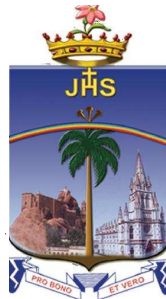


# **INDUSTRY 5.0: A NEW PROSPECT FOR BUSINESS AND INDUSTRIAL TRANSFORMATION**

*Editor*

**Dr. M. Julias Ceasar**



**PG & RESEARCH DEPARTMENT OF COMMERCE  
St. JOSEPH'S COLLEGE (Autonomous)**

*Special Heritage Status Awarded by UGC, Nationally Accredited at 'A++' Grade (Cycle IV) by NAAC  
College with Potential for Excellence by UGC, DBT-STAR & DST-FIST Sponsored College*

**TIRUCHIRAPPALLI-620 002, INDIA.**

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## Preface

A new phase in industrial development, Industry 5.0 provides great opportunities to reinvent our organizations and industries. Industry 5.0 emphasizes human-machine cooperation and balance. The novel approach prioritizes human creativity and invention using cutting-edge technology like AI, robotics, and the IoT.

The National Level Conference on "**Industry 5.0: A New Prospect for Business and Industrial Transformation**" is proudly supported by the Indian Council of Social Science Research. The theme is Industry 5.0's potential to promote sustainable development, efficiency, and innovation in various industries. This is a call to design industrial processes that are effective, inclusive, resilient, and adaptable to the rapidly changing global environment. This conference provides a floor for scholars, industry executives, legislators, and practitioners a unique chance to discuss important topics, share cutting-edge research, and plan for a future where human creativity and technology growth are entwined.

I appreciate Dr. M. Julias Ceasar, the organising secretary of the conference, Dr. G. John, Head of the Department of Commerce and all who have shared the responsibility for organising this conference. I thank all the participants, presenters, and sponsors for their generous assistance. May this conference stimulate and spark new ideas and foster enduring partnerships for future.

With warm regards,  
**Rev. Dr. S. Mariadoss, S.J**  
Principal, St. Joseph's College (Autonomous),  
Tiruchirappalli.



## Foreword

The collection of articles/papers presented on the occasion of ICSSR sponsored National Conference on “Industry 5.0: A New Prospect for Business and Industrial Transformation” delves into the emerging paradigm, exploring its implications, opportunities, and challenges. This book is intended for business leaders, policymakers, researchers, and anyone interested in understanding the future of industry and the potential it holds for creating a more sustainable, inclusive, and human-centric world. Before we delve into the promise of Industry 5.0, let us rewind the tape of industrial history. We’ve witnessed remarkable shifts—from the mechanization of Industry 1.0 (think steam engines and cotton mills) to the electrification of Industry 2.0 (hello, assembly lines!) and the computerization of Industry 3.0 (the birth of mainframes and automation). Industry 4.0, our immediate predecessor, brought us the Internet of Things (IoT), big data, and smart factories. But now, the curtain rises on a new act—one that transcends mere efficiency gains and cost savings.

We are slowly entering into an era of Industry 5.0 where the digital and physical worlds intertwine, where artificial intelligence dances with craftsmanship, and where the heartbeat of innovation resonates through factories, offices, and supply chains. As we embark on this journey together, the academia is endowed with the holiest task of exploring the contours of this transformative landscape.

As we fancifully put our bet behind AI, AGI, GAI, AR, VR, Big Data, cloud computing, smart manufacturing etc., we should not forget the scar of industrial revolutions happened so far. There is a faint hope, seen at the end of the tunnel in the form of Industry 5.0 that seems to carry a torch of responsibility. Circular economies, green manufacturing, and eco-friendly supply chains are not

buzzwords anymore; they're imperatives. We envision factories powered by renewable energy, where waste becomes raw material, and where prosperity doesn't come at the cost of our blue planet. No industry stands alone. Industry 5.0 thrives on collaboration-between companies, disciplines, and nations. R&D labs share breakthroughs, startups disrupt giants, and academia fuels innovation. It's a global dance, and everyone has a role. The boundaries blur, and we find ourselves in a grand marketplace of ideas. We, the academia, have a responsibility to look into the 'growth and development' brought about by Industrial Revolutions from a 360 degree angle and this book would fuel that purpose.

***G. John, PhD***

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## **Editor's Note**

The industrial revolution was a period of global transition of human economy towards more efficient and stable manufacturing process that succeeded the agricultural revolution. This transition helped in foregoing manual process to machine enabled process. Innovation has resulted in increased output to meet the needs of ever growing population. The industrial revolution marked major turning point in the history of humanity by increasing the employment opportunity and standard of living. The process of industrial revolution has been continuously changing in sync with change in science and technology. ICT has changed the face of industrial revolution enabled by AI, AGI, Generative AI, AR, VR, IoT, Robotics, Machine learning, Big Data and Cloud Computing. Initially men were replaced by machine and later in Industry 5.0 there is a growing tendency to pass on the task of decision making to machines. It has both pros and cons which needs the attentions and actions from the academia to fully harness the positives and to address the apprehensions in the following themes:

1. Industry 5.0: Impact on Economic Development
2. Industry 5.0: Opportunities and challenges for MSMEs
3. Industry 5.0: Smart Manufacturing
4. Industry 5.0: Technology, transformation and growth
5. Industry 5.0: Consistency in Business
6. Industry 5.0: Impact on Social Development
7. Industry 5.0: Sustainable Health and Environment Protection
8. Industry 5.0: Smart Education for Technology Skill sets
9. Industry 5.0: Opportunities and Challenges for social living
10. Industry 5.0: Opportunity for developing Human Capital
11. Industry 5.0: Industrial Growth and Export Promotion

Industry 5.0 involves the innovations in technology that supports business and industrial production along with human. It depends on two aspects one is technology and the other is innovation. Industry 5.0 has travelled a long way

from mechanization to automation leading to quality in knowledge, skills and ability that ultimately leads to innovation. But for innovation, there is no new technology or new means of business or production. Hence, innovation and technology work hand in hand replacing human interventions. The innovation and technological up-gradation is from the innovative skills and knowledge of human being. In the light of these aspects there were nearly 100 papers received from Faculty members, research scholars and students across the country that spell of the interest of the academia in the topic.

I consider it a privilege to thank the college management consisting of Rev. Fr. Rector, Rev. Fr. Secretary and Rev. Fr. Principal who support the initiative to extract funds from ICSSR, the Head of the Department Dr. G. John and the team of faculty who supported in the initiative from beginning till now. Words are inadequate to thank Ph.D scholars Ms. H. Bella Josepha, Ms. C Parvathi, Mr. J. Renish, Mr. X. Jesma Michael who untiringly worked towards shaping the book and the conference proceedings.

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## **REVOLUTIONIZING GROWTH: EXPLORING THE IMPACT OF INDUSTRY 5.0 ON ECONOMIC DEVELOPMENT IN THE AUTOMOBILE SECTOR**

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### **ABSTRACT**

*This study investigates the transformative potential of Industry 5.0 technologies within the automobile sector and their implications for economic development. Industry 5.0 represents a new era of manufacturing characterized by the integration of advanced technologies such as AI, IoT, and robotics, aimed at fostering collaboration between humans and machines. Through a comprehensive analysis, this research aims to assess the multifaceted impacts of Industry 5.0 on productivity, innovation, environmental sustainability, and employment within the automobile industry. Specific objectives include evaluating the efficiency gains achieved through Industry 5.0 adoption, analyzing its role in fostering innovation and customization, assessing its environmental benefits, and exploring its implications for economic growth and employment. Findings suggest that Industry 5.0 technologies have the potential to revolutionize traditional manufacturing practices in the automobile sector, leading to significant improvements in productivity, efficiency, and innovation.*

**Keywords:** Industry 5.0, Economic Development, Automobile Sector.

### **INTRODUCTION**

The automobile sector stands on the precipice of transformation with the advent of Industry 5.0, a paradigm that promises to revolutionize not only manufacturing processes but also the very essence of economic development. In this study, we delve into the intricate interplay between Industry 5.0 and the automobile sector, aiming to unravel the profound impact it holds on economic growth. Our investigation traverses the realms of technological innovation, workforce dynamics, supply chain resilience, and environmental sustainability, seeking to discern the multifaceted implications of this emerging industrial epoch. By analyzing case studies, industry trends, and scholarly insights, we endeavor to provide a comprehensive understanding of how Industry 5.0 is reshaping the landscape of the automobile sector and catalyzing novel avenues for economic advancement. Through this exploration, we aspire to illuminate the transformative potential of Industry 5.0 and offer valuable insights to stakeholders, policymakers, and researchers navigating the ever-evolving terrain of economic development in the automotive industry.

## **TECHNOLOGICAL ADVANCEMENTS IN INDUSTRY 5.0**

**Human-Robot Collaboration:** The integration of collaborative robots, or cobots, allows for safer and more efficient manufacturing environments. These cobots work alongside human workers, augmenting capabilities and reducing the risk of injury while enhancing precision and productivity.

**Artificial Intelligence and Machine Learning:** AI and machine learning enable predictive maintenance, quality control, and the creation of personalized consumer experiences. By analyzing vast amounts of data, these technologies can predict equipment failures, optimize production processes, and tailor products to individual preferences.

**IoT and Connectivity:** The IoT facilitates real-time data collection and analysis, improving decision-making processes and operational efficiency. Connected devices across the manufacturing floor and supply chain provide insights into performance metrics and help streamline operations.

**Sustainable Manufacturing:** Industry 5.0 promotes sustainable manufacturing practices, incorporating green technologies to reduce carbon footprints and improve resource efficiency. This shift towards sustainability not only benefits the environment but also enhances economic viability by reducing waste and energy consumption.

## **OBJECTIVES OF THE STUDY**

1. To assess the impact of Industry 5.0 technologies on productivity and efficiency in the automobile industry.
2. To evaluate how Industry 5.0 fosters innovation and customization in vehicle manufacturing.
3. To analyze the environmental benefits of adopting Industry 5.0 practices in automobile production.
4. To investigate the economic growth and employment effects of Industry 5.0 in the automobile sector

## **SCOPE OF THE STUDY**

The Impact of Industry 5.0 on Economic Development in the Automobile Sector" encompasses a multifaceted examination of the intersection between Industry 5.0 principles and the automotive industry's economic landscape. This study will delve into the transformative potential of Industry 5.0 technologies, such as advanced robotics, artificial intelligence, and the Internet of Things (IoT), within the context of automotive manufacturing and supply chains. It will analyze how these innovations are reshaping traditional production processes, enhancing efficiency, and fostering new opportunities for economic growth.

## METHODOLOGY

To analyze the impact of Industry 5.0 on economic development in the automobile sector, you can follow a structured methodology that incorporates both primary and secondary data sources.

**Literature Review:** Conduct a comprehensive review of existing literature on Industry 5.0 and its potential impact on the automobile sector. Explore academic journals, industry reports, conference papers, and reputable online sources to gather insights into the theoretical framework and existing research findings.

**Conceptual Framework Development:** Based on the literature review, develop a conceptual framework that outlines the key dimensions of Industry 5.0 and its potential implications for economic development in the automobile sector.

**DATA ANALYSIS:** Analyze the primary data collected through surveys and interviews using appropriate statistical techniques and qualitative analysis methods. Quantify the respondents' perceptions, identify common themes, and extract meaningful insights regarding the impact of Industry 5.0 on economic development.

**PRIMARY DATA COLLECTION:** Design and conduct primary data collection methods to gather first hand insights into the impact of Industry 5.0 on the automobile sector's economic development. This could involve:

**Surveys:** Develop a structured questionnaire to collect quantitative data from industry stakeholders such as automotive manufacturers, suppliers, technology providers, and policymakers. Include questions about their perceptions, adoption strategies, and expected outcomes related to Industry 5.0 initiatives.

**Interviews:** Conduct semi-structured interviews with key informants from the automobile sector, including executives, engineers, researchers, and government officials. Explore their perspectives on the challenges, opportunities, and future prospects associated with Industry 5.0 adoption.

**SECONDARY DATA ANALYSIS:** Supplement the primary data analysis with insights from secondary data sources such as industry reports, market studies, government publications, and expert opinions. Use these secondary sources to corroborate and contextualize your findings, as well as to provide broader industry perspectives and trends.

### PERCENTAGE ANALYSIS

Gender	No. of Respondents	Percentage
Male	347	69
Female	153	31
<b>Total</b>	<b>500</b>	

The above table shows that there are 69 per cent of the respondents who belongs to male category and 31 per cent in female category. Hence, it reveals that the majority of the respondents are in male category

Designation	No. of Respondents	Percentage
Employer	200	40
Employee	300	60
<b>Total</b>	<b>500</b>	

The above table shows that there are 40 per cent of the respondents who belong to the employer category and 60 per cent in the employee category. Hence, it reveals that the majority of the respondents are in the male category.

### Economic Development in the Automobile Sector

#### ANOVA TEST

Variables		SS	Df	MS	F	Result
Gender	Between Sample	22769.28	5	4553.85	0.02457	Significant
	Within Sample	74119.68	4	18529.92		
	<b>Total</b>	<b>96888.96</b>	<b>9</b>			
Age	Between Sample	6195.49	6	1032.58	0.01491	Significant
	Within Sample	48467.84	7	6923.97		
	<b>Total</b>	<b>54663.34</b>	<b>13</b>			
Experience	Between Sample	10527.84	7	1503.97	0.02692	Significant
	Within Sample	44679.04	8	5584.88		
	<b>Total</b>	<b>55206.88</b>	<b>15</b>			
Designation	Between Sample	12820.32	4	3205.08	0.02299	Significant
	Within Sample	69697.92	5	13939.58		
	<b>Total</b>	<b>82518.24</b>	<b>9</b>			
Monthly Income	Between Sample	41389.92	7	5912.846	0.04100	Significant
	Within Sample	58395.52	8	7299.44		
	<b>Total</b>	<b>99785.44</b>	<b>15</b>			
Educational Background	Between Sample	48916	8	6114.5	0.04604	Significant
	Within Sample	57296	9	6366.222		
	<b>Total</b>	<b>106212</b>	<b>17</b>			
Marital Status	Between Sample	55282.56	5	11056.51	0.08515	Not Significant
	Within Sample	77903.36	6	12983.89		
	<b>Total</b>	<b>133185.9</b>	<b>11</b>			

In the ANOVA table, the p-value of gender is 0.02 which is below 0.05 and, therefore, there is a statistically significant difference between gender and Economic Development in the Automobile Sector. Concerning the p-value is 0.01, which is below 0.05

and, therefore, there is a statistically significant difference between age and Economic Development in the Automobile Sector.

**HYPOTHESIS**

1. "Industry 5.0 fosters innovation and enables a higher degree of customization in vehicle manufacturing.-This hypothesis implies that Industry 5.0 technologies encourage innovative practices and facilitate the production of customized vehicles to meet diverse consumer demands.
2. "Adoption of Industry 5.0 practices in automobile production leads to significant environmental benefits-This hypothesis posits that Industry 5.0 technologies contribute to reducing the environmental footprint of automobile manufacturing processes through efficiency improvements and sustainable practices.
3. "Industry 5.0 implementation in the automobile sector stimulates economic growth and increases employment opportunities.-This hypothesis suggests that the adoption of Industry 5.0 practices in the automobile industry positively impacts economic growth by creating new job opportunities and driving overall industry expansion.

**CONCLUSIONS:** In conclusion, this study delves into the transformative effects of Industry 5.0 technologies on various facets of the automobile industry. Through a comprehensive analysis, it is evident that Industry 5.0 represents a monumental shift in manufacturing paradigms, offering unparalleled opportunities for economic development and growth within the sector. By leveraging advanced automation, data analytics, and artificial intelligence, Industry 5.0 has redefined productivity standards, leading to significant efficiency gains and cost reductions throughout the production process. Moreover, the emphasis on innovation and customization facilitated by Industry 5.0 has not only enabled manufacturers to meet evolving consumer demands but has also stimulated market expansion and competitiveness. Importantly, the study highlights the pivotal role of Industry 5.0 in fostering environmental sustainability within the automobile industry through the adoption of sustainable manufacturing practices and resource optimization initiatives.

## **A COMPARATIVE ANALYSIS OF BALANCE SHEETS OF INDIA POSTS PAYMENTS BANK (IPPB) AND AIRTEL PAYMENTS BANK (APB)**

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### **ABSTRACT**

*The rapid digitization of financial services has led to the emergence of several payments banks and each of these banks is competing for market share. This research paper conducts a comparative analysis of two major payments banks in India, namely India Post Payments Bank (IPPB) and Airtel Payments Bank (APB). This research paper evaluates the balance sheets of both banks by exploring secondary data sources, including annual reports. This research contributes valuable insights into the comparative performance and strategies of India Post Payments Bank and Airtel Payments Bank. The interpretation of financial statements of both banks aim to inform policymakers, stakeholders, and researchers how the payments banks are advancing in the banking industry by providing some light on these two important payments banks.*

**Key words:** India Posts Payments Bank, Airtel Payments Bank, Comparative Analysis, Balance Sheet.

### **INTRODUCTION**

The Indian financial landscape has witnessed a significant transformation in recent years, with the proliferation of payment banks playing a pivotal role in driving financial inclusion and digitization. Among these, India Post Payments Bank (IPPB) and Airtel Payments Bank have emerged as prominent players, offering a wide range of financial services to the masses. This study seeks to provide an in-depth comparative analysis of various components of balance sheets of both IPPB and Airtel Payments Bank, focusing on balance sheet for two years i.e. 2021 and 2022 to assess the financial performance. By examining these factors, we aim to offer valuable insights into the strategies and successes of these payment banks.

### **LITERATURE REVIEW**

Singh, S., Kumar, A., Parmjeetsingh, K. A., & Chaudhary, K. (2017). A Study on Airtel Payment Bank a Step Towards Digital India: This paper studied the establishment of Payments Bank specifically focusing on Airtel Payment Bank (APB) with the aims to understand its functioning, potential disruption to existing banks, benefits, challenges, and opportunities. It

also compares the differences between payments banks and commercial banks. Overall, the article emphasizes the crucial role of banks in the economy and how payment banks like APB contribute to financial inclusion and the transition towards a cashless and technology-driven economy in India. D'Souza, S. (2018): *Payment Bank: A Revolutionary step of Indian Post Payment Bank towards financial inclusion*: This study, based on secondary data, outlines Payment Banks' operations and their dual role in advancing financial inclusion and fostering fintech in Indian banking. The findings are promising for expanding financial services, especially in rural areas, targeting low-income individuals and small businesses. Kaveri, V. S. (2021): This research conducted on payments banks (PBs), focusing on their regulatory aspects, business activities, and evaluating their business performance using secondary data from the RBI. The study revealed that PBs have been progressing at a gradual pace. The author also provided recommendations to enhance the performance of PBs.

### **OBJECTIVES**

1. To make comparative analysis of the balance sheet of IPPB for two years
2. To make comparative analysis of the balance sheet of APB for two years
3. To compare and interpret the Liabilities of IPPB with APB
4. To compare and interpret the Assets of IPPB with APB

### **RESEARCH METHODOLOGY**

1. Data Collection: Data for this research was collected through official websites of both Airtel Payments Bank and India Posts Payments Bank which includes Annual reports which contains financial statements.
2. Data Analysis: For Analysis and interpretation a tool of 'Comparative Financial Statements' is used. This is the one of the important tools of analysis of financial statements for comparison of financial statements of other similar firm<sup>1</sup>. Such a Comparative analysis provides meaningful information about firm which is performing better compared to that of other. 1. ARORA, M. (2016). *Cost and management accounting*.
3. Comparative Framework: A comparative framework was developed to systematically assess the strengths and weaknesses of IPPB and Airtel Payments Bank in various dimensions including Capital, Liquidity Position, and Deposits etc. at a different period of time i.e. for the year 2021 and 2022.

### **ANALYSIS AND INTERPRETATION**

#### **Comparative Statement of Balance Sheet of Airtel Payments Bank for the financial year ended 31<sup>st</sup> March 2021 and 2022:**

(In '000)

<b>Particulars</b>	<b>2021</b>	<b>2022</b>	<b>Absolute Change</b>	<b>%</b>
<b>Capital and Liabilities:</b>				

Capital	23,329,876	23,483,471	153,595	0.66
Reserves & Surplus	(20,114,180)	(20,010,683)	103,497	-0.51
Employee Stock Options Outstanding	62,651	65,265	2,614	4.17
Deposits	5,956,340	9,923,983	3,967,643	66.61
Borrowings	-	574,946	-	-
Other Liabilities and Provisions	7,382,127	7367250	-14,877	-0.20
<b>TOTAL LIABILITIES</b>	<b>16,616,814</b>	<b>21,404232</b>	<b>4,787,418</b>	<b>28.81</b>
<b>ASSETS:</b>				
Cash & Balances with Reserve Bank of India	613948	786399	172,451	28.09
Balances with Banks and Money at Call & Short Notice	3921585	4714765	793,180	20.23
Investments	7979368	10,824,048	2,844,680	35.65
Advances	-	-	-	-
Fixed Assets	659595	1,287,215	627,620	95.15
Other Assets	3442318	3791805	349,487	10.15
<b>TOTAL ASSETS</b>	<b>16616814</b>	<b>21404232</b>	<b>4,787,418</b>	<b>28.81</b>

Source: Annual Reports of Airtel Payments Bank Table no. 1

**Comparative Statement of Balance Sheet of India Posts Payments Bank for the Financial year ended 31<sup>st</sup> March 2021 and 2022:**

(In '000)

Particulars	2021	2022	Absolute Change	Percentage %
Capital and Liabilities:				
Capital	12550000	14550000	2,000,000	15.94
Reserves & Surplus	-8103856	-9819377	-1,715,521	21.17
Employee Stock Options Outstanding	-	-	-	-
Deposits	22996851	36917218	13,920,367	60.53
Borrowings	169964	-	-	-
Other Liabilities and Provisions	3004437	3363240	358,803	11.94
<b>TOTAL LIABILITIES</b>	<b>30617396</b>	<b>45011081</b>	<b>14,393,685</b>	<b>47.01</b>
<b>ASSETS:</b>				



Cash & Balances with Reserve Bank of India	1074128	2672807	1,598,679	148.84
Balances with Banks and Money at Call & Short Notice	6074544	9730653	3,656,109	60.19
Investments	19090898	29008863	9,917,965	51.95
Advances	0	15620	15,620	-
Fixed Assets	1577433	788712	-788,721	-50.00
Other Assets	2800393	2794426	-5,967	-0.21
<b>TOTAL ASSETS</b>	<b>30617396</b>	<b>45011081</b>	<b>14,393,685</b>	<b>47.01</b>

Source: Annual Reports of IPPB Table no. 2

**Comparison of Changes in Various components of Balance sheets of IPPB and APB  
(Consolidated Comparative statement)**

Particulars	Changes in Percentage in 2022 as compared to 2021	
	IPPB	APB
<b>Capital and Liabilities:</b>		
Capital	15.94	0.66
Reserves & Surpl-us	-21.17	-0.51
Employee Stock Options Outstanding	-	4.17
Deposits	60.53	66.61
Borrowings	-	-
Other Liabilities and Provisions	11.94	-0.20
<b>TOTAL LIABILITIES</b>	<b>47.01</b>	<b>28.81</b>
<b>ASSETS:</b>		
Cash & Balances with Reserve Bank of India	148.84	28.09
Balances with Banks and Money at Call & Short Notice	60.19	20.23
Investments	51.95	35.65
Advances	-	-
Fixed Assets	-50.00	95.15
Other Assets	-0.21	10.15
<b>TOTAL ASSETS</b>	<b>47.01</b>	<b>28.81</b>

Table no. 3

## **ANALYSIS AND INTERPRETATION OF VARIOUS COMPONENTS OF BALANCE SHEETS OF INDIA POST PAYMENTS BANK (IPPB) & AIRTEL PAYMENTS BANK (APB):**

### **Capital and Liabilities:**

**Capital:** There is a significant increase of 15.94% vis-à-vis just meager change of only 0.66% of capital in IPPB and APB respectively. the IPPB has experienced a significant boost in its capital, which will indeed give a greater scope for expansion and growth in its operations. **Reserves and Surplus:** With respect to APB this includes Statutory Reserves, Share premium and General Reserve. The figures of 2022 is arrived to after apportionment in the carry forwarded negative balance of the Profit and Loss Account. As regards to IPPB the amount transferred to Statutory Reserve and Capital Reserve apportioned from carry forwarded negative balance of Profit and Loss Account. Thus the increase of 21% in IPPB as compared to just 0.5% in APB is perhaps due to the changes in the balance in the Profit and Loss Account<sup>2</sup>

**Employee Stock Options Outstanding:** This is a scheme relates to providing an option to employees of the bank to subscribe to shares and is not applicable to IPPB. Hence it is not considered for comparison.

**Deposits:** Both banks have witnessed high rise i.e. Almost over 60% in Deposits. This indicates both banks achieved remarkable growth rate and shown their ability to attract more customers. **Borrowings<sup>3</sup>:** In respect to IPPB the Borrowing is absence for 2022 but in 2021 there was borrowing of Rs.169964000/-. On the other hand for APB, absence in 2021 but in 2022 there was Rs. 574946000/-. This change in pattern of borrowing suggests emerging financial needs and strategy. The zero borrowing of IPPB in 2022 reflect strengthened financial position and reducing its dependency on external debt. In respect of APB, the shift from no Borrowing to borrowing in 2022 perhaps reflects a specific need for external financing.

*3. Schedule no. 4 of Annual reports for 2021-22 of APB and IPPB.*

**Other Liabilities and Provisions:** This liability includes various financial obligations and provisions. However as per details mentioned in schedule 5 of Annual reports of both payments bank the entire portion of this amount pertains to 'Others (including provisions)'. With respect to IPPB this liability has been increased by 11.91% whereas there is a decrease of -0.2% in APB. As regards to IPPB this could be the result of various factors like provisions for losses, other financial obligations etc.

### **ASSETS:**

**Cash & Balances with Reserve Bank of India:** There is an increase of 148% in IPPB whereas 28.09% in APB. The absolute volume of this asset is high in IPPB i.e. Rs. 2672807000 as compared to APB which amounts to Rs. 786399000/-. In respect of IPPB this balance is lies in 'Current Account' (Rs.17142807000) and in 'Other Accounts' (Rs.930000000).

Balances with Banks and Money at Call & Short Notice: Both IPPB and APB have witnessed growth of balance in this category. There is an increase of around 60% and 20% in IPPB and APB respectively as compared to previous year (2021). This balance includes deposits available in Indian Banks in Current and Other Deposit Account. However neither IPPB nor APB have any deposits in foreign banks. Investments: The investment comprises Government Securities, Approved Securities, Shares, Debentures, and Bonds. But the entire investment of APB is made in Government Securities (Rs. 10,824,048000) while the IPPB has also made its major portion investment in Government Securities (Rs.29001161000) and small portion of Rs.7702000 in shares. The IPPB has witnessed a jump of around 52% in 2022 whereas in APB this investment has jumped to 35.65%.

Fixed Assets: Both IPPB and APB do not have fixed asset of Premises. For IPPB the amount of other fixed assets including furniture and fixtures decreased from Rs.911315000 to Rs.704726000 and fixed assets related to Computer Software from Rs.666118000 to Rs.83986. As such overall decrease of 50% in fixed assets in 2022 as compared to its previous year 2021. This changes could probably the result of operational strategy or shift towards asset model. As regards to APB the showed figure relates to Other Fixed Assets (including Furniture and Fixtures and there is a high increase in this asset i.e. 95% in 2022 as compared to 2021 i.e. from Rs.659595000 to Rs.1287215000/-.<sup>8</sup> This growth possibly indicates investments in infrastructure in support of its operations. This changes in Fixed Asset category showed the difference in strategy of both banks.

Other Assets: These assets comprises of Interest accrued, Advance Tax, TDS, Differed Tax asset etc. The IPPBs has witnessed almost same in 2022 as compared to its previous year 2021 i.e. only decrease of meager 0.21% and this amount spread over on various components Interest accrued, Tax paid in advance, Differed Tax Asset (covers major portion), Security deposit, DOP Capital Commitment and others. On the other hand APB has witnessed increase of 10% in this asset and this amount spread over only on Interest accrued, Advance Tax and Others.<sup>9</sup>This changes in both banks possibly due to their differences in their financial strategies or operational needs.

## **CONCLUSION**

This comparative analysis reveals significant difference between India Post Payments Bank (IPPB) and Airtel Payments Bank (APB) in their financial position and financial strategies. The IPPBs financial statements displayed substantial growth in Capital and the APB too has a higher absolute capital. The significant increase in deposit amounts at both banks is proof that consumers perhaps find these payment banks' products and services convenient and attractive. The high absolute volume of deposit of IPPB holds a distinct advantage over APB with its extensive postal network, which greatly facilitates achieving its core mission of serving the unbanked and under banked rural areas who don't have access to banking services, aligning perfectly with the aim of financial inclusion.

## **INDUSTRY 5.0: A NEW MEANS FOR EMPOWERMENT TOWARDS GROWTH AND TRANSFORMATION**

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### **ABSTRACT**

*The Industrial Revolution, was a period of global transition of humaneconomy towards more efficient and stable manufacturing processes that succeeded the Agricultural Revolution, starting from Great Britain, continental Europe, and the United States. This transition helped in moving from manual process to machine enabled process in all areas of processing and manufacturing industries. The innovation enabled innovative ideas has triggered increase in output to meet the challenge of increasing population all over the world. The Industrial Revolution marked a major turning point in history of humanity. At one side there has been a regular employment and on the other side there is small increase in the standard of living of the people which was greatly acknowledged by the Economists. With this small background on industrialization let us look at Industry 5.0 which is the Fifth major Industrial Revolution purely based on technology invasion which is a new and emerging phase of industrialization that sees humans working alongside advanced technology and Artificial Intelligence (AI) powered robots to enhance workplace processes more effective and efficient. This aspect of technology invasion is coupled with a more human-centric focus as well as increased resilience and an improved focus on sustainability. Thus, the Industry 5.0 refers to robot and smart machines working alongside people with added resilience and sustainability goals included towards production and quality products and services.*

**Key words:** *Human Community, Human Centric focus, Sustainability.*

### **Introduction:**

The Industrial Revolution, was a period of global transition of human economy towards more efficient and stable manufacturing processes that succeeded the Agricultural Revolution, starting from Great Britain, continental Europe, and the United States occurred during 1760. This transition helped in going manual process to machine enabled process in all areas of processing and manufacturing industries. The innovation enabled innovative ideas has triggered increase in output to meet the challenge of increasing population all over the world. The Industrial Revolution marked a major turning point in history of humanity. At one side there has been a regular employment and on the other side there is small increase in the standard of living of the people which was greatly acknowledged by the Economists. With this small beck ground on industrialization let us look at Industry 5.0 which is the Fifth major Industrial Revolution purely based on technology invasion which is a new and emerging

phase of industrialization that sees humans working alongside advanced technology and Artificial Intelligence (AI) powered robots to enhance workplace processes more effective and efficient. This aspect of technology invasion is coupled with a more human-centric focus as well as increased resilience and an improved focus on sustainability.

Thus, the Industry 5.0 refers to robot and smart machines working alongside people with added resilience and sustainability goals included towards production and quality products and services. Industry 5.0 seeks to add human, environmental and social aspects back into the equation, encompassing the facets such as artificial intelligence, automation, big data analytics, the Internet of Things (IoT), machine learning, robotics, smart systems, and virtualization. This new industrial revolution is described by the European Union as providing g, “a vision of industry that aims beyond efficiency and productivity as the sole goals, and reinforces the role and the contribution of industry to society.”

#### **Review of literature:**

1. (*Alekseev, A.N., Buraeva, E.V., Kletskova, E.V., Rykhtikova, 2019*) In modern digital era, technology has dominated in all sectors of society. In manufacturing sectors, technology development has been divided into different time zones (Industry 1.0–4.0). These industrial upheavals have highly focused on technology applications. But modern challenges of customization, personalization and technology upgrading can only be done by human involvement. These modern challenges have led to new industrial revolution called “Industry 5.0,” which emphasizes on technology advancement with human empowerment. In this research paper, authors have studied the enablers, which help in execution of Industry 5.0 in Indian manufacturing sector.
2. (*J. Clean. Prod. 2022*) Industry 5.0 is a new phase of industrialization which focuses on humans, resilience, and sustainability. The importance of the research on Industry 5.0 has grown considerably and includes a range of different themes. Using a large corpus of data from Scopus, this study conducts a biblio-metric review with the aim of providing a holistic overview of the research on Industry 5.0. We review 300 publications on Industry 5.0 to identify their theoretical foundations, research trajectories, and main topics, as well as to propose new research orientations.

#### **Evolution of the Industrial Revolution (Industry 1.0 to 5.0)**

The First Industrial Revolution began back in the 18<sup>th</sup> Century, moving through five iterations as technologies and processes developed over the ensuing centuries.

**Industry 1.0:** Beginning in around 1780, this first revolution focused on industrial production based on machines that were powered by steam and water.

**Industry 2.0:** Some 100 years later, in 1870, this second industrial revolution was based on electrification and took place with mass production through assembly lines.

**Industry 3.0:** Stepping forward another 100 years, to 1970, Industry 3.0 saw automation through the use of computers and electronics. This was enhanced by globalization (Industry 3.5), involving off shoring of production to low-cost economies.

**Industry 4.0:** We are currently living in the fourth industrial revolution, which is based around the concept of digitalization and includes automation, artificial intelligence (AI) technologies, connected devices, data analytics, cyber-physical systems, digital transformation, and more. You can find out more about Industry 4.0 in our FAQ.

**Industry 5.0:** We are now entering the fifth industrial revolution with a focus on man and machines working together. Based upon personalization and the use of collaborative robots, workers are free to deliver value-added tasks for customers. This latest iteration goes beyond manufacturing processes to include increased resilience, a human-centric approach, and a focus on sustainability.

### **The Industry 5.0**

Industry 5.0 is the Fifth major Industrial Revolution purely based on technology invasion which is a new and emerging phase of industrialization that sees humans working alongside advanced technology and Artificial Intelligence (AI) powered robots to enhance workplace processes more effective and efficient. This aspect of technology invasion is coupled with a more human-centric focus as well as increased resilience and an improved focus on sustainability. Thus, the Industry 5.0 refers to robot and smart machines working alongside people with added resilience and sustainability goals included towards production and quality products.

### **Industry 5.0 Strategies**

As mentioned above, Industry 5.0 is underpinned by three strategies:

**1. Human-Centric:** Industry 5.0 includes a strategy that moves people from being seen as resources to being genuine assets that make marvels in organizations. Industry 5.0 refocuses to also create added value for workers in order to attract and keep the best employees who will ever be an asset to the organization or business units with their creative ideas and innovative spirits.

**2. Resilience:** As the world has become more joined-up over the years we have seen the widespread impact of global matters such as the Covid-19 pandemic and international supply shortages. Whereas many businesses look to improving efficiencies and optimizing profits, these factors do not improve resilience. In fact, there is a belief that a concentration on agility and flexibility can make companies less resilient.

Rather than focusing on growth, profit and efficiency, more resilient organizations would look to anticipate and react to any crisis to ensure stability through challenging times.

**3. Sustainability:** Industry 5.0 extends sustainability from simply reducing, minimizing or mitigating against climate damage to actively pursuing efforts to create a

positive change. Sometimes referred to as 'Net Positive,' this goal aims to make the world a better place with companies becoming part of the solution rather than being a problem or simply paying lip-service to sustainability goals through 'green washing.'

**Objectives**

1. To explore the idea of Industry 5.0 in the light of digital transformation.
2. To identify the advantages and disadvantages of Industry 5.0 for business.
3. To examine the opportunities and challenges for taking the industrial units ahead with new ways of business.
4. To offer suggestions to make use of the Industry 5.0

**Methodology:**

**Data Collection:** A descriptive research model is adopted and to that end the data have been collected from the secondary source by refereeing the articles from journals and magazines, published documents, Library records, Books and through internet sources. The primary data also have been collected for the study with the help of a questionnaire.

**Sampling technique:** As many as 176 respondents who are in high tech business units (Manufacturing and Service) were contacted through Google form, which is used to collect the required data for the study. A simple random method is used to extract the required information for the study.

**Data analysis:** The Collected data were processed further in the light of some important statistical tools to make it readable and understandable in an easy manner. The analysis includes percentage analysis, cross tabulation, t-Test and ANOVA.

**Hypothesis:** There is no significant difference among the employees of manufacturing and service organizations towards accepting to work in industry 5.0 environments with the following variables Gender, The level of education, Type of Job, Technological challenges and Time duration of the work

**Industry 5.0 Advantages and Disadvantages**

**Advantages**

1. The main advantage of Industry 5.0 is the creation of higher value jobs that afford greater personalization for customers and improved design freedom for workers.
2. By allowing manufacturing processes to be handled through automation, human workers are able to focus more of their time on delivering improved, bespoke services and products.
3. This was already beginning with Industry 4.0, but Industry 5.0 pushes this further through improved automation and feedback to create a service-based model where humans are able to focus on adding value for end-users.

4. Meanwhile the increased focus on sustainability and resilience means that businesses become more agile and flexible while also having a positive impact on society – rather than simply mitigating any negative effects.

#### **Disadvantages**

1. It is difficult to see the disadvantages of Industry 5.0, but the challenge will lie in how organizations are able to adapt to embrace this new concept.
2. Those that are able to become more human-centric, resilient and sustainable will likely spearhead future solutions while those who fail to keep up will fall behind.
3. To understand this better, it is worth looking in more detail at the strategies of Industry 5.0 – namely a human-centric approach, improved resilience and a broader focus on sustainability.

#### **Opportunities of Industry 5.0**

1. Increased automation will impact employment positively in many sectors through the deployment of next-generation technology.
2. Highly automated manufacturing systems provide greater opportunity for customization to customers.
3. Industry 5.0 provides greater opportunities for creative people to come and work which enables the optimization of human efficiency.
4. Industry 5.0 creates higher-value employment than before because this gives back the liberty to people to be responsible for construction (Rossi, 2018).
5. In industry 5.0, the operator within the production cell gets more engaged in the planning method than in the more or less automated manufacturing method (Rossi, 2018).
6. It allows liberty of design to function and allows more tailor-made and personal products.
7. It enables the automation of manufacturing methods better with Industry 5.0 by feeding the real-time information from the sector.
8. Increased safety of the employees at the work floor because COBOTs can take up hazardous and dangerous works.
9. More personalized products and services increase customer satisfaction, loyalty and attracts new customers which results in increased profit and market share for the companies.
10. Industry 5.0 provides increased importance to the human-machine interaction subject field and offers a larger platform for research and development in this domain.
11. Quality services can be provided at the remote locations with the help of industry 5.0 especially in healthcare industry such as medical surgeries in rural areas by robots.



### **Challenges of Industry 5.0**

1. This trend increases work polarization where middle-skill employment is decreasing and the workforce is split into two communities: extremely trained and qualified; low-paid and unqualified employees. This may alleviate the skilled and unskilled divide in the society.
2. Due to highly automated manufacturing systems, skill development is a humongous task such as training workforce for adoption of advanced and cutting-edge technologies, and inducing behavioral change for interacting with.
3. Collaborative robotics is the method of automation, which together with human co-workers also stays an important danger on the shop floor (Rossi, 2018).
4. Smart manufacturing systems demand higher autonomy and sociality capabilities as key factors of self-organized systems. The shift from present context to industry 5.0 is difficult due to lack of autonomy in the present systems such as integrated decision making.
5. From manufacturing systems, it is difficult to acquire high quality and integrity of the data and it is difficult to accommodate diverse data repositories (Thoben, 2017).
6. Industry 5.0 demands a huge amount of investment to fully implement all its pillars which is difficult to industry and especially the SMEs to adopt.
7. For instance, industry 5.0 offers a great potential in healthcare industry but high degree of precision and accuracy is needed. The research in this front is still in nascent stage and demands high amount of investments and infrastructure.
8. It is challenging for startups and entrepreneurs since industry 5.0 demands high investments and infrastructure with cutting edge technology requirements.
9. Due to higher levels of automation in the industries, the existing business strategy and business models have to be modified and customized to meet the requirements of industry 5.0. Due to mass personalization, business strategy will be focusing more on customer centric operations. Customer subjectivity changes over time and it is difficult to change the business strategies and business models frequently.
10. Business strategies in industry 5.0 demands higher level of dynamism to sustain competition due to differential customer preferences.

### **Results and Discussion**

1. The study had covered the young employees annexed to the industry 5.0 and have taken their professional work in the manufacturing and service sector industries.
2. There is no gender difference in the recruitment or the work assignment as the knowledge and education plays a major important role, the researcher could not find any gender difference in doing the job.

3. Both the undergraduates and post graduates are employed in the segment and these people have more practical knowledge along with application skills and team work.
4. There is no rural or urban divide in the recruitment and only knowledge in the expected area is considered as an important factor for recruitment.
5. All the employees invariably of the gender, nativity and social background have been provided opportunity to gain knowledge and upgrade skills focusing on the interest of the organization.
6. Though there is standard time for work, still many organizations work without any time schedule as it is a global job at one side and on the other the work is based on target achievement
7. The concept of Industry 5.0 is understood or made to understand by all the employees and hence their interest towards productivity in of high standard.
8. All the employees are involved in digital means of productivity and service and hence working with technology is challenging but with knowledge, ability and skills the interface between the men and machine.
9. There is huge volume of resources that is recognized as the capacity of the industry to fulfill social objectives beyond employment and development.
10. Workers welfare and technology up-gradation is the far most priority that aims for wealth beyond growth.
11. Employees feel that there is a scope for safety and security in the organization, as the organization feels that the work force is the major asset of the organization.
12. Human centric work atmosphere prevails in the organization with values and respect to the man power considering that they are the most powerful asset to the organization.

### **Conclusion**

This industrial revolution relates to human-machine interaction to make jobs easier and quicker. Industry 5.0 brings the personalization idea to the next stage. Industry 5.0 is used with greater effectiveness to meet the extremely personalized demand and to build a virtual environment, advanced computers and information technologies. Industry 5.0 is the realization of optimal integration of big data, Artificial Intelligence, internet of things (IoT), cloud computing, COBOTs, innovation and creativity. Industry 5.0 is expected to create higher-value employment with larger freedom for design thinking and creativity. It helps to improve the productivity of labour and greater opportunity for customization to customers. On the flip side, due to highly automated manufacturing systems, skill development for the workforce is a humongous task. Even though industry 5.0 provides greater autonomy to robots, important and moral based decision making is vested with humans. Overall, industry 5.0 is expected to revolutionize the production systems and process by allowing larger collaboration between humans and robots in providing tailored products to customers.

## **IMPACT OF DIGITIZATION OF MUTUAL FUND MARKET IN INDIA**

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### **ABSTRACT**

*Financial technology power investing tools have a pivotal role to play in the transformation of Indian mutual fund business which is critical for future market like India. By deploying advanced algorithms and machine learning, these tools enhance risk assessment, predictive analytics, and portfolio management. This paper examines how the changes in investor behavior, fund performance and market dynamics are related. It also examines some of the regulatory challenges and opportunities to enhance accessibility through better market functioning. The aim of this essay is to present how digitalization has the power and capability through changing conventional investing habits can make better financial growth not only in India but across with it being a mutual fund industry here.*

**Key Words:** Fintech power investment tools, Indian mutual fund market, Portfolio Management, Market dynamics, Investor behavior

### **Introduction**

Technology, in the changing world of finance, has played a major role towards increasing reach for Indian mutual fund business. It's changing the way we structure our financial life, automating work and helping us navigate through massive data in order to make better decisions. Good to know this change is happening not just in India but globally as well. However, as with anything new and powerful, especially when it comes to financial investment, the use of algorithms in finance is not without their challenges. The use of machine learning and algorithms is becoming vastly more powerful - it has developed to the point that their application can completely turn investing on its head. The ability of the technology to process massive quantities of data and detect intricate patterns has largely shaped the investing world. The latest AI in trading has changed this scene, and because of such developments we are now able to analyze the historical data which makes it possible. AI-based algorithms can comb through vast archives of historical market behavior data which reveal patterns and trends that human researchers may not be able to observe. This historic data provides information on how stocks can behave in moving markets and machines learning from this past behavior will be able to tell what future stock prices could look like but not with 100%. Indian stock market is a versatile beast, full of opportunities and threats. For those investors moving around in this evolving landscape, AI-driven tools sure to transform planning for investment through data-powered insights, conducting automated analysis and much more. A report by NASSCOM and BCG projected that the Indian AI market will grow

to touch \$17 billion in 2027 (Singh & Saikia, 2024). This is a huge growth rate; which shows how big the market can become. The AUM of the Indian MF Industry has increased from ₹ 10.11 trillion as on May 31, 2014 to ₹ 58.91 trillion as an effect showing an around six-fold growth in just under ten years showcasing that its pivotal status with the financial ecosystem in country. This is possible because of the growing interest from investors, enabled by a superior financial acumen and digital platforms proliferation. At the same time that artificial intelligence (AI) has transformed global financial services, from mutual funds. In India FinTech solutions are being greeted with enthusiasm among Mutual Fund businesses, largely boosting consumer involvement and risk assessment & portfolio management. This connection not only delivers real-time data and personalized investment strategies, but it also enhances investor outcomes by improving operational efficiency. To that end, this study investigates the impacts of fintech on Indian mutual fund market to ensure stable and balanced financial ecosystem via investor behavior effects, industry dynamics changes upshot and resultant regulatory framework wake.

#### **Review of Literature**

An analysis of these gaps between what Indian mutual fund investors expect and the actual performance delivered by mutual funds' portfolios. So as to analyze investor risk perceptions, the study utilizes a structured questionnaire and analyzes techniques such as ANOVA & Chi-square. It focuses on material disclosure and currency of operation with respect to the industry practices followed by Asset management companies (Nidhi & Ravi, 2011). Studies on the factors influencing mutual fund performance have been reported by (Amaladoss & N. Suguna, 2019) which also throw light on what future could hold for this industry. Research and policy support will help give rise to a vibrant ecosystem of mutual funds as they remain an important part of the capital markets in India. In his research of artificial intelligence's disruptive potential in investment fund management, (Brozovic, 2019) discusses the disruptive characteristics of artificial intelligence in investment fund management, stressing benefits such as decision-making enhancement and cost reduction. In fact, this article highlights several key areas of concern like a shortage in skilled labor, poor data quality and technology infrastructure.

#### **Objectives of the Study**

1. To compile a history of the development of fintech and its application to mutual fund markets.
2. To evaluate the potential effects of India's Mutual Fund Market Digitization.

**Research Methodology:** The current study uses a large amount of secondary material that was gathered from books, journals, articles, government papers, and publications from numerous websites on relevant topics. The research study makes extensive use of the readily available data from the aforementioned sources.

**Evolution of Fintech:** *Fintech 1.0 (1866-1967):* The evolving stage of Fintech is with the development of Fintech infrastructures for financial services at a global level which include the completion of the first transatlantic cable in 1866 and Fedwire becoming operational for electronic funds transfer over telegraph using Morse code from 1918.

*Fintech 2.0 (1967-2008):* The era began with Barclays putting in the first ATM back in 1967. During the 1970s, the NASDAQ, the first electronic stock exchange, and SWIFT, a system for interbank payments, emerged on the scene.

*Fintech 3.0 (2008-Present):* After 2008, new providers were allowed in by failure of faith in banks and regulatory changes. This is when Bitcoin and other crypto-currencies appeared, which started from blockchain technology. The real victory was that as start-ups exploded, be it through offering new financial products and services or acting more like a start-up themselves, established banks found some common ground.

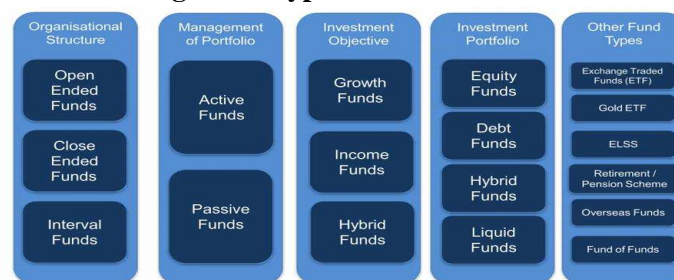
*Fintech 3.5:* The fintech technology revolutionized at its full swing within emerging markets, driven by the rapid growth of mega-implementers with contextually high use levels such as China and India. Unlike the West, these countries were able to readily embrace new solutions without having to worry about legacy bank branches.

**Fintech Market in India:** India has become one of the fastest growing fintech markets in the world due to a large internet user base. It includes segments such as digital lending, digital payments, Insurtech, wealth tech, and blockchain. Fintech adoption has increased owing to demonetization and COVID-19 generated digitization in India. The National Payments Corporation of India developed crucial infrastructure for payment systems with the support of the Reserve Bank of India and Indian Banks' Association. The Unified Payment Interface facilitated digital payments. India Stack as their digital infrastructure and framework for ensuring paperless and cashless delivery of services in India. The Pradhan Mantri Jan Dhan Yojana supported expansion of financial services' footprint among the unbanked. Fintech has been living through a 'funding winter' since 2023 due to global macroeconomic dynamics and gunshy investors. However, the sector remains resilient due to regulatory endorsement and a drive towards digitalization. The key regulatory bodies that regulate fintechs in India are RBI, IRDAI and SEBI. As such, services including stock-broking, investment advisory, etc. fall within its purview. IRDAI regulates insurers, corporate agents, web aggregators for insurance, third-party agents for insurance, etc. Sustainable growth will expand, led by the country's young population, comfortable with technology, and state help. The fintech market size was \$584 billion in 2022 and is projected to surpass \$1.5 trillion by 2025. The size of the total addressable market is poised to grow to \$1.3 trillion by 2025. Assets under management and revenue will be \$1 trillion and \$200 billion by 2030.

## Mutual Funds

A mutual fund is a pool of funds made by various investors, whose investments are used to buy equities (stocks), bonds, government securities, or money market instruments. Mutual funds are professionally managed and pay out income or gains to shareholders. All the Asset Management Companies in India needs to register with SEBI so they fall under regulatory supervision followed by the SEBI (Mutual Funds) Regulations, 1996 as part of fees & expenses.

**Figure 1: Types of Mutual Funds**



Source:<https://www.amfiindia.com/investor-corner/knowledge-center/types-of-mutual-fund-schemes.html>.

**The Rise of Fintech in Mutual Fund Industry:** Fintech has gone a long way in revolutionizing the mutual fund industry with ease of access, efficiency, and user-friendliness. These platforms provide mutual funds online without much hassle with an easy consumer interface along with automation of transactions like Zerodha, Groww, Paytm Money, and many others. They allow carrying out investments from almost anywhere as fund performance and market trends can be checked using mobile apps.

The Indian mutual fund industry has grown significantly over the past decade, having been established in 1963 with the Unit Trust of India (UTI). We can notice how Mutual Fund Assets under Management (AUM) has exploded in India over a decade since December 2013 until December 2023.

The mutual fund industry in India has been growing at a steady rate over the past few years due to the increasing participation of retail investors and the growth of systematic investment plans (SIPs). The AUM in the industry grows at varying rates due to economic conditions in the market and investors' confidence. Digital platforms, growing fintech innovations, and increasing investment levels in the sector also drive growth.

**Sources: Statista Market Insights, World Bank, OECD, Eurostat, World Bank PovalNet, WID - World Inequality Database**

India is poised to see a steady increase in disposable income, from \$2.92 trillion in 2019 to an anticipated value of \$6.50 trillion by 2029 with a small fall in the middle due to COVID-19 -

(see figure). They serve as a notable marker of economic recovery and growth with such strong gains in household income. This will drive the more house owners to invest in mutual funds as the disposable income goes up thereby increases market participation and bring larger investors base. With increased competition and higher financial literacy, Indian mutual fund market is likely to grow more with new services by the Financial Institutions. Surveys reveal that only 27 per cent of India's population is financially literate. Additionally, only 16.7 per cent of Indian students have a basic understanding of finance and money management. Predictions state that India will continue to be the fastest-growing economy for the next decade. Digital platforms and mobile apps have made it easier for tech-savvy individuals to access and manage their investments. Besides, AI and robo-advisors are providing more personalized investment advice, attracting tech-savvy millennial investors. The number of active SIP accounts rose from 96 lakh crore in 2021 to 2 lakh crore in 2024 marking a rise of 28 per cent year-on-year

**Conclusion:** The digitization of the mutual fund market in India is changing how business is done making risk assessment, predictive analytics and portfolio management a more efficient process. Sophisticated algorithms and machine learning are completely changing how investors not only interact with the market, but also facilitate making sound decisions amidst all of this data. This has resulted in alterations to the way an investor invests, fund performance and market dynamics. The fin-tech driven investment instruments have also transformed mutual funds through automated trading strategies, personalized financial counseling and instant market information. AI Systems help to quickly and comprehensively scan humongous data that leads us towards timely & accurate information which ends up for improved portfolio management, the identification of new investment strategies and this very digitalization work could do wonders in accelerating the financial wellbeing of India and entire mutual fund industry. To stabilize the financial ecosystem in order to avoid panic-driven market behavior effects due to fintech, this study delves deep into various impact areas of fintech on Indian mutual fund industry including investor behavior dynamics, changes in industry established dynamics and regulatory framework. Mutual funds have also emerged as an important intermediation system for the Indian capital markets and thus there is a need to conduct more research along with policy support to incentivize mutual fund applications.

## **OPPORTUNITIES AND CHALLENGES: INDUSTRY 5.0 FOR SOCIAL TRANSFORMATION WITH MANAGEMENT PERSPECTIVES**

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### **ABSTRACT**

The advent of Industry 5.0 signifies a transformative phase in industrial production, emphasizing the synergy between human intelligence and advanced technology. Unlike Industry 4.0, which focuses on automation and digitalization, Industry 5.0 places humans at the centre of the production process, collaborating with intelligent systems to achieve unprecedented efficiency and customization. Humans have evolved with tools since the dawn of our species; from sharpened stones to the computer systems of today. Each new tool has been an invention, but it has also been part of a lineage of change, not entirely different from biological evolution. Hence Industry 5.0 is a new production model where the focus lies on the interaction between humans and machines.

**Keywords:** Industry 5.0, Industrial Production, Automation, Digitalization, Collaboration

**Introduction:** Industry 5.0 is meant to describe the most recent phase, but it is not simply the next technological advancement. Rather, it aims to rebalance what was becoming an excessive reliance on technologies, with the potential for negative consequences on workers and societies. The three core elements of Industry 5.0, as presented by the European Commission, are human-centricity, sustainability, and resilience (European Commission, Directorate-General for Research and Innovation, et al., 2021). In Japan, a similar evolution is captured as Society 1.0 through 5.0, with the latter referring to a Super Smart Society, where “people, things, and systems are all connected in cyberspace and optimal results obtained by AI exceeding the capabilities of humans are fed back to physical space” (Onday, 2019, p. 1). This evolution also aligns with objectives similar to the UN Sustainable Development Goals. The emergence of Industry 5.0, in the wake of Industry 4.0’s rapid progress, is a testament to the sustainability and human-centricity gaps of the evolving industrial landscape.

Industry 5.0 is the recent phase in the phylogeny of industry, based on the idea of Industry 4.0 representing a socially driven and technologically pushed digital transformation. The paradigm of Industry 5.0 focuses on sustainability, while Industry 4.0 concentrates on smart mass production. The earlier phase of industry dealt with automation and data exchange. Mere data exchange would not promote development in the industrial sector; it



should be accompanied by the collaboration of humans and machines. Industry 5.0 aims to integrate human workers more closely with advanced technologies, leveraging the enabling techniques of the digital world, information technology, and operational technologies.

### **Evolution from Industry 1.0 to Industry 5.0**

The evolution of industry has been a long and fascinating journey, with each stage bringing new advancements and innovations in manufacturing. From the first industrial revolution, known as Industry 1.0, to the upcoming Industry 5.0, each stage has been characterized by its own unique set of developments.

**Industry 1.0** The First Industrial Revolution which began in the 18<sup>th</sup> century, marked the transition from a handicraft economy to a manufacturing industry that utilized machines and new technologies. This revolution was primarily driven by the development of steam power, which led to increased volume and productivity. Examples include - the flying shuttle being invented in 1733 to ease cloth weaving process, 1790, when the first textile mill was built in the US, and 1794, when the cotton gin was patented.

**Industry 2.0** The Second Industrial Revolution occurred in the late 19<sup>th</sup> and early 20<sup>th</sup> century and was marked by the implementation of electricity in production and the invention of the assembly line. This revolution resulted in a significant increase in mass production. Henry Ford successfully used assembly line production in his automobile assembly facility as part of this phase.

**Industry 3.0** The Third Industrial Revolution began in the 1970s and saw production activities becoming increasingly automated with the help of new memory-programmable controls. This was the era in which computers became an integral part of production, making possible the partial automation of certain manufacturing processes.

**Industry 4.0** The Fourth Industrial Revolution is characterized by the application of increasingly sophisticated computers, robots, and communication technologies to industrial processes. Processes that have been automated and performed by robots are now interconnected with a network of devices that share and analyse data, also known as IoT (Internet of Things) networks.

**Industry 5.0** The Fifth Industrial Revolution is the next stage of development in manufacturing, where machines become smart enough to perform complex functions intelligently, all by themselves. This will leverage advanced technologies and computing capabilities to collaborate with humans, giving pace and accuracy. Industry 5.0 thrives to find the right balance between robotisation and humans, blending the power of smart, precise, accurate machinery with human creativity and ingenuity.

### **Industrial Transformation (Management Perspectives)**

**Enhanced Customization and Personalization:** Customer-Centric Production: Industry 5.0 allows for the creation of highly customized products tailored to individual customer

preferences. This is made possible through advanced data analytics, AI, and flexible manufacturing systems. **Competitive Advantage:** Companies can differentiate themselves by offering unique, personalized products, thus enhancing customer loyalty and opening new market segments.

**Improved Human-Machine Collaboration - Synergistic Work Environment:** Intelligent machines and robots can perform repetitive and hazardous tasks, allowing human workers to focus on creativity, problem-solving, and decision-making.

**Enhanced Productivity:** The collaboration between humans and machines can lead to higher productivity and efficiency, as tasks are allocated to the most suitable entity.

**Sustainability and Ethical Manufacturing:** **Eco-Friendly Production:** Industry 5.0 emphasizes sustainable practices, such as using renewable energy sources, reducing waste, and optimizing resource usage.

**Social Responsibility:** Companies can improve their reputation and brand image by adopting ethical manufacturing practices that prioritize worker well-being and environmental responsibility.

**Advanced Human-Machine Interfaces (HMIs)**

**User-Friendly Systems:** The development of advanced HMIs enables seamless interaction between workers and machines, improving operational efficiency and reducing the learning curve for new technologies.

**Real-Time Decision Making:** Enhanced HMIs provide real-time data and analytics, enabling managers to make informed decisions quickly and accurately.

**Workforce Empowerment and Skill Enhancement**

**Continuous Learning:** Industry 5.0 encourages continuous learning and upskilling of the workforce, preparing employees for more complex and rewarding tasks.

**Job Satisfaction:** By engaging in more creative and meaningful work, employees can experience higher job satisfaction and motivation.

## **Challenges**

**Integration of Advanced Technologies:** **High Initial Investment:** Implementing Industry 5.0 technologies requires significant upfront investment in new equipment, software, and infrastructure.

**Complex Integration:** Integrating advanced technologies into existing systems can be complex and time-consuming, requiring careful planning and execution.

**Workforce Transition and Training:** **Skill Gap:** There is a potential skill gap between current workforce capabilities and the skills required for Industry 5.0. Managers must invest in comprehensive training programs to bridge this gap.

**Change Management:** Ensuring smooth transitions and managing resistance to change among employees is critical to successful implementation.

**Increased Vulnerability:** The interconnected nature of Industry 5.0 systems increases the risk of cyber-attacks and data breaches.

**Data Protection:** Companies must implement robust cybersecurity measures and data protection protocols to safeguard sensitive information.

#### **Ethical Considerations and Social Impact**

**Job Displacement:** While Industry 5.0 creates new opportunities, it may also lead to job displacement for certain roles, necessitating measures to support affected workers. **Ethical Dilemmas:** Managers must navigate ethical dilemmas related to AI decision-making, data privacy, and the impact of automation on society.

#### **Regulatory Compliance**

**Evolving Regulations:** As technology advances, regulatory frameworks must evolve to address new challenges and ensure the responsible use of Industry 5.0 technologies.

**Compliance Costs:** Adhering to new regulations can increase compliance costs for companies, requiring careful management.

#### **Ensuring Inclusivity**

**Equitable Access:** Ensuring that the benefits of Industry 5.0 are accessible to all stakeholders, including marginalized communities, is essential for promoting social and economic inclusion.

**Inclusive Policies:** Developing inclusive policies and practices can help create a more equitable and just industrial landscape.

**Conclusion:** Industry 5.0 represents a paradigm shift in the industrial landscape, emphasizing the harmonious integration of human creativity and machine efficiency. This evolution from Industry 4.0 to Industry 5.0 opens new opportunities for customization, sustainability, and human-centric production. However, it also presents significant challenges, including technological integration, workforce transition, cyber-security, ethical considerations, regulatory compliance, and ensuring inclusivity. By addressing these challenges proactively and strategically, businesses can harness the full potential of Industry 5.0 and drive social transformation, paving the way for a more sustainable, equitable, and prosperous future.

## **A STUDY ON INDUSTRY 5.0: IMPACT OF OTT ON DTH CABLE CONNECTIONS IN TIRUNELVELI**

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### **ABSTRACT**

*The over-the-top (OTT) platform market has grown rapidly since its inception. OTT apps provide scalability that is equivalent to conventional pay-tv for media owners, distributors, and brands, all while avoiding the demand for traditional cable boxes and smoothly streaming video. OTT apps, which combine the adaptability of the Internet with the global reach of traditional TV, have grown to be a powerful force, opening up a plethora of opportunities for marketers, distributors, and artists around the world. Today's OTT trends are reshaping the landscape in the midst of these improvements. The platform's success is largely due to the continuous advancements made by leading content publishers, which are driving its growing appeal over traditional viewing habits. Surprisingly, the growth of 5G technology is expected to boost the OTT video market size to double by 2024. We will examine how over-the-top (OTT) content affects cable connections in this study.*

**Keywords:** *OTT, Entertainment, DTH Cable, Digital*

**Introduction:** The internet and over-the-top (OTT) video platforms are making dramatic and swift inroads into the entertainment industry, particularly in the realm of television and movies, including traditional broadcast TV. A multimedia provider that sells streaming media separately is considered an "Over-the-top" media service. Although it also applies to internet-based voice calling services, messaging apps, and audio streaming, the phrase is most frequently used about video-on-demand platforms. It requires access to laptops, PCs, tablets, and cell phones as well as the internet. "Direct To Home" service is what DTH stands for. It is an online satellite service that sends television programming directly to customers' nationwide locations via satellite transmission. Directly received from the satellite, transmissions are digital by nature.

### **REVIEW OF LITERATURE**

**Amin. R., et al (2024)** :Most of the two respondents believe that their studies are impacted by OTT media access to some degree. With a mobile device or computer with internet access, young people can watch over-the-top (OTT) platforms at anytime and anywhere. After seeing the OTT platform, respondents may find themselves drawn to obscenity, violence, and vulgar web series. This platform exhibits a great deal of violence.

The study's findings indicate that OTT platforms affect young people and can, to some extent, shape their behavior.

**Nair. A., et al (2021):** In India, over-the-top (OTT) services will keep growing and will have a big effect on how many people watch our traditional media, like television and multiplexes. This number will inevitably decline even though some people who prefer seeing films in theatres will keep doing so. OTT platform services will surely impact TVs and multiplex footfalls in the future. Finally, we would like to state that OTT platform providers will be recognized as the technological advances of the future and will have a big influence on how we all watch television.

**Paul. D.V. (2020):** OTT is expected to keep growing more quickly than conventional distribution methods. The steadily increasing number of users on Netflix, Hulu, and Amazon Prime is a prime illustration of this. It is a given that content will continue to rule in the upcoming years. Networks must make sure they have the infrastructure built to give the incoming audience the highest caliber of experience, whether or not broadcasting is 5G enabled. Broadcasting is already a reliable and tested technology that lets people watch the latest entertainment whenever they want. India is expected to have one billion internet users by 2030, with nearly all of them being connected by 2020, making it the largest video-viewing market in the world.

#### **Objectives**

1. To research the factors influencing customers' decisions between DTH service and OTT platforms.
2. To investigate and evaluate how preferences for online viewing relate to the elements that lead users to select over-the-top (OTT) platforms over direct television (DTH).
3. To ascertain if OTT platforms are capable of totally displacing DTH.

#### **METHOD OF DATA COLLECTION**

Two different levels are used to gather the data for this study paper:

- 1) Primary data - To obtain all the information needed for the research paper and to provide a comprehensive response to the question needed for analysis, the primary data for this study was gathered using a structured questionnaire.
- 2) Secondary data - This category consists of books, journals, papers, and webpages that provide crucial information essential to the study.

**EFFECT OF OTT ON DTH CABLE CONNECTIONS:** Video can be broadcast on various internet-connected devices, including computers, smartphones, smart TVs, and tablets, on OTT platforms, but not on DTH. Viewers are able to view the video from any location at any time.

**Affordable:** Compared to going to the movies in a theatre, watching many movies, reality shows, and sporting events is possible with a single subscription, which is far less

expensive. The cost and rates of over-the-top (OTT) platforms have not decreased to the point where DTH is no longer offered or where there is a noticeable decline in the number of customers.

**Unique content:** certain unique, exclusive content is only accessible through membership and is limited to a specific OTT platform.

**Customers' preferences** on what, how, and on which device they wish to watch are also important considerations. Both traditional broadcast television and more modern alternatives like over-the-top (OTT) platforms have their places. Similar to how DTH supplanted Cable Connections, OTT is currently displacing DTH. For this reason, to stay in business, several DTH providers are collaborating with OTT platforms.

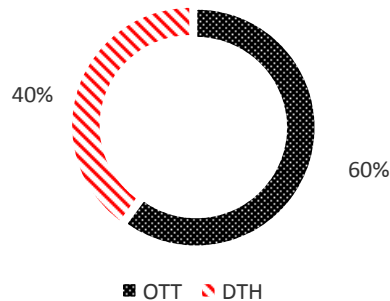
#### ANALYSIS AND INTERPRETATION

The characteristics that affected OTT on DTH, together with the respondents' age group, occupation, and income, are listed in the following table.

**Table 1.1**

Sl.No.	Particulars	No. of the respondents	Percentage %
<b>Age Group</b>			
	<b>21 – 30 years</b>	<b>27</b>	<b>36</b>
	31 – 40 years	20	27
	41 – 50 years	18	24
	Above 50 years	10	13
<b>Income</b>			
	Below 25000	15	20
	<b>25000 – 50,000</b>	<b>30</b>	<b>40</b>
	50,001 – 75,000	16	21
	75,001 – 1,00,000	14	19
<b>Profession</b>			
	Student	10	14
	Government Employee	14	19
	<b>Private Employee</b>	<b>31</b>	<b>43</b>
<b>Type of Platform preferred by Customers</b>			
<b>1.</b>	<b>OTT</b>	<b>45</b>	<b>60</b>
<b>2.</b>	<b>DTH</b>	<b>30</b>	<b>40</b>
<b>Factors Influenced in using OTT over DTH</b>			
	Affordable Price	22	29
	<b>Can be watched anytime and anywhere</b>	<b>30</b>	<b>40</b>
	Ease of Purchase	15	20
	Good picture quality	8	11

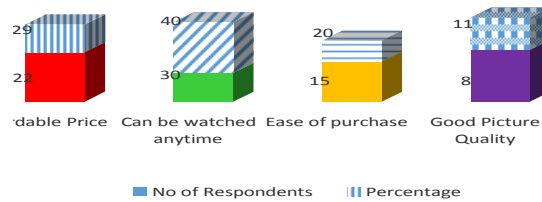
**CHART 1.1 : TYPE OF PLATFORM PREFERRED BY CUSTOMERS**



It is clear from the foregoing that 40% of respondents watch their preferred channels on DTH, while 60% watch them on OTT.

**CHART 1.2**

**Factors Influenced in Using OTT over DTH**



One might infer the several reasons people chose to incorporate OTT into their daily lives from the above chart. Twenty percent said it's easy to purchase, twenty percent said the price of OTT is reasonable, eleven percent said OTT has a very good quality of picture when compared to DTH, and the majority of respondents-40 percent-said they can use it anytime and anywhere.

**CONCLUSION:** It is clear from the research study that OTT has had a significant influence on DTH. Currently, OTT is becoming more popular and replacing DTH. The majority of respondents said that when they watch their favourite films and channels in their free time, they would rather use over-the-top (OTT) services. The respondents gave a variety of reasons for using over-the-top (OTT) services, including its reasonable price, original content, high-quality images, and portability. In the modern world, the choice of clients about what, how, and according to which mediums they would like to watch is crucial. Both traditional broadcast television and over-the-top (OTT) services have their places wherein the major role is overtaken by OTT.

## **INDUSTRY 5.0: ORCHESTRATING INNOVATION FOR CONSISTENT BUSINESS TRANSFORMATION**

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### **ABSTRACT**

*Industry 5.0, marked by human-machine collaboration and customization, presents a unique challenge: achieving consistent business transformation while fostering continuous innovation. This paper explores strategies for orchestrating this balance. We examine how Industry 5.0 technologies, such as AI and data analytics, can be leveraged to streamline processes, ensure quality control, and facilitate knowledge transfer. We further discuss methods for fostering a culture of innovation within a framework of consistent performance. This research aims to provide valuable insights for businesses navigating the dynamic landscape of Industry 5.0, enabling them to achieve sustainable growth through orchestrated innovation.*

Keywords: (Industry, Innovation, Consistency, Sustainable Growth)

**Introduction:** This new era prioritizes human and machine performance and efficiency, aiming to strike a balance between continuous innovation and continuous operational change this poses a unique challenge for businesses on how to unlock potential equipped with state-of-the-art technologies such as AI and data analytics to ensure reliability and repetitive performance happens. This paper explores this important question in detail. We examine how innovations are formed in Industry 5.0, examining how these advances can streamline processes, guarantee quality control, and facilitate knowledge transfer within the workforce times. Additionally, we explore ways to foster a culture of innovation that flourishes within a framework that fosters continuous business improvement. By analysing these aspects, this paper aims to provide valuable insights for companies navigating the dynamic Industry 5.0 environment, ultimately enabling them to achieve sustainable growth through structural innovation.

**Review of Literature:** Industry 5.0 marks a significant shift in the industrial landscape, characterized by a focus on human-machine collaboration and mass customization (Hermann et al., 2016). While this new era promises enhanced productivity and flexibility, achieving consistent business transformation amidst continuous innovation presents a unique challenge (Stock & Oehmen, 2019). This literature review explores how existing research addresses this challenge, focusing on strategies for orchestrating innovation for consistent business transformation in Industry 5.0.

**Gaps and Areas for Further Research:** While existing research provides valuable insights, there are still gaps to be addressed. There is a need for further investigation into metrics for



measuring consistent business transformation within the context of Industry 5.0. Additionally, research on fostering a culture of innovation that thrives alongside consistent performance can be further explored. This paper aims to contribute to these areas by investigating strategies for orchestrating innovation while ensuring consistent business transformation in Industry 5.0.

#### **Key Principles of Industry 5.0:**

**Human-machine collaboration:** Industry 5.0 redefines the human role in manufacturing. Instead of replacing people with machines, we need to enhance human capabilities with advanced technology. This collaborative environment supports innovation and entrepreneurship by ensuring human oversight and ethical considerations.

**Personalization:** This principle uses advanced data analysis and flexible processes. Imagine creating an online product offering real-time information, or finding a service to fit your situation. Industry 5.0 empowers businesses to meet diverse customer requirements, driving engagement and deep loyalty.

**Sustainability:** This principle focuses on reducing waste, efficient use of materials, and adopting environmentally friendly practices throughout the life cycle of construction. Imagine using recycled materials in manufacturing, using energy-efficient methods, and reducing pollution. Industry 5.0 encourages businesses to operate within the boundaries of the planet, ensuring long-term sustainability and contributing to a brighter future.

**Resilience:** This principle emphasizes building flexibility, redundancy, and real-time analytics capabilities. Imagine intelligent systems that can anticipate and react to events, supply chains that can change strategies around problems, factories that can adjust production in response to changing market conditions, and Industry 5.0 empowers businesses to be flexible, ensuring they can navigate a dynamic and unpredictable world.

#### **Key Technologies Powering Industry 5.0**

**Collaborative Robots (Cobot's)** Imagine robots that work seamlessly alongside humans, not replacing them. Cobot's are a key technology in Industry 5.0, designed for ease of use and safety. They can handle repetitive, dangerous, or physically demanding tasks, freeing up human workers for more creative and strategic roles. This human-machine collaboration fosters increased productivity and a more efficient work environment.

**Artificial Intelligence and Machine Learning (AI & ML):** These powerful tools are driving innovation in Industry 5.0. AI algorithms can analyse vast amounts of data, enabling predictive maintenance, optimizing processes, and facilitating autonomous decision-making. Machine learning allows systems to continuously learn and improve, leading to increased efficiency and adaptability.

**Internet of Things (IoT):** Imagine a factory where machines, sensors, and devices seamlessly communicate. The Internet of Things (IoT) makes this vision a reality. By connecting devices to a network, real-time data exchange becomes possible, allowing for

better monitoring, control, and automation across the entire production process. This interconnectedness fosters increased transparency and facilitates data-driven decision-making.

**Augmented Reality (AR) and Virtual Reality (VR):** These immersive technologies are revolutionizing training, maintenance, and customer interactions in Industry 5.0. AR overlays digital information onto the real world, providing workers with real-time instructions and guidance. VR creates a completely simulated environment, allowing for safe and realistic training scenarios.

### **Human-Centric Design in Industry 5.0: Prioritizing the Worker**

**The Role of Human Workers:** Industry 5.0 moves away from automation replacing humans. Instead, it focuses on human-machine collaboration, where technology complements human skills. Workers become innovation drivers, leveraging advanced tools to tackle complex challenges.

#### **Enhancing Worker Experience**

**Training and Development:** Forget boring lectures! Imagine immersive training experiences with AR and VR. AR overlays can provide real-time instructions and guidance directly on equipment. VR allows for safe and realistic simulations, fostering skill development and building confidence.

**Safety and Well-being:** Industry 5.0 prioritizes worker well-being. Ergonomic design principles create comfortable and safe work environments. Real-time health monitoring systems, powered by wearable technology, can detect potential health issues early on, allowing for preventative measures.

### **Business Transformation through Industry 5.0: Unlocking Efficiency and Customer Focus**

Industry 5.0 presents a transformative opportunity for businesses, ushering in an era of intelligent and human-centric manufacturing. This new industrial revolution goes beyond the automation focus of Industry 4.0, prioritizing collaboration, and customization. Here's how Industry 5.0 empowers businesses to achieve significant transformations:

**Operational Efficiency:** Imagine a factory floor buzzing with activity but with minimal waste and downtime. Industry 5.0 technologies like AI and IoT play a crucial role in streamlining operations. Here's how:

**Predictive Maintenance:** AI algorithms analyze sensor data from machines, predicting potential failures before they occur. This allows for proactive maintenance, minimizing downtime, and ensuring smooth production flow.

**Real-Time Monitoring:** IoT connects machines and devices, enabling real-time monitoring of production processes. This allows for immediate identification of bottlenecks and adjustments to optimize production efficiency.

**Automated Tasks:** Repetitive tasks can be handled by robots, freeing up human workers to focus on more complex tasks. This reduces the risk of human error and increases overall process consistency.

**Customer-Centric Innovation:** Industry 5.0 empowers businesses to shift their focus towards the customer. Here are some key aspects of this transformation:

**Data-Driven Insights:** Businesses can leverage vast amounts of customer data to understand preferences, predict needs, and personalize product offerings. Imagine analyzing buying patterns to predict future demand or offering customized product configurations. This data-driven approach leads to products and services that truly resonate with customers.

**Mass Customization:** Traditional mass production gives way to mass customization in Industry 5.0. Advanced manufacturing processes can adapt to individual customer needs, allowing for personalized products. This caters to the growing demand for unique and tailored offerings, enhancing customer satisfaction and loyalty.

**Enhanced Customer Interaction:** AR and VR technologies can revolutionize customer interactions. Imagine a customer using VR to experience a product in their home environment or AR providing real-time product information while in a physical store. This personalized and interactive approach fosters deeper customer engagement and builds brand loyalty.

### **Challenges and Considerations on the Road to Industry 5.0**

While Industry 5.0 presents a promising future, there are significant challenges and considerations that businesses need to address:

#### **Technological Barriers:**

**Integration:** One major hurdle is seamlessly integrating new Industry 5.0 technologies with existing legacy systems. These systems may not be designed to handle the real-time data exchange and complex communication protocols required by Industry 5.0 technologies. Overcoming these compatibility issues requires a significant investment in infrastructure upgrades and system integration expertise.

**Cyber-security:** The interconnected nature of Industry 5.0 makes it vulnerable to cyberattacks. With an increased number of connected devices and vast amounts of data flowing through networks, the risk of data breaches and cyber threats becomes more prominent. Robust cybersecurity measures, including secure data encryption and continuous vulnerability assessments, are essential to safeguard sensitive information.

#### **Ethical and Social Implications:**

**Job Displacement:** A major concern surrounding automation is its potential impact on employment. While Industry 5.0 emphasizes human-machine collaboration, some jobs may be replaced by robots or intelligent systems. This necessitates workforce development strategies to equip workers with the skills needed for the evolving job market.

**Data Privacy:** Industry 5.0 relies heavily on data collection and analysis. However, this raises concerns about data privacy. Businesses need to ensure transparent data collection practices and robust data security measures to protect personal information. Furthermore, ethical considerations regarding data ownership and usage need to be addressed to maintain public trust.<sup>2</sup>

## **EXPLORING THE IMPACT OF INDUSTRY 5.0 ON MSMEs IN KERALA: ADOPTION AND EFFICACY OF SOCIAL MEDIA MARKETING STRATEGIES**

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### **Abstract**

*Micro, Small, and Medium Enterprises (MSMEs) in Kerala are presented with a transformative opportunity by the transition to Industry 5.0, which is defined by the integration of advanced technologies and human-centric approaches. This review paper investigates the influence of Industry 5.0 on micro, small, and medium-sized enterprises (MSMEs) in Kerala, with a specific emphasis on the efficacy and implementation of social media marketing strategies. The investigation investigates the utilization of technologies such as artificial intelligence (AI), machine learning, and robotics to optimize social media marketing initiatives. It evaluates the degree to which these technologies have been implemented by MSMEs in Kerala, identifying the primary drivers and obstacles to their adoption.*

Keywords: Industry 5.0, MSMEs, SMM, IoT, and Artificial Intelligence

### **Introduction**

Kerala is renowned for its progressive socio-economic indicators and high literacy rate. The state's economy is considerably bolstered by a vibrant ecosystem of MSMEs. These organizations are frequently distinguished by their capacity to address niche markets, innovation, and agility (Song et al., 2023). Nevertheless, they are confronted with distinctive obstacles, including the necessity to perpetually adjust to evolving market dynamics, intense competition, and limited resources (Roy et al., 2020). In this context, the adoption of Industry 5.0 technologies presents both opportunities and challenges for MSMEs in Kerala. Social media marketing is one of the most promising areas in which these technologies have the potential to make a significant impact.

Social media has revolutionized the manner in which businesses interact with their consumers by providing platforms for engagement, brand development, and direct sales (Chatterjee & Kar, 2020). Effective social media marketing can create a level playing field for MSMEs, enabling them to compete with larger enterprises by reaching a global audience at a relatively low cost (Gupta et al., 2013). Nevertheless, the integration of Industry 5.0 technologies into social media marketing strategies is still a rapidly developing field that has the potential to significantly improve the effectiveness and efficacy of these endeavors (Barata & Kayser, 2023; Ghobakhloo et al., 2024).

### **Applications and Implications**

The profound implications of Industry 5.0 are felt across a variety of sectors. In the field of manufacturing, it facilitates the development of intelligent factories that facilitate the seamless collaboration between humans and robotics (Akundi et al., 2022). In the healthcare sector, Industry 5.0 technologies have the potential to improve patient outcomes by facilitating personalized treatments and to enhance precision medicine (Gomathi et al., 2023). Businesses can provide highly personalized purchasing experiences in retail by utilizing AI to anticipate and comprehend customer preferences (Akerkar, 2019).

Industry 5.0 technologies have the potential to empower MSMEs to generate more personalized and engaging content, automate routine tasks, and acquire more profound insights into consumer behavior in the context of social media marketing (Bhatt & Kumar, 2022). For example, AI-powered analytics can assist businesses in comprehending the preferences and behaviours of their target audience, thereby enabling them to develop more specialized and effective marketing campaigns. In the same way, chat-bots and automated messaging systems can enhance the overall customer experience by providing immediate customer support and engagement (Jamil, 2023).

### **MSMEs in Kerala: Industry 5.0 Opportunities**

The integration of cutting-edge technology with people-first strategies is what's driving the fifth industrial revolution, or Industry 5.0. This change brings a lot of chances, especially for MSMEs in Kerala who are involved in social media marketing (SMM). To help MSMEs compete better in the digital economy, SMM strategies that leverage Industry 5.0 technology can greatly improve their effectiveness (Gomathi et al., 2023). This article delves into the possibilities presented by Industry 5.0 for micro, small, and medium-sized enterprises (MSMEs) in Kerala to embrace and enhance their social media marketing approaches.

Social media platforms offer MSMEs access to global markets, thereby removing geographical barriers and allowing businesses to reach a broader audience (Huda & Praswati, 2023). By facilitating targeted and personalized marketing campaigns that resonate with international audiences, Industry 5.0 technologies enhance this capability. MSMEs can customize their marketing strategies to accommodate local preferences and cultural subtleties

by utilizing sophisticated analytics and AI to identify and target potential customers in various regions (Putri et al., 2023). This global reach not only facilitates the development of a diverse and loyal customer base but also provides businesses with new revenue sources.

Industry 5.0 provides MSMEs with sophisticated data analytics capabilities, allowing them to make informed decisions based on real-time data (Tambunan et al., 2023). Social media platforms produce an abundance of data, such as user demographics, engagement metrics, and conversion rates. MSMEs can acquire a more profound understanding of their social media performance by utilizing AI and machine learning to identify what is effective and what is not (Al-Ghamdi, 2021). Predictive analytics can also predict future trends and behaviours, enabling businesses to maintain a competitive edge (Imran et al., 2020).

Industry 5.0 prioritizes sustainability, which also applies to social media marketing strategies. MSMEs can enhance their marketing strategies to decrease waste and enhance efficiency by utilizing AI and data analytics (Singh et al., 2014). For instance, predictive analytics can assist businesses in more precisely predicting demand, thereby reducing overproduction and minimizing waste (Murugan & Prabadevi, 2024). Furthermore, the promotion of eco-friendly products and practices, as well as the implementation of sustainable practices in social media marketing, can improve a brand's reputation and attract environmentally conscious consumers.

#### **MSMEs in Kerala: Industry 5.0 Challenges**

The adoption and assimilation of advanced technologies necessary for effective SMM are among the primary challenges faced by MSMEs in Kerala under Industry 5.0. The implementation of AI, machine learning, and other Industry 5.0 technologies into the marketing practices of many MSMEs may be hindered by a lack of technical expertise, infrastructure, and resources (Bhatt & Kumar, 2022). The initial investment in these technologies, as well as the ongoing maintenance and updates, can be prohibitive for smaller enterprises, resulting in a digital divide where larger firms with greater resources benefit from a competitive advantage (George & George, 2023).

In Kerala, there is a substantial skill disparity and a lack of digital literacy among MSME owners and employees, in addition to the adoption of technology (Harikumar, 2023). The comprehension and utilization of Industry 5.0 technologies for SMM necessitates specialized knowledge in digital marketing strategies, automation tools, data analytics, and AI algorithms (Ganesan & Gopalsamy, 2022). Recruiting and retaining competent professionals who can effectively navigate these technologies is a common challenge for MSMEs. Additionally, it is imperative to implement continuous training and upskilling programs to guarantee that employees possess the requisite abilities to optimize SMM endeavours in an Industry 5.0 environment (Victor et al., 2024).

MSMEs in Kerala face persistent obstacles due to the evolving market dynamics and the rapid tempo of technological innovation. Real-time data analysis and predictive insights are made possible by Industry 5.0 technologies, which enable businesses to promptly modify their SMM strategies (Longo et al., 2020). Nevertheless, in order to remain informed about consumer preferences, competitor activities, and emergent trends, it is necessary to engage in continuous monitoring and make agile decisions. In order to capitalize on opportunities for growth in the dynamic digital landscape and anticipate market shifts, MSMEs must be proactive in utilizing Industry 5.0 capabilities.

### **Conclusion**

The convergence of Industry 5.0 and social media marketing presents a unique opportunity for MSMEs in Kerala to enhance their competitiveness and drive sustainable growth. By leveraging advanced technologies, MSMEs can create more personalized and engaging marketing campaigns, streamline their operations, and gain deeper insights into customer behaviour. However, realizing these benefits requires a concerted effort to overcome technical, ethical, and organizational challenges. Through strategic investment in technology, training, and ethical practices, MSMEs in Kerala can harness the full potential of Industry 5.0 to thrive in the digital age. MSMEs in Kerala are presented with a plethora of opportunities as a result of the integration of Industry 5.0 technologies into their social media marketing strategies. These technologies provide a variety of benefits, including enhanced personalization and customer engagement, advanced analytics for data-driven decision-making, increased efficiency through automation, cost-effectiveness, scalability, access to global markets, and sustainable practices. In the digital age, MSMEs in Kerala can achieve greater success, drive sustainable growth, and enhance their competitiveness by adopting Industry 5.0.

## **INDUSTRY 5.0: A PATH TO SUSTAINABLE INNOVATION**

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### **ABSTRACT**

*This research paper explores the impact of Industry 5.0 on job creation and transformation, quality of life enhancements, sustainability, and ethical considerations. By examining the potential job opportunities in emerging fields, the paper aims to provide insights into the evolving industrial landscape shaped by the integration of human creativity and advanced technologies. Key themes include AI management, robotics maintenance, data analytics, sustainable manufacturing, and digital twin development.*

**Keywords:** Industry 5.0, job opportunities, emerging fields, advanced technologies, sustainability

## **Introduction**

Industry 5.0 represents a significant shift in industrial practices, emphasizing the collaboration between humans and machines to drive innovation and productivity. As this new era unfolds, it brings forth a wave of emerging job opportunities in fields such as AI management, robotics maintenance, data analytics, sustainable manufacturing, and digital twin development. Understanding these potential job avenues is crucial for preparing the workforce for the demands of a rapidly evolving industrial landscape.

## **Review of Literature**

Industry 5.0 represents a paradigm shift in industrial practices, emphasizing the integration of human creativity and advanced technologies. This review explores the current literature on Industry 5.0, highlighting its potential impacts on social development, including job transformation, quality of life improvements, sustainability, customization, resilience, ethical growth, and education.

## **Human-Machine Collaboration**

Unlike its predecessor, Industry 4.0, which focuses on automation and smart factories, Industry 5.0 prioritizes the synergy between humans and machines. This collaboration aims to leverage human creativity and decision-making capabilities alongside machine efficiency and precision (Xu et al., 2021). The literature suggests this approach can lead to more innovative solutions and products, enhancing industrial productivity and creativity (Demir et al., 2022).

## **Job Creation and Transformation**

There are mixed views on the impact of Industry 5.0 on employment. While automation raises concerns about job displacement, many studies argue that Industry 5.0 will create new job opportunities in emerging fields such as AI management, robotics maintenance, and data analytics (Bag et al., 2021). Furthermore, it is anticipated that existing jobs will undergo significant transformation, necessitating reskilling and upskilling of the workforce to adapt to new technological demands (Baron & Pande, 2022).

## **Quality of Life Enhancements**

Industry 5.0's integration of advanced technologies into various sectors promises substantial improvements in quality of life. For instance, AI and robotics can assist in surgeries, enhance diagnostics, and provide personalized treatments, leading to better patient outcomes (Bennett & Cassim, 2021). In agriculture, intelligent technologies enable more efficient and sustainable farming practices, addressing food security concerns (Ahuja & Chouksey, 2021).

## **Sustainability and Environmental Impact**

A key focus of Industry 5.0 is sustainability. By optimizing resource use and reducing waste, advanced technologies can help mitigate the environmental impact of industrial activities (Stock & Seliger, 2016). The literature highlights the potential for Industry 5.0 to



promote eco-friendly practices, such as improved recycling processes and the development of sustainable products (Esmailian et al., 2020).

#### **Customization and Personalization**

The fusion of human creativity with machine precision in Industry 5.0 allows highly customized and personalized products and services. This level of customization meets individual needs more effectively and drives customer satisfaction and innovation in product development (Kusiak, 2018).

#### **Resilience and Flexibility**

Industry 5.0 emphasizes the need for resilient and flexible manufacturing processes capable of adapting to changing demands and disruptions. This adaptability is crucial for maintaining stability in crises like natural disasters or pandemics (Ivanov et al., 2020). The literature underscores the importance of developing robust systems that can withstand and quickly recover from unforeseen events (Dolgui & Ivanov, 2021).

#### **Ethical and Inclusive Growth**

The human-centric nature of Industry 5.0 brings ethical considerations to the forefront. The literature advocates for technological advancements that promote inclusive growth, reduce inequalities, and enhance social welfare (Nahavandi, 2019). Ensuring that the benefits of Industry 5.0 are equitably distributed across society is a recurrent theme in recent studies (Lasi et al., 2014).

#### **Education and Lifelong Learning**

As technological advancements continue to evolve, there is a growing emphasis on education and lifelong learning. Industry 5.0 necessitates continuous skill development and adaptability, ensuring the workforce remains competent and competitive in a rapidly changing industrial landscape (Demir et al., 2022). The literature highlights the importance of educational programs that equip individuals with the necessary skills to thrive in an Industry 5.0 environment (Bennett & Cassim, 2021).

#### **Implementing Effective Industry 5.0**

1. **Policy Frameworks:** Governments should develop policies that support innovation while protecting workers and the environment.
2. **Public-Private Partnerships:** Collaboration between public and private sectors can drive research, development, and deployment of Industry 5.0 technologies.
3. **Education and Training:** Continuous education and training programs are essential to equip the workforce with the necessary skills.
4. **Ethical Standards:** Establishing ethical standards for technology use ensures that Industry 5.0 developments are aligned with societal values.

Industry 5.0 can create a more sustainable, inclusive, and prosperous society by focusing on these areas.

## **Advantages of Industry 5.0**

### **1. Enhanced Collaboration Between Humans and Machines:**

**Human Creativity and Innovation:** Leveraging human creativity alongside machine efficiency can lead to greater innovation and product development.

**Improved Job Satisfaction:** Workers can engage in more meaningful tasks, enhancing job satisfaction and reducing monotony.

### **2. Sustainability:**

**Resource Efficiency:** Advanced technologies optimize the use of resources, reducing waste and promoting sustainability.

**Environmental Benefits:** Lower carbon emissions and a focus on renewable resources support ecological conservation efforts.

### **3. Increased Productivity and Efficiency:**

**Automation:** Automating repetitive tasks increases productivity and allows human workers to focus on strategic activities.

**Operational Efficiency:** Intelligent systems streamline operations, leading to cost savings and higher efficiency.

### **4. Resilience and Adaptability:**

**Crisis Management:** Predictive analytics and AI enhance the ability to anticipate and respond to disruptions.

**Agility:** Quick adaptation to market changes and consumer demands ensures competitiveness.

### **5. Economic Growth:**

**Innovation:** Combining human skills with advanced technologies drives innovation, leading to new products, services, and business models.

**Higher Standards of Living:** Increased productivity and economic growth can lead to higher living standards.

### **6. Social Inclusion and Accessibility:**

**Inclusive Workplaces:** Technologies can be designed to assist people with disabilities, making workplaces more inclusive.

**Remote Work Opportunities:** Enhanced digital infrastructure supports remote working, allowing for greater inclusion of diverse geographic locations.

## **Disadvantages of Industry 5.0**

### **1. Job Displacement:**

**Automation:** While it creates new jobs, automation can also displace workers performing repetitive tasks, leading to job loss and economic displacement for some individuals.

**Skill Gaps:** Rapid technological advancements may result in skill gaps, where the workforce may not be adequately prepared for new roles.

**2. High Initial Costs:**

**Investment:** Implementing advanced technologies requires significant initial investment, which can be a barrier for small and medium-sized enterprises.

**Maintenance:** Ongoing maintenance and upgrades of these technologies can also be costly.

**3. Data Privacy and Security:**

**Privacy Concerns:** The extensive use of data in Industry 5.0 raises concerns about data privacy and security.

**Cybersecurity Risks:** Increased connectivity and reliance on digital systems can make industries more vulnerable to cyberattacks.

**4. Ethical Considerations:**

**Fair Labor Practices:** Ensuring fair labour practices in the face of automation and AI is critical to maintaining social equity.

**Bias in AI:** AI systems can perpetuate biases if not properly designed and monitored.

**5. Complexity and Integration Challenges:**

**System Integration:** Integrating new technologies with existing systems can be complex and require significant process changes.

**Technical Expertise:** High levels of technical expertise are required to implement and manage advanced technologies, which can be a barrier for some organizations.

**6. Economic Inequality:**

**Digital Divide:** Access to advanced technologies may be uneven, exacerbating economic inequality between those who can afford to implement these technologies and those who cannot.

**Conclusion**

The emergence of Industry 5.0 presents a wealth of opportunities for individuals to explore new and exciting career paths in cutting-edge fields. By embracing the advancements in AI, robotics, data analytics, sustainability, and digital twin technologies, individuals can position themselves at the forefront of innovation and contribute to the sustainable growth of industries. As we navigate the complexities of Industry 5.0, stakeholders must prioritize education, training, and skill development to ensure a skilled workforce capable of thriving in this dynamic and transformative industrial environment.

## **PREFERENCE OF ONLINE SHOPPERS TOWARDS UNIFIED PAYMENT INTERFACE (UPI) AS A METHOD OF PAYMENT WITH SPECIAL REFERENCE TO MADURAI CITY**

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### **ABSTRACT**

*Unified Payments Interface (UPI), a user-friendly payment solution developed by National Payments Corporation of India (NPCI), operates on the Immediate Payment System (IMPS) framework. It acts as a mobile application compatible with iPhone OS (IOS) and Android devices. It allows users to link multiple bank accounts to a single mobile application, making it convenient for them to perform various banking transactions seamlessly. This research paper aimed at analyzing the Perception of Online Shoppers towards Unified Payment Interface (UPI) as a method of payment with special reference to Madurai City. The findings of the study showed that, majority of the respondents using UPI are male and are below 25 years of age. They spend only below ₹20,000 per month through Unified Payment Interface (UPI). Most of the respondents prefer Google Pay for making payments and there is a significant relationship between the income of the respondents and the maximum amount spent while shopping online, through UPI per month.*

**Key words:** Unified Payments Interface (UPI), Online Shopping, Latest technology

### **Introduction**

UPI, a user-friendly payment solution developed by National Payments Corporation of India (NPCI), operates on the IMPS framework. Accessible via smartphones, UPI functions akin to an email ID for monetary transactions. It streamlines payments through Virtual Payment Addresses (VPAs), which users establish by linking their accounts to a bank's mobile app. With UPI, sending and receiving money has become very easy.

### **OBJECTIVES OF THE STUDY**

1. To analyze the awareness about Unified Payments Interface (UPI) method of payment among customers.
2. To assess the preference of customers towards Unified Payments Interface (UPI) method of payment.
3. To find out the problems faced by the customers' in using Unified Payments Interface (UPI) method of payment.

### **METHODOLOGY**

The sample size taken for this study is 50. The sampling design adopted for the study is Convenience sampling. Questionnaire was prepared to obtain the required primary data.

The data collected through questionnaire was transferred to a master table from which various tables were prepared from further analysis. The secondary data was collected from the internet.

### FRAMEWORK OF ANALYSIS

To analyze the primary data, the researcher has used the following tools:

1. Percentage analysis
2. Chi-Square test
3. Garrett's Ranking

### HYPOTHESIS

1. There is no significant relationship between the occupation of the respondents and the negative consequences faced in using UPI method of payment.
2. There is no significant relationship between the income of the respondents and their level of satisfaction in using UPI method of payment.

### LIMITATIONS OF THE STUDY

1. The study was restricted only to the respondents in Madurai city.
2. The sample size is 50, it does not represent the whole population in the city.

### FINDINGS

#### Results of Percentage Analysis:

<b>Table 1: Demographic Characteristics of Sample Respondents</b>		
<b>DEMOGRAPHICS</b>	<b>N = 50</b>	<b>% OF RESPONDENTS</b>
<b>A. Gender:</b>		
Male	29	58
Female	21	42
<b>B. Age:</b>		
Below 25 years	25	50
25 years – 50 years	14	28
50 years – 75 years	9	18
Above 75 years	2	4
<b>C. Educational Qualification:</b>		
HSC	12	24
UG	20	40
PG	15	30
Professional course	3	6
<b>D. Occupation</b>		
Home maker	2	4
Student	27	54
Entrepreneur	3	6

Professional	10	20
Others	8	16
<b>E. Family's monthly income:</b>		
Below ₹25,000	9	18
₹25,000 - ₹50,000	28	56
₹50,000 - ₹75,000	7	14
₹75,000 - ₹1,00,000	3	6
Above ₹1,00,000	3	6

Table 1 shows the demographic characteristics of the sample respondents. 58% of the respondents are male; 50% of them are below 25 years of age; A majority of 40% of the respondents have completed Under graduate courses; 54% of the respondents are students and 56% of them are between the ₹25,000 - ₹50,000 income category.

<b>Table 2: Awareness and Consumer behaviour towards UPI</b>		
PARTICULARS	N = 50	% OF RESPONDENTS
<b>A. Source of Awareness:</b>		
Word-of-mouth	32	64
Shopping Websites / Apps	5	10
Advertisements	3	6
Others	10	20
<b>B. Preferred E-Seller:</b>		
Amazon	7	14
Flipkart	13	26
Ajio	6	12
Meesho	10	20
Snapdeal	5	10
Myntra	6	12
Others	3	6
<b>C. Maximum amount spent through UPI per month:</b>		
Below ₹20,000	26	52
₹20,000 - ₹40,000	10	20
₹40,000 - ₹60,000	8	16
Above ₹60,000	6	12
<b>D. Duration of UPI usage:</b>		
Less than 1 year	10	20
1 to 5 years	32	64
More than 5 years	8	16
<b>E. Service Provider used:</b>		
Google Pay	15	30
PhonePe	12	24

Paytm	13	26
Amazon Pay	7	14
BHIM (Bharat Interface for Money)	3	6
<b>F. Negative consequences of UPI:</b>		
Security Concerns	6	12
Temptation to overspend	25	50
Dependency on Technology	8	16
Transaction Failures	7	14
Others	4	8

Table 2 interprets the awareness and consumer behaviour of the sample respondents towards UPI method of payment. A majority of 64% of the respondents have come to know about the UPI method of payment through Word-of-mouth; 26% of the respondents prefer shopping through Flipkart; 52% have spent only Below ₹20,000 through UPI; 64% of the respondents have been using UPI from 1 to 5 years; A majority of 30% of them have used Google Pay for making payments; 50% of the respondents opine that UPI creates a Temptation to overspend.

#### Results of Chi-Square test

**Hyp 1:** There is no significant relationship between the occupation of the respondents and the preferred UPI Service provider.

<b>Table 3: Chi-Square Tests (Occupation &amp; preferred UPI Service provider)</b>		
Calculated value	Degrees of freedom	Table value at 5% significance level
22.56	16	26.29

Since the Table value is greater than the calculated value of Chi-Square, the null hypothesis is accepted. Hence there is no significant relationship between the occupation of the respondents and the preferred UPI Service provider.

**Hyp 2:** There is no significant relationship between the income of the respondents and the maximum amount spent while shopping online, through UPI per month.

<b>Table 4: Chi-Square Tests (Income &amp; Maximum amount spent through UPI)</b>		
Calculated value	Degrees of freedom	Table value at 5% significance level
17.12	15	15.51

Since the Table value is lesser than the calculated value of Chi-Square, the null hypothesis is rejected. Hence there is significant relationship between the income of the respondents and the maximum amount spent while shopping online, through UPI per month.

**Results of Garrett’s Ranking**

<b>Factors</b>	<b>Mean Scores</b>	<b>Rank</b>
Security	58.65	II
User experience	52.49	IV
Discounts & offers	60.44	I
Length of procedure	51.92	V
Fees and costs	44.66	VII
Integrity	49.43	VI
Geographical support	42.04	VIII
Compatibility	56.35	III

The factors considered by the customers before choosing Unified Payments Interface (UPI) as a method of payment while shopping online was ranked using Garrett’s Ranking. The Factor, “Discounts & offers” was ranked first and the last rank was given to the factor “Geographical support”.

**SUGGESTIONS**

A majority of the respondents using Unified Payments Interface (UPI) as a method of payment while shopping online have got to know about it through word-of-mouth. This shows that there are no proper advertisements to create awareness about the available payment methods. The service providers must create awareness about their service availability through any form of advertisements to increase the usage. Most of the respondents have been using UPI for 1 to 5 years. This shows that they are comfortable with the working terms and conditions relating to this method of payment. The service providers and the E-Sellers can rely on these third-party payment vendors for payment processes, which also attracts more of sales. Only a few respondents have used BHIM (Bharat Interface for Money) for making payments during online shopping. This shows Competing UPI apps have introduced innovative features and services beyond basic peer-to-peer (P2P) payments, such as bill payments, merchant transactions, rewards programs, and integration with other services. BHIM may need to enhance its feature set and continuously innovate to remain competitive and meet evolving user needs.

**CONCLUSION**

UPI has revolutionized mobile payment technology by enabling smartphones to serve as primary payment devices for both sending and receiving payments. Unlike other payment systems, UPI stands out as one of the most advanced payment systems globally. It facilitates direct money transfers between any two bank accounts using a smartphone. With UPI, customers can seamlessly pay merchants online and offline without the need to enter credit



card details, IFSC codes, or net banking/wallet passwords. The primary aim of UPI is to simplify money transfers by providing a single interface that is easy, quick, and hassle-free. These distinctive features of UPI have motivated service sector respondents to adopt this tool.

## **ROLE OF EDUCATION 5.0 AND INDUSTRY 5.0 IN DEVELOPING COUNTRIES: AN EMPIRICAL STUDY**

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### **ABSTRACT**

*Education is a cornerstone for the progress of any country. Education 5.0 prioritizes the development of essential skills like problem-solving, critical thinking, creativity, and communication, as opposed to rote memorization. This can be achieved through methods like collaborative learning projects and incorporating technology into the curriculum. The concept of Industry 5.0, which emphasizes collaboration between humans and advanced technologies, is bringing about a corresponding shift in education, known as Education 5.0. This new approach to education focuses on preparing students for the demands of this future workplace. Education is one of the most important pillars of the country's infrastructural development. This paper discusses the historical perspective of educational development as a standard originated as Education 1.0. Its latest form is Education 5.0, and it is highly rated in terms of its association with current business needs and integration with industrial and technological developments.*

### **INTRODUCTION**

Education in the 21<sup>st</sup> century will face more severe challenges than in the previous century. Technological advances in the era of Industrial Revolution 5.0 have developed so rapidly entering classrooms without having to go through social political control, and moral control. Education 5.0 would help in emphasizing and prioritizing human qualities at the core of the education system by identifying skills and roles that are most suitable for any individual student. It can help people show their unique talents, boost their creativity, and improve their ability to think critically. It can also help develop their design and problem-solving skills. The focus is not confined to employability alone but also on the needs of society at large. Using Industry 5.0 in education can give a broader view. It can help students understand their learning path, find their place in the job market, and keep up with global changes. In this type of education system, learners are encouraged to be active participants in education and curriculum development. The learners are also guided in the safety and ergonomic aspects of using technologies, thereby ensuring their physical and mental health conditions. Thus, students' abilities and readiness to participate in continuous and lifelong learning are enhanced.

## **REVIEW OF LITERATURE**

One of the sub-systems in society which was affected seriously by these transformations is education. Accordingly, with changes in the production process and the reflections of these changes on social life, the content and concept and content of education have gained new meanings. Some authors have called these transformations education has passed or is expected to pass through as Education 1.0, 2.0, 3.0, and 4.0 (Harkins, 2008; Moravec, 2013). Education 1.0 is a kind of education that meets the needs of agricultural society. Knowledge was used to be transferred from teacher to student and students focused on the teacher's explanations. Education 2.0 is a kind of education system that meets the needs of industrial society. The learning process is focused on acquiring technologies that will be utilized in work life. Education 3.0 has evolved education to meet the needs of society by taking advantage of technology. Lastly, Education 4.0, developed at the beginning of the 21st century is expected to meet the needs of the innovation age. Students are expected to produce and adapt new technologies that will contribute development of societies in this process (Puncreobutr, 2016, p.93-94). Education 1.0 is conceptualized as "download education", Education 2.0 as "open access education, Education 3.0 as "knowledge-producing education" and lastly Education 4.0 as "innovation-producing education" (Harkins, 2008; Moravec, 2008). Educational technologies play a vital role in education by providing students with access to a wide range of learning resources, making it easier for educators to personalize the learning experience, and providing students with access to advanced learning tools (Al-Emran et al., 2023; Al-Sharafi et al., 2022; Al-Tahitah et al., 2021). These technologies can revolutionize students' learning and lead to a more efficient, personalized, and effective education system (Al-Emran & Mezhuyev, 2019; Al-Nuaimi & Al-Emran, 2021; Mohd Rahim et al., 2022). Industry 5.0 also brought a variety of educational applications. One application of Industry 5.0 in education is the use of smart classrooms and learning environments.

**METHODOLOGY:** This research is qualitative research using the study literature method. This method collects information or data through books, journals, or articles that are relevant to the issue being studied. This aims to obtain information or data related to the learning approach in the era of Society 5.0. The Methodology will contain why education 5.0 is required and what are the things necessary for effective communication between robots and human beings. (Rada, 2018) had clearly defined the robot's existence and effectiveness.

### **OBJECTIVES**

1. To identify the key technologies and tools that are driving Industry 5.0 in education 5.0 and their potential impact on teaching and learning.
2. To explore the challenges and opportunities associated with the integration of Industry 5.0 technologies in education 5.0.

3. To examine the effectiveness of Learning Management systems in education.
4. To explore the potential implications of Industry 5.0 for educational policy and practice.

### **CHALLENGES OF INDUSTRY 5.0 IN EDUCATION 5.0**

While Industry 5.0 brings many potential benefits, it also presents several challenges for the education sector. One major challenge is the need to prepare students for jobs that do not yet exist. Industry 5.0 technologies are rapidly evolving, and it is difficult to predict exactly which skills and knowledge will be required in the future. This makes it difficult for educators to prepare students for the job market and ensure they can compete in a rapidly changing economy. Another challenge is the need to provide students with the necessary digital skills to thrive in an Industry 5.0 world. As more and more jobs become reliant on advanced technologies, students must be proficient in areas, such as coding, data analysis, and machine learning. This requires a significant investment in both teacher training and the development of relevant curricula. Additionally, not all students have the same level of access to technology and digital resources, which can create a divide between those who can take advantage of Industry 5.0 opportunities and those who are left behind. This is particularly true in developing countries, where access to education and training may be limited. As intelligent technologies become more sophisticated, there is a risk that they may be used to discriminate against certain groups of people or to perpetuate existing power imbalances. Educators must address these ethical issues and ensure that students are aware of the potential risks and responsibilities associated with Industry 5.0 technologies.

One of the main challenges of Industry 5.0 in education is the need to adapt teaching and learning methods to accommodate Industry 5.0 technologies. This may require the development of new pedagogical approaches, as well as the integration of technology into the classroom. It may also require the adoption of new assessment methods to evaluate students' knowledge and skills in this rapidly evolving field. Another challenge is the need to address ethical concerns related to the use of Industry 5.0 technologies. For example, there are concerns about the potential for AI and robotics to perpetuate biases and perpetuate inequities. There is also a need to consider the potential for these technologies to be used for nefarious purposes, such as surveillance or manipulation. Another challenge of Industry 5.0 in education is the impact on employment and job security.

### **INDUSTRY 5.0 and EDUCATION 5.0**

IR 5.0 will also transform education [39, 40], current education is fuelled by information, and if it can be trained and equipped with digitally smart machines, or COBOTS, that are further supplemented with the human touch, it will take society along the path of personalized education. As a result, COBOTS will help to develop a human-centric society, which will be strengthened by human wisdom, enabling education 5.0, tailored education for everybody.

Humans will be aided by many functioning COBOTS to assist them with day-to-day tasks and support their personal and professional development.

#### **EDUCATION 5.0-BRIEF HISTORY**

Education 5.0 can be seen as a new paradigm that reinterprets the concepts of learning, student, teacher, and school according to the needs of Industry 5.0. One of the examples of innovative teaching and learning practices as a part of Educations 5.0 is the flipped classroom model. In flipped classrooms, students can investigate lesson-related digital sources such as videos, presentation materials, and e-materials out of school and they can acquire the knowledge they need out of traditional classrooms. So, students can utilize classroom time for activities such as discussion, analysis, and problem-solving (Youngkin, 2014, p.368). Flipped classrooms can be accepted as a blended learning process since this model utilizes online learning materials while transforming traditional classrooms and enhances the education process with these materials (Garrison & Kanuka, 2004, p.96; Gogebakan-Yildiz, Kiyici & Altintas, 2016, p.187). So, the flipped classroom is a teaching-learning model that makes students responsible for their learning, is practice-based, gives students individualized education opportunities, and allows them to learn anywhere and anytime. Therefore, it can be said that the flipped classroom model is coherent with the qualifications of Education 4.0. Flipped classrooms which allow blended learning can be evaluated as a mode-developed example of Education 3.0 and distance education practices. During Education 3.0 process issues like how to integrate education and technology, how to include technology in present educational programs which are already very crowded and intense, or how to overcome inconsistency between schooling and information Technologies were discussed (Ballantyne, Wong & Morgan, 2017, p.4; Collins & Halverson, 2010, p.19; Sendov, 1987, p.193). However, the answer to the question of which educational and managerial practices are needed for Education 4.0 is so abstract and beyond satisfactory. 21st-century skills, which are aimed to be gained through education, and the concept of innovation that has been discussed in the field of education since the mid-2000s, reflect the transformations expected from education by Industry 4.0. These transformations clarify the content of Education 4.0 and lead to redefining the educational concepts, processes, and practices. However, there are very few studies that discuss the theoretical structure of Education 4.0 both in Turkish (Yildiz-Aybek, 2017) and in foreign literature (Harkins, 2008; Peters, 2017; Puncreobutr, 2016; Wallner & Wagner, 2016). Also, these very studies take Education 4.0 at a very abstract and only theoretical level. However, taking into consideration the subjective, cultural, and economic structure of the societies and the unique characteristics of their educational systems, it is thought that the content and characteristics of Education 4.0 need to be operationalized to direct the implementation. Thus, concrete implementation proposals would be developed to facilitate the transition to Education 4.0 following the structure and functioning of the Turkish

education system. In addition, determining the characteristics of Education 4.0 would contribute to the related literature. In this context, it is aimed to determine the characteristics of school manager, teacher, and student aspects of Education 4.0 according to the opinions of experts on educational sciences in this study.

**ROLE OF INDUSTRY 5.0 IN EDUCATION 5.0:** Japan defines Industry 5.0 as ‘Society 5.0’ a ‘human touch’ revolution (Harayama, 2017): “A human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space.” Where digitalization would not make humans obsolete in the transformation process. Instead, it would help skilled workers and highly skilled professionals to guide smart machines and robots, establishing a cooperative and collaborative workspace integrated with the perfect combination & interaction of Cognitive Computing and Human Intelligence. Industry 5.0 would bridge the gap between robots and highly-skilled workforces to produce and deliver the best-personalized services to customers. As highlighted Industry 5.0 will demand highly skilled professionals and workforces to efficiently fulfill the Goals and Objectives of Society 5.0.

Education 5.0 will enable an individual to master skills like learning, unlearning, and relearning to adapt and embrace the ever-changing environment of the technical World (figure 1). Education 5.0 would be personalized, which would enhance the learning process and prepare students to endure and confront the uncertainties in the future with their enriched skillsets that will allow them to sustainably create new values and services to benefit and balance a society as a whole. To educate the students with the latest skills and up-scaling their standard of thinking, there arises a need for High-Definition Educators, Educators 5.0. These educators will be able to stimulate and apply human intelligence and thought processes in the computer would work in a collaborative environment with humans, hence called Cobots (Collaborative Robots), which will enrich the learning process in Society 5.0.

## **CONCLUSION**

Education 5.0 describes various methods of incorporating technological sophistication into learning, whether physically or not. Era 5.0 represents a quantum leap forward from era 4.0, as it integrates neuroscience, cognitive psychology, and educational technology through the use of web-based and mobile technologies, including applications, hardware, and software. Education 5.0 is a phenomenon that emerges in response to the needs of the 5.0 industrial revolution, in which humans and robots collaborate to develop solutions, address various problems, and identify innovative possibilities for modern human life.

## **DISCUSSION**

Humans have recognized the possibility of using technology as a tool of advancement since the first IR. Steam machines, assembly lines, and computers are just a few of the technological developments that have occurred over the previous several centuries, all to

produce more powerful technology and enhance productivity and effectiveness. IR 5.0 shifts the paradigm and ushers in a revolution by putting less emphasis on technology and assuming that the ultimate potential for advancement resides in human-machine cooperation. IR 5.0 is not a passing trend, but rather it's a manufacturing paradigm change with ramifications for productivity, economics, and commerce. Due to the competitive benefits that the IR 5.0 model offers, organizations that do not adapt their production to this model will quickly become outdated.

## **EXPLORING THE DIGITAL HORIZON: CURRENT TRENDS AND FUTURE DIRECTIONS OF AI IN HIGHER EDUCATION**

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### **Abstract**

*The integration of Artificial Intelligence (AI) into higher education is reshaping traditional teaching and learning methods, marking a new era of transformative innovations. This abstract provides an overview of the multifaceted impact and future potential of AI in higher education. It explores AI's diverse applications, including personalized learning and adaptive assessment systems. By leveraging data-driven insights, AI promotes individualized education environments that cater to various learning styles and student needs. Additionally, AI-powered virtual teaching assistants enhance educational experiences by offering on-demand support and fostering interactive learning environments. AI also streamlines administrative operations, optimizing resource allocation and enhancing institutional efficiency overall. Ethical considerations associated with AI implementation, such as fairness, transparency, and privacy in educational AI systems, are examined in this study. Looking forward, the paper outlines future prospects for AI in higher education, envisioning ongoing advancements in adaptive technologies, collaborative learning environments, and the seamless integration of emerging technologies like virtual and augmented reality.*

*In conclusion, this study underscores the importance of continuous research, professional development, and strategic planning to fully harness AI's potential in shaping the future landscape of higher education.*

**Keywords:** *Artificial intelligence, transformative innovations, higher education, adaptive technologies, ethical consideration.*

### **1. INTRODUCTION**

*"As educators, our responsibility is to harness AI's potential for positive impact, shaping a future where technology and empathy unite to nurture enlightened minds."*

Artificial Intelligence (AI) is swiftly revolutionizing higher education, offering exciting prospects for personalized learning, enhanced student outcomes, and innovative teaching methods. The incorporation of AI technologies within higher education institutions holds promise for enriching teaching and learning experiences, streamlining administrative tasks, and delivering tailored support to students.

**Personalized Learning:** AI-driven systems can analyze student data, such as learning preferences and strengths, to customize educational content and experiences according to individual needs. Imagine an AI tutor that adjusts its teaching approach in real-time, offering targeted assistance and optimizing learning efficiency.

**Intelligent Feedback and Assessment:** AI enables automatic grading of essays, quizzes, and other assignments, providing students with immediate feedback and insights into their performance. This allows educators more time for personalized interactions and guidance. **Virtual Labs and Simulations:** AI-powered virtual labs and simulations enable students to explore and learn in controlled environments, replicating real-world scenarios and intricate systems. This is especially valuable in fields like science, engineering, and medicine.

**Enhanced Accessibility:** AI tools can offer real-time captioning for lectures, language translation, and personalized interfaces for students with disabilities, promoting inclusivity and making higher education accessible to all.

In summary, by leveraging AI thoughtfully, educators can advance learning outcomes, foster innovation, and create a more inclusive educational environment that prepares students for future challenges and opportunities.

## **2. REVIEW OF LITERATURE**

The 21<sup>st</sup> century has witnessed profound transformations in digital technology, offering substantial benefits for information exchange and communication. These advancements have created a new environment ripe with opportunities for skills utilization. The study explores the potential applications of AI and robotics in higher education, examining the challenges and opportunities they present (Alzu'bi, Younis, et al., 2018). AI has now firmly established itself as a pivotal component of the digital landscape, playing integral roles in both general and higher education contexts, as highlighted by Edtech (2020). Its effectiveness is evident in tasks such as email filtering, advertising, applications, YouTube, and virtual assistants like Google. Moreover, AI is extensively integrated into digital libraries, Google Scholar, and other research engines across global higher education institutions (García-Vélez et al., 2021).

However, the resilience of AI, as discussed by Ma and Siau (2018), varies from fragility in limited, structured tasks like data collection to robustness when it can perform complex cognitive tasks akin to humans (Beight & Reddell, 2005). Despite its indispensable role, concerns persist about AI's potential threats to human civilization, a viewpoint shared by prominent figures such as Bill Gates, Elon Musk, and Stephen Hawking (Ma & Siau, 2018).

While these insights are crucial, they invite scrutiny, as further exploration is warranted, given the elusive nature of truth.

**3. OBJECTIVES:** The research questions addressed in this article are: What are the effects of AI on higher education, and conversely, how will higher education influence AI?

The specific objective in par with the primary objectives are as follows:

1. To assess the impact of AI on higher education.
2. To explore AI's effects on learning and teaching methodologies.
3. To forecast the implications of AI for graduates' careers.

#### **4. RESEARCH METHODOLOGY**

**4.1. Research Design:** In this research paper, objectivism serves as the philosophical framework, given that the gathered data relies on perceptions, emotions, and personal experiences. The study has adopted a descriptive survey design where an attempt has been made through the research to find out the magnitude of research areas stated in the objectives with the help of a structured questionnaire. The study was conducted in Bengaluru city where the audience includes academic staff, students, managers, and decision-makers with diverse cultural and educational backgrounds. Since the study is a pilot study the target sample size is 80 out of which 35 men, 45 women between the age group of 20 to 45 years which is selected through random sampling method and the data was collected through structured questionnaires.

**4.3. Data Analysis Tools:** Questionnaire: - A structured questionnaire was created for this current study. A Five-point Likert scale was used for few research questions with 1 being strongly disagree and 5 being strongly agreeing of the scale. The data was analyzed using the statistical package SPSS Descriptive statistics was used to describe and summarize the properties of the mass of data collected from the respondents.

**4.3 Limitations of the study:** The study has been limited to institutions and teachers from commerce and management streams in Bengaluru city, The other stream of education i.e., science, Arts/humanities are not taken into consideration

Due to the time constraint the sample size was small.

**5. RESULTS AND FINDINGS:** The data was analyzed using SPSS software where descriptive analysis was taken into consideration. The survey results indicate that AI will have a substantial impact on various aspects of higher education, including learning and teaching methods, assessment and grading processes, skills essential for future work, and the trajectories of graduate careers.

##### **5.1. AI impacts on higher education**

The study clearly indicates the concern of 72.5% have expressed that AI impacts higher education with yes while 22 people with 27.5% are neutral and an indication that there is high



degree of impact of AI in Higher education. This also envisages for a major concern that AI indeed has a greater impact on Higher education.

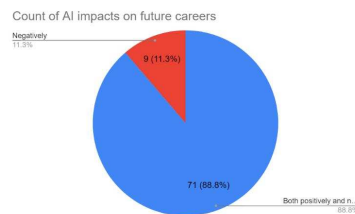
### 5.2 Better usage of technology by AI when compared to humans

It is observed that majority are neutral with the thought when AI can be much better than humans, however the disagreement on the other end takes the lower-end which is of a concern too.

### 5.3 Effectiveness of AI in assessments and accuracy when compared to humans.

The study shows around 74 respondents feel that AI has better scope in providing accurate and effective in grading than humans. This shows the future can be more of AI driven in higher education.

### 5.4 AI impacts on future careers



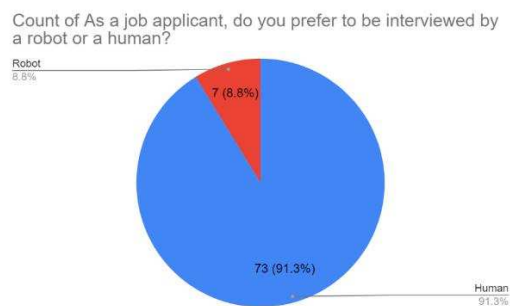
*AI impacts on future careers*

The chart clearly indicates AI has driven the education system and that future careers can be easily impacted in a positive way with 88.8% have envisioned for a positive growth.

### 5.5 Dominance of AI in empowering students in teaching new skills

The responses imply that there is a need to learn and acquire new skills for future jobs could be AI driven as 67.5% have agreed, while 7.5% have indicated it is not necessary to have jobs that are AI dictated per say.

### 5.6 A choice between humans and robots during interviews



*A choice between humans and robots during interviews*

This chart is quite evident from previous responses though people have agreed that AI does have a significant impact on higher education, however from the job seekers 91.3% of respondents are more prone to be interviewed by humans over technology.

**5.7 Factors for shortlisting criteria**In addition to the previous responses the trailing effect is that people feel that no matter the technology and its upgradation the process of shortlisting candidates at the time of recruitment to be manually done rather than automation process. 91.3% have agreed and responded to the manual process.

**5.8 Concepts that will be impacted by AI**

The concepts comprising Ethics, Cognitive abilities, humanities can be impacted by AI. Unanimously 81.3% have opted for all the concepts while 18.8% have agreed for cognitive abilities. On the whole people do understand that these concepts will have a major impact.

**5.9 Replace academic staff with robots**

The chart shows close to 80% disagree that academic staff should be replaced with robots. This in contrast while none have mentioned the staff have to be replaced by robots. This implies the higher education system to be driven by people rather than robots and man-made technology.

**6. RECOMMENDATION:** Based on the findings and concerns detailed in this research paper, the researcher suggests that the integration of AI into higher education should become a standard practice across all institutions. However, effective utilization of AI necessitates comprehensive training for academic staff to equip students with the skills required to navigate future career challenges. Additionally, the researcher advocates for prioritizing ethics and human values in AI education, underscoring their crucial role as safeguards against potential threats posed by AI to humanity. Furthermore, safeguarding privacy and dignity through regulations and international laws is essential, as unchecked AI could encroach upon human liberties. Ultimately, higher education institutions must maintain oversight over AI to ensure it enhances rather than diminishes human welfare and dignity.

**7. CONCLUSION:** This research paper explored the influence of AI on higher education, emphasising its human, ethical, and cognitive implications for the broader future of humanity, particularly in relation to students and their future careers. As a result, AI significantly influences the learning and teaching processes. For instance, a significant portion of the participants express the belief that AI surpasses humans in efficiency when it comes to learning and teaching.

## AI ENABLED LIFE – A PARADIGM SHIFT

**Dr. G. JOHN**, *Head and Associate Professor, Department of Commerce, St. Joseph's College, Tiruchirappalli-2*

### Introduction

The integration of AI into our daily lives is not just a trend but a paradigm shift that's redefining how we live our lives today. Thanks to the growth of knowledge over the different phases of Industrial Revolution 1.0 to Industrial Revolution 5.0. Knowledge Doubling Period (KDP) has been decreasing exponentially over time due to the advancement in ICT and continuous research. The concept of the "Knowledge Doubling Period" refers to the amount of time it takes for the total amount of human knowledge to double. In early 20<sup>th</sup> Century KDP was estimated to be 100 years. In 1940s, the KDP was about 20 years. Subsequently, in 1980s KDP was around 12 years that accelerated to 1-2 years in 2000. But now, it is said to double every 73 days. Thanks to various phases of Industrial Revolution and scientific advancement. This phenomenal acceleration in KDP was achieved mainly due to a) Technological Advancement, b) Internet and Digital Communications, c) Globalisation and Connectivity, d) Big Data and Artificial Intelligence and e) Open Access to publishing and data. The evolution from Industry 1.0 to Industry 5.0 represents significant advancements in technology and manufacturing processes, with AI playing a crucial role in the latest stages. AI has not impacted just production process alone, but every sphere of life.

### CONCEPTUAL CLARIFICATION

**a. Artificial Intelligence:** AI is a branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. It involves the use of computers and machines to mimic the problem-solving and decision-making capabilities of the human mind.

**b. Generative AI (GAI):** Generative AI is designed to create new content. Based on the patterns and data they have been trained on, they can produce text like parts of this column, images, music, and more. Prominent examples include ChatGPT that generates human-like text, and DALL-E, which creates images from textual descriptions.

**c. Artificial General Intelligence (AGI):** AGI is AI with capabilities that rival those of a human. This is a type of AI that aims to replicate human cognitive abilities across a wide range of tasks. Unlike narrow AI, which is designed for specific tasks, AGI would be capable of understanding, learning, and applying knowledge in a manner similar to a human being. AGI would have the capability to perform any intellectual task that a human can, including reasoning, problem solving, perception and language comprehension. Succinctly, AGI can understand, communicate, and act with the same nuance and sensitivity of human which is at present a farfetched reality.

## **AI – ANYWHERE AND EVERYWHERE**

Though AI has existed since the 1950s, its recent applications have been remarkable. These are some examples of AI's expanding influence on everyday activities, across industries and verticals. From the moment we wake up to the time we lay our heads to rest, AI is quietly working behind the scenes to make our daily experiences smoother, smarter, and more enjoyable.

**Taxi booking apps:** Take the case of taxi-booking apps like Uber. It just ensures 'a ride is just minutes away'! AI achieves this by analysing historical data to efficiently allocate drivers. Advanced algorithms predict demand patterns using historical and external data, optimising driver allocation to high-demand areas.

**Voice assistants:** Consumer acceptance of this technology is growing, particularly in healthcare sector where voice assistants are used to detect diseases through vocal biomarkers. Voice-based chatbots also support telehealth applications for triage and screening. Digital assistants like Siri, Google Home, and Alexa use AI-powered Voice User Interfaces (VUI) to process and interpret voice commands. AI enables these applications not only to understand voice instructions but also to access extensive databases stored in cloud platforms. This allows them to quickly analyse vast amounts of data to complete tasks and provide personalised search results.

**ChatBots and VoiceBots:** Remember Disha 2.0! This is a typical and practical example of application of AI in action, evolving from simple rule-based systems to sophisticated conversational agents like ChatGPT. AskDISHA 2.0, developed by CoRover.ai, assists users in performing various transactions related to Indian Railways. There are many such ChatBots and VoiceBots doing rounds like Meena, BlenderBot, Rose AI, Siri, Google Assistant, Amazon Alexa etc. ChatBots are text based and VoiceBots are voiced based. These systems makes use of technologies such as NLP and machine learning to comprehend user queries, context, and intent. They provide personalised responses, guide users through complex processes, and learn from interactions to improve continuously.

**Entertainment streaming Apps:** Streaming services like Netflix, Hulu, Spotify, YouTube, and TikTok use AI algorithms to provide personalized content recommendations to users. These algorithms analyze users' viewing or listening history, preferences, and behaviors to suggest tailored content, enhancing the overall user experience. These platforms analyze user interactions to recommend personalized content. AI processes vast amounts of user data to create tailored catalogues of music, movies, and TV shows. AI also plays a crucial role in ensuring uninterrupted streaming by automatically allocating servers and adjusting bandwidth based on media popularity.

**Personalized marketing:** Today, marketing has become highly personal. Thanks to AI. Brands leverage AI-driven personalization solutions to engage customers effectively. By

analysing customer data, AI tailors marketing campaigns, emails, and recommendations, enhancing customer satisfaction and driving conversions. AI innovations in marketing include using computer vision to predict ad performance and creating logos that resonate with target audiences.

**Image recognition through google lens:** Image recognition is the ability of computers to identify and classify specific objects, places, people, text, and actions within digital images and videos. It's a crucial application of computer vision, which enables machines to "see" and understand visual data. Example for this is Google Lens. It utilizes AI to recognize objects, landmarks, and text in images. It employs Optical Character Recognition (OCR) technology to extract and interact with text, such as translating foreign language signs or saving business card information as contacts.

**Social media algorithms:** If you are in social media, you do not exist and considered 'dead'. Almost all of us are hooked to it. Platforms like Instagram, Facebook, and YouTube use AI algorithms to personalise user experiences. These algorithms analyse user behaviour to curate content feeds, suggest connections, and display targeted ads. Machine learning models also ensure platform safety by identifying and filtering inappropriate content.

**Smart input keyboards:** You don't have to worry about your 'poor spelling' today. AI-powered mobile keyboard apps enhance user experience with features like autocorrection, language detection, and predictive typing. These apps use machine learning algorithms to understand context and predict words accurately, supporting over 300 languages and dialects.

**Fraud detection in banking:** Financial institutions use AI-driven systems for real-time transaction monitoring and fraud detection. AI analyses transaction patterns and behaviours to detect anomalies and potential fraudulent activities, enhancing security in online banking.

**Navigation and travel:** If you don't use Google Maps you are lost. Sometimes, you are lost when you use it too. Navigation apps like Google Maps utilise AI to analyse real-time traffic data and optimise routes for users. AI-driven models improve route accuracy and provide updates based on satellite imagery and geographical data.

**Gamified therapy:** AI-powered gaming applications are designed to gauge users' mental states and provide therapeutic benefits. Virtual reality (VR) headsets enhance engagement in cognitive behavioural therapy (CBT), adapting gameplay based on user behaviour.

**Fall detection and car crash detection:** Wearable devices use AI algorithms to detect falls and monitor driving behaviours for potential accidents. AI enhances safety features in vehicles by analysing surroundings and predicting collisions.

**Self-driving vehicles:** AI advancements enable autonomous vehicles to operate independently using deep reinforcement learning and simultaneous localization and mapping (SLAM). These vehicles navigate environments, predict obstacles, and improve road safety.

**Facial recognition technologies:** Facial recognition technology, integrated into smartphones and security systems, uses AI to unlock devices and enhance security. AI reduces bias and improves accuracy in facial recognition software, supporting applications in various industries.

**AI-driven speech recognition:** AI enhances speech recognition in applications like Google Recorder and Live Captions, transcribing spoken words into text in real-time. These features improve accessibility and user engagement with multimedia content.

**Security and surveillance:** AI video monitoring systems analyse surveillance footage to detect irregular behaviour and enhance security in public places. AI-driven facial recognition software identifies individuals and prevents privacy breaches.

**Email filtering:** AI-driven email filtering systems detect and filter spam, organise emails into folders, and improve communication efficiency with predictive typing and autocorrect features.

**AI Image generators:** Generative AI models like DALL-E create unique images based on textual prompts, supporting creative design and visual content creation in various industries.

**Weather prediction:** AI-powered meteorological models analyse weather data to offer accurate forecasts and real-time updates for planning daily activities.

**Internet of Things (IoT):** AI enhances IoT devices by analysing sensor data and improving device responses to human stimuli, enabling smarter home appliances and automated tasks.

### **PREDICTIVE AI (a sub set of GAI)**

Predictive AI refers to artificial intelligence systems designed to make forecasts about future events, trends, or behaviors based on historical data. These systems use machine learning algorithms, statistical techniques, and data analysis to identify patterns and make informed predictions. Predictive AI is widely used in various industries to improve decision-making, optimize operations, and enhance strategic planning. Some of the applications are:

#### **1. Finance**

1. Stock Market Prediction, Forecasting stock prices and market trends
2. Risk Management-Identifying potential risks
3. Fraud Detection

#### **2. Healthcare**

1. Disease Prediction- Predicting the likelihood of diseases and patient outcomes.
2. Resource Optimization-Anticipating patient admission rates and optimizing hospital resources.
3. Patient Readmission Risk
4. Personalized Treatment Plans

#### **3. Retail and E-commerce**

1. Customer Behavior-Predicting purchasing patterns and customer preferences.

2. Inventory Management
3. Forecasting product demand to optimize stock levels
4. Churn Prediction

#### **4. Manufacturing**

1. Predictive Maintenance-Anticipating equipment failures to schedule timely maintenance.
2. Quality Control- Predicting defects in products and improving manufacturing processes.

#### **5. Marketing**

1. Customer Segmentation - Identifying target customer groups for personalized marketing.
2. Campaign Effectiveness - Predicting the success of marketing campaigns.
3. Sales Forecasting

#### **6. Transportation and Logistics**

1. Traffic Prediction - AI systems analyze traffic patterns to predict congestion and suggest optimal routes for drivers.
2. Fleet Management - Predictive models forecast vehicle maintenance needs and optimize fleet operations for logistics companies.
3. Demand Prediction for Ride-Hailing Services- Companies like Uber use AI to predict rider demand in different areas and times, optimizing driver allocation.

#### **7. Energy**

1. Energy Consumption Forecasting - Utilities use predictive AI to forecast energy demand, optimizing energy production and distribution.
2. Predictive Maintenance for Power Plants- AI predicts equipment failures in power plants, enabling proactive maintenance and reducing downtime.
3. Renewable Energy Optimization- Predictive models forecast weather conditions to optimize the use of renewable energy sources like solar and wind power

#### **8. Agriculture**

1. Crop Yield Prediction: AI models predict crop yields based on weather patterns, soil conditions, and farming practices, helping farmers make informed decisions.
2. Pest and Disease Forecasting: Predictive AI analyzes environmental data to forecast pest infestations and disease outbreaks, enabling timely interventions.
3. Resource Optimization: AI predicts the optimal use of water, fertilizers, and other resources to maximize crop productivity and sustainability.

#### **9. Insurance**

1. Claims Prediction: Insurance companies use predictive models to estimate the likelihood of claims, adjusting premiums and managing risk accordingly.

2. Customer Lifetime Value Prediction: AI predicts the long-term value of policyholders, helping insurers tailor their offerings and improve customer retention.
3. Fraud Detection: Predictive AI identifies potentially fraudulent insurance claims, protecting companies from significant financial losses.

**Conclusion:** The list is endless. Our lives are defined and redefined continuously as AI continues to advance. AI is here to stay and makes our lives better and smarter. It has become inseparable part of our lives. We can't avoid lest we may become archaic. The only way is to make better use of it. Smart homes equipped with AI-driven systems can adjust lighting, temperature, and security settings according to your preferences. Autonomous vehicles promise safer and more efficient commuting experiences. Predictive analytics can optimize supply chains, reducing waste and ensuring goods reach you when you need them. By streamlining routine tasks, personalizing experiences, revolutionizing healthcare, enhancing communication, and fuelling creativity, AI is opening doors to a more convenient, efficient, and tailored existence. Use it prudently, otherwise your mere existence will be a question mark!

## **INDUSTRY 5.0: SUSTAINABLE HEALTH AND ENVIRONMENT PROTECTION**

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### **Abstract**

The concept of doing business with a focus on sustainable health and environmental protection encompasses a wide range of practices and principles. It involves making strategic decisions that prioritize the long-term well-being of employees, communities, and ecosystems, while still maintaining economic viability. This approach recognizes that the health of people and the planet are inextricably linked, and that businesses have a crucial role to play in addressing global challenges such as climate change, resource depletion, and public health crises. This article explores the importance and implementation of sustainable health and environment protection focused business practices.

### **INTRODUCTION**

This article aims to give a clear understanding of the undercurrents in the current business landscapes and helps the reader to navigate the complex landscape of sustainability and environment/health-focused business practices. To effectively implement a business model focused on sustainable health and environmental protection, it's crucial to have a clear understanding of these concepts and how they intersect with business operations.

#### *Defining Sustainable Health*

Sustainable health refers to a state of complete physical, mental, and social well-being that can be maintained over the long term without depleting resources or causing harm to



individuals or communities. In a business context, this encompasses employee health and well-being programs, occupational safety measures, products and services that promote consumer health, community health initiatives.

*Defining Environmental Protection*

Environmental protection involves safeguarding the natural world and its resources from harm or degradation. For businesses, this includes reducing carbon emissions and energy consumption, minimizing waste and pollution, conserving natural resources, protecting biodiversity, implementing sustainable sourcing practices.

*The Intersection of Business, Health, and Environment*

The relationship between these three domains is complex and multifaceted. Sustainable practices often lead to more efficient use of resources, benefiting both the environment and the business's bottom line. Consumers, employees, and investors increasingly expect businesses to prioritize health and environmental considerations. Business decisions can have far-reaching effects on both human health and environmental systems, creating a ripple effect throughout society. The need for sustainable solutions can spur innovation, leading to new products, services, and business models propelling a circular economy. By understanding the various interrelationships, businesses can begin to develop strategies that holistically address health and environmental concerns while maintaining economic viability. This integrated approach forms the foundation for a truly sustainable business model that can thrive in a "VUCA" world.

**KEY AREAS OF FOCUS**

Transitioning to a business model that prioritizes sustainable health and environmental protection requires a systematic approach. When building and implementing a business model focused on sustainable health and environmental protection, there are several key areas that companies typically need to address. [1] Driving Energy Efficiency and Renewable Energy adoption. [2] Waste Reduction and Circular Economy [3] Sustainable Supply Chains [4] Focus on Employee Health, Well-being and Work Life Balance [5] Product Innovation for Sustainability [6] Water Conservation and Management [7] Biodiversity and Ecosystem Protection [8] Transportation and Logistics Optimization [9] Green Building and Facilities Management [10] Community Health Initiatives.

By focusing on these key areas, businesses can create a comprehensive approach to sustainable health and environmental protection. It's important to note that the specific focus areas may vary depending on the industry and the unique challenges and opportunities each business faces.

## **IMPLEMENTATION OF A SUSTAINABLE HEALTH AND ENVIRONMENT FOCUSED BUSINESS MODEL**

The implementation of the business model for a sustainable business needs to have a strong leader sponsorship inside the organization. The sustainability focus should be spelt clearly in their mission statement with clear ambitious goals and metrics set like being carbon neutral by 2025 etc. Active stakeholder engagements, particularly customers, in complementing sustainability efforts must be part of the corporate culture. Sustainability must be integrated into every aspect of their business, from product design to marketing campaigns and should be deeply embedded in their corporate culture, influencing everything from employee benefits to political activism.

Organizations must draw inspiration from successful businesses to effectively transition to a model that prioritizes sustainable health and environmental protection.

### **CHALLENGES TO IMPLEMENTATION**

While the benefits of adopting a sustainable and health-focused business model are clear, companies often face significant challenges in implementation.

Some common obstacles:

[1] *Short-Term Cost Increases*: Many sustainability initiatives require upfront investments, which can be difficult to justify to shareholders focused on short-term profits. [2] *Lack of Internal Expertise*: Many companies lack the specialized knowledge required to implement comprehensive sustainability strategies. [3] *Supply Chain Complexity*: For many businesses, a significant portion of their environmental impact occurs in their supply chain, which can be difficult to influence and monitor [4], *Measuring Impact/outcomes*: Quantifying the results of sustainability initiatives, especially social impact, can be challenging. [5] *Changing Consumer Behaviour*: Even when companies offer sustainable products, convincing consumers to change their habits can be difficult [6] *Regulatory Uncertainty*: Changing environmental regulations can make long-term planning difficult [7] *Balancing Multiple Stakeholder Interests*: Different stakeholders (employees, customers, investors, communities) may have conflicting sustainability priorities [8] *Maintaining Momentum and enthusiasm*: After initial enthusiasm, sustainability efforts can lose steam, especially during economic downturns.

**SOLUTIONS:** All business must aim to integrate with the global community and work on the <sup>7</sup>United Nations Sustainable Development Goals (SDG) within their regulatory framework in their respective countries. We can adopt some strategies to overcome the challenges while implementing a sustainable business model. We need to emphasize on long-term cost savings, risk mitigation in financial projections and implement gradual changes to spread costs over time. We need to invest in hiring sustainability experts, training and development for existing staff. We need to partner with NGOs or academic institutions for

knowledge transfer. Clear supplier codes of conduct must be developed and collaboration with suppliers on initiatives to help them be compliant with sustainability requirements needs to be undertaken. Align and Adopt standardized reporting frameworks like <sup>8</sup>Global Reporting Initiative (GRI) or standards like <sup>9</sup>Sustainability Accounting Standards Board (SASB). Use behavioural economics principles in marketing sustainable products and educating consumers about benefits of sustainable choices. Engage in policy discussions, advocacy and implement strategies that go beyond compliance to create a buffer against future regulations. Conduct regular stakeholder engagement sessions and communicate transparently about trade-offs and decision-making processes. Embed sustainability into core business strategy, articulate performance metrics and make environmental activism a core part of brand identity and corporate culture. By anticipating these challenges and implementing targeted solutions, businesses can more effectively navigate the transition to a sustainable and health-focused model. It's important to remember that this is an on-going process that requires continuous adaptation and improvement.

#### **FUTURE TRENDS**

Doing business with a mind-set aimed towards sustainable health and environmental protection is no longer just an ethical choice—it's becoming a fundamental aspect of successful business strategy in the 21st century. Several emerging trends are likely to shape the landscape of sustainable and health-focused business practices in near future.

1. Artificial Intelligence (AI) for Sustainability: AI and machine learning are increasingly being applied to environmental and health challenges. New tools help optimizing energy consumption in buildings and industrial processes, predicting and mitigating environmental risks, personalizing health interventions for society.

Doing business with a mind-set aimed towards sustainable health and environmental protection is no longer just an ethical choice—it's becoming a fundamental aspect of successful business strategy in the 21st century. Several emerging trends are likely to shape the landscape of sustainable and health-focused business practices in near future.

1. Artificial Intelligence (AI) for Sustainability: AI and machine learning are increasingly being applied to environmental and health challenges. New tools help optimizing energy consumption in buildings and industrial processes, predicting and mitigating environmental risks, personalizing health interventions for society.

2. Circular Economy Business Models: The shift from a linear "take-make-waste" model to a circular economy is gaining momentum. Design thinking and design for recyclability, reusability are becoming standard practice, spurt in growth of repair and refurbishment services, <sup>15</sup>legislations like “right to repair directive(R2RD)” have been enacted in EU parliament. The Indian government has started a <sup>16</sup>portal under Ministry of Consumer Affairs.

3. **Regenerative Business Practices:** Going beyond sustainability to actively restore, regenerate ecosystems, creation of carbon negative product lifecycles and elimination of carbon footprints in supply chains.
4. **Holistic Health, Well-being Programs:** Companies are adopting more comprehensive approaches to employee and community health thereby addressing social determinants of health in community initiatives, promoting usage of wearable technology and data analytics for personalized health interventions.
5. **Climate Resilience Planning:** As climate change impacts become more severe, businesses are focusing on adaptation alongside business risk mitigation decisions like investments in resilient infrastructure and supply chains.
6. **Sustainable Finance Innovation:** New financial instruments like green bonds, sustainability-linked loans and integration of ESG factors into mainstream investment decisions are emerging to support sustainable business models.
7. **Transparency & Traceability:** Increasing demands for corporate transparency are driving new practices like Block chain for supply chain traceability, real-time sustainability reporting and consumer facing product impact labelling.
8. **Collaborative Ecosystems:** Complex sustainability challenges are driving increased collaboration, cross-sector partnerships and industry-wide initiatives to address shared challenges.
9. **Personalized Sustainability:** Technology is enabling more personalized approaches to sustainability like AI-driven recommendations for sustainable choices, gamification of individual sustainability efforts like the case of <sup>17</sup>Ant Forest, a feature in Alibaba's Alipay app, has engaged over 500 million users in reducing their carbon footprint through gamification.

These trends indicate a future where sustainability and health considerations are deeply embedded in business strategies, operations, and innovations. Companies that anticipate and adapt to these trends are likely to be better positioned for long-term success.

## **CONCLUSION**

In conclusion, the shift towards sustainable and health-focused business practices is not just a trend, but a fundamental reimagining of the role of business in society and its relationship with the natural world.<sup>7</sup> The global market for sustainable products is projected to reach \$150 billion by 2025, growing at a CAGR of 8.4%. As we face unprecedented global challenges, from climate change to public health crises, businesses have both the responsibility and the opportunity to be a force for positive change. Those that successfully navigate this transition will not only contribute to a healthier planet and population but will also be better positioned to thrive in the economy of the future. For businesses yet to fully embrace sustainable and health-focused practices, the time to act is now. The risks of inaction can have an adverse effect on businesses losing their competitive advantage in the markets and becoming irrelevant.

## **IMPACT OF DIGITAL TRANSFORMATION ON RISK MANAGEMENT STRATEGIES IN BUSINESS**

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### **ABSTRACT**

*The main aim of the study is to know the impact of digital transformation on risk management strategies in business. The research employs a mixed-method approach, integrating both qualitative and quantitative analyses. The study is grounded in surveys, interviews, and a comprehensive examination of secondary literature. The findings of this study are anticipated to provide actionable insights for policymakers, industry leaders, and support organizations. By understanding the challenges faced by entrepreneurs in adopting digital technology, stakeholders can formulate targeted interventions, policies, and initiatives that foster a conducive environment for digital entrepreneurship in Tamil Nadu. Ultimately, this study aspires to contribute to the sustainable and inclusive growth of the entrepreneurial ecosystem in the digital era. Through process analysis is the important tools and techniques used in identifying risks and occupies the first rank, Through brainstorming is the next important tools and techniques used in identifying risks and occupies the second rank, Audits or physical inspection is the third important tools and techniques used in identifying risks and occupies the fourth rank and through scenario analysis is the last tools and techniques used in identifying risks and occupies the last rank.*

**Key Words:** Digital Transformation, Risk Management Strategies, Brainstorming and Process Analysis

**INTRODUCTION:** Nowadays, digital transformation is imperative for all businesses. Due to the variety of digital technologies that have been developed over time, which allowed for constant communication between objects and people as well as new methods of creating and processing data, the central paradigm of the digital transformation has emerged. Risk-taking is an important part of corporate strategic decision-making, reflecting the risk appetite of enterprises when considering investment projects. Enterprises, as economic subjects, play a prominent role in promoting economic and social development. Meanwhile, Risk selection is the key to enhancing the core competitiveness of enterprises and promoting high-quality economic development. The increase in the risk-taking level and the pursuit of excessive profits are also the driving force for sustainable economic growth. Therefore, a reasonable level of corporate risk-taking can help enterprises make decisions to take risks and seize

investment opportunities in order to obtain excess profits, promoting the improvement of corporate performance and enhancing the core competitiveness of enterprises. However, due to the uncertainty of the environment and the opacity of information, managers often tend to choose conservative investment projects under the guidance of risk aversion motives, so that enterprises are at a lower level of risk taking, which in the long run will reduce the survival motivation and vitality of enterprises, and thus be eliminated by the market. The application of digital technology can promote the improvement of enterprise innovation level, make full use of enterprise resources, enhance enterprise value, and increase the willingness of enterprises to take risks in investment activities. On the other hand, digital transformation uses artificial intelligence, cloud computing, block chain, and other digital technologies to break the limitations of time and space through data integration and all-round changes to economic factors, to monitor and warn production and operation around the clock, and to create a favorable environment for the improvement of enterprise risk-taking level. Therefore, under the trend of the digital economy era, it is of great theoretical and practical value to explore the influence mechanism between digital transformation and corporate risk-taking.

#### **LITERATURE REVIEW**

Godson K. Mensah, Werner D. Gottwald, (2016) have carried out a non-experimental approach for identify the correlations between influence of Chief risk officer, audit committee & support of top management in implementation of Enterprise risk management. Correlations Results shown by them are strongly positive between Chief risk office & audit committee.

Farah Salwati Ibrahim, Muneera Esa (2017) have conducted a critical review in Enterprise Risk Management in construction industry focusing housing property sector of Malaysia to identify the strength & weakness of the firm to provide better solution to strategy decision makers for improve performance level of the organization.

Linshan Li (2018) has carried out the detail study within 12 organizations, to find detailed relationship between ERM & Firms performance. Among twelve organizations, five companies have separate board of Risk Committee and four companies have audit committee, three doesn't have ERM on board.

**RESEARCH METHODOLOGY:** The research employs a mixed-method approach, integrating both qualitative and quantitative analyses. The study is grounded in surveys, interviews, and a comprehensive examination of secondary literature.

**SIGNIFICANCE OF THE STUDY:** The findings of this study are anticipated to provide actionable insights for policymakers, industry leaders, and support organizations. By understanding the challenges faced by entrepreneurs in adopting digital technology, stakeholders can formulate targeted interventions, policies, and initiatives that foster a conducive environment for digital entrepreneurship in Tamil Nadu. Ultimately, this study aspires to contribute to the sustainable and inclusive growth of the entrepreneurial ecosystem in the digital era.

**OBJECTIVES OF THE STUDY**

1. To identify the tools and techniques used in identifying risks
2. To know the risk assessment strategies

**ANALYSIS AND INTERPRETATION**

**Table 1**  
**Formulation of risk plan**

<b>Sl. No</b>	<b>Formulation of risk plan</b>	<b>Mean Score</b>	<b>SD</b>	<b>Rank</b>
1.	The organization has a risk treatment (action) plan	3.7690	.71566	VIII
2.	The responsibility for risk management is documented and understood throughout the organization	3.7405	.70578	IX
3.	For attainment of organizational objectives, effective risk management system is important	3.8595	.68519	V
4.	Effective risk management can improve organization's performance	3.8810	.70465	IV
5.	To a great degree organization developed a close link between its strategic objectives and management of risks [e.g. risk identification is conducted during strategic planning]	4.0214	.64221	I
6.	Management has documented its attitude on risk management for the benefit of all staff	3.8219	.70803	VI
7.	The accountability (responsibility) for risk management within organization is formulated, documented and communicated	3.8929	.69464	III
8.	While formulating the risk plan, organization, is able to allocate appropriate resources in support of risk management policy, and risk management practices	3.9048	.65578	II
9.	Overall, the culture of organization tends to reflect a risk taking or risk averse attitude	3.7738	.67959	VII

Source: Computed data

Table 1 highlights the mean and standard deviation of the sample respondents with regard to formulation of risk plan. To a great degree organization developed a close link between its strategic objectives and management of risks [eg risk identification is conducted during strategic planning] is the important formulation of risk plan and occupies the first rank with the mean score of 4.0214, while formulating the risk plan, organization, is able to allocate appropriate resources in support of risk management policy, and risk management

practices is the next important formulation of risk plan and occupies the second rank with the mean score of 3.9048, the accountability (responsibility) for risk management within organisation is formulated, documented and communicated is the third important formulation of risk plan and occupies the fourth rank with the mean score of 3.8929 and the responsibility for risk management is documented and understood throughout the organization is the last formulation of risk plan and occupies the last rank with the mean score of 3.7405.

**Table 2**  
**Tools and techniques used in identifying risks**

Sl. No	Tools and techniques used in identifying risks	Mean Score	SD	Rank
1.	Audits or physical inspection	4.0762	.71058	III
2.	Through brainstorming	4.1690	.66087	II
3.	Through SWOC (strengths, weaknesses, opportunities, Challenges) analysis	3.9238	.71393	VI
4.	Through interview / focus group discussion	3.9548	.76333	IV
5.	Through scenario analysis	3.8190	.76350	VIII
6.	Through past organizational experience	3.9262	.71251	V
7.	Through process analysis	4.2095	.65098	I
8.	Through a combination of tools	3.7108	.79414	VII

Source: Computed data

Table 2 highlights the mean and standard deviation of the sample respondents with regard to tools and techniques used in identifying risks. Through process analysis is the important tools and techniques used in identifying risks and occupies the first rank with the mean score of 4.2095, Through brainstorming is the next important tools and techniques used in identifying risks and occupies the second rank with the mean score of 4.1690, Audits or physical inspection is the third important tools and techniques used in identifying risks and occupies the fourth rank with the mean score of 4.0762 and through scenario analysis is the last tools and techniques used in identifying risks and occupies the last rank with the mean score of 3.8190.

**Table 3**  
**Risk Assessment Strategies**

Sl. No	Risk Assessment Strategies	Mean Score	SD	Rank
1.	The charter of the Committee includes a risk management and internal control framework	3.8000	.67198	II
2.	The culture of organization tend to reflect a risk taking or risk averse attitude	3.7833	.64679	III



3.	Organization reviews and amends its risk profile resulting from Likelihood, Consequence, financial impact, reputation impact and achievement of objectives	3.8738	.70510	I
4.	The organization's risks assessed by using: a. qualitative analysis methods, quantitative analysis methods, that is identification of a precise level of risk	3.7128	.71441	IV

Source: Computed data

Table 3 highlights the mean and standard deviation of the sample respondents with regard to risk assessment strategies. Organization reviews and amends its risk profile resulting from Likelihood, Consequence, financial impact, reputation impact and achievement of objectives is the important risk assessment strategies and occupies the first rank with the mean score of 3.8738, the charter of the Committee includes a risk management and internal control framework. is the next important risk assessment strategies and occupies the second rank with the mean score of 3.8000, the culture of organization tend to reflect a risk taking or risk averse attitude is the third important risk assessment strategies and occupies the fourth rank with the mean score of 3.7833 and the organization's risks assessed by using: a. qualitative analysis methods, quantitative analysis methods, that is identification of a precise level of risk is the last important risk assessment strategies and occupies the last rank with the mean score of 3.7128.

### CONCLUSION

In conclusion, a study on the issues of using digital technology in entrepreneurship in Tamil Nadu reveals a nuanced landscape marked by both opportunities and challenges. The findings underscore the importance of understanding the specific context of Tamil Nadu' entrepreneurial ecosystem to formulate targeted strategies for leveraging digital technology. Here are key conclusions drawn from the study: The study highlights variations in digital technology adoption across different sectors within Tamil Nadu. While certain sectors may be quick to embrace digital tools, others may face challenges in integrating technology into their business models. Tailored interventions are necessary to address sector-specific needs. A significant barrier to widespread digital technology adoption is the level of digital literacy and skill development among entrepreneurs. The study emphasizes the need for comprehensive training programs that address the specific skills required for effective utilization of digital tools. Disparities in digital infrastructure between urban and rural areas emerge as a critical factor influencing entrepreneurial success. Bridging this gap is imperative to ensure that entrepreneurs in rural areas have equitable access to digital resources, fostering inclusive growth.

## **A COMPARATIVE ANALYSIS OF RISK MANAGEMENT PRACTICES IN PUBLIC AND PRIVATE SECTOR INDUSTRIES**

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### **Abstract**

*The present investigation is a quantitative research to understand the effect of Risk Identification, Risk Assessment, Risk Monitoring and control based on Risk Management practices. It is based on exploratory research inquiry and examines the Risk management System in Public and Private sector industries. The present research is conducted on a sample of 100 employees of public and private sector industries in Kanyakumari District. 50 respondents were chosen from public and private sector industries. The respondents were selected on a judgmental or non-random sampling basis. The study was undertaken in various public and private sector industries based all across Kanyakumari district in different phases. In the first phase, standardized scales to measure Risk Identification, Risk Assessment, Risk Monitoring and control and Risk Management practices were administered on the executives of industries who were working in Risk management departments. In the second phase, the data thus collected was tabulated for the statistical treatment to yield the results of the study. In the final phase, reasons for similarities and differences in Risk management system of public and private sector industries were discussed in the light of available literature. Risk Identification, Risk Assessment, Risk Monitoring and Control are the important aspects in Risk Management System in Public and Private sector industries which in turn affect the Risk management practices of Public and Private sector industries. In order to achieve efficient Risk management system complete Risk management Framework should be monitored and an integrated approach towards Risk management should be followed.*

**KEY WORDS:** Risk Identification, Risk Assessment, Risk Monitoring and control and Risk Management practices

### **INTRODUCTION**

Risk Management means identification, measurement, monitoring and controlling risks in an organization. Risk management framework is important for industries. The risk management strategy must be integrated with its overall corporate strategies (e.g. Froot and Stein, 1994). In conjunction with the underlying frameworks, basic risk management process that is generally accepted is the practice of identifying, analyzing, measuring, and defining the desired risk level through risk control and risk transfer.

- (a) Clearly defined risk management policies and procedures covering risk identification, acceptance, measurement, monitoring, reporting and control.
- (b) Organizational structure with clearly defined roles and responsibilities regarding risk management. Organizations also have separate department of risk management or risk management committee to supervise this function across the organization.
- (c) An effective management information system in order to ensure flow of information from operational level to top management so as to report any deviation when observed.
- (d) Risk management framework develops a mechanism to ensure an ongoing review of the risk management system policies and procedures so that timely revisions are done.

### **LITERATURE REVIEW**

Al-Tamimi (2002) investigated the degree to which the UAE commercial banks use risks management techniques in dealing with different types of risk. The study found that the UAE Commercial banks were mainly facing credit risk. The study also found that inspection by branch managers and financial statement analysis were the main methods used in risk identification. The main techniques used in risk management according to this study were establishing standards, credit score, credit worthiness analysis, risk rating and collateral; the study also highlighted the willingness of the UAE commercial banks to use the most sophisticated risk management techniques, and recommended the adoption of a conservative credit policy. Holmstrom and Tirole (2000) analyzed various ways in which firms in the real and the financial Sectors manage their liquidity needs and developed a unified and optimal contracting approach to the choice of capital structure, liquidity and risk management, and their relationship to the soft budget constraints and free cash flow theories. Wang and Sheng-Yung (2004) studied foreign exchange risk, world diversification and Taiwanese American depository receipts (ADRs). In this study they tried to answer the following question: Should USA investors purchase American depository receipts issued by Taiwanese multinationals? Empirical results indicated that foreign exchange risk is priced in Taiwanese ADRs. Moreover, Taiwanese ADRs were shown to help USA investors diversify their portfolios globally. These findings suggest that Taiwanese ADRs are valid investment tools for USA investors who seek international diversifications.

### **OBJECTIVES OF THE STUDY**

- (i) To know the practices of Risk Identification of public and private sector industries
- (ii) To study the practices of Risk Assessment of public and private sector industries
- (iii) To study the risk management practices of public and private sector industries

### **HYPOTHESES**

H<sub>0</sub>: There is no significant difference between Public and Private sector industries in practices of Risk Identification.

H<sub>0</sub>: There is no significant difference between Public and Private sector industries in practices of Risk Assessment

H<sub>0</sub>: There is no significant difference between Public and Private sector industries in risk management practices

**METHODOLOGY:** The present investigation is a quantitative research to understand the effect of Risk Identification, Risk Assessment, Risk Monitoring and control based on Risk Management practices. It is based on exploratory research inquiry and examines the Risk management System in Public and Private sector industries. The study was undertaken in various public and private sector industries based all across Kanyakumari district in different phases. In the first phase, standardized scales to measure Risk Identification, Risk Assessment, Risk Monitoring and control and Risk Management practices were administered on the executives of industries who were working in Risk management departments.

**SAMPLING DESIGN:** The present research is conducted on a sample of 100 employees of public and private sector industries in Kanyakumari District. 50 respondents were chosen from public and private sector industries. The respondents were selected on a judgmental or non-random sampling basis.

#### ANALYSIS AND INTERPRETATION

##### Practices of Risk Identification and Practices of Risk Assessment among Public and Private sector industries

The following table shows the relationship between Public and Private sector industries and their Practices of Risk Identification and Practices of Risk Assessment.

**Table 1**  
**Public and Private sector industries and Practices of Risk Identification and Practices of Risk Assessment – “t” Test**

Sl. No	Type of Industry	Risk Identification		Risk Assessment	
		Mean %	S.D	Mean %	S.D
1.	Private	119.48	11.23	90.82	7.68
2.	Public	116.90	11.64	88.11	9.33
Statistical Result ‘t’ Values		2.244			2.169
Level of Significance		p<0.005			p<0.005

Source: Primary data

The mean and standard deviation for the variables namely Practices of Risk Identification and Practices of Risk Assessment based on Public and Private sector industries. Table clearly indicates that the private sector industries have more risk identification (119.48), better risk assessment (90.82), when compared public sector industries. This served difference between type of industries and Practices of Risk Identification is statistically significant and difference

between type of industries and Practices of Risk Assessment is statistically significant and the t values of Practices of Risk Identification and Practices of Risk Assessment of Public and Private sector industries are significant at (0.05) level.

**Table 2**  
**Public and Private sector industries and Risk Monitoring and Control and Risk Management Strategies – “t” Test**

Sl. No	Type of industry	Risk Monitoring and Control		Risk Management Strategies	
		Mean %	S.D	Mean %	S.D
1.	Private	119.51	10.86	91.00	8.05
2.	Public	117.93	11.66	89.07	8.72
Statistical Result ‘t’ Values		0.664		0.690	
Level of Significance		p>0.005		p>0.005	

Source: Primary data

The mean and standard deviation for the variables namely Risk Monitoring and Control and Risk Management Strategies based on Public and Private sector industries. Table clearly indicates that the private sector industries have more risk monitoring and control (119.51), better risk management strategies (91.00), when compared public sector industries. It is inferred from the above table that there is no significant difference between Public and Private sector industries in their Risk Monitoring and Control. The t-value 0.664 is less than the table value at 5% level of significance. Hence the null hypothesis is accepted. Thus there is no significant difference in Risk Monitoring and Control with the respect to the Public and Private sector industries. Table further shows that there is no significant difference between Public and Private sector industries in their risk management strategies. The t-value 0.690 is less than the table value at 5% level of significance. Hence the null hypothesis is accepted. Thus there is no significant difference in risk management strategies with the respect to the Public and Private sector industries.

### **SUGGESTIONS**

In order to achieve efficient Risk management system complete Risk management Framework needs to be monitored and an integrated approach towards Risk management is required. Understanding Risk and Risk Management, Risk Identification, Risk Analysis, Risk Monitoring and Credit Risk Analysis are the five important aspects in Risk Management System in Banks which in turn affect the Risk management practices of bank. Hence, banks and regulators should focus on each aspect and accordingly frame the policies. Public and private sector industries have better understanding of risk and risk management. Understanding of risk in employees can be developed through proper training programs. Hence, Public and private sector industries and regulators should focus on training programs so that there is common understanding of risk across the organization.

## CONCLUSION

Risk Identification, Risk Assessment, Risk Monitoring and Control are the important aspects in Risk Management System in Public and Private sector industries which in turn affect the Risk management practices of Public and Private sector industries. In order to achieve efficient Risk management system complete Risk management Framework should be monitored and an integrated approach towards Risk management should be followed. The results indicated that Risk Monitoring and Control were the most important aspects or the most influencing aspects in Risk Management Practices, which mean that Public and Private sector industries need to give more attention to these aspects of Risk management.

## INDUSTRY 5.0 – OPPORTUNITY AND CHALLENGES FOR MSME'S

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### Abstract

*Impact of Industry 5.0 on the larger Indian economy is substantial. Industry 5.0 shows promising possibilities of boosting India's economic growth. MSMEs or Micro, Small, and Medium Enterprise contribute to the sustainability and growth of employment, economic, output, and export sectors all across the country. MSMEs account for 40-50% of India's total export and 30% of India's gross domestic product (GDP).The MSMEs have huge growth potential, they are likely to produce 10-15 million employment opportunities in the next decade. The government of India is going all in with helping the MSMEs rise to their full potential. Government initiatives like 'Come make in India' 'Digital India', and 'Do in India' are run in the country to promote and favor the growth of MSMEs.*

**Keywords:** Industry, Entrepreneur, growth

### Introduction

The MSMED (Micro, Small and Medium enterprises development) Act 2006 classifies manufacturing enterprises as micro, small and medium based on the level of investments in plant and machinery. Service enterprises are classified based on their investments in equipment. The sector contributed around 29% to GDP in 2015-16 and 45% to India's total manufacturing output. Its contribution to exports is nearly 40% in value terms. It contributes majorly to the exports of products like sports goods, textiles, handicrafts, leather goods, etc. Despite its high contribution to employment generation, enhancement of entrepreneurial skills, domestic production, innovation, GDP growth, balanced regional development, export earnings, economic diversification, social stability, and private sector growth; it suffers from multiple problems. Availability of adequate and timely finance

without any complexities is the biggest challenge. Lack of the latest technology and its timely upgradation is another problem. The human resource factor also suffers from a number of limitations because of a lack of need-based training and development facilities for the managerial and technical personnel. The current paper attempts to study the challenges related to financing, technology, HR, operations and exports in detail. It is believed that the MSME sector can contribute highly to employment generation in less developing areas because of the dominance of labor-intensive industries and minimum capital investments. But the sector is infected with many types of problems which are needed to be resolved by providing timely and affordable solutions so that MSME sector can enhance its role further as the true engine of growth for the Indian economy. The paper also provides a few possible strategies to provide a more conducive environment to MSMEs.

Industrial investments in the MSME sector as well as their MSMEs have been severely affected by several factors; some of them are 'external' while many other challenges are also 'internal'. It is important to understand the various challenges being faced by the MSMEs, which will impact them and their future. These challenges can be categorized into external and internal factors, where internal factors may be further divided into four sub-categories. The external factors include the overall financial health of India, where the case has shown that despite having a huge potential for growth in exports, their total exports have only risen by 5%. Some other examples of such challenges include global macroeconomic conditions. With the help of this article, we are going to further highlight the various issues being faced by the MSME sector along with their negative impacts.

#### **Growth opportunities for MSMEs in India**

1. **Telecommunications:** India is the second largest market for telecommunications. It has shown a growth rate of 10% since 2022. The Self Reliant Scheme boosts domestic manufacturing and aims to increase telecom networking appliances. The domestic manufacturing of telecom networking equipment will boost employment in MSMEs. Mobile handsets and other devices will be manufactured at low cost due to their huge demand in the Indian market.
2. **Services Export:** The universal aim of achieving a clean and green corporate regime is done by - Planet, People, and Profit. Entrepreneurs of MSMEs can re-direct in this direction to enhance the export of service by staking on this definition since India has a comparative advantage in the service sector.
3. **Putting the PLI scheme to work:** The government of India has introduced the Productivity Linked Incentive Scheme with a total cost of ₹1.97 lakh crore to facilitate 13 industry sectors to harness Make in India, thereby improving our manufacturing prowess and export chance. The government has also announced three

schemes for the automotive industry wherein the manufacturing of electric vehicles will be encouraged to reduce carbon footprint, import fuel, and improve growth.

4. **Subsidy on patents:** The MSME registered enterprises are given up to 50% subsidy on registering their patents.
5. **Discounts:** MSMEs have the benefit to get discounts on interest rates on overdraft facilities from banks as well as under the Credit Guarantee Trust Fund Scheme.
6. **Facilitating start-ups:** According to Nasscom, India has 66 unicorns to date and is still counting. India is home to multiple unicorn startups and funding opportunities. MSMEs with innovative ideas must be nurtured with the right motivations and free from the bureaucratic labyrinth.
7. **Subsidy on technology upgradation:** MSMEs are eligible for a capital subsidy for elevating their technology through Credit Linked Capital Subsidy Scheme (CLCSS).
8. The micro, small and medium enterprises are the opportunity providers for the key to India's overall development. Despite facing challenges the industry has shown spectacular growth creating huge employment opportunities all across the country. With the government and the people's support, it's likely to escalate its growth in the coming decades.

### **Major Challenges for MSME's**

#### **Financial challenges:**

1. The MSME units find it difficult to access funds for their operational needs as well as expansion needs. Government has taken various steps to make funds reach these units like the provisions of priority sector lending, specialized bank branches to lend to MSMEs, debt restructuring, credit guarantee trust, margin money assistance scheme etc. but the problem is that there is widespread unawareness on financial and government schemes and thus the illiterate and semi-literate entrepreneurs find themselves hesitant to make use of government agencies for their financial needs.
2. There is a lack of financial literacy and consulting support for these small entrepreneurs. The MSME sector suffers from a lack of sound advice for finance because of a lack of financial knowledge.
3. The formal sector of lending funds to the MSME sector is also plagued with many complexities. It is not an easy process to make use of formal lending. There is a prolonged and complex process involved in banks because of many formalities and documentation requirements. This is a must for the MSMEs to prove their worthiness. Many MSME entrepreneurs lack the knowledge and understanding of such documentation. Despite the actions of the ministry of finance, the credit rating of MSMEs is a difficult procedure in itself.



4. The small units find it difficult to provide collateral security for accessing the bank funds. It is also evident that the institutional lenders fail to understand the unique financial needs of the MSMEs because their needs and functioning are much different than from the large lenders of the banks.
5. In the formal banking sector, MSMEs also find it difficult to acquire microfinance, working capital finance and trade finance because of the perceived greater risks these smaller units have. So generally, these units have to survive with limited funds.
6. Once MSME units manage to prove their worthiness by going through the complex procedures, the sanction process of the loans is a cumbersome process and it is also accompanied by a delay in disbursement of funds.
7. The informal sector of credit may provide quick disbursement of the much-needed funds but the rate of interest is really high.
8. MSME sector has limited access to equity capital. The establishment of BSE SME Exchange and NSE Emerge in 2012 have spurred the participation of SMEs in the capital market. The formalities are much liberal for SMEs as compared to the companies listed on mainboard but still, there are few units which get listed on this new form of exchange.

#### **Technology challenges**

1. Lack of the latest technological skills and obsolescent machinery, as well as equipment, have contributed to increased operating costs for the Indian MSMEs. It has led to a negative impact on the manufacturing competitiveness of the sector. There is a dire need for technological upgradation.
2. Need-based research programs should be promoted for the well being of the sector. The traditional artisans are not empowered enough to compete with the high technological advancements of the larger firms.
3. MSMEs are not sufficiently familiar with the concept of lean manufacturing.
4. There is a lack of skilled manpower and thus the enrolment in business incubators need to be enhanced.
5. Entrepreneurs, as well as other employees of MSME units, are not well equipped with the Information and communication technology (ICT) skills which can completely transform the way in which businesses are operated.

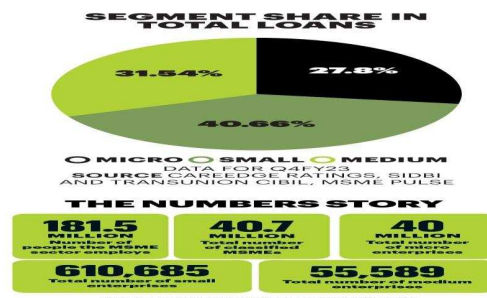
#### **Human Resource challenges**

1. MSMEs are largely unable to acquire HR with high managerial capabilities because such employees get themselves connected to companies providing large attractive packages which are not possible for many SMEs.

2. MSMEs suffer from the problem of inadequate and untrained personnel needed for effective internationalization. There is a shortage of sector-specific trained employees at all levels.
3. This vibrant sector also goes through informal recruiting. Managing HR processes like the activities of selection, training, and compensation are also not given a very high priority.
4. The selected employees do not get enough opportunities for the training and development of managerial skills. One of the reasons is the lack of funds. Thus, such HR lacks the latest technical know-how related to areas of production, finance, accounting, and marketing. Such employees may also be illiterate or ignorant of any advancement in various operational areas.
5. It is difficult for MSMEs with limited funds and skills to motivate any skilled managerial and technical personnel. There is generally a lack of any motivational packages for the skilled HR if any.
6. Lack of highly skilled personnel leads to faulty planning, execution, and appraisal of the performances of the MSME units.
7. One of the biggest challenges is related to the complex labor laws which are complex and practically very difficult to comply with by the small units.

**Recent Update about the challenges in the MSME Sector:**

“The biggest challenges for MSME’s to compete with cheaper imports in India or exports abroad are access to technology and getting timely payments”- ANIL BHARDWAJ, Secretary General ,FISME



A total of 40.7 million businesses are registered on the Udyam and Udyam Assist Platform (that registers informal micro enterprises) and they cumulatively employ more than 181.5 million people, as of March 24, 2024. In July 2021, retail and wholesale traders were also allowed to register on the portal, but only for PSL. Experts say that given the diverse entities that form the sector, there is a need for more clarity on what constitutes an MSME. This would also help in better percolation of policies to the grassroots.

The composite criteria to qualify as an MSME are linked to investment in plant and machinery and annual turnover. Micro units can have investment in plant and machinery of not more than Rs 1.crore and annual turnover of not more than Rs.5 crore; small enterprises (Rs 10.crore; up to Rs.50 crore); and medium businesses (Rs.50 crore; up to Rs.250.crore). But MSMEs can range from one running a boutique from home to a company that manufactures electrical transformers. Rajendra Agrawal, Lok Sabha MP from Meerut and Convenor of a forum of MPs across party lines called Friends of MSMEs, says it is necessary to classify MSMEs “not only capital-wise but also industry wise”. Khandelwal says wholesale and retail traders would like to be included in the overall definition for more benefits. Given the complex and diverse nature of many of these problems, finding solutions may take time. But a common thread running through all these businesses is that of optimism, grit, and the belief that they can grow and do well with the right kind of support. If they manage to make their way out of this labyrinth of problems, these businesses could very well be the building blocks on which India can become an economic superpower.

#### **Conclusion**

"In these testing times, SMEs must pivot towards innovative strategies to navigate the complexities of cost pressures, talent retention, and sustainable practices. Our research not only identifies the critical hurdles, but also offers a roadmap for SMEs to emerge stronger and more agile". MSMEs face a number of challenges, but the government is doing its best to ensure that the MSME sector remains competitive. The cost of funding is gradually decreasing, and both public and private sectors are working towards developing better products that can be competitive in terms of quality and price. Perhaps, if we get rid of corruption and focus more on quality, then MSMEs will be able to beat bigger firms.

## **A STUDY ON THE AWARENESS LEVEL OF ARTIFICIAL INTELLIGENCE (A.I) TOOLS IN EDUCATION AND IT'S UTILITY AMONG COLLEGE STUDENTS OF THOOTHUKUDI.**

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#### **Abstract**

*This study examines the intersection of Industry 5.0 and smart education, focusing on the development of technology skill sets. Industry 5.0 represents the next evolutionary step in industrial transformation, emphasizing human-centric, sustainable, and resilient production systems. In parallel, smart education leverages advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and big data to create adaptive and personalized learning environments. This review synthesizes current research on how smart*

education can equip students with the necessary skills to thrive in Industry 5.0, highlighting key trends, challenges, and opportunities. The findings suggest that integrating Industry 5.0 principles with smart education frameworks can significantly enhance the acquisition of technology skills, preparing the students as skillful workforce for future industrial demands.

*Key words: skillful student workforce, technology skill sets*

### **Introduction**

**Industry 5.0** builds upon the foundations of Industry 4.0, which is characterized by the integration of cyber-physical systems, IoT, and cloud computing. Industry 5.0, however, places a stronger emphasis on the collaboration between humans and machines, aiming for more personalized and sustainable production processes. It seeks to enhance human well-being and work satisfaction while maintaining high productivity and efficiency.

**Smart education** refers to the use of advanced technologies to create a more interactive, engaging, and efficient learning environment. Key components include:

**Artificial Intelligence (AI):** AI-powered tools provide personalized learning experiences by adapting content to individual learner needs and preferences.

**Internet of Things (IoT):** IoT devices facilitate real-time data collection and interaction, enhancing hands-on learning experiences.

**Big Data Analytics:** Analyzing large datasets helps in understanding learning patterns and improving educational strategies.

### **Technology Skill Sets for Industry 5.0**

The skill sets required for Industry 5.0 extend beyond traditional technical skills to include:

**Digital Literacy:** Proficiency in using digital tools and understanding digital environments.

**Complex Problem Solving:** The ability to tackle intricate problems using a combination of analytical thinking and creativity.

**Collaboration with AI:** Working alongside AI systems to enhance productivity and innovation.

**Sustainability Awareness:** Understanding the principles of sustainable development and their application in industrial contexts.

### **The Role of Smart Education in Developing Industry 5.0 Skills**

Smart education platforms can play a crucial role in developing these skills through:

**Personalized Learning Paths:** AI can tailor educational content to meet individual learning needs, ensuring that students acquire relevant skills efficiently.

**Interactive and Experiential Learning:** IoT and augmented reality (AR) can create immersive learning experiences that mimic real-world industrial environments.

Continuous Assessment and Feedback: Big data analytics provide continuous assessment opportunities, allowing for real-time feedback and adjustment of learning strategies.

**Objective of the study**

- i. To find out the awareness level of students towards AI tools
- ii. To identify how AI technology has been useful to students in their education
- iii. To find out various AI learning tools available to the students
- iv. To find out various challenges faced by students

To analyze whether AI technology has brought a different impact on present education system

**Statement of the Problem**

Though these AI tools are a blooming sector among the students and education, we need to make research on the usefulness, challenges awareness and the impact these AI tools has created in the present education system. While some say AI helps students learn better by personalizing lessons and giving access to more resources, we need more research to know for sure.

**Period of The Study**

The study was carried out from January 2024 to march2024. The questionnaire was circulated from Feb 2024. The data were collected during the month of Jan to March from the students in the study area of Thoothukudi district.

**Primary Data:**

Questionnaires were prepared and were given to selected college students to know their views.

**Secondary Data:**

The secondary data was collected from magazines, websites, research articles, journals and web data has also been collected. Daily newspaper was a competent tool in collecting secondary data.

**SAMPLING DESIGN:**

A sample of 40 respondents residing in various parts of Thoothukudi was selected on a random basis. The questionnaire was useful for collecting great source of information. The data collected were original in nature. It is first-hand information. For collection of data, 40 copies of questionnaires were collected through google form.

**LIMITATIONS OF THE STUDY:**

The limitations of the study are,

This study was carried out only among the students in Thoothukudi district. The sample size is restricted to 40. Due to time constraint, the most essential information has been taken for the study.

## **TOOLS USED IN EDUCATION**

### **1. Chat GPT**

ChatGPT is a natural language processing chat-bot driven by generative AI technology that allows you to have human-like conversations and much more. The AI tool can answer questions and assist you with tasks, such as composing emails, essays.

### **2. BARD AI:**

Gemini is Google's conversational AI chat-bot, meant to function similarly to Chat-GPT, with the biggest difference being that Google's service pulls its information from the web. (Chat-GPT's data is limited up to 2021) Like most AI chat-bots, Gemini can code, answer math problems, and help with your writing needs. Audio Pen:

*For years, I have been using voice-to-text to write blogs, books, emails, and lesson plans. This is an AI-powered web app that you can use on your computer or phone. The app takes your words and enhances them as it generates the text, which you can edit as needed.*

### **3. CANVA MAGIC WRITE:**

Canva now offers an AI text-to-image generator called Magic Write, which can inspire creativity in writing. It provides ideas, helps with brainstorming, and supports lesson planning, making it a useful tool for educators for creating a presentation or other graphic for classroom use.

### **4. CURIPOD:**

This website enables teachers to create interactive lessons in minutes using AI. Students can explore various topics, and the AI functionality helps generate customized lessons tailored to their learning needs. Teachers simply type in a topic, and a ready-to-run lesson is generated with text, images, and activities such as polls, open-ended responses, word clouds, and more.

### **5. EDUAIDE.AI:**

This is an AI-assisted lesson-development tool that provides educators with more than 100 resource types to choose from to create high-quality instructional materials. It offers the ability to translate the generated content into more than 15 languages instantly. Educators can generate a syllabus, create discussion prompts, use the “teaching assistant” for help with creating individualized education program plans, write emails, or even compile a list of accommodations for students.

### **6. OPENAI:**

The recently released Teaching with AI guide for teachers was created to help educators use Chat-GPT in their classroom. The guide comes with several suggested prompts and includes explanations that clarify exactly how Chat-GPT works and what its limitations are,

## 7. QUIZIZZ:

With Quizizz, teachers can design quizzes that will create a personalized learning path based on each student's responses. Teachers can also create lessons with Quizizz, which now has an AI enhancement that can adjust question difficulty, check grammar, and redesign questions to reflect real-world scenarios, with more features on the way.

## 8. PERPLEXITY AI

It provides apps for IOS and Android. Perplexity provides several modes of searching. The "Copilot" mode asks the user clarifying questions to refine queries. The "Focus" mode sets a topic for queries.

*Why is AI Important in Learning and Development?*

AI, or artificial intelligence for students, is the computer system simulation of human intelligence processes. In AI learning and development, it can enhance and augment learners' educational experiences.

Here is the contribution of AI Learning and Development functions:

- **Personalized Learning:** AI enables personalized learning experiences for each learner. This can be done by analyzing the learner's performance and adapting the curriculum or content to their needs and preferences.
- **Intelligent Tutoring Systems:** AI-powered tutoring systems can provide learners with personalized feedback and guidance as they work through the curriculum. These systems can also analyze learners' performance and adapt the instruction to their needs.
- **Automated Content Creation:** AI can create educational content, such as videos, quizzes, and other interactive materials. This can save time and resources for educators and trainers.

## ANALYSIS AND INTERPRETATION OF DATA

*Reason for Using Ai Tools In Learning And Education*

Factors	I	II	III	IV	Total score	Mean score	Rank
Accessibility	15	5	10	20	2355	47.1	IV
Personalized learning	20	10	10	10	2730	54.6	I
Cost Savings	5	20	15	10	2415	48.3	III
Customized Feedback	10	15	15	10	2500	50	II

Source: Primary Data

Personalized learning had a highest score (54.6) and is therefore ranked 1<sup>st</sup>, And Customized feedback gets the 2<sup>nd</sup> rank, Cost savings gets the 3<sup>rd</sup> rank, Accessibility gets the 4<sup>th</sup> rank.

**Table no 3.24**  
**Rating the AI tools based on the students learning experience**

<b>Factors</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>Total score</b>	<b>Mean score</b>	<b>Rank</b>
<b>ChatGpt</b>	15	15	10	10	2645	52.9	<b>I</b>
<b>Bard AI</b>	8	20	17	5	2587	51.74	<b>II</b>
<b>Perplexity AI</b>	16	10	9	15	2529	50.58	<b>III</b>
<b>Merlin</b>	5	14	20	11	2326	46.52	<b>IV</b>

**Source:** Primary Data

Chat GPT had a highest score (52.9) and is therefore ranked 1<sup>st</sup>, And Bard AI gets the 2<sup>nd</sup> rank, Perplexity AI gets the 3<sup>rd</sup> rank, Merlin AI gets the 4<sup>th</sup> rank

*Table no 3.20*

*Challenges faced while using AI tools*

<b>Factors</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>Total score</b>	<b>Mean score</b>	<b>Rank</b>
<b>Technical issues</b>	12	8	12	10	8	2572	51.44	<b>II</b>
<b>Privacy concerns</b>	8	7	12	8	15	2230	44.6	<b>V</b>
<b>Lack of training</b>	10	11	10	14	5	2590	51.8	<b>III</b>
<b>Reduce critical thinking</b>	15	10	6	8	11	2609	52.18	<b>I</b>
<b>Resistance to change</b>	5	14	10	10	11	2379	47.58	<b>IV</b>

**Source:** Primary Data

Reduce critical thinking had a highest score (52.18) and is therefore ranked 1<sup>st</sup>, And Technical issues gets the 2<sup>nd</sup> ranked (51.44), Lack of training gets the 3<sup>rd</sup> rank (51.8), Resistance to change gets the 4<sup>th</sup> rank(47.58), Privacy concerns has been ranked 5(44.6).

Findings are statements of factual information based upon the data analysis. They are answers to the research question.

**SUGGESTIONS:**

The suitable suggestions are,

- ❖ Many students suggested that AI tools should be cost free to use as many AI tools are subscription-based AI tools
- ❖ The educational institutions must incorporate with more AI tools to the students for learning and for academic purpose making it easier and accessible to students in future.
- ❖ We need to educate and create awareness to students about various AI tools available for their learning and education purpose apart from CHATGPT.
- ❖ Many students preferred that AI tools has personalized their learning experience by providing them with quality feedback regarding their strength and weakness of each individual personally.



- ❖ Many students found AI tools to be helpful to students who do self-study, research scholars and students who prepare for competitive exams.

## CONCLUSION

AI tools have the potential to revolutionize education by adapting to individual student needs and fostering a more engaging and effective learning environment. By harnessing the power of AI, educators can create more personalized, engaging and dynamic learning experiences that cater to the diverse needs of students ultimately empowering them to succeed in this current digital age.

The integration of AI tools necessitates a shift in the teacher's role from information delivery to facilitation of personalized learning journeys. Educators should focus on mentoring, guiding, and fostering critical thinking skills. It is the duty of Educators and policymakers should prioritize training and awareness programs to build proficiency in utilizing AI tools effectively. This will empower them to harness the full potential of AI-driven educational technologies.

## FUELLING THE ENGINE: NEW CREDIT SCHEMES FOR SOLVING THE PROBLEMS FACED BY THE MSME SECTOR

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### **Abstract**

*The MSME sector is one of the major contributors to India's GDP. Moreover, Micro, Small, and Medium Enterprises (MSME) are one of the major reasons for the globalization of economies as they act as the pivotal drivers of economic growth, employment generation, and innovation.. It examines the new financial products and services designed to enhance credit accessibility, the strategic measures adopted to lessen risks, and the impact of regulatory frameworks in fostering a conducive lending environment. The findings suggest that while new credit provisions have significantly improved capital access for MSMEs, persistent challenges such as collateral requirements, high interest rates, and stringent credit evaluations remain. This research provides actionable insights for policymakers, financial institutions, and stakeholders to refine credit mechanisms, thereby ensuring sustainable growth and inclusivity within the MSME sector.*

**Key Words:** *MSME, Overdrafts, Working Capital, No Pre-Sanction visit required, online loan facility, solar rooftop, margin money as a grant*

## **I. Introduction**

The MSME Sector of India started on 2<sup>nd</sup> October 2006, it existed before the 1940s but then after the 1990s it started gaining importance in the country's economy. Afterward, when the Government of India Introduced the MSME Act 2006 which boosted the growth of the sector and contributed significantly to the country's GDP, export revenue, and employment generation. As per the present case scenario, the MSME sector of India contributes 29.1% of its GDP and has also employed more than 11 crore people. These stats define the real contribution to the country so it is important for the country to provide them with better facilities which could ease their working and support them to boost their growth.

So, to fulfill that requirement Indian banks with the backing of the government are coming up with different credit facilities for the MSME sector so that it could help in expanding business in India and all over the world and improve the export system. Other than that, the MSME sector creates employment at a low cost and amounts to a large share of production as well. These schemes or credit facilities provide a better opportunity for a person to start his own business by investing fewer amounts on his own, to get collateral-free credit at low interest rates, and also to get instant online loans.

## **II. Literature Review**

Research that has already been done emphasizes the difficulties MSMEs have getting loans. Conventional loan conditions, such as collateral security and rigorous credit assessments, can serve as obstacles, especially for small and micro businesses (Credible, Financial Express). These companies are further burdened by high lending rates, which restrict their capacity to grow and make investments (MSME Schemes, Ministry of MSME, and Government of India).

In response, new credit schemes are emerging, focusing on:

**Collateral-free loans:** Programmes such as PNB's PM SVANIDHI provide street sellers with microcredit without requiring collateral, making it easier for them to obtain operating capital ("PM STREET VENDOR'S ATMANIRBHAR NIDHI (PM SVANIDHI)", PNB Scheme Circular, June 5, 2020 [internal document]).

**Reduced Interest Rates:** Monetary strain for prospective businesses is lessened by government programs like the Mukhyamantri Swarojgar Yojna, which offer subsidized loans via nationalized banks (Mukhyamantri Swarojgar Yojna Scheme Booklet, Respective State Government Websites).

**Faster loan processing:** Digital lending platforms like PNB's PABL offer pre-approved business loans within an hour, eliminating lengthy application processes and paperwork demands ("Pre-Approved Business Loan (PABL)", PNB E-Services

Sector-specific schemes: Initiatives like the State Bank of India's Surya Shakti cater to the specific needs of MSMEs, offering loans for solar rooftop installations, promoting energy efficiency and cost savings ("Surya Shakti - Solar Finance", State Bank of India website)

Even if these novel approaches are a step in the right direction, their efficacy has to be understood through a critical evaluation of the literature. It is vital to research how these programs affect MSME expansion and loan accessibility. Are the loan amounts adequate? Are the intended beneficiaries of the initiatives, especially the smaller rural businesses, being reached by them? These approaches can be further refined by identifying knowledge gaps.

Additionally, this study will investigate theoretical frameworks associated with MSME financing, including frameworks for financial inclusion and access to financing (see scholarly materials from organizations such as the Institute for Financial Management and Research (Chennai) [<https://ifmr.ac.in/>] (<https://ifmr.ac.in/>) and the National Institute of Bank Management (PUNE). This larger perspective will clarify how well the new schemes are in fostering a more inclusive financial system for MSME.

Through a comprehensive analysis of recent credit schemes, current literature, and pertinent ideas, this research endeavors to furnish policymakers, financial institutions, and stakeholders with practical insights. The MSME sector may continue to expand and contribute to the Indian economy by using digital technology, filling identified shortages, and improving lending procedures.

#### **Objective of the study**

1. To know about new credit facilities offered by banks for Micro, small, and medium enterprises in India.
2. To know how the new credit facilities will address the needs of MSMEs.

**Research and Methodology:** Only secondary data is taken into consideration for the study. The germane secondary data is collected from the publications of the Ministry of Micro, Small, and Medium Enterprises, Articles on the credit facilities for the MSME sector, Bank websites and circulars, Case studies read during my internship, and related research papers. With the help of government and bank official websites and written articles on the MSME sector, its growth, its present statistics etc. are taken into consideration while writing this paper.

#### **III. Discussion**

Bank is one of the major sources of Finance for a business in India's Micro, Small, and Medium Enterprise (MSME) Sector. They are known as Institutional Lenders and are regulated by The Reserve Bank of India (RBI) which includes Public Sector Banks, Private Sector Banks, Foreign Banks, Co-operative Banks, and Regional Rural Banks.

As per the statistics of Forbes Advisor, "There are a total of 633.9 lakh MSMEs in India out of which over 99% of total MSMEs qualify as micro-enterprises that make up to

630.5 lakh enterprises. There are a total of 3.3 lakh businesses that qualify as small businesses i.e. 0.5% of all MSMEs and just 0.05 lakh qualify as medium businesses that sum of 0.01% of all MSMEs.” This illustrates how much support is required for the MSME sector of India to grow to small, medium, and above-level enterprises. They require a larger amount of capital as compared to present, and one of the best ways to get it is by financing an MSME loan because after seeing the condition of the MSME sector and its importance for the country, banks are launching new schemes with the help of the government working hand in hand to facilitate the customer to the best with their products and flexible policies.

As per the report on the 24<sup>th</sup>, of the Standing Advisory Committee on MSME, FIDD, and RBI held on September 17, 2019, the outstanding credit growth in the Respective Commercial banks is the highest followed by a great improvement in the Public Sector banks, and then the Private Banks. The Banking sector of India is developing with the introduction of new credit schemes from the government, which has helped improve the conditions and fulfill the requirements of all the enterprises under MSME.

Moreover, during the period of COVID-19, 1/3 of the MSME enterprises faced a 50% revenue loss. So, the government introduced a new scheme implemented by the Indian banks – “Mukhyamantri Swarojgar Yojna” for all the states. The main objective of the scheme is to persuade enterprising youth of the State, migrants who returned to their states after their businesses got shut down or incurred large losses, i.e. especially in Uttarakhand, Madhya Pradesh, due to COVID-19, skilled and unskilled artisans, handicraftsmen, and educated urban and rural unemployed persons to establish their enterprises/businesses.

Under the scheme, enterprising young entrepreneurs who are native or permanent residents of the state and who want to be self-employed, provide loan facilities through Nationalized/ Scheduled Commercial Banks, State cooperative banks/ Regional Rural Banks so they can start their enterprises, services, or businesses.

*SUBSIDY: WHEN IMPLEMENTED IN UTTARAKHAND, SUBSIDY GRANTED IN MARGIN*  
But after the Lockdown one of the most effective initiatives taken by the government is to decrease the energy consumption of the MSME enterprises, to decrease it as well as generate business out of it, coordinating with the Indian commercial banks, and public sector banks the government of India launched a new scheme to for installation of Solar rooftop/ground mounted grid-connected systems for captive use. So, one is launched by the State Bank of India- Surya Shakti – Solar Finance on April 5, 2024. This is for the existing MSME enterprises that are having requirements for the installation of Solar rooftop/ground-mounted grid-connected systems. It is in the form of a Term loan with the maximum amount of loan Rs. 10 Crores. The borrower’s margin is set to 20% of the loan amount with a repayment period of a maximum 10 years including the initial moratorium period.

**Special Features:**

1. For existing connections: Centralized Processing by Surya Shakti Cell (SSC), Mumbai & Sanction by respective Sanctioning Authority as per existing Delegation of Powers based on aggregate exposure.
2. For new connections: Centralized Processing & Sanction by Surya Shakti Cell (SSC), Mumbai.

**VI. Suggestion**

1. Medium Enterprises should also be included as beneficiaries under CGTMSE, as it will resolve the issue of units becoming ineligible on its upgradation to the medium category from the small category on account of investment in plant and machinery/equipment.
2. There should be more focus on reducing the period of loan sanctioning in offline mode. As the online mode is much faster and has provided the customer with easy hassle-free financing facilities still many schemes are there that are not available in the online form and the processing period should be reduced.
3. Banks should focus more on marketing and spreading awareness about the schemes as the major problem in India is the lack of awareness and knowledge about various facilities offered by the banks and the government due to improper way of advertisements which lack of knowledge or awareness sustains and the businessmen who are uneducated or normal citizens unable to get the benefit of those facilities.
4. More emphasis should be placed on the usage of digital technologies by Micro, Small, and medium enterprises to improve their creditworthiness and access to credit by using digital accounting systems for accurate financial record keeping, online payment modes to streamline cash flow, digital credit scoring, moving towards the online market for growth and diversifying their business, etc.
5. To encourage greater lending to the MSME sector, each bank and area should have a strategy in place for credit sanctioning officers that includes incentives, awards, and rewards

**V. Conclusion**

As the banks are improving their credit facilities and financing schemes, the struggles the MSME sector used to face are decreasing. Due to the collaborative work of the government and the banks more refined credit schemes are being introduced which will not only help small and micro enterprises to grow their businesses to a greater extent but also help to generate more employment and eventually contribute to the growth of the Indian economy. The importance of the MSME sector will never decrease and as the sector grows the requirement for capital will also increase respectively so the banks will come up with more

effective schemes which will provide them with a better opportunity to raise capital in the form of term loans, overdraft, etc. for their future investments and working capital.

Although I have described a few schemes there are more coming up and some are still in use at present but these are some of the most effective and direct problem-solving schemes that address the problem clearly and focus on contributing to solving the common problems faced by the small-scale businessmen.

## **A STUDY ON ADDRESSING SOCIAL CHALLENGES IN THE AGE OF INDUSTRY 5.0.**

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### **Abstract**

This study investigates the social challenges arising from the transition to Industry 5.0, focusing on human-machine collaboration and its implications for workforce reskilling, digital inclusion, ethical technology use, and sustainable development. Employing a survey-based research design, data was collected from 61 managers across various companies in Tamil Nadu that have implemented Industry 5.0 technologies. The structured questionnaire captured quantitative and qualitative insights into the implementation and impact of these technologies. The findings reveal a predominantly male managerial workforce with significant underrepresentation of females, predominantly aged between 30 to 40 years, indicating a mid-career cohort. The study underscores the importance of gender diversity and age profiles in managerial roles within Industry 5.0 contexts. Key findings highlight the necessity for advanced technical skills, the effectiveness of training programs, and the critical role of on-the-job training in reskilling employees.

**Keywords:** *Industry 5.0, digital inclusion, ethical technology use, sustainable development, managerial workforce, technological integration.*

### **Introduction**

The rapid advancement of technology has led us into the era of Industry 5.0, a period marked by the integration of human creativity with intelligent systems. Unlike its predecessor, Industry 4.0, which focused on automation and data exchange in manufacturing technologies, Industry 5.0 aims to harmonize human and machine collaboration to achieve more sustainable, efficient, and socially responsible outcomes. This new paradigm shift is driven by the need to address not only economic and industrial challenges but also significant social issues that have emerged or been exacerbated by previous industrial revolutions.

The advent of Industry 5.0 brings to light several social challenges that need to be addressed to ensure inclusive and equitable progress. One of the foremost challenges is the need for reskilling and upskilling the workforce. As automation and AI continue to evolve, there is a growing need for workers to acquire new skills that complement these technologies. According to the World Economic Forum, by 2025, 50% of all employees will need reskilling due to the adoption of new technologies (World Economic Forum, 2020). This necessitates a concerted effort from governments, educational institutions, and industries to invest in continuous learning and development programs.

### **Review of Literature**

A significant challenge is addressing the digital divide. The integration of advanced technologies in Industry 5.0 can exacerbate existing inequalities if not managed properly. Access to technology and digital literacy remain unevenly distributed across different socio-economic groups, regions, and countries. Bridging this divide is crucial to ensure that the benefits of Industry 5.0 are shared broadly and do not leave behind vulnerable populations (van Dijk, 2020).

Moreover, the ethical implications of advanced technologies such as AI and robotics cannot be overlooked. Issues related to data privacy, algorithmic bias, and the ethical use of AI are of paramount concern. The development and deployment of these technologies must be guided by ethical frameworks that prioritize human well-being and social justice (Floridi et al., 2018). Industry 5.0 presents an opportunity to redefine these frameworks and incorporate ethical considerations into the core of technological advancements.

### **Objectives of the Study**

1. The objective of this study is to explore and address the social challenges emerging from the transition to Industry 5.0, focusing on the integration of human and machine collaboration.
2. To know the implications for workforce reskilling, digital inclusion, ethical technology use, and sustainable development.

### **Methodology**

1. **Research Design:** This study employs a survey-based research design to explore the social challenges associated with the implementation of Industry 5.0. The study focuses exclusively on managers from 61 companies in Tamil Nadu who have firsthand experience with integrating Industry 5.0 technologies. The primary aim is to gather insights on workforce reskilling, digital inclusion, ethical technology use, and sustainable development from these key stakeholders.
2. **Survey Instrument:** A structured questionnaire was developed to collect data from the managers. The questionnaire was designed to capture detailed information on the implementation and impact of Industry 5.0 technologies in their respective

companies. The survey included both closed-ended questions, which provided quantitative data, and open-ended questions, which allowed for qualitative insights.

3. **Sample Selection:** The sample consisted of 61 managers from various companies across Tamil Nadu that have implemented Industry 5.0 technologies. These managers were selected based on their involvement in the implementation process and their understanding of the social challenges associated with these technologies.
4. **Survey Administration:** The survey was administered electronically to ensure a wide reach and convenience for the respondents. An introductory email explaining the purpose of the study and ensuring confidentiality was sent to the participants, followed by the survey link. Reminders were sent to encourage participation and completion of the survey.

### **Analysis and Interpretation**

- **Perception of Workforce Reskilling Needs**

The majority of respondents believe that the implementation of Industry 5.0 technologies has increased the need for advanced technical skills in the workforce. Specifically, 34.4% of respondents agree, and 29.5% strongly agree with this statement, while 21.3% are neutral. Only 4.9% disagree, and 9.8% strongly disagree. The mean score for this item is 3.69 (SD = 1.23), indicating a general agreement among the respondents.

- **Effectiveness of Training and Development Programs**

Regarding the effectiveness of training and development programs in addressing new skill requirements introduced by Industry 5.0, the majority of respondents hold a positive view. Specifically, 34.4% agree, and 31.1% strongly agree with the statement. Meanwhile, 23.0% are neutral, 8.2% disagree, and 3.3% strongly disagree. The mean score is 3.82 (SD = 1.07), suggesting that respondents generally believe these programs have been effective.

- **Role of On-the-Job Training in Reskilling**

On-the-job training has been considered a key component in reskilling employees for Industry 5.0 technologies, with 41.0% of respondents strongly agreeing and 32.8% agreeing. A smaller proportion remains neutral (14.8%), while 6.6% disagree and 4.9% strongly disagree. The mean score of 3.98 (SD = 1.13) reflects a strong agreement with the importance of on-the-job training.

- **Digital Inclusion and Accessibility**

The efforts to ensure digital inclusion and accessibility for all employees in the context of Industry 5.0 are generally perceived positively. 34.4% of respondents agree and 29.5% strongly agree that such measures have been taken. However, 26.2% are neutral, 6.6% disagree, and 3.3% strongly disagree. The mean score is 3.80 (SD = 1.05), indicating a positive perception overall.



- **Challenges of Digital Literacy**

The lack of digital literacy among employees is seen as a significant challenge in ensuring digital inclusion. 36.1% agree and 27.9% strongly agree with this statement, while 23.0% are neutral. Only 11.5% disagree, and 1.6% strongly disagree. The mean score of 3.77 (SD = 1.04) suggests that digital literacy is recognized as a considerable challenge.

- **Effectiveness of Digital Literacy Training**

Providing digital literacy training has been effective in promoting digital inclusion within the organization, according to the majority of respondents. 36.1% strongly agree, and 32.8% agree with this statement, whereas 18.0% are neutral. A smaller proportion disagrees (8.2%) and strongly disagrees (4.9%). The mean score is 3.87 (SD = 1.15), indicating a positive view of these training efforts.

- **Addressing Ethical Considerations**

The ethical considerations such as data privacy and security are acknowledged as being addressed when implementing Industry 5.0 technologies. 37.7% agree and 21.3% strongly agree with this statement, while 27.9% are neutral. 9.8% disagree and 3.3% strongly disagree. The mean score is 3.64 (SD = 1.03), reflecting a generally positive perception.

- **Establishing Ethical Guidelines**

Establishing ethical guidelines and policies is considered essential to ensuring that the use of Industry 5.0 technologies aligns with ethical standards. 36.1% strongly agree, and 31.1% agree with this statement, while 16.4% are neutral. A smaller proportion disagrees (11.5%) and strongly disagrees (4.9%). The mean score is 3.82 (SD = 1.19), indicating a positive perception of the importance of ethical guidelines.

- **Conducting Regular Audits and Assessments**

Regular audits and assessments are believed to have been conducted to ensure ethical use of Industry 5.0 technologies, with 32.8% of respondents both agreeing and strongly agreeing. Meanwhile, 24.6% are neutral, 3.3% disagree, and 6.6% strongly disagree. The mean score is 3.82 (SD = 1.13), suggesting that such practices are generally perceived positively.

- **Integration of Sustainability Practices**

The integration of sustainability practices, such as implementing energy-efficient technologies, is viewed positively by the respondents. 39.3% strongly agree, and 31.1% agree with this statement. Meanwhile, 19.7% are neutral, 3.3% disagree, and 6.6% strongly disagree. The mean score of 3.93 (SD = 1.15) indicates strong agreement.

- **Impact of Sustainability Practices**

The integration of sustainability practices is believed to have had a positive impact on operations and reputation. 34.4% agree, and 32.8% strongly agree with this statement, while

19.7% are neutral. A smaller proportion disagrees (3.3%) and strongly disagrees (9.8%). The mean score is 3.77 (SD = 1.23), reflecting a positive view of the impact.

- **Challenges in Aligning with Sustainability Goals**

There are perceived significant challenges in aligning Industry 5.0 technologies with sustainability goals, with 39.3% agreeing and 24.6% strongly agreeing. Meanwhile, 23.0% are neutral, 4.9% disagree, and 8.2% strongly disagree. The mean score of 3.67 (SD = 1.15) suggests recognition of these challenges.

**Conclusion**

The survey data indicates a general agreement among respondents on the increased need for advanced technical skills due to Industry 5.0 technologies, the effectiveness of training programs, the importance of on-the-job training, and the measures taken for digital inclusion. Ethical considerations and the establishment of guidelines are also viewed positively, though there are perceived challenges in ensuring digital literacy and aligning sustainability practices with Industry 5.0 technologies. Overall, the findings reflect a positive perception of the efforts and initiatives related to Industry 5.0 while highlighting areas that require further attention, particularly in addressing ethical and sustainability challenges.

## **A STUDY ON THE SUSTAINABLE MARKETING OF THE SNACKS FOOD INDUSTRY IN SELECTED DISTRICTS IN TAMILNADU WITH SPECIAL REFERENCE TO ASWINS SWEETS**

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### **Abstract**

*This study looks at the sustainable marketing techniques in the snack business, with a focus on Aswin Sweets, a popular brand in Tamil Nadu. As worldwide demands for sustainable products grow, businesses are pressured to embrace ecologically responsible methods. The sweets plan to include sustainability into its marketing efforts, such as using locally sourced ingredients, eco-friendly packaging, and community participation programs. In addition, the study looks into customer views and behaviors towards sustainable snacks, as well as the influence of sweets' sustainability activities on brand image and customer loyalty. This study, which uses a combination of qualitative interviews, surveys, and secondary research, provides insights into the challenges and opportunities that snack manufacturers face when implementing sustainable marketing strategies, as well as the importance of such*

*initiatives in meeting the changing demands of conscious consumers. A sample size of 255 participants responded to this research work from selected districts in Tamil Nadu. Non-probability convenient sampling technique was adopted. An exploratory research design was chosen for this study.*

**Keywords:** Sustainable Marketing, Sustainable snacks, Brand, Ecologica

## **INTRODUCTION**

Sustainability marketing refers to the promotion of ecologically sustainable products and/or services. The technique also includes the promotion of a company's brand values and socially responsible actions. People in the 2020s are considerably more mindful of how their actions affect the environment. While becoming more environmentally conscious begins at home, there is no denying that large-scale economic operations have a far greater influence on the environment. To ensure our planet's long-term existence, many modern customers want to support firms actively decreasing their environmental footprint. A narrative that began in 2004 is now a beloved and trusted name in households throughout Tamil Nadu, with 30 outlets today. It shows pride in standing the test of time next to other businesses and gaining a favorable reputation thanks to the Indian snacks and savories. The endless efforts to create a variety of bites and the whimsically innovative ideas of the founder, Shri KRV Ganesan have taken the firm to new heights. The never-repurposed organic, cold-pressed groundnut oil made repeated customers for Aswins. The delicious treats that are available online help customers to reach Aswins in their comfort.

## **REVIEW OF LITERATURE**

Sustainable marketing is the basic requirement of all businesses because, without a strategy for sustainable marketing, we cannot withstand in the market. Once we reach the customers then we have to start working on the sustainability of our products in the market and for that, we need sustainable marketing strategies. We explore consumer support for sustainable business using the theoretical background of value-belief-norm theory (Stern et al., 1999) and sustainable marketing (Lunde, 2018). In this research reexamines stakeholder theory in ethical circumstances, taking into account political ideology and stakeholders' opinions regarding environmental spending. (Rudawska, 2019; Stern et al., 1999), this study is to contribute by offering a thorough grasp of the extent to which SMEs in Europe's food and drink industry are implementing sustainable marketing strategies. The emphasis will be on identifying the distinctions between businesses that operate in business-to-business (B2B) and business-to-customer (B2C) environments. (Bridges & Wilhelm, 2008) "Going beyond green: The "why and how" of integrating sustainability into the marketing curriculum. To support sustainable marketing practices, the curriculum must emphasize the need for a sustainable lifestyle, business, economy, and society. (Vila-Lopez & Küster-Boluda, 2021).

Based on the various literature reviews the following hypotheses were framed:

Two hypotheses have been framed to understand the association between the variables.

We used Chi-square analysis.

Ho: There is no significant association between sustainability initiatives and active involvement of Aswins sweets towards community events and activities

Ha1: There is a significant association between sustainability initiatives and the active involvement of Aswins sweets towards community events and activities

Ho: There is no significant association between gender and Rate the quality of competitors' product

Ha2: There is a significant association between gender and Rate the quality of competitors' product

Ho: There is no significant association between monthly income and willingness to pay for more snacks

Ha3: There is a significant association between monthly income and willingness to pay for more snacks

## **RESEARCH METHODOLOGY**

An exploratory research design is used for this research study. The purpose of this research is to explore and understand the sustainable market of selected districts in Tamil Nadu with special reference to Aswin sweets. 255 respondents have responded to this research. A non-probability snowball sampling technique is used for this study. The data is collected through a well-structured questionnaire. The respondents for the study are the customers of Aswins, who give importance to the sustainable marketing of the snacks industry in Tamilnadu. The research is mainly based on primary data and secondary data. Primary data is collected through the snowball sampling method from the Aswin customers using a structured questionnaire. Secondary data is collected from various other sources such as reports, articles, journals, documents, printed literature, certain websites, etc.,

### **Objective of the study**

- To know the sustainable strategies that should be adopted in the snack industry
- To know about the expectations of the stakeholders and the ways to help the sustainable market.
- To know more about the competitors of similar products to improve the quality of the products to sustain in the market

## **DISCUSSION**

255 valid responses were collected from the respondents. The Analysis of demographic data shows that the mean age of the respondents in the selected areas of Tamil Nadu is 25 years and the mode is 22.0. A standard deviation of 8.217 indicates moderate age variation among the respondents. The sample spans a wide range of ages with a minimum of 13 and a maximum of 62. As reliability and validity are important to ensure the integrity and quality of the survey, the reliability test was made, and the score was above 0.7.

**Gender \* Learn about New snacks Cross tabulation**

Gender	Through Social Media	Television Commercials	Food blogs or Websites dedicated to reviewing Snacks	In-Store Promotion and Displays(pop)	Others	Total
Female	31	22	16	22	17	108
Male	53	21	15	33	25	147
<b>Total</b>	<b>84</b>	<b>43</b>	<b>31</b>	<b>55</b>	<b>42</b>	<b>255</b>

*Table 4.1*

**Number\_Member\_Family \* Often\_Buy\_Snacks\_Aswins Crosstabulation**

Number of Family Members	Every Day	Once in a Week	Once in a Month	Rarely / Once in a Special Occasion	Never	Total
1-2	4	14	8	16	8	50
3-5	14	45	50	50	14	173
6-7	3	7	6	9	2	27
Above 7	1	0	1	2	1	5
<b>Total</b>	<b>22</b>	<b>66</b>	<b>65</b>	<b>77</b>	<b>25</b>	<b>255</b>

*Table 4.2*

**Monthly\_Income \* Product\_Quality Crosstabulation**

Monthly_Income	Extremely Important	Important	Neutral	Not Important	Not at all important	Total
Below 10,000	42	45	45	8	6	146
10,000 to 30,000	19	19	17	3	2	60
30,000 to 50,000	6	11	13	3	2	35
Above 50,000	6	4	3	1	0	14
<b>Total</b>	<b>73</b>	<b>79</b>	<b>78</b>	<b>15</b>	<b>10</b>	<b>255</b>

*Table 4.3*

**Sustain abilities Initiatives:**

Sustainability Initiatives (Multiple Responses)	Total Number of Responses
Environmental conservation	83
Social responsibility	109
Transparency in operation	53
Fair treatment of employees	39
Other	42
<b>Total</b>	<b>326</b>

**Table 4.4**  
**Chi-Square Tests:**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	94.415 <sup>a</sup>	72	.039
Likelihood Ratio	93.151	72	.048
N of Valid Cases	255		

a. 79 cells (83.2%) have expected count less than 5. The minimum expected count is .02.

Hypothesis I:

Ho: There is no significant association between sustainability initiatives and active involvement of Aswins sweets towards community events and activities

H1: There is a significant association between sustainability initiatives and the active involvement of Aswins sweets towards community events and activities

**Chi-Square Tests-Monthly Income \* Willing to pay more for Snacks**

<b>Chi-Square Tests</b>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.195 <sup>a</sup>	3	.533
Likelihood Ratio	2.465	3	.482
N of Valid Cases	255		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 2.36.

Hypothesis II:

Ho: There is no significant association between monthly income and willingness to pay for more snacks

H1: There is a significant association between monthly income and willingness to pay for more snacks

**Chi-Square Tests-Gender \* Rate the quality of competitors product**

<b>Chi-Square Tests</b>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.857 <sup>a</sup>	16	.227
Likelihood Ratio	23.044	16	.113
N of Valid Cases	255		

a. 21 cells (61.8%) have expected count less than 5. The minimum expected count is .42.

Hypothesis III:

Ho: There is no significant association between gender and Rate the quality of competitors' product

H1: There is a significant association between gender and Ratethe quality of competitors' product

**Finding:**

The questionnaire was collected from 255 valid respondents, revealing an average age of 25 years and a maximum number of respondents under 22. They were indicating a relatively young demographic in the selected districts. The gender analysis showed that men (147) were more likely to learn about new snacks through different channels than women (108) and preferred social media more. The most emphasized sustainability initiatives are social responsibility (109 responses) and environmental conservation (83 responses), together accounting for nearly 60% of the total responses. Transparency in operation, fair treatment of employees, and other initiatives make up the remaining 40%. Hypothesis testing was made using Chi-square analysis, which revealed no significant association between gender and perception of competitors' product quality, and between monthly income and willingness to pay more for snacks.

**Conclusion**

The absence of significant associations between gender and perception of competitors' product quality, as well as between monthly income and willingness to pay more for snacks, implies that these factors may not heavily influence consumer behavior in this study. Future initiatives in the snack industry should prioritize sustainability efforts, aligning with the preferences and concerns expressed by respondents. Further research could delve deeper into understanding the nuances preferences and behaviors of consumers in the snack market, which would help to develop targeted marketing strategies and sustainable product innovations.

## **INDUSTRY 5.0: OPPORTUNITIES AND CHALLENGES FOR SOCIAL TRANSFORMATION**

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**Abstract**

*Consumers demand for a product is ever increasing and to fulfill day to day essentials requirements numerous products and services are consumed by individuals, firms and corporates. The article focuses the approach of Industries towards Individual consumers,*

*firms, corporates and the Government. Industrial revolution has been creating numerous transformations in the advancements in terms of products and simplification in the processes. Any changes in the industry which results in the advancement of the mankind is characterized as transformation. In the Industrial transformation, advertisements, branding, product positioning and promotional measures are playing a vital role for disseminating product or service-related information to general public, which are inducing the consumers to buy products or services. This paper reviews the industrial transformation from industry 4.0 to industry 5.0 in various sectors particularly in the manufacturing, processing and agro- based industries sector. The positive implications of Industry 5.0 in the societal development as well as the challenges are analyzed by assessing the previous studies which are cited in the references.*

**Keywords:** Digital transformation, Revolution, Industrialization, Sustainable development, Communication.

**Introduction:**

Industry 1.0 noticeable changed occurred from the handwork economy to tools based economy in the agricultural, textile and mining industries. The second revolution termed as Industry 2.0, in which faster transfer of persons and innovative ideas, the machines replaced factory workers. Industry 3.0 is termed the digital revolution enabled automation of memory-programmable controls plus computers. In this revolution mass production and the use of digital logic, integrated circuit chips; derived technologies included computers, digital cellular phones, and the internet. The innovations of the technology are transforming traditional products as well as business procedures. The digital revolution is converting technology into digital format. Industry 4.0 is a union among the physical assets and advanced technologies by applying artificial intelligence, Internet of Things, robotics and 3 Dimensional printing.

**Evolution of Money from Barter to Block chain:**

Barter Economy: Direct exchange of goods and services without a standardized currency, limited by the "double coincidence of wants". In the ancient days business transactions happed with exchange of goods against goods. Due to the necessity of a fortuitous alignment of desires between trading parties and its inherent inefficiency when dealing with intricate transactions. As economies expanded and the transportation of substantial amounts of physical commodity money became unfeasible, nations implemented the use of representational money . This monetary system entailed the utilization of tangible tokens, such as coins or paper notes, which could be traded for a predetermined quantity of a valuable item held in a centralized repository. Physical coins and paper bills backed by governments, facilitating commerce and finance growth. Fiat money, which is declaration by governments or authoritative body, designating it as legal tender was introduced.



Governments have the ability to exercise control over the supply of fiat currency, facilitating more efficient management of economies.

#### **Industrial Revolution in Commerce and Business Transactions:**

Industrial revolution in commerce and business transactions took multiple aspects, including open innovation that has a significant impact on developing the innovation capacity in businesses, helping them to achieve competitive advantage through providing faster, cost-saving, and efficient solutions to stakeholders. Applying open innovation may accelerate businesses' innovation process, including a cashless payments system and reducing competitive pressure to achieve sustainable growth in the business. Digitalization is one the forms in which industrial revolution occurred in business transaction by the rise of e-commerce, online payments, and digital platforms has transformed how businesses operate and interact with customers. Automation is another form in the industrial revolution through the intervention of Artificial intelligence and machine learning are automating various business processes, improving efficiency and reducing human error. Global Connectivity is yet another form that has created a borderless communication and the ability to reach a global customer base has opened up new opportunities for businesses.

#### **Sustainability and Environmental Impact in Industry 5.0**

Promoting the reuse, recycling, and repurposing of materials to minimize waste. The eras of Industry 4.0 accentuates the formation of a zero-waste policy within an internet-based circular economy with the motive of minimizing material consumption and embrace an inventive approach in terms of product development and supply chain management.. The process of digitization in industries with the chance to advance innovative business models, effective utilization of renewable energy, and invent energy supply strategies by applying improved technologies with a cost effective approach. And following the Eco-Friendly Processes by adopting manufacturing methods that minimize environmental degradation and pollution. Ensuring ethical and responsible sourcing of materials and components. It is essential that to create the efficiency of communication in changing organizational processes and thereby influencing the creation of sustainable supply chains.

#### **Challenges and Barriers to Adopting Industry 5.0:**

It is imperious to assess the present situation and examine the obstacles faced by industrial enterprises in their endeavour to integrate Industry 4.0. Numerous researchers have conducted various investigations pertaining to Industry 4.0 initiatives [15]. Integrating advanced technologies like AI and IoT can be challenging for some businesses. Industry 4.0 illustrates the global technological revolution. Big data analytics (BDA), robots, simulation, the industrial internet of things, cyber-security, cloud computing, additive manufacturing, augmented reality, and machine learning are needed to integrate into Industry 4.0. Numerous businesses are embracing such production system technologies in preparation for Industry 4.0

adoption. Employees may require extensive training to adapt to the new human-machine collaboration models. To address the problems posed by an increasingly digital world, current employment and skills policies will need to be overhauled. The administration must play a role in ensuring that an increasingly digital world produces higher-quality jobs and that both businesses and employees have the resources to take advantage of new job possibilities that arise. Skills policy should focus on four critical areas to help people take advantage of these opportunities and support inclusive growth.

**Embracing Digital Transformation in Business:**

Digital transformation is a long-term process that requires focus on the ultimate strategic goal. The digitalization process quickly expanded with the introduction of computers into business and caused the first major changes in the management paradigm. It is focused on incremental innovations within the existing production system. Digital transformation causes disturbing changes and digital optimization that aligns the production process with the costs and profits that the organization achieves within the industry. The ultimate objective is to change the existing situation and to create new production processes, new products and new markets. Various forms of digital transformation in business happen through Assess Readiness by evaluating organization's digital maturity and identify areas for improvement. Developing a suitable strategy by creating a comprehensive plan to integrate new technologies and processes, Investment in talented human skills by up-skill and reskill the workforce to adapt to the changing landscape.

**The Future of Business and Industrial Transformation with Industry 5.0:**

Digital transformation implies focus on the future and solutions beyond control of existing digital optimization. Digital transformation is creating completely new business model, and what is more important, new strategic new model of acquiring market and achieve profit zone. Digital transformation is the process of using digital technologies to create new – or modify existing – business processes, culture, and customer experience to meet changing business and market requirements. Personalized Production is achieved through Customized goods and services tailored to individual customer preferences, Sustainable Operations by Minimizing environmental impact through eco-friendly manufacturing and supply chains, Human-Centric Collaboration by seamless integration of human expertise and advanced technologies for enhanced productivity.

**Opportunities and Challenges for Social Transformation**

The value-sensitive design approach proposed by Fabio De Felice et al., as a principled framework to illustrate how technologies enable human-machine symbiosis in the factory of the future can be designed to embody elicited human values and to illustrate actionable steps that engineers and designers can take into account in their design projects. Therefore, it is believed that the analysis of the productivity and reliability of the machining

line in the context of human-centric design will be the frontline of future research. The opportunities possible for future businesses are Collaborative Efforts by fostering partnerships and cooperation across sectors is key to driving positive change and harnessing collective knowledge, resources, and creativity. Empowering Marginalized Voices are meaningful social transformation that requires intensifying the voices of those who have historically been excluded from positions of power and influence. Confronting Structural Issues could be addressed through transformative change demands addressing deep-seated, systemic problems that perpetuate marginalization and inequity.

### **Conclusion**

The potential of Industry 5.0 in advancing sustainable development and emphasizes the importance of adopting a comprehensive approach that encompasses technological, societal and ethical considerations. Sustaining momentum for social transformation could be accomplished in the Industry 5.0 by continuous adaptation and embracing a flexible and iterative approach to address evolving challenges and utilizing the opportunities [27]. Collective accountability is another possibility that results in fostering a shared sense of responsibility among all stakeholders to ensure the sustainability of change efforts. Visionary Leadership is yet another tool that leverages in cultivating a new generation of leaders who can inspire and guide the social transformation process [26]. Equitable Partnerships is also the mechanism that would build a long-term, mutually beneficial collaborations lead to marginalized communities as equal partners.

## **EMPHASIS ON HUMAN CAPITAL DURING THE TRANSITION FROM INDUSTRY 4.0 TO INDUSTRY 5.0: A REVIEW ON EXISTING LITERATURE**

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### **Abstract**

*Industry 5.0 redefines the role of human capital, promoting soft skills, creativity, critical thinking, and emotional intelligence, thus creating a more human-centric workplace by addressing ethical considerations, fair labor conditions, and corporate social responsibility. However, it poses challenges such as rapid technological advancements, job displacement, ethical concerns, privacy issues, and cybersecurity risks. The primary objective of the study is to understand the emphasis on Human Capital during the transition from Industry 4.0 to Industry 5.0 and to analyze the prospects and challenges to the organizations by integrating Human Capital in Industry 5.0. The study shows that Industry 5.0 enables*

*Human-machine collaboration and human-centric advancements for organizational and environmental sustainability. Addressing challenges like continuous reskilling and ethical concerns requires proactive planning through collaboration among governments, educational institutions and businesses.*

**Keywords:** Industry 5.0, Industry 4.0, Human Capital, Organizational sustainability

## **INTRODUCTION**

Industry 5.0 represents a paradigm shift in industrial advancements, giving importance to human-machine collaboration instead of replacing humans with machines with sustainable growth and, and resilience (Gródek-Szostak et al., 2023; Madsen et al., 2023). This is more inclusive and collaborative where humans work along with advanced technologies like big data, artificial intelligence, and the Internet of Things to enhance productivity and efficiency (Ghobakhloo et al., 2023; Singh et al., 2023). Industry 5.0 is a means to achieve societal goals with more focus on human well-being, environmental sustainability, and worker-centric management processes. The shift towards Industry 5.0 is driven by the need to address socio-economic and ecological challenges, which is a major drawback of earlier technologies. Industry 5.0, the next phase in manufacturing and production systems, integrates advanced technology with human intelligence, emphasizing the collaboration of humans, machines, and technology by increasing the skilled workforce (Lykov & Razumowsky, 2023a). This new paradigm introduces a human touch to Industry 4.0, enhancing efficiency through automation with IoT-connected robots that mimic human brains (Gomathi et al., 2023a).

The transition from Industry 4.0 to Industry 5.0 presents huge opportunities and challenges for human capital in industrial sectors globally. While Industry 4.0 emphasized automation using AI and IoT technologies, Industry 5.0 shifts towards a human-centric approach, integrating advanced technologies to enhance productivity by prioritizing human well-being and environmental sustainability. However, this transition necessitates addressing various complexities related to skills development, ethical considerations, and organizational adaptation. The study aims to understand the emphasis on Human Capital during the transition from Industry 4.0 to Industry 5.0 and to analyze the prospects and challenges to the organizations by integrating Human Capital in Industry 5.0. Also, to examine the ethical and societal implications of integrating advanced technologies and strategies to promote Human-centered innovation and sustainability.

## **INDUSTRY 5.0 AND HUMAN RESOURCE**

Industry 5.0 emphasizes the pivotal role of human capital in various sectors as this prioritizes human-centric approaches by emphasizing human well-being and quality of work-life (Kalateh et al., 2022a; Lindner & Reiner, 2023a; Nahavandi, 2019). The evolution from Industry 4.0 to 5.0 underscores the importance of soft and hard skills in enhancing organizational competitiveness and fostering holistic growth (Ruiz-de-la-Torre et al., 2023).

Furthermore, bibliometric studies highlight the emergence of Industry 5.0 as a field that focuses on human factors, human-robot collaboration, and human-machine interaction, signifying a new era where human-centeredness is at the core of technological advancements. The evolution from Industry 1.0 to Industry 5.0 has significantly impacted human capital by emphasizing the importance of personalization, collaboration, and skill development. Industry 5.0, the latest paradigm, places a strong focus on human-centric approaches, prioritizing the well-being of workers and creating sustainable and resilient production systems (Lykov & Razumowsky, 2023a; Melnyk et al., 2021). Innovations in technology and human elements must coexist. Future socio-technical systems, such as complex I5.0 production systems, where humans, machines, robots, computers, software, and algorithms collaborate, will benefit greatly from this shared consideration in their design, benefiting both industry and society (Lindner & Reiner, 2023b)

The primary characteristic of Industry 5.0 is "personalization," which is associated with both offering customized products to clients and, in our perspective, guaranteeing customization in labor relations with workers, since the human worth is enhanced through human-machine partnership (Alves et al., 2023a; Orlova, 2021). In reality, big data analytics, along with AI and IoT, are the enablers that will drive the shift from Industry 4.0 to Society 5.0 and offer creative ways to enhance consumers' psychophysical circumstances (Giugliano et al., 2023; Sharp, 2020)

#### **Transition from Industry 4.0 to 5.0 with an emphasis on human capital**

In Industry 4.0, the role of humans is often relegated to supervisors or operators of automated systems, necessitating a high level of technical expertise to manage and maintain these advanced technologies (Agote Garrido et al., 2023; Rybczak & Ziemiński, 2022). However, Industry 5.0 redefines this dynamic by fostering a collaborative environment where technology serves to augment human capabilities rather than replace them. This paradigm shift highlights the importance of soft skills, creativity, critical thinking, and emotional intelligence, complementing the existing technical skillset.

The work environment in Industry 4.0 is predominantly optimized for maximum efficiency, sometimes at the expense of worker comfort and well-being (Ahmad Rozelan Yunus, 2020). In contrast, Industry 5.0 endeavors to create a more human-centric workplace, integrating ergonomic designs and smart technologies to enhance comfort, safety, and overall well-being. Job design also evolves, shifting from being centered on machine capabilities to being tailored to human strengths, supported by technology (Kalateh et al., 2022a). This approach not only leverages human judgment, creativity, and interaction but also allocates repetitive or hazardous tasks to machines.

The emphasis on well-being and work-life balance is another cornerstone of Industry 5.0. While technological advancements in Industry 4.0 can reduce physical workloads, they

often increase demands for availability and responsiveness, potentially leading to stress and burnout. Industry 5.0 prioritizes employee well-being and work-life balance, utilizing technologies to support flexible working arrangements, reduce workplace stress, and create healthier work environments (Fadwa Mahiri et al., 2023; Giugliano et al., 2023). Ethical considerations also play a more prominent role in Industry 5.0, where fair labor conditions, environmental sustainability, and corporate social responsibility are integral to business operations (Agote Garrido et al., 2023). This ethical focus ensures that the benefits of technological advancements are equitably distributed and that the broader societal impact is positive.

#### **INDUSTRY 5.0: PROSPECTS ON HUMAN CAPITAL**

Industry 5.0 presents significant opportunities for human capital by prioritizing the well-being of workers, enhancing their skills through collaboration with digital technologies (Alves et al., 2023b). This new paradigm emphasizes personalization in labor relations, increasing human value through human-machine collaboration and individual professional development trajectories, leading to improved labor productivity and social communication (Orlova, 2021). The focus on human-centeredness in Industry 5.0 ensures that technology, organizations, and workplaces are adapted to human and societal needs, fostering sustainable and resilient systems that empower workers and contribute to individual, corporate, and social wealth (Giugliano et al., 2023; Kalateh et al., 2022b).

Another significant opportunity lies in the promotion of creativity and innovation. Industry 5.0 emphasizes the role of human creativity, critical thinking, and problem-solving in driving innovation alongside technology. Companies can foster a culture that encourages employees to experiment, take calculated risks, and generate new ideas. Establishing cross-functional teams and innovation hubs can facilitate collaborative ideation and experimentation, leading to innovative solutions and advancements. Global connectivity and cross-cultural skills are increasingly important in Industry 5.0. This era enables global connectivity and collaboration across borders, requiring employees to possess strong cross-cultural communication and collaboration skills.

#### **INDUSTRY 5.0: HURDLES ON INTEGRATION WITH HUMAN CAPITAL**

Industry 5.0 challenges human capital to adapt to new roles, embrace technological advancements, and foster a balance between human and technological capital to drive sustainable development.

Industry 5.0 poses challenges related to human capital, focusing on human-centricity and the collaboration between humans and robots in the workplace. The transition to Industry 5.0 involves addressing issues such as security, legal, regulatory, psychological, socio-ethical, and ethical concerns in the context of Human-centric transformation. Additionally, the need for adequate HR skills, the changing roles of IT and HR departments, and the potential job

losses due to automation are highlighted as critical challenges in the shift towards Industry 5.0 (Ellitan, 2020).

Global competition for specialized talent necessitates strategies for attracting and retaining skilled workers. Addressing these challenges involves proactive planning, investment in education and training, and collaboration among governments, educational institutions, and businesses to develop a skilled, adaptable, and innovative workforce for sustainable growth.

### **CONCLUSION**

In conclusion, Industry 5.0 heralds a transformative era that integrates advanced technologies with a human-centric focus, emphasizing collaboration between humans and machines. This shift from the automation-centric Industry 4.0 to a more inclusive, personalized approach offers significant opportunities for developing human capital. By fostering skills in advanced technologies, promoting creativity and innovation, and enhancing global connectivity and cross-cultural skills, Industry 5.0 can create a more dynamic, adaptable workforce. Furthermore, it emphasizes the importance of ethical considerations, responsible AI use, and the well-being of employees, ensuring that technological advancements contribute positively to society.

However, the transition to Industry 5.0 also presents challenges. Rapid technological advancements necessitate continuous reskilling and upskilling, while job displacement due to automation requires effective transition programs and upskilling initiatives. Ethical and privacy concerns demand education on responsible technology use, and bridging the digital skills divide is crucial for equitable participation. Additionally, adapting organizational cultures to promote innovation and dealing with heightened cyber security risks are imperative. Addressing these challenges involves proactive planning, investment in education and training, and fostering a supportive organizational culture. Collaboration between governments, educational institutions, and businesses is essential to developing a skilled, adaptable, and innovative workforce capable of driving sustainable growth and competitiveness. By balancing technological advancements with human values, Industry 5.0 can enhance human well-being, foster societal resilience, and create a more sustainable and inclusive industrial landscape.

## **AGRICULTURE 5.0: OPPORTUNITIES & CHALLENGES OF FARMERS**

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### **Abstract**

*The agricultural industry has undergone several significant changes over the past few decades, influenced by the industrial revolutions that have occurred. These changes have progressed from Indigenous agriculture to mechanized farming and the current precision*

*agriculture. Today, the use of Artificial Intelligence (AI) and Internet of Things (IoT) are increasing and the use of these types of technologies has made agriculture smarter and better. Investing in technological innovation is necessary to encourage the development of long-term agricultural alternatives. The Internet of Things, sensors and sensor networks, robots, artificial intelligence, cloud computing, big data and other disciplines will help accelerate the transition to agricultural version 4.0. Basically, the purpose of writing this review is to understand the agricultural revolution and the knowledge of farmers about what technology that should be used in agriculture. Agriculture 5.0 is the way to smart agriculture in the future. The use of smart technologies requires huge financial investments and machine learning. Due to the advancement of agriculture, it is difficult for farmers to acquire technical and digital literacy.*

**Key words:** Agricultural 5.0, Smart Technologies [AI, IoT], Farmers digital literacy.

### **Introduction**

Agriculture has progressed since ancient times from 1.0 to 4.0 to cultivate land and produce animals for human food. Agriculture developed gradually and systematically over time period. Agriculture 1.0 ushers in an era of traditional agriculture based primarily on humans and animals. Although primitive tools such as sticks, stones and simple tools were used in agriculture at the time, production was low due to lack of labour. In the 90's, steam engine was introduced after the widespread usage of power, notably in agriculture. After that, farmers will try to use autonomous machines during Agriculture 2.0. Agriculture 2.0 has increased efficiency and productivity, resulted in the use of small amounts of chemicals. But in the 20th century, the harmful effects of chemical use became evident, including chemical contamination of fields, environmental destruction, massive energy consumption and waste of natural resources. Agriculture 3.0 began in the 20th century as a result of the enormous technical development caused by the creation of computers. The computer works accurately and precisely. The introduction of computers brought automation to the game. Thanks to this, all computer technologies have made it possible to control agricultural machines efficiently and intelligently. Whatever problems remained in Agriculture 2.0; Agriculture 3.0 completely solved them. Correct allocation of work tasks to farm machinery reduced herbicide use, improved irrigation, etc. Agriculture 4.0 is now a reality, thanks to the use of the latest technologies such as the Internet of Things [IoT], Big Data, Artificial Intelligence [AI], Cloud Computing and Remote Sensing, which helps in advancing in production with the sources hassle free from error of mistakes and labour lack demand would be overcome by these machine learning. Agriculture 5.0 represents the convergence of cutting-edge technologies with farming practices. It aims to revolutionize agriculture by leveraging digital innovations, data analytics, and automation.



### **Literature Review**

Agriculture 5.0: By exploring supply and demand, the question of building the future can be seen as a contradiction in the global context of population growth and the rise of middle-class consumers demanding greater consumption of resources. According to these ideas, agricultural productivity should increase by 70 percent by 2050. To present this vision, economists say that farmers will have to produce more food in the next generation than the work of all farmers since the first agricultural revolution 10,000 years ago. In addition to the challenge of producing more food while maintaining global health, there are other important areas to consider. By developing interconnected networks such as artificial intelligence (AI), Internet of Things (IoT), drones, smart devices and mobile devices, work has increased in supporting successful agricultural work. Consequently, a more advanced agriculture must be established, characterized by the adoption of production methods, techniques and tools developed through innovation, research and development.

### **In India context,**

Agriculture and related sectors such as livestock, forestry and fisheries account for 17.5% of the gross domestic product (GDP) and 41.49% of the workforce in 2020. India is the world's first largest net area of growth, followed by the United States and China. The economic contribution of agriculture to India's GDP has declined along with the country's overall economic growth. However, agriculture is the largest economic sector in terms of population and plays an important role in the socio-economic structure of India. Agriculture will suffer from the lack of mechanization. The use of conventional, non-mechanized tools in agriculture needed to feed the growing world population is something that cannot be allowed. As agriculture is increasing, non- agricultural activities are gaining attention. There is no farming involved, but all systems must be managed by competent people. Most of this system is built on the Internet of Things (IoT), big data, artificial intelligence (AI) and 5G technologies.

The Internet of Things (IoT) is a great technology that offers many new solutions to modernize the agricultural sector and exchange opportunities between companies. IoT solutions and products are being developed by research institutes and scientific groups to address various aspects of agriculture.. The Internet of Things (IoT) has revolutionized the way data is collected on farms by providing real-time locations through connected devices such as sensors and cameras, giving farmers unprecedented levels of work performance. This data is analysed using advanced analytics tools to show trends over time, allowing farmers to decide when is the best time to plant a crop or apply a specific treatment, combining their experience with current trends monitored by IoT devices. right time for you. Agricultural IoT applications, sensors/devices, communication protocols and various networks. The main difficulties and challenges that are being investigated in the agricultural sector are also

analysed. In addition, an agricultural Internet of Things framework has been provided that interprets the description of various current agricultural technologies. In addition, national policies for IoT agriculture were discussed. Finally, a list of key concerns and challenges in IoT agriculture is provided to help researchers consider future options. Artificial Intelligence [AI] AI-powered products can use these variables to track product results. Companies are turning to AI technologies to improve a wide range of agricultural operations throughout the food supply chain. AI is spreading due to its widespread use, rapid technological improvements, and wide range of applications in situations that cannot be adequately addressed by humans or traditional computing architectures. In general, a crop management system provides an interface for general crop management, and includes all aspects of farming.

#### **AI used in the following areas of Agriculture**

##### **Soil and crop health monitoring system:**

The kind of soil and nutrition of the soil have a significant impact on the crops that are grown and their quality. The quality of the soil is deteriorating as a result of growing deforestation, making it difficult to assess.

##### **Weather forecasting using AI:**

Farmers find it challenging to determine the best time to sow seeds due to climate change and rising pollution. With the aid of artificial intelligence, farmers can analyze weather conditions by using weather forecasting, which helps them plan the type of crop that can be grown and when seeds should be sown.

##### **Pests' detection using AI:**

AI systems employ satellite photos and historical data to determine whether any insects have landed and, if so, which species-such as locusts, grasshoppers, and others-have done so. AI aids farmers in their battle against pests by sending alerts to their cell phones so that farmers may take the necessary precautions and employ the necessary pest management.

##### **Crop health monitoring using drones:**

Drone technology has had a lasting effect on the productivity of India's agriculture sector. The companies like Equinox Drones provide farmers with drone-powered solutions to boost productivity in a variety of farming operations, including precision farming, livestock management, pesticide application, crop stress identification, treatment planning, plant growth monitoring, and scouting. In the future, AI will help farmers evolve into agricultural technologists, using data to optimize yields down to individual rows of plants.

#### **OPPORTUNITIES IN AGRICULTURAL 5.0: FARMERS' PERSPECTIVE**

**Precision agriculture:** IoT sensors, drones and satellite imagery are used to gather information about soil health, crop and environmental conditions. It enables farmers to make informed decisions in real time, optimizing the use of resources and maximizing yield.

**Smart Farming:** Integrating Artificial Intelligence and Machine Learning Algorithms for Autonomous Monitoring and Management of Farm Operations. This includes automated planting, watering, fertilizing and pest management that adjust based on real-time data.

**Vertical Farming:** Uses controlled environment agriculture (CEA) techniques such as hydroponics, aeroponics and vertical farming to grow crops indoors under optimized conditions. This method reduces water use, eliminates pesticides and allows year-round production in urban areas.

**Blockchain in Agriculture:** Adoption of Block chain technology improves supply chain traceability and transparency. It ensures food safety, reduces fraud and provides consumers with accurate information about the origin of food.

**Agri-Tech Startups:** Rapid growth of startups focusing on innovative solutions in agriculture such as biotechnology-enhanced crop varieties, sustainable packaging solutions and farm management software.

**Data-driven decision making:** Farmers can use big data analytics to analyze historical data, predict trends and optimize farm management practices. This leads to better risk management and better profitability.

**Sustainable agriculture:** Integration of renewable energy sources (solar, wind) into power plants, introduction of circular economy principles (waste recycling, use of by-products) and sustainable agricultural practices to minimize environmental impact.

**Skill development:** Demand for technology and data science skills is growing in the agricultural sector. There are opportunities for training programs and training initiatives to prepare the workforce for Agriculture 5.0.

**Global food security:** Addressing climate change, population growth and resource scarcity by developing sustainable agricultural systems that can produce more food with fewer resources.

**Policy and Regulation:** Government and regulators have an important role to play in supporting the adoption of Agriculture 5.0 with policies that encourage innovation, guarantee food safety and promote sustainable practices.

#### **CHALLENGES IN FARMERS' KNOWLEDGE OF AGRICULTURAL 5.0**

**Cost of technology:** Adopting advanced technologies such as artificial intelligence, robotics and the Internet of Things can be expensive, especially for smallholders or farmers in developing regions. Availability of affordable technology and infrastructure is crucial for widespread adoption.

**Digital divide:** Differences in access to digital technology and internet connections between rural and urban areas can hinder the adoption of Agriculture 5.0 practices. Bridging this digital divide is essential to ensure equal access to technological benefits.

**Data protection and security:** The collection and management of large amounts of

farm data through IoT sensors and artificial intelligence systems raises concerns about data privacy and security. Farmers need assurance that their information is protected from unauthorized access and misuse.

**Skills and Training:** Successful use of Agriculture 5.0 technologies requires a workforce that is skilled in data analysis, IT systems management and technology troubleshooting. Ensuring adequate education and training opportunities for farmers is crucial.

**Regulatory Challenges:** Developing regulatory frameworks that adapt to new technologies while ensuring food safety, environmental sustainability and fair marketing practices can be complex and vary from region to region.

**Reluctance to change:** Farmers may be reluctant to adopt new technologies because they worry about possible disruptions to traditional farming practices, are unsure of the return on investment or because they are unaware of the benefits of Agriculture 5.0.

**Environmental Impact:** While Agriculture 5.0 aims to promote sustainability, there are concerns about the environmental impact of intensive farming practices enabled by advanced technologies. Managing water use, maintaining soil health and biodiversity remain critical.

**Infrastructure constraints:** Inadequate infrastructure, such as reliable power supply, transport networks and storage facilities, can limit the effectiveness of Agriculture 5.0 technologies, especially in remote or underdeveloped areas.

**Market access and distribution:** Improving market access and efficient distribution channels for agricultural products are essential to maximize the benefits of the productivity gains made possible by Agriculture 5.0.

**Ethical considerations:** Ethical issues related to AI and automation in agriculture, such as displacement of human labour, fair distribution of benefits and ensuring responsible use of technology, must be carefully considered and addressed.

## **CONCLUSION**

Agriculture 5.0 represents a transformative shift towards sustainable, tech-driven farming practices. By integrating advanced technologies such as AI, IoT, and robotics with traditional agricultural wisdom, Agriculture 5.0 promises increased efficiency, productivity, and resilience in the face of environmental challenges. This new era fosters a holistic approach to farming that not only boosts yields but also minimizes environmental impact, ensures food security, and enhances the livelihoods of farmers globally. As we embrace Agriculture 5.0, we pave the way for a more sustainable future where agriculture thrives in harmony with nature and meets the growing demands of a rapidly changing world.

## **CYBER SECURITY DETERMINANTS IN POLICE STATIONS: THE WORK LIFE BALANCE OF WOMEN POLICE IN TIRUNELVELI**

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### **Abstract**

*"This abstract explores the cyber security determinants in police stations and their impact on the work-life balance of women police officers. Technology and digital advancement have produced several advantages to mankind, but it has also created a new field to focus on and monitor, which is cyber security for the prevention of cyber-crimes. Countries like Iraq have embraced these innovations without any proper prelude measures and are facing different challenges to combat cyber issues. In this context, this study has empirically evaluated the influence of organizational cyber security on the digital workplace performance of women employees. Some of the external factors, i.e., policy compliance of the organization and attitudes of employees towards cyber security, have been investigated as mediators. This study has discussed its theoretical and practical implications and limitations for policymakers and future researchers as well."*

**Keywords:** cyber security, digital workplace, work life balance, attitude towards cyber security.

### **1. INTRODUCTION**

Cyber-crime is not an old sort of crime to the world. It is defined as any criminal activity which takes place on or over the medium of computers or internet or other technology recognized by the Information Technology Act. Cyber-crime is the most prevalent crime playing a devastating role in Modern India. The intersection of cyber security and work-life balance in police stations, especially for women officers in Tirunelveli. In 2021, the Government of Tamil Nadu have notified 46 Cyber Crime Police Stations, one each in every District / City / Special Unit and their respective jurisdictions. Cyber police are police departments or government agencies in charge of stopping cybercrime. As digital threats grow, strong cyber security in police departments is essential. This study explores aiming to develop policies that support effective cyber security and the well-being of women officers. Understanding these dynamics is vital for improving their work environment and job satisfaction.

## **1.2 STATEMENT OF THE PROBLEM**

The integration of cyber security measures in police stations is crucial, yet the unique challenges faced by women police in Tirunelveli in balancing work and life remain underexplored. Inadequate cyber security infrastructure exacerbates these challenges, leading to potential data breaches and increased work-related stress. This study aims to identify the specific cyber security determinants affecting women police. Understanding these issues is essential for developing strategies to enhance both cyber security and the well-being of women in law enforcement.

## **1.3 SCOPE OF STUDY**

The study aims to explore the cyber security determinants within police stations in Tirunelveli district, focusing on their impact on the work-life balance of women police. It examines the challenges women face in maintaining cyber security protocols and how these challenges affect their professional and personal lives. The research seeks to identify specific factors contributing to these challenges and propose actionable solutions to enhance both cyber security and work-life balance. This study is essential for improving the efficiency and well-being of women police in Tirunelveli.

## **1.4 OBJECTIVES**

1. To identify the factors responsible for balance in work life and family life.
2. To know the reason for work life balance of women police.
3. To identify the factors, feel about the work in cyber security department and improvement needs for work life balance.

## **1.5 METHODOLOGY OF THE STUDY**

Research Type: Analytical research

## **1.6 PRIMARY DATA**

Primary data were collected from 50 women police in Tirunelveli through interview schedule method for the purpose of extracting the required data.

## **1.7 SECONDARY DATA**

In this study, the researcher has collected secondary data from books, magazines, journals, articles, and websites.

## **1.8 STATISTICAL METHODS**

For the present study, the researcher has used statistical techniques such as percentage analysis, weighted average, and Garrett ranking method.

## **REVIEW OF LITERATURE**

**Paek, S.Y., Nalla, M.K. and Lee, J. (2020)** This study explored South Korean police officers' attitudes toward public-private partnerships (PPPs) in cyberspace policing. It found that officers' perceptions of cybercrime severity, computer skills, and training awareness positively influenced their support for PPPs, while more years of experience had a negative

impact. This research fills a gap by identifying predictors of officer support for cross- sectoral partnerships in combatting cybercrime.

**Liou, K.T. (2019)3**, The study reviews the background of the police service model, the development of police-related technology and the relationship between these technologies and police performance measures. Based on the analysis of managerial concepts, the study provides discussions about risks of technology and human factors, resource limitation, professional attitude and culture, privacy concerns, citizen video and social media, and public trust. The study examine police technology application from a broad perspective to address not only technology operational issues but also related organization, management, community and policy concerns.

## 2. DATA ANALYSIS AND INTERPRETATION

**Table 1 Age of the respondents**

Variables	Categories	No. of Respondent	Percentage
Age	18 to 22	5	10%
	23 to 27	10	20%
	28 to 32	5	10%
	Above 32	30	60%
	<b>Total</b>	<b>50</b>	<b>100%</b>

**Source: Primary Data**

Out of 50 respondents, 10% of the respondents belong to the age group of 18-22 years, 15% of the respondents belong to the age group of 23 - 27 years, 10% of the respondents belong to the age group of 28 - 32 years, and remaining 60% of the respondents belong to the age group of Above 32 years

**Table 2 Educational qualification of the respondents**

Variables	Categories	No of Respondent	Percentage
Educational qualification	Higher Secondary	15	30%
	Under Graduate	20	40%
	Post Gradaute	15	30%
	Others	0	-
	<b>Total</b>	<b>50</b>	<b>100%</b>

**Source: Primary Data**

The above table shows that 30% of the respondents have studied upto higher secondary 40% of the respondents are undergraduates, 30% of the respondents have completed post graduate.

**Table 3 Marital status of the respondents**

<b>Variables</b>	<b>Categories</b>	<b>No. of Respondent</b>	<b>Percentage</b>
<b>Marital status</b>	Married	30	60%
	Unmarried	18	36%
	Widowed	1	2%
	Divorced	1	2%
<b>Total</b>		<b>50</b>	<b>100%</b>

**Source: Primary Data**

The above table shows, 60% of the respondents are married, 36% of the respondents are unmarried, 2% of the respondents are widowed and the remaining 2% of the respondent are divorced.

**Table 4 Rank category of the respondents**

<b>variables</b>	<b>Categories</b>	<b>No. of respondents</b>	<b>Percentage</b>
<b>Rank Category</b>	Constable	5	10%
	Grade 1	5	10%
	Head Constable	5	10%
	Sub Inspector	27	54%
	Inspector	5	10%
	DSP/AC	1	2%
	DC/ADSP	1	2%
	Command/SP	1	2%
<b>Total</b>		<b>50</b>	<b>100%</b>

**Source: Primary Data**

The above table shows 10% of respondents of the respondents are constable, 10% of the respondents are grade 1, 10% of the respondents are head constable, 54% of the respondents are sub inspector, 10% of the respondents are inspector, 2% of the respondents are DSP/AC, 2% of the respondents are DC/ADSP and remaining 2% of the respondents are Commandant/SP.

**Table 5 Improvement needs to the respondents**

<b>Variables</b>	<b>Categories</b>	<b>No. of RESPONDENTS</b>	<b>PERCENTAGE</b>
<b>Improvement</b>	Improved Childcare Facilities	5	10%
	More Flexible Working Arrangements	15	30%
	Enhanced Leave Police	20	40%



	Gender-Sensitive Training Programs for Supervisor	10	20%
<b>Total</b>		<b>50</b>	<b>100%</b>

**Source: Primary Data**

The above table shows 10% of the respondents selected Improved Childcare Facilities, 30% of the respondents selected More Flexible Working Arrangements, 40% of the respondents selected Enhanced Leave Police, remaining 20% of the respondent selected Gender-Sensitive Training Programs for Supervisor.

**WEIGHTED AVERAGE**

A weighted average is a calculation that takes into account the varying degrees of importance of the numbers in a data set. In calculating a weighted average, each number in the data set is multiplied by a predetermined weight before the final calculation.

W = weighted average n = number of terms to be averaged  $w_{\{i\}}$  = weights applied to x values  $X_{\{i\}}$  = data values to be averaged

**Table 6**  
**Factors Enhancing the Work Life Balance as Women Police**

S. No	variables	SA (5)	A (4)	N (3)	D (2)	SD (1)	Total	Weighted average
1	Nature of your profession work is comfort	15 (75)	20 (80)	10 (30)	5 (10)	-	195	39
2	Working hours and shift time	5 (25)	5 (20)	15 (45)	15 (30)	10 (10)	130	26
3	Salary structure is reasonable	15 (75)	25 (100)	5 (15)	5 (10)	-	200	40
4	Welfare measures (health care, medical assistance, insurance policies)	25 (125)	15 (60)	5 (15)	5 (10)	-	210	42
5	Promotion opportunities for career growth	25 (125)	15 (60)	10 (30)	5 (10)	-	225	45

6	Adequate Safety ensured at work place	15 (75)	20 (80)	10 (30)	5 (10)	-	195	39
7	Job autonomy without interference from higher officials and political parties	20 (100)	15 (60)	5 (15)	5 (10)	-	185	37
8	Proper appreciation and recognition for the work done	25 (125)	15 (60)	5 (15)	5 (10)	-	210	42
9	Uniform comfortless	10 (50)	20 (80)	15 (45)	5 (10)	-	185	37
10	Provision of residential quarters	20 (100)	25 (100)	5 (15)	-	-	215	43
11	Usage of police vehicles for their children to go to school	15 (75)	20 (80)	10 (30)	5 (10)	-	195	39
12	Usage of police vehicles for sick person	20 (100)	25 (100)	5 (15)	-	-	215	43
13	Work environment	10 (50)	20 (80)	15 (45)	5 (10)	5 (5)	190	35
14	Support from higher officials in work Nature	15 (75)	20 (80)	10 (30)	3 (6)	2 (2)	193	38.6

**Source: Primary data**

The above table reflect the **Factors Enhancing our Work Life Balance as Women Police**, out of 14 variables, Promotion opportunities for career growth secured the highest average of 45. Next to that, Provision of residential quarters secured average of 43 and Proper appreciation and recognition for the work done & Welfare measures (health care, medical assistance, insurance policies) secured average of 42.

**Table 7 FEELS ABOUT THE WORK LIFE**

S. No	Variables	Happy (3)	Neutral (2)	Unhappy (1)	Total	Weighted Average
1	Amount of the time spend at	30 (90)	15 (30)	5 (5)	125	41.6

	work					
2	Facilities is given to me	25 (75)	24 (48)	1 (1)	124	41.3
3	Sufficient salary	35 (105)	15 (30)	-	135	45
4	Working environment	25 (75)	24 (48)	1 (1)	124	41.3
5	Flexible Working Hours	15 (45)	20 (40)	15 (15)	100	33.3
6	Safety Accommodations	30 (90)	17 (34)	3 (3)	127	42.3
7	Carrier Promotion	35 (105)	15 (30)	-	135	45
8	Getting moral Support and Counselling from colleagues	30 (90)	15 (30)	5 (5)	125	41.6
9	Transportation Assistance	25 (75)	15 (30)	10 (10)	115	38.3
10	Specialized Training Programs	35 (105)	10 (20)	5 (5)	130	43.3

**Source: Primary data**

The above table reflects the feels about the work, out of 10 variables, Carrier Promotion & Sufficient salary secured highest average of 45. Next to that, Specialized Training Programs secured average of 43.3 and Safety Accommodations secured average of 42.3.

**2.2 GARRETT RANKING METHOD**

Garrett's ranking technique is a method used to rank preferences and change orders of constraints and advantages into numerical scores. It is a simple technique that researchers can use to determine preferences among variables. As per this method, respondents have been asked to assign the rank for all factors and the outcomes of such ranking have been converted into score value with the help of the following formula:  $\text{Percent position} = 100 (\text{Rij} / 0.5) \text{Nj}$   
 $\text{Rij} = \text{Rank given for the } i\text{th variable by } j\text{th respondents}$   
 $\text{Nj} = \text{Number of variables.}$

**Table 8**  
**Reason for work life balance**

S. No	Particulars	Average	Rank
1	Managing the number of tasks and responsibilities to prevent overwhelming schedules	25.55	VII
2	Balancing work demands with personal well-being to reduce mental and emotional strain	27.51	IV
3	Aligning work responsibilities with personal interests and strengths for a more fulfilling career	27.43	V
4	Finding a balance between dedication to work and engaging in outside interests for overall satisfaction	28.53	II

5	Clarifying job expectations and responsibilities to maintain clarity and focus.	27.34	VI
6	Having support systems and policies in place to facilitate work life balance initiatives	21.28	X
7	Utilizing tools and resources to streamline work processes and enhance efficiency	25.14	VIII
8	Establishing a supportive network at home to help manage both Professional and personal commitments.	28.38	III
9	Addressing external factors such as health issues or financial concerns that may impact work-life balance	22.25	IX
10	Ensuring equal opportunities and accommodations for women in the workplace to support their work-life balance needs	34.04	I

**Source: Primary data**

The above table shows that 50 respondents rank the reason for work life balance. The first rank is Ensuring equal opportunities and accommodations for women in the workplace to support their work-life balance needs , The second rank is Finding a balance between dedication to work and engaging in outside interests for overall satisfaction, the third rank is Establishing a supportive network at home to help manage both professional and personal commitments, The fourth rank is Balancing work demands with personal well-being to reduce mental and emotional strain, The fifth rank is Aligning work responsibilities with personal interests and strengths for a more fulfilling career, The sixth rank is Clarifying job expectations and responsibilities to maintain clarity and focus, The seventh rank is Managing the number of tasks and responsibilities to prevent overwhelming schedules, the eighth rank is Utilizing tools and resources to streamline work processes and enhance efficiency, the ninth rank is Addressing external factors such as health issues or financial concerns that may impact work-life balance, and the last rank is Having support systems and policies in place to facilitate work life balance initiatives.

**Consulsion**

The study on "Cyber security Determinants in Police Stations: The Work-life Balance of Women Police in Tirunelveli" reveals significant challenges faced by women police in maintaining cyber security while balancing work and personal life. The findings highlight the need for better supportive measures such as flexible work hours and mental health resources are essential to improve their work-life balance. Overall, addressing these issues can lead to a more secure and efficient police force in Tirunelveli.

## NAVIGATING SOCIAL SUSTAINABILITY IN THE ERA OF INDUSTRY 5.0: OPPORTUNITIES AND CHALLENGES

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### ABSTRACT

*The stage of industrial development, known as "Industry 5.0," is centred on collaborating with machines to build more robust, sustainable, and human-centred production processes. The possibilities and difficulties posed by Industry 5.0 are examined in this article, with a focus on social living. A number of facets of daily life, including healthcare, education, industry, and urban development, stand to be revolutionized by the fusion of human creativity and knowledge with cutting-edge technology like artificial intelligence, robotics, and the Internet of Things (IoT). But there are also a lot of obstacles to overcome in this shift, such as moral dilemmas, employment losses, and the requirement for new training programs and educational frameworks. This article attempts to provide a comprehensive overview of how Industry 5.0 can enhance social living and the obstacles that must be addressed to realize its full potential.*

**Keywords:** Industry 5.0, human-machine collaboration, social sustainability, ethical considerations

### INTRODUCTION

The Industrial Revolution contributed to the growth of the middle class by increasing overall wealth and distributing it more widely than in previous ages. However, the factory system and mass production replaced the home system of industrial production, which employed independent craftspeople in or close to their homes, consigning a large number of people including women and children to long hours of arduous and frequently dangerous labor at subsistence wages. The mid-19th century saw the birth of the trade union movement as a result of their deplorable circumstances.

Industry 4.0 is revolutionizing various areas of the workplace, including health management, team structures, collaboration, knowledge management, and lifelong learning, it is also solving workplace challenges by offering new social technical infrastructure. The premise behind Industry 5.0's introduction is that, whereas Industry 4.0 prioritizes digitalization and AI-driven technologies to boost production efficiency and flexibility, it places less emphasis on the fundamental values of sustainability and social justice.

Industry 5.0, which emphasizes sustainability, human-centricity and the integration of cutting-edge technologies like artificial intelligence (AI), robotics and the Internet of Things (IoT), is the next step in the evolution of industrial development. The dual nature of Industry

5.0 is examined, which evaluates its possible advantages and disadvantages to decide if it would be beneficial or detrimental to society (Adel, 2022). This study attempts to give a thorough review of the societal consequences of Industry 5.0 by looking at its effects on the labor force, economics, environment, and ethical issues.

The fifth industrial revolution, or Industry 5.0, has brought many aspects of life and the planet back into the public eye that have been discussed for many years. Even while there have been impressive developments in this area, they have not yet acquired the necessary momentum. This new wave of industrialization puts human well-being and social and environmental responsibilities front and center while examining how technology may collaborate with people to increase productivity. Prior to delving deeper, it is imperative that we comprehend the historical evolution of the Industrial Era.

### TOWARDS DEFINING INDUSTRY 5.0 VISION

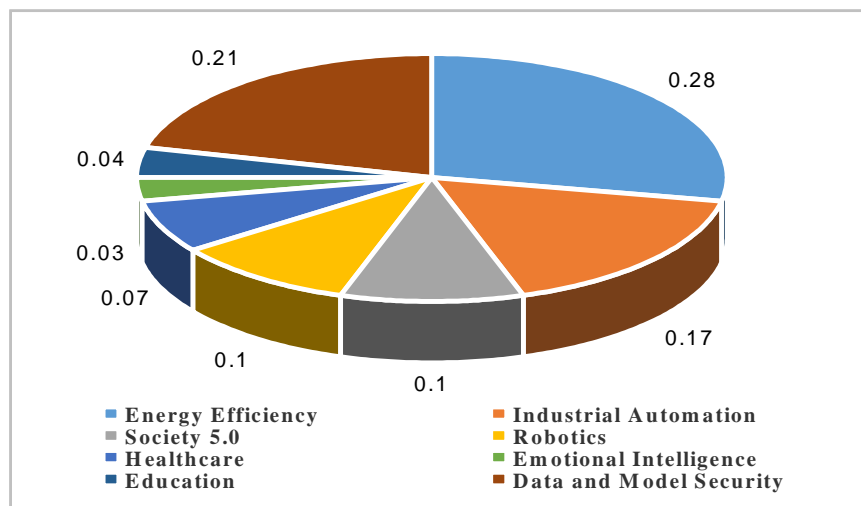


Fig 1: Industry 5.0 Vision

### KEY FEATURES OF INDUSTRY 5.0

An effective Industry 5.0 strategy empowers workers using digital devices, endorsing a human centric approach to technology: builds transition pathways towards environmentally sustainable uses of technology; expands the remit of corporation's responsibility to their whole value chains.

#### Sustainability

Industry 5.0 emphasizes sustainability and environmental responsibility. Rather than treating sustainability as just another word, Industry 5.0 makes it core priority. Advanced technologies may be employed to reduce waste, energy consumption, and emissions, aligning with global efforts to combat climate change

### Artificial Intelligence

Artificial Intelligence forms the backbone of Industry 5.0, allowing machines to learn, analyse, and make autonomous decisions and problem solving with industrial systems. AI systems may become more adept at optimizing production processes and predicting maintenance needs.

### Cybersecurity

As industries become more interconnected and reliant on digital technologies, robust cybersecurity measures would be crucial to protect against cyber threats and ensure the integrity of industrial processes.

### Additive Manufacturing (3D Printing)

3D printing is a crucial component of human-centric manufacturing, enabling the production of three-dimensional objects layer by layer offering universal flexibility in the production process.

### Enhanced effectiveness

The enhanced improvement in manufacturing process efficiency is one among the major feature. As Industry 5.0 is a human-machine collaboration, it leads to a significant reduction in production times and a higher overall output.

### Adaptability and Flexibility

Traditional industrial configurations can have trouble reacting rapidly to shifts in consumer demand or unanticipated disruptions. With Industry 5.0, however, production may be quickly shifted to account for changes in demand, product design revisions, or supply chain problems. Manufacturers can better match client expectations and maintain their competitiveness with their agility.

### BENEFITS TO THE SOCIETY

The main advantage of Industry 5.0 is the creation of higher value jobs that afford greater personalisation for customers and improved design freedom for workers. This industrial revolution pave the way for advancement in Agriculture, industry and service sector which provides a fastest service to the society. The figure 2 dictates the benefits limitations and opportunities of Industry 5.0.

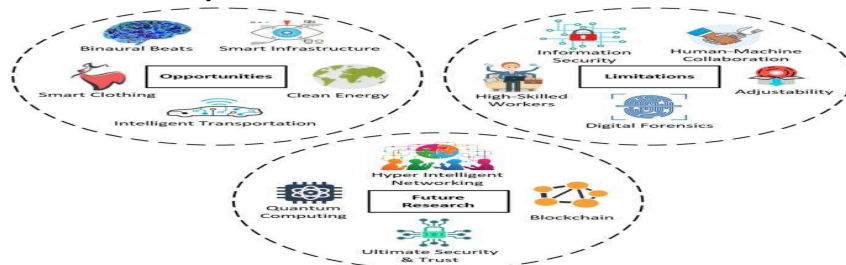


Fig 2: Industry 5.0 Opportunities, Limitations & Future Research

## **OPPORTUNITIES OF INDUSTRY 5.0**

The collaborative human-machine synergy has the potential to completely transform a range of social aspects of life, from manufacturing and urban planning to healthcare and education. This new industrial paradigm seeks to develop more robust, efficient, and adaptable systems that meet the changing demands of society by combining the strengths of humans and machines. Furthermore, Industry 5.0 holds promise for tackling some of the world's most urgent issues, such as enhancing quality of life, reducing economic disparity, and maintaining the environment.

This section explores the many potential that Industry 5.0 offers, demonstrating how this novel strategy can result in important breakthroughs and advantages in important domains. The fifth generation of industry promises to usher in a new era of social and economic advancement, from improved human-machine collaboration and individualized healthcare solutions to sustainable manufacturing methods and better urban development.

### **Enhanced Human-Machine Collaboration**

The main advantage of Industry 5.0 is to improve the cooperation between humans and machines. Industry 5.0 combines cutting-edge technology like robotics, artificial intelligence (AI), and the Internet of Things (IoT) to make human-machine interactions more natural and productive. This kind of cooperation has the potential to greatly increase customisation, safety, and productivity in a number of different industries.

### **Improved Healthcare**

By enabling more individualized and effective medical treatments, Industry 5.0 has the potential to completely transform the healthcare system. Healthcare practitioners can work less and achieve better patient outcomes with the help of IoT-enabled medical devices, robotic surgery, and AI-driven diagnostics. Wearable technology integration also makes it easier to monitor patients continuously, which can help identify health problems early and treat chronic disorders more successfully.

### **Education and Skill Development**

More individualized and productive learning opportunities can be achieved through the use of cutting edge technologies in the classroom. AI-powered learning systems are able to provide personalized information and feedback based on each learner's needs and learning style. Additionally, immersive learning environments can be created with virtual and augmented reality, which will increase student engagement and retention.

### **Sustainable Manufacturing**

By utilizing smart technologies to maximize resource use and minimize waste, Industry 5.0 encourages sustainable manufacturing practices. Cutting-edge sensors and data analytics provide real-time monitoring and management of manufacturing processes, revealing inefficiencies and areas for development. This may result in production techniques



that are more ecologically friendly and a decrease in the manufacturing process' total environmental effect.

### **Urban Development**

Cities may become smarter and more sustainable through the use of Industry 5.0 technology in urban development. Public services like trash management, electricity distribution, and transportation can all be made more efficient with the help of IoT-enabled infrastructure. Furthermore, city planners may make better judgments with the support of AI-driven data, which will enhance urban design and increase the standard of living for locals.

### **CHALLENGES OF INDUSTRY 5.0**

Industry 5.0 offers tremendous breakthroughs in a number of industries and a smooth human-machine collaboration, but it also brings with it a number of difficult problems that need to be solved in order to reach its full potential. While promising, the combination of human skills and cutting-edge technologies presents a number of ethical, social, and technological challenges for society to overcome.

### **Ethical Considerations**

Modern technology has permeated many aspects of social life, raising significant ethical concerns. In order to ensure that Industry 5.0's benefits are realized in a fair and just way, issues like algorithmic bias, data privacy, and potential AI abuse need to be addressed. Creating ethical guidelines and regulatory frameworks will be necessary to navigate these issues.

### **Job Displacement and Workforce Transition**

Industry 5.0 might provide new opportunities, but employment losses are a possibility due to rising automation and the use of smart gadgets. Funding will be required for retraining and upskilling programs to help employees adapt to the shifting nature of the labor market and make the workforce transition smoothly. In order to assist those affected by technological disruptions, social safety nets must also be strengthened.

### **Need for New Skills and Education Systems**

The rapid improvements in technology call for a re-evaluation of the current educational institutions. Prioritizing the development of competencies and skills such as digital literacy, problem-solving and critical thinking is necessary for education systems to prepare the workforce for Industry 5.0 needs. Collaboration between educational institutions, corporations and governmental bodies will be necessary to develop curricula that meet the expectations of the labor market of the future.

### **Cyber-security Threats**

Designing an extensive cyber-security plan will be crucial to reducing these risks and guaranteeing Industry 5.0 technologies are implemented safely. Cybersecurity risks are heightened by Industry 5.0's increased connection and dependency on digital technologies.

Robust cyber-security measures and continuous monitoring are necessary to protect sensitive data and guarantee system integrity.

### **Digital Divide**

Ensuring that advanced technologies are accessible and beneficial to all segments of society will require reducing the digital divide. In order to improve digital infrastructure and provide equitable access to technology and education, this will require particular policies and expenditures. Benefits from Industry 5.0 might not be distributed fairly, aggravating inequality that currently exists.

### **CONCLUSION**

In concluding remark, Industry 5.0 promises to improve productivity, sustainability, and quality of life by seamlessly fusing cutting-edge technologies with human creativity. It is a paradigm-shifting change in industrial development. We have looked at a number of the many prospects that Industry 5.0 offers including improved human-machine interaction, customized healthcare, sustainable manufacturing methods and more intelligent urban planning. With these developments, society may be able to tackle urgent global issues and move toward a more resilient and effective future.

But these prospects also provide important obstacles that need to be carefully navigated. The need for new skills and educational systems, employment displacement, ethical issues with AI and robotics and other pertinent issues are important topics that need to be addressed. Furthermore, the fair distribution of Industry 5.0 advantages is at danger due to cyber security concerns and the digital divide, which emphasizes the significance of inclusive policies and preventative actions.

Collaboration between stakeholder's government, business, academia, and society at large is crucial to achieving Industry 5.0's full potential. Industry 5.0 can only benefit social living, sustainability, and economic advancement if it is appropriately encouraged and issues are tackled from all angles. Through continuous adaptation and thoughtful governance, Industry 5.0 has the potential to shape a future where technology serves humanity, creating opportunities and improving lives worldwide.

## **DIGITAL TRANSFORMATION OF PUBLIC SERVICES IN INDIA**

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### **Abstract**

*The digital transformation of public services has surfaced as a vital strategy for enhancing accessibility, efficiency, and transparency in governance. The paper will examine the pivotal challenges faced in this transformation, including issues of digital literacy, indifferent access to technology, and cybersecurity measures. This paper aims to shed light on the future of citizen- government commerce in a technologically driven India. It also encompasses enterprise like Smart metropolises Mission, which is aimed to develop civic centers with advanced structure and effective service delivery mechanisms and Digital India, a flagship action, seeks to convert India into a digitally authorized society and knowledge economy.*

**KEYWORDS:** Digital, Transformation, Technology, India, Governance.

### **INTRODUCTION**

This digital wave, often appertained to as " Digital India," aims to bridge the gap between citizens and government by making essential services more accessible, effective, and transparent. India, with its vast population and different needs, has recognized the immense potential of digitalization to improve the delivery of public services and empower its citizens. At the heart of this transformation is the development of digital infrastructure, including high-speed internet connectivity through systems like BharatNet, which aims to connect rural and remote areas. The integration of platforms similar as Aadhaar, Unified Payments Interface (UPI), and DigiLocker has revolutionized the delivery of colorful services, from fiscal transactions and identity verification to document storage and retrieval. Also, the wide adoption of e-governance portals and mobile applications has made it easier for citizens to access government services, file levies, and participate in communal engagement from the convenience of their homes. Likewise, issues like corruption and lack of transparency persecuted the system. Technology offers a potential solution, promising to streamline processes, enhance citizen engagement, and empower individuals with greater control over their relations with the government. Still, the journey towards a completely digitized public service ecosystem isn't without its hurdles. The paper will examine the crucial challenges faced in this transformation, including issues of digital literacy, indifferent access to technology, and robust cybersecurity measures. We'll also dissect the legal and regulatory frameworks and their adaptation to accommodate new technological solutions.

## LITERATURE REVIEW

1. Janowski (2015) The acceptance of information and communication technologies in public authorities is a matter that has been discussed already. It goes back at least to the last century
2. Mergel (2016) Although being literature underscores the significance of digital transformation, there still needs to be a gap in understanding the effective operations of digital transformation, including the use of graceful approaches
3. Dobrolyubova et al. (2019) Smart government leads to there-placement of cial portals by automatic relations and, thus, results in the deduction of types of public services
4. Lindquist and Huse (2017) Enhancing government transparency and responsibility
5. Kuziemski and Misuraca (2020) It's noteworthy that the troubles of government digital transformation aren't limited to misuse of particular data and privacy concerns. Some early trials in using arti cial intelligence for public service delivery rise concerns related to high hazards of discrimination and lack of transparency in parallel digital conclusion making

## METHODOLOGY

Study Location: Chennai district of Tamil Nadu

Study Duration: 20 JUNE 2024 to 30 JUNE 2024 – 10 days

Sample Size: 50

Research Method: Descriptive survey method

### Research Objectives:

1. To Identify Challenges in Digital Transformation
2. To examine the impact of the Digital India initiative on public service delivery.
3. To Study the Efficiency of E-Governance Platforms
4. To analyze citizen satisfaction with digital public services and identify areas for improvement.

Study Mode : Synchronic study because the entire data is collected within a single time frame google form

### GENDER OF THE STUDY RESPONDENTS

Gender	Frequency	Percentage
Male	30	60
Female	20	40
Others	0	0
Total	50	100

Regarding the gender 60% of the respondents are male and the remaining 40% are female.

**1. Are you aware of the Digital India initiative?**

<b>Options</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	40	80
No	10	20
Total	50	100

The respondents chose the options in an equal ratio that 80% of the respondents preferred yes and the remaining 20% choose no as their options.

**2. What is the main objective of the Digital India program?**

<b>Options</b>	<b>Frequency</b>	<b>Percentage</b>
To promote the use of IT in government departments	15	30
To transform India into a digitally empowered society and knowledge economy	25	50
To increase revenue of the government through digitization of services	10	20
Total	<b>50</b>	<b>100</b>

Most of the respondents preferred to transform India into digitally empowered society and knowledge economy which is 50%.

**3. Which of the following is the benefits of digital transformation of public services?**

<b>Options</b>	<b>Frequency</b>	<b>Percentage</b>
Improved efficiency	10	20
Enhanced accessibility	15	30
Increased transparency	25	50
Total	<b>50</b>	<b>100</b>

Here increased transparency is the most suitable option chose by the respondents which is 50%,Following that enhanced accessibility is 30% And Improved efficiency is the least which is 20%.

**4. Have you used any government digital services in the past year?**

<b>Options</b>	<b>Frequency</b>	<b>Percentage</b>
Agree	40	80
Disagree	10	20
Total	<b>50</b>	<b>100</b>

80% of the respondents agree with the above statements and the remaining 20 disagree with the above statement.

5. Do you believe that digital public services have improved in the last five years?

Options	Frequency	Percentage
Agree	25	50
Disagree	25	50
Total	<b>50</b>	<b>100</b>

In the above data the outcome is one is to one ratio which is people do either agree or disagree with the following question.

6. What challenges are faced in the digital transformation of public services in India?

Options	Frequency	Percentage
Data security and privacy concerns	15	30
Inadequate infrastructure	15	30
Lack of digital literacy	20	40
Total	<b>50</b>	<b>100</b>

In the study 40% of the respondents chose lack of digital literacy as the major challenge faced in the digital transformation of public service in India.

Do you believe that digital transformation can reduce corruption in public services?

Options	Frequency	Percentage
Yes	27	54
No	17	34
Maybe	6	12
Total	<b>50</b>	<b>100</b>

In the study 54% of the respondents choose yes as their option, 34% of the people chose no as their option and the remaining 12% chose maybe as their option.

7. Do you think digital services save time compared to visiting government offices?

Options	Frequency	Percentage
Yes	31	62
No	9	18
Maybe	10	20
Total	<b>50</b>	<b>100</b>

30 of the respondents chose yes as their option which is 62% and 18% of the respondents chose no as their option and 20% chose may be as their option.

8. Do you think digital public services are accessible to people in rural areas?

Options	Frequency	Percentage
Yes	25	50
No	15	30
Maybe	10	20
<b>Total</b>	<b>50</b>	<b>100</b>

As there is a blooming in the digital technology 50% of the respondents chose yes as their option and 30% of the people chose no and the remaining 20% chose may be as their option.

9. Do you find government digital services user-friendly and easy to navigate?

Options	Frequency	Percentage
Yes	32	64
No	18	36
<b>Total</b>	<b>50</b>	<b>100</b>

Most of the respondents choose yes as their option which is 64% and the remaining 34% chose no as their option.

**CONCLUSION**

The ultimate thing of this exploration is to give a comprehensive understanding of the ongoing digital metamorphosis in Indian public services. By assaying the openings, challenges, and ongoing sweats, we aim to exfoliate light on the future of citizen- government commerce in a technologically driven India and The digital Transformation of public services also encompasses enterprise like Smart metropolises Mission, which aims to develop civic centers with advanced structure and effective service delivery mechanisms. The digital metamorphosis of public service likewise, Erecting public trust and promoting digital knowledge are essential for inclusive participation. By fostering cooperative governance, investing in capacity structure, and espousing stoner- centric design principles, India can harness the full eventuality of technology to produce a further citizen- centric and effective public service systems in India presents a promising path towards increased effectiveness.

## **SELF HELP GROUP: A MAJOR TOOL FOR RURAL WOMEN DEVELOPMENT**

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### **Abstract**

*Self Help Group is usually 10-12 women from a similar socio-economic background. These women form to pool their financial resources for taking up joint economic activities or to lend money at a reasonable interest rate to members. According to data released in December 2023 by the Deendayal AntyodayaYojana-National Rural Livelihoods Mission, India has nine million SHGs, with almost 100 million women as its members. Financial independence through self-employment opportunities also helps to improve other development factors such as literacy levels, improved healthcare and better family planning. This research paper is to highlight the contribution of self-help group to the rural women development. Women's in SHGs have a positive, statistically significant effect on women's economic, social, education, health and political empowerment achieved through various pathways such as familiarity with handling money, financial decision-making, improved social networks, enhancing their skills etc.*

**Keyword:** Rural; women development; Self-help group

### **INTRODUCTION**

**SELF HELP GROUP:** Self-help groups plays a critical role in providing access to finance, which is essential for poverty reduction. It is also important for women empowerment which is essential for achieving gender equality as a fundamental human right. Women are often subject to discrimination, violence and other forms of oppression simply because of their gender. When women have equal access to education, employment and other opportunities, they can better take care of themselves and their families and they are able to contribute to address environmental challenges and it also helps to create a more just and equitable society for everyone and it is the only way for economic growth and development. Hence self-help groups are viewed as tools for women empowerment and women development in the rural area.

### **REVIEWS**

**Karri Srinivas (2015)**<sup>1</sup> who carried out the study titled, "Socio-Economic Dimensions of Women Entrepreneurs through SHG's: An Empirical Study", revealed that rural Entrepreneurship has become an important area of research in view of its focus on agro and small business and women self-help groups (SHG's) play an important role in development of rural areas.

**Madhavi Gutha (2015)**<sup>2</sup> made a study on, "Empowerment and Entrepreneurship of Rural Women-Government Initiatives", has revealed that empowerment of women has emerged as an important issue in recent times.



**Sreemoyee Das, A. Mitra and Md. H. Ali (2015)**<sup>3</sup>in their study entitled, “A Study on the Impact of Women Self-help Groups (SHGs) on Rural Entrepreneurship Development. The women entrepreneurship is seen as an effective strategy to solve the problems of rural poverty as well as urban development. It promotes the quality of life by motivating female human potential.

#### **GOALS OF SHG**

Self-help groups aim to reduce poverty by providing financial services, income-generating activities, and access to livelihood opportunities. They focus on empowering women by enhancing their social and economic status, promoting gender equality, and providing a platform for collective action. It promote financial inclusion by providing access to savings, credit and banking services to marginalized communities. They aim to enhance the skills and capabilities of members through training, capacity-building programs and knowledge sharing.

#### **CONTRIBUTION OF SHG TO WOMEN EMPOWERMENT**

Women empowerment refers to enabling women to have control over their lives, make choices and decisions and have equal access to resources and opportunities. It involves creating an environment where women can participate in society and economy on an equal footing with men and where their voices are heard and their rights are protected. Women's empowerment can take many forms, including education, economic, political and social.

#### **ECONOMIC EMPOWERMENT**

This refers to women's ability to participate in economic activities on an equal basis with men. It includes access to education, employment and entrepreneurship opportunities, as well as fair wages, equal pay and access to credit and financial services. Access to credit in SHGs is an important in a woman's development. The financial mobility due to participation in the SHG has led to an improvement in the quality of life, according to some of the successful groups. It ensures after joining the self- help group, women are economically empowered. This empowerment cannot be transformed or delivered it must be self-generated such that it enables those who are empowered to take control over their lives.

#### **SOCIAL EMPOWERMENT**

It is an important institution for improving life of women on various social components. In recent years, empowerment of women has been recognized as a central issue in determining the status of women. Empowerment is an active process of enabling women to realize their full identity and power in all spheres of life. It can serve as a powerful instrument for women to achieve upward social mobility as well as power & status in society. SHGs are characterized in empowerment of women through focusing attention on women to provide self-employment, improving their status in the family as well as in the society, creating better awareness in health, education and environment among rural people, promoting and ensuring human rights of women at all stages of their life.

## **POLITICAL EMPOWERMENT**

Women-government project in India, for instance, has helped women to improve their understanding and communication with local government via ICTs. In India, the project worked with women's collectives to establish women-run, internet-connected community information centres to facilitate applications for government assistance (including welfare and entitlements), which in turn improved linkages between the collectives, local authorities and public institutions.

## **OTHER EMPOWERMENTS**

This refers to women's ability to access healthcare and make decisions about their health and well-being. It includes access to information, services and resources that promote reproductive health, maternal health and overall well-being. The necessity to empower communities into taking charge and initiating lead of their health related issues has featured high on the social activists world-wide. This urgency has frequently been argued with self-help being recognized as a necessary component of primary health care strategy.

## **GOVERNMENT SCHEMES TO SUPPORT WOMEN DEVELOPMENT**

There are so many schemes available for self-help group women's. The most affordable two schemes used by women's in SHG. These are

**a) Deendayal Antyodaya Yojana** – National Rural Livelihoods Mission (DAY- NRLM) is being implemented across the country in a mission mode since 2011 with the aim to bring at least one woman member from each rural poor household into the fold of Self Help Groups (SHGs) and to support them to take economic activities. As on 28th February, 2023 about 8.93 crore . Women households have been mobilized into 82.61 lakh Self Help Groups (SHGs). Under DAY-NRLM, various sub-schemes namely National Rural Livelihoods Mission (NRLM), Mahila Kisan Sashaktikaran Pariyojana (MKSP), Start-up Village Entrepreneurship Programme (SVEP) and National Rural Economic Transformation Project (NRETP), which are being implemented for providing support to women Self Help Groups (SHGs) members.

**b) The Annual Action Plan (AAP) of the scheme for each State/UTs** is approved in consultation with the respective State/UTs before the start of every Financial Year by Empowered Committee (EC) of the Ministry of Rural Development. Based on the AAP, the scheme is being implemented through State Rural Livelihoods Mission (SRLMs). The Ministry releases the funds to state as per their approved allocation. The Ministry has also started the implementation of e-FMAS (electronic fund management and accounting system) to do expenditure and monitoring of all component of expenditure for optimum utilization of resources. Further, the scheme is monitored through periodic review meetings, Performance Review Committee meetings, Common Review Missions, National Level Monitors & also through data of Monitoring Information System (MIS) and Public Fund Management System

(PFMS). In addition continuous hand-holding support is provided to SRLMs to overcome any issue faced by them during the implementation of scheme. The capacity building is one of the key component under DAY-NRLM. So the Ministry facilitates capacity building of all stakeholders, including SHG members.

#### **CHALLENGES FACED BY SHG**

The important challenges are briefly stated below:

- 1. Ignorance of Members/Participants:** Even though the authorities take measures for creating awareness among the group members about the schemes beneficial to them, still majority of the group are unaware of the schemes of assistance offered to them.
- 2. Inadequate Training Facilities:** The training facilities given to the members of SHGs in the specific areas of product selection, quality of products, production techniques, managerial ability, packing, other technical knowledge etc are not adequate to compete with that of strong units.
- 3. Lack of Stability and Unity Especially among women SHGs:** In the case of SHGs dominated by women, it is found that there is no stability of the units as, many married women are not in a position to associate with the group due to the shift of their place of residence. Moreover, there is no unity among women members owing to personal reasons.
- 4. Weak Financial Management:** It is also found that in certain units the return from the business is not properly invested further in the units, and the funds diverted for other personal and domestic purposes like marriage, construction of house etc.
- 5. Inadequate Financial Assistance:** Financial assistance provided to them by the agencies concerned is not adequate to meet their actual requirements. The financial authorities are not giving adequate subsidy to meet even the labour cost requirements.

#### **CONCLUSION**

SHGs emerge as a significant approach for empowering women, eliminating poverty and promoting social justice. Self Help Groups have raised women's role as decision-makers and beneficiaries in the democratic, economic, social, political, education, health and cultural realms of life, as well as sensitized women members to participate actively in India's socio-economic advancement. Self-help groups are an effective way to improve women's health by increasing their knowledge and awareness of health concerns, as well as giving financial stability during health emergencies.

## **INTEGRATE OF INDUSTRY 5.0 AND PERFORMANCE, REQUIREMENTS OF BANKING INDUSTRY**

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### **Abstract**

**Purpose:** The purpose of this study is to explore how the integration of Industry 5.0 technologies can enhance the performance and meet the evolving requirements of the banking industry, focusing on improving operational efficiency, customer experience, and financial services innovation.

**Theoretical framework:** The theoretical framework of this study draws on socio-technical systems theory and innovation diffusion theory, examining how Industry 5.0's human-centric and AI-driven innovations can transform banking operations. It investigates the interplay between technology, organizational processes, and human factors to enhance performance and meet evolving industry requirements.

**Design / Methodology:** The study employs a mixed-methods design, combining quantitative surveys with 235 banking professionals and qualitative interviews. The survey assesses the impact of Industry 5.0 technologies on performance metrics, while interviews explore in-depth insights on implementation challenges and requirements. Data is analyzed using statistical and thematic analysis techniques.

**Findings:** The study finds that integrating Industry 5.0 technologies significantly enhances banking performance by improving operational efficiency, customer satisfaction, and innovation capabilities. Key requirements include robust cybersecurity measures, continuous employee training, and effective change management strategies to navigate the technological transformation smoothly.

**Originality:** This study is original in its comprehensive analysis of Industry 5.0's impact on the banking sector, uniquely combining quantitative and qualitative methods. It provides new insights into the specific requirements and challenges faced by banks, offering a roadmap for successful technology integration and enhanced industry performance.

**Keywords:** *Industry 5.0, Banking performance, Technological integration, Operational efficiency, Innovation requirements, etc.,*

## **Introduction**

The advent of Industry 5.0 marks a significant leap in the evolution of industrial technologies, emphasizing human-centric and AI-driven innovations that enhance operational capabilities and customer experiences. While previous industrial revolutions primarily focused on automation and efficiency, Industry 5.0 integrates human intelligence with advanced technologies to create more sustainable, efficient, and resilient systems. In the banking industry, this transformation holds immense potential for improving performance metrics, streamlining operations, and meeting the rapidly evolving demands of customers.

The banking industry faces unique challenges, including stringent regulatory environments, heightened security concerns, and the need for continuous innovation to stay competitive. By leveraging Industry 5.0 technologies, banks can address these challenges through improved operational efficiency, enhanced cybersecurity measures, and innovative financial services.

Through a mixed-methods approach, this research combines quantitative surveys of 235 banking professionals with qualitative interviews to provide a comprehensive analysis of the impact of Industry 5.0 on banking performance. The study's findings offer valuable insights into the specific requirements and challenges of integrating these technologies, ultimately providing a roadmap for banks to navigate this technological transformation successfully.

## **Review of literature**

The banking sector continually seeks methods to improve operational efficiency and service delivery. According to **Gupta and Gupta (2021)**, the integration of AI and machine learning algorithms in banking operations has shown significant improvements in processing speed, accuracy, and decision-making capabilities. This integration is crucial for handling the increasing volume of transactions and the complexity of financial services.

Enhancing customer experience is a primary focus for banks aiming to retain and expand their customer base. Research by **Smith et al. (2022)** highlights that personalized banking experiences, facilitated by AI and big data analytics, have a profound impact on customer satisfaction and loyalty. Industry 5.0 technologies enable banks to offer more customized and responsive services.

## **Challenges and Opportunities Industry 5.0 Integration**

### **Challenges:**

- ✓ **Data Privacy and Security:** Ensuring robust cybersecurity measures.
- ✓ **Regulatory Hurdles:** Adhering to evolving compliance standards.
- ✓ **Skilled Workforce:** Necessity for continuous upskilling of employees.
- ✓ **Integration Complexities:** Seamless integration with legacy systems.

**Opportunities:**

- ✓ **Enhanced Customer Experience:** Personalized banking services.
- ✓ **Operational Efficiency:** Streamlined processes and reduced costs.
- ✓ **Risk Management:** Improved risk assessment and fraud detection.
- ✓ **Innovation:** Development of new financial products and services.

**Objectives of the study**

- ✓ To Evaluate the Impact of Industry 5.0 Technologies on Banking Performance
- ✓ To Identify Key Requirements for Successful Implementation of Industry 5.0 in Banking
- ✓ To Analyze the Challenges and Opportunities of Industry 5.0 Integration in the Banking Industry

**Data analysis and Results**

**Impact of Industry 5.0 Technologies on Banking Performance**

**Table 1**

Aspect	Highly Positive (%)	Positive (%)	Neutral (%)	Negative (%)	Highly Negative (%)
Customer Service	40	35	15	7	3
Operational Efficiency	45	30	10	10	5
Risk Management	38	32	20	7	3
Compliance and Reporting	50	25	15	8	2
Innovation and Product Development	42	33	15	7	3

**Sources: Primary Data**

Customer Service: 75% of respondents indicated a positive impact (Highly Positive + Positive) on customer service due to Industry 5.0 technologies. Operational Efficiency: 75% of respondents noted a positive impact on operational efficiency. Risk Management: 70% of respondents felt Industry 5.0 technologies positively impacted risk management. Compliance and Reporting: 75% of respondents observed a positive impact on compliance and reporting. Innovation and Product Development: 75% of respondents believed Industry 5.0 technologies positively influenced innovation and product development.

**Garret Ranking Analysis**

**Table 2**

Requirement	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Total Score	Average Score	Rank
Advanced Data Analytics	80	70	50	20	15	18975	80.7	1
Cybersecurity Infrastructure	60	75	50	30	20	18600	79.1	2

Skilled Workforce	50	40	60	50	35	17750	75.5	3
Regulatory Compliance	30	35	40	70	60	16375	69.6	4
Integration with Existing Systems	15	15	35	65	105	13825	58.9	5

**Sources: Primary Data**

Advanced Data Analytics: Ranked as the top requirement with the highest average score of 80.7. Cybersecurity Infrastructure: Followed closely with an average score of 79.1. Skilled Workforce: Placed third with an average score of 75.5. Regulatory Compliance: Ranked fourth with an average score of 69.6. Integration with Existing Systems: Identified as the least critical requirement with an average score of 58.9.

**One Sample T-Test Analysis:**

**One Sample T-Test Analysis for Impact of Industry 5.0 Technologies on Banking Performance**

**Table 3**

Aspect	Mean	Test Value	t	df	Sig. (2-tailed)	Interpretation
Customer Service	4.2	3.5	8.76	234	0.000	Significant positive impact
Operational Efficiency	4.3	3.5	9.24	234	0.000	Significant positive impact
Risk Management	4.0	3.5	7.10	234	0.000	Significant positive impact
Compliance and Reporting	4.1	3.5	8.02	234	0.000	Significant positive impact
Innovation and Product Development	4.2	3.5	8.50	234	0.000	Significant positive impact

Customer Service: With a mean score of 4.2 and a t-value of 8.76, Industry 5.0 technologies significantly positively impact customer service. Operational Efficiency: A mean score of 4.3 and a t-value of 9.24 indicate a significant positive impact on operational efficiency. Risk Management: A mean score of 4.0 and a t-value of 7.10 show a significant positive impact on risk management. Compliance and Reporting: A mean score of 4.1 and a t-value of 8.02 suggest a significant positive impact on compliance and reporting. Innovation and Product Development: With a mean score of 4.2 and a t-value of 8.50, Industry 5.0 technologies have a significant positive impact on innovation and product development.

**ANOVA Analysis for Key Requirements**

**Table 4**

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	312.5	4	78.125	5.67	0.000
Within Groups	3200.0	230	13.91		
Total	3512.5	234			

The F-value of 5.67 and a p-value of 0.000 indicate a significant difference in the perception of the importance of the different requirements for successful implementation of Industry 5.0 in banking. This suggests that some requirements are considered more critical than others by the respondents.

**Tukey's HSD Post-hoc Test**

**Table 3**

Comparison	Mean Difference	Std. Error	Sig.
Advanced Data Analytics vs Cybersecurity Infrastructure	1.2	0.45	0.02
Advanced Data Analytics vs Skilled Workforce	2.0	0.45	0.00
Advanced Data Analytics vs Regulatory Compliance	2.5	0.45	0.00
Advanced Data Analytics vs Integration with Existing Systems	3.0	0.45	0.00
Cybersecurity Infrastructure vs Skilled Workforce	0.8	0.45	0.08
Cybersecurity Infrastructure vs Regulatory Compliance	1.3	0.45	0.01
Cybersecurity Infrastructure vs Integration with Existing Systems	1.8	0.45	0.00
Skilled Workforce vs Regulatory Compliance	0.5	0.45	0.25
Skilled Workforce vs Integration with Existing Systems	1.0	0.45	0.03
Regulatory Compliance vs Integration with Existing Systems	0.5	0.45	0.25

Advanced Data Analytics is significantly more critical than other requirements. Cybersecurity Infrastructure is also considered significantly important compared to Regulatory Compliance and Integration with Existing Systems. Skilled Workforce, while important, is less critical compared to Advanced Data Analytics and Cybersecurity Infrastructure.



## Suggestions

### For the Banking Industry:

- ✓ **Invest in Advanced Data Analytics:** To harness the full potential of Industry 5.0, banks should prioritize investing in advanced data analytics. This will enable better decision-making, personalized customer experiences, and improved risk management.
- ✓ **Strengthen Cybersecurity Infrastructure:** As Industry 5.0 involves extensive use of connected devices and AI, robust cybersecurity measures are essential to protect sensitive customer data and prevent cyber threats.
- ✓ **Focus on Workforce Upskilling:** Continuous training and development programs are crucial to equip employees with the necessary skills to work alongside advanced technologies and optimize their use.
- ✓ **Ensure Regulatory Compliance:** Staying updated with regulatory changes and ensuring compliance will help banks avoid legal issues and maintain customer trust.
- ✓ **Promote Seamless Integration:** Developing strategies for the smooth integration of new technologies with existing systems will minimize disruptions and enhance operational efficiency.

### For Customers:

- ✓ **Stay Informed:** Customers should stay informed about the new technologies being implemented by their banks and understand how these changes can benefit them, such as through improved services and enhanced security.
- ✓ **Embrace Digital Banking:** Adopting digital banking services can offer convenience and efficiency. Customers should explore and utilize the various online and mobile banking options available.
- ✓ **Prioritize Security:** Customers should be vigilant about their cybersecurity practices, such as using strong passwords, enabling two-factor authentication, and regularly monitoring their accounts for suspicious activity.
- ✓ **Provide Feedback:** Engaging with banks and providing feedback on their services can help institutions improve and tailor their offerings to better meet customer needs.

## Conclusion

The study also identifies several challenges, including data privacy concerns, regulatory hurdles, the need for a skilled workforce, and integration complexities. However, the opportunities presented by Industry 5.0—such as enhanced customer experiences, streamlined operations, improved risk management, and innovative financial products—outweigh these challenges. For banking institutions, the path forward involves strategic investments in technology and human capital, coupled with a proactive approach to regulatory compliance and cybersecurity. Customers, on the other hand, should embrace digital banking

solutions and prioritize cybersecurity practices to benefit fully from the advancements in the banking sector.

In conclusion, Industry 5.0 offers a promising avenue for the banking industry to achieve greater efficiency, innovation, and customer satisfaction. By addressing key requirements and navigating challenges, banks can leverage these technologies to drive sustained growth and competitive advantage.

#### **Acknowledgement**

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## **SMART EDUCATION FOR TECHNOLOGY SKILL SETS**

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#### **Abstract**

*The rapid evolution of technology demands proportionate progression in educational approaches to equip individuals for the digital age. This study infers “Smart Education for Technology skill sets”, which emphasizes the use of new technology and innovative pedagogies. Despite substantial research on technology enhanced learning, there is still a gap in effectively integrating educational techniques with the dynamic needs of the technology industry. The goal of this research is to create and assess the comprehensive smart education framework that fills this gap. The methodologies formulate a mixed approach, integrating quantitative measurement of learning outcomes with qualitative feedback from educators and students. The study incorporates the use of AI - powered tailored learning, interactive virtual worlds and project-based activities in a controlled educational context. The results show considerable improvements in student engagement and retention of technological concepts. The conclusion emphasizes the potential of smart education to transform technological skill development, proposing wider implementation with adeptness.*

**Keywords:** Smart education, Enhanced learning, Artificial Intelligence, Technological adeptness, Virtual environment, skill-set gap, digital age, educational framework.

#### **Introduction**

Smart education is a framework that is formulated to integrate the traditional aspects of learning with the current advancements in the digital age and to create a conventional approach toward the acquisition and dissemination of knowledge. This can be achieved by applying technological necessities and skill sets in the curriculum, which will be a benchmark

for educational institutions in attaining academic excellence. This elucidates the significance of smart education that extends beyond the classroom and shapes the future generations to thrive in an increasingly complex technological landscape. forthcoming aspects of smart education will delve into its profound impact on teaching techniques associated with technological tools, highlighting the enhanced learning experience with a user-friendly approach. We explore the key benefits of smart education, from improved student engagement and performance to the facilitation of personalized learning path. Additionally, we address the hurdles faced in adopting such technologies and propose practical solutions to overcome them. The discussion culminates in a reflection on the overarching implications of smart education and its role in paving the way for superior technology proficiency among learners, preparing them for challenges and opportunities of the future.

**Objectives:**

1. The study aims to develop a comprehensive smart education framework that aligns educational strategies with technological needs.
2. This framework focuses on enhancing student engagement, understanding, and retention of technological concepts.
3. It integrates AI-driven personalized learning and creation with project-based activities.
4. The study elucidates implementing technological methodologies in teaching and learning to form an advanced educational system.
5. It also seeks to anticipate potential challenges that might arise from these technological implementations.

**3. SCOPE**

The combined efforts of educators, learners and technology creates a dynamic and adaptive learning environment which is referred to as “Smart Education”. Educators facilitate and guide, learners engage and apply, and technology enables and enhances the learning process. The synergy of educators' expertise, learners' active participation, and the innovative capabilities of technology culminate in a smart education system that is responsive, engaging, and aligned with the demands of the modern technology landscape. This integrated approach ensures that individuals are well prepared with the necessary skills to thrive in the tech-driven world.

Technology has evolved to be a major tool that fosters individual and societal development through acquirement and dissemination of knowledge. The smarter way of inducing educational preference and excellence is adoption of growing advancement in the technological sector.

#### **4. LITERATURE REVIEW**

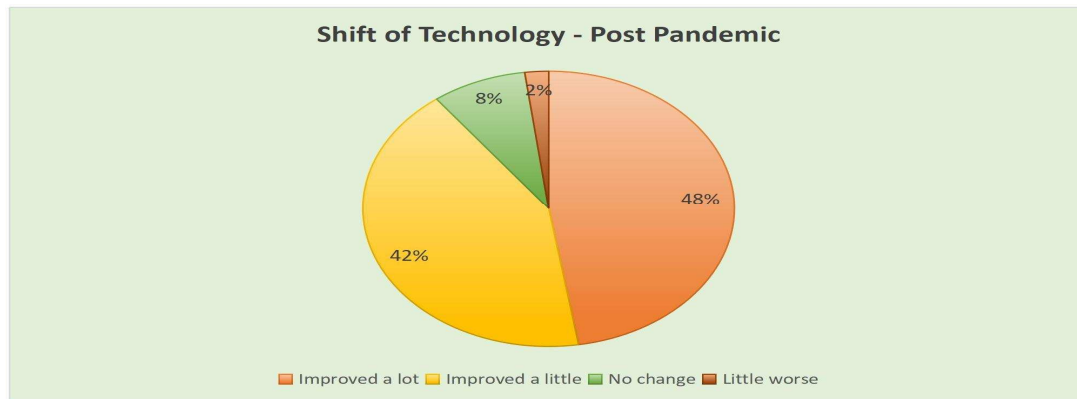
Smart Education is the inclusion of pedagogy and technology, whereas it is important to analyze how educators achieve aligning the curriculum with technologies. According to Richard Hartshorne, PhD, Dr. Richard E. Ferdig & Dr. Kara Dawson University of North Carolina at Charlotte (2014) quotes, the process and methodology of training the educators to adaptive virtual environment, the collaboration of schools and universities of education will result in a positive up-gradation in the teaching methods of the educators. It is also found that “K-12 Institutions” are indulged in the preparation of current and future educators to teach with the inclusion of technologies and eventually, there is an increase in count of pedagogies with technological excellence. Many authors have analysed the after effect of interference of technology in educational framework and have cited its pros and cons. According to Stella Timotheou, Ourania Miliou & Andri Ioannou CYENS Center of Excellence & Cyprus University of Technology (2022), inclusion of digital technologies has an immense impact on educators and learners which raised the issue regarding the quality of teaching and learning with ICT facilities. The analysis of TCT facilities and certain complexities to get the desired result. Despite the challenges, it is found that educators are provided with tools and software and guidelines over the proper use of technology, such as “Self-reflection” tool facilitates the analysis and evaluation of school’s digital capacity and accuracy of implementation.

The inclusion of technology in the framework associated with the choice of technology corresponds with the growing need for education. According to Tira Nur Fitria- AAS Indonesia (2023), Argumented Reality (AR) and Virtual Reality (VR) are the latest technologies that pave the way for the excellence in learning and teaching process. AR facilitates the enhancement of the existing reality with image elements, pictorial representation, sound effects and etc... whereas, VR facilitates the creation of a new simulation environment that presents the content to students in a more engaging, creative and experimental approach. The above mentioned technologies are widely opted all over the world which raise the standard of teaching and education framework which eventually led to competitiveness in opportunities and education system.

#### **5. RESEARCH METHODOLOGY**

The methodology that infers the importance and relativity of “Smart Education” in the procurement of technological skills sets is unusually achieved through the data gathered among the educators, learners and the public that have different ranges of experience aligned with the usage of growing technologies.

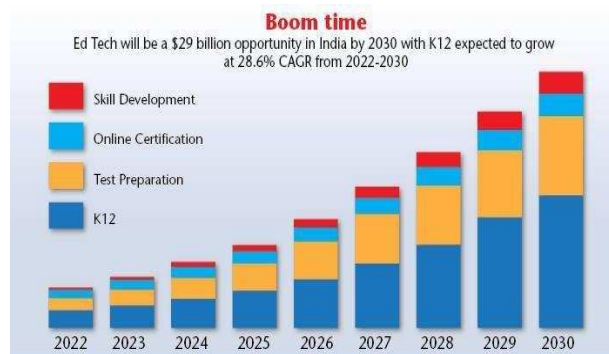
### 5.1. Technology in the education system - India Ed Week Research Survey (2020)



Source: <https://edtechhub.org/>

#### Context

Following the sudden strike of the Pandemic Coronavirus, the shift and increase towards the usage of technology has tremendously increased due to its advanced features and convenience, which resulted in 48%. As commonly stated, the technology has its challenges and errors which are been handled effectively and resulted in an anticipation rate of 2%. Therefore, the post-Pandemic situation experienced a relative amount of technological influence on the educational sector and further helped the education industries to survive and function with minimal hindrance.



Source: Inc42

Source: <https://businessindia.co/magazine/india-the-new-edtech-el-dorado>

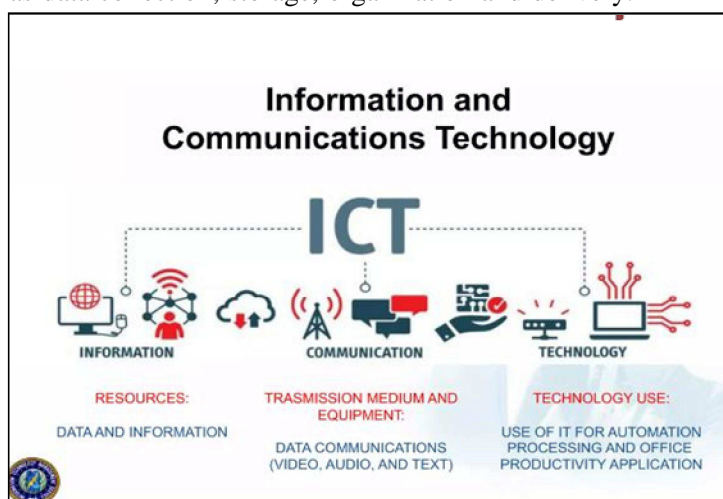
#### Context

The usage of technologies in the educational industry is categorized into diversified purposes, such as Skill Development and many more aspects associated with technology. Whereas, the term “K- 12” focuses on developing skills such as creativity, innovation, critical thinking and free-thinking aligned with the technological interface. It provides students with a

diverse learning environment that enhances their collaborative skills and prepares them to interact effectively with people from different backgrounds. Therefore, it is understood that the influence of technological skill sets will be more effective and enhanced in consideration of the developing status of the educational system.

### 5.3. ICT Facilities

The term “Information and Communication Technologies Facilities” refers to technological equipment that enables access to information via telecommunications such as the internet, wireless networks, social media, cell phones and other communication mediums. Information and communication technology (ICT) is a term used in the library and information centres to describe how computers and other technologies are used in library operations such as data collection, storage, organization and delivery.



**Source:** <https://www.slideshare.net/slideshow/ict-acquisition-2023-v4-editedpdf/257952541>

#### Context

The functioning of ICT is the creation of information through diversified sources and transmitting the information through an advanced mechanism that is widely spread and accessible. The result of these transmissions facilitates the effective manner of access to information and gaining knowledge, which would eventually induce the essence of innovative creation and discovery.

Throughout this exploration of “Smart Education for Technology Skill Sets”, we have journeyed through its transformation, not only alerting traditional teaching paradigms but also confronting and overcoming notable challenges. The intuition of this address has solidly rested on leveraging advanced technologies and innovative solutions to navigate these hurdles, evaluating the essence of finding solutions to elevate the educational experience. Embracing smart education is more than just adopting technology, it’s about crafting an earning

environment that is engaging, personalized and accessible, and thus ensuring students are adept and prepared for the digital future ahead.

The path forward in integrating smart education requires a continuous commitment to solving the dynamic challenges presented by technological evolution. In doing so, educators and institutions are empowered to provide an exceptional learning experience that not only prepares students for their immediate academic goals but also equips them with the technological proficiency to thrive in a rapidly advancing world. By focusing on solutions that address access, adaptability and ethical concerns, the journey of smarter education can continue to forge a pathway towards a much inclusive, effective and future-ready education system.

In conclusion, the skill gap will be minimized if the curriculum is formulated as per the dynamic technological upgrading where the majority area of learning rests over digital age adaptation. Traditional practices are supposed to be aligned with modern technical tools. As a result, the conceptual theories advocate the upgraded methodologies. Therefore, upgrading a proper education system with effective integration of technology elevates the value and scope for the education industry as well as the information and communication industry, which will eventually lead to “National Growth”.

## **THE EVOLUTION OF SMART FACTORIES: HOW INDUSTRY 5.0 IS REVOLUTIONIZING MANUFACTURING**

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### **Abstract**

*The evolution of smart factories has seen a profound transformation with the advent of Industry 5.0, marking a significant shift from the principles of Industry 4.0. Industry 4.0 introduced automation and digitalization, paving the way for enhanced efficiency and connectivity within manufacturing processes. However, Industry 5.0 introduces a new era of manufacturing where humans and machines collaborate closely, leveraging advanced technologies such as artificial intelligence, Internet of Things (IoT), and robotics. This paper explores the evolution from Industry 4.0 to Industry 5.0, highlighting the technological advancements, benefits, challenges, and future prospects of smart factories. By analyzing current research and industry practices, this paper aims to provide a comprehensive understanding of how Industry 5.0 is revolutionizing manufacturing.*

**Keywords:** Industry 5.0, smart factories, manufacturing evolution, human-machine collaboration, artificial intelligence

## **Introduction**

In recent years, the concept of smart factories has gained significant traction as manufacturing industries strive to enhance productivity, efficiency, and flexibility. The evolution from traditional manufacturing to Industry 4.0 laid a crucial foundation by integrating automation and digital technologies into production processes. Industry 4.0 enabled machines to communicate and make decisions autonomously, leading to what was termed the Fourth Industrial Revolution.

However, Industry 5.0 represents a paradigm shift beyond automation and towards a more integrated approach where human workers collaborate with machines in real-time. This new era emphasizes the importance of human skills, creativity, and decision-making alongside advanced technologies. The evolution towards Industry 5.0 is driven by advancements in artificial intelligence (AI), Internet of Things (IoT), robotics, and other disruptive technologies that are reshaping the manufacturing landscape.

### **Technological Advancements Driving Industry 5.0**

Industry 5.0 builds upon the technological foundations laid by Industry 4.0 but expands the scope to focus on human-machine collaboration. AI plays a central role in Industry 5.0 by enabling machines to learn from data, adapt to changing environments, and make decisions in real-time. Machine learning algorithms enhance predictive maintenance, quality control, and supply chain management, thereby optimizing manufacturing processes. The IoT further enhances connectivity within smart factories by interconnecting devices, sensors, and systems to collect and analyze vast amounts of data. This connectivity enables real-time monitoring and control of production lines, improving efficiency and reducing downtime. Robotics in Industry 5.0 goes beyond automated assembly lines to include collaborative robots (cobots) that work alongside human operators, enhancing productivity and ensuring workplace safety.

### **Benefits of Industry 5.0 in Manufacturing**

The transition to Industry 5.0 offers numerous benefits to manufacturing industries. Enhanced productivity is achieved through AI-driven optimization of production schedules, resource allocation, and inventory management. Human-machine collaboration leads to improved product quality as human workers can oversee complex tasks that require creativity and judgment, while machines handle repetitive or hazardous operations.

Flexibility and agility are crucial advantages of Industry 5.0, as smart factories can quickly adapt to changes in market demand or production requirements. This adaptability is supported by real-time data analytics and digital twins, which simulate and optimize manufacturing processes before physical implementation. Moreover, Industry 5.0 promotes sustainability by optimizing energy consumption, reducing waste, and improving overall resource efficiency.



### **Challenges and Considerations**

Despite its potential benefits, the implementation of Industry 5.0 in manufacturing presents several challenges and considerations. Workforce adaptation is a critical issue, as employees need to acquire new skills such as data analytics, programming, and human-robot collaboration. Upskilling initiatives and continuous training programs are essential to prepare the workforce for the digital transformation of smart factories.

Cybersecurity is another significant concern in Industry 5.0, as increased connectivity and data sharing expose smart factories to cyber threats and attacks. Robust cybersecurity measures, including encryption, authentication, and intrusion detection systems, are necessary to protect sensitive data and ensure the integrity of manufacturing operations.

Ethical considerations also arise with the deployment of AI and robotics in smart factories. Issues such as job displacement, privacy concerns, and algorithmic bias require careful ethical frameworks and regulatory guidelines to mitigate potential risks and ensure fair and responsible use of advanced technologies.

### **Case Studies and Industry Applications**

To illustrate the practical applications of Industry 5.0, this paper examines case studies from various industries, including automotive, electronics, and pharmaceuticals. These case studies highlight how leading manufacturers are leveraging AI, IoT, and robotics to achieve operational excellence, improve product quality, and enhance customer satisfaction.

For example, in the automotive industry, smart factories equipped with AI-powered robots and IoT-enabled sensors enable predictive maintenance and just-in-time production scheduling, reducing downtime and optimizing supply chain efficiency. Similarly, in the electronics sector, collaborative robots work alongside human operators to assemble intricate components with precision and speed, ensuring high product reliability and compliance with industry standards.

### **Future Outlook and Conclusion**

Looking ahead, the evolution of smart factories towards Industry 5.0 is expected to continue reshaping the manufacturing landscape. Emerging technologies such as 5G connectivity, edge computing, and augmented reality (AR) are poised to further enhance the capabilities of smart factories, enabling real-time data processing, remote operation, and immersive training experiences.

However, realizing the full potential of Industry 5.0 requires collaboration between industry stakeholders, government agencies, and academic institutions to address technological, regulatory, and socio-economic challenges. By fostering innovation, investing in research and development, and promoting digital literacy and skills training, stakeholders can accelerate the adoption of Industry 5.0 and drive sustainable growth in manufacturing.

In conclusion, Industry 5.0 represents a transformative phase in the evolution of smart factories, emphasizing human-machine collaboration, advanced technologies, and sustainable practices. By leveraging AI, IoT, and robotics, manufacturers can achieve higher levels of productivity, efficiency, and agility while addressing challenges related to workforce adaptation, cybersecurity, and ethical considerations. Through continuous innovation and strategic investments, smart factories are poised to lead the future of manufacturing in the digital age.

## **RUSSIA-UKRAINE CRISIS IMPACTS INDIAN BUSINESSES**

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### **Abstract**

*The ongoing conflict between Russia and Ukraine has sent shockwaves through the international economic landscape. India, a major player in the global market, is not exempt from these repercussions. This crisis has triggered a domino effect, disrupting supply chains, inflating input costs, and potentially dampening export demand. Additionally, the heightened uncertainty surrounding the global economy throws a wrench into future planning for Indian businesses. This analysis delves into the specific challenges Indian businesses face due to the Russia-Ukraine crisis. We'll identify the key pressure points and explore how businesses are adapting to this new reality. Furthermore, the piece will examine the potential long-term ramifications for Indian enterprises and propose strategies to navigate the post-crisis environment and ensure success.*

**Key Words:** Russia – Ukraine war, Impact of business and Indian economy

### **Introduction**

The world watched in dismay as the conflict between Russia and Ukraine unfolded. This geopolitical crisis has transcended borders, creating ripples that are felt across the global economy. India, a rising economic powerhouse, is not shielded from these disruptions. This analysis dives deep into how the Russia-Ukraine crisis is impacting Indian businesses. We'll explore the key challenges, from supply chain disruptions to rising costs, and examine how businesses are adapting to this evolving landscape. We'll also look towards the future, considering the potential long-term implications and offering strategies for Indian businesses to navigate the post-crisis environment and ensure continued success.

### **Review of literature**

Several studies have documented the far-reaching economic consequences of the Russia-Ukraine war.

**Liadze et al. (2022)** highlight the disruption of global supply chains, impacting various commodities and industries.

**The World Bank (2022)** report emphasizes the surge in global energy prices, particularly for crude oil, which has a domino effect on transportation costs and inflation. These findings are particularly relevant for India, a major importer of energy resources.

**Singh et al. (2022)** suggests that the Indian textile sector, heavily reliant on exports to Europe and Russia, faces significant threats due to the disrupted trade landscape. Similarly, studies by **Nazeeruddin (2022)** explore the impact on the Indian food sector, with rising prices of essential commodities like wheat and edible oil due to the conflict's disruption of major exporters like Ukraine.

### **Statement of the problem**

The Russia-Ukraine crisis presents a significant challenge for Indian businesses. The conflict has disrupted global supply chains, leading to potential shortages of critical materials and components. Additionally, the surge in global energy and commodity prices is driving inflation, increasing input costs for Indian businesses. These factors, combined with potential changes in trade dynamics due to sanctions, create uncertainty and threaten the profitability and growth of Indian companies.

### **Objectives**

- To study the Russia-Ukraine crisis is affecting Indian businesses for the main objectives includes in supply chains, cost increases, and potential changes in export demand.
- This objective implies offering practical recommendations for Indian businesses to ensure success in the face of these challenges.

### **Methodology**

This research will employ a multi-pronged approach to analyze the impact of the Russia-Ukraine crisis on Indian businesses. Here's a breakdown of the methodology:

#### **Data Collection:**

##### **Secondary Data Analysis**

We will extensively review existing research on the topic. This includes academic journals, industry reports, and reports from organizations like the World Bank and International Monetary Fund (IMF). These sources will provide a comprehensive understanding of the global economic impact of the crisis and its potential implications for India.

##### **Trade Data Analysis**

We will analyze trade data between India, Russia, and Ukraine to assess pre-crisis trade patterns and identify potential disruptions caused by sanctions or market changes. Trade data can be sourced from government agencies or international trade organizations.

### **News and Media Analysis**

We will closely monitor news reports and industry publications to stay updated on the evolving situation and capture real-time business responses to the crisis.

### **Limitations**

- The ongoing nature of the crisis might limit the availability of complete data.
- Access to confidential business information could pose challenges.

### **Result and discussion**

The Russia-Ukraine crisis has triggered a complex set of challenges and potential opportunities for Indian businesses. This analysis will delve into the key areas of impact:

#### **Supply Chain Disruptions**

The war has disrupted global supply chains, potentially leading to shortages of critical materials and components needed for Indian production. Businesses heavily reliant on imports from Russia or Ukraine might face delays or difficulty securing essential supplies. This analysis will explore sector-specific vulnerabilities and identify alternative sourcing strategies businesses can adopt.

#### **Cost Increases**

The surge in global energy and commodity prices is driving inflation and increasing input costs for Indian businesses. Rising transportation costs due to higher fuel prices will further squeeze profit margins. This analysis will assess the impact of inflation on different sectors and explore cost-saving measures businesses can implement.

#### **Trade Dynamics**

Sanctions on Russia and potential disruptions in trade with Ukraine could significantly alter India's trade landscape. This analysis will examine the potential decline in exports to these countries and explore opportunities for diversification into new markets. The impact of sanctions on Indian imports from Russia and Ukraine will also be explored.

#### **Business Responses and Adaptations**

Indian businesses are likely adopting various strategies to cope with the crisis.

This analysis will explore potential business responses like cost-cutting measures, exploring alternative suppliers, or adapting production processes.

Case studies of businesses successfully navigating the crisis can provide valuable insights for others.

#### **Long-Term Implications**

The crisis might have long-term consequences for the Indian economy, potentially leading to

- Increased focus on domestic production and self-reliance.
- Diversification of trade partners to reduce dependence on specific regions.
- Increased investment in building resilient supply chains.

This analysis will explore potential long-term shifts in the Indian economy and suggest strategies for businesses to position themselves for success in the post-crisis era.

### **Findings, Suggestions, and Conclusion**

#### **Findings**

- The Russia-Ukraine crisis has significantly impacted Indian businesses through disrupted supply chains, rising input costs, and potential changes in trade dynamics.
- Specific sectors like textiles and agriculture are particularly vulnerable due to their reliance on imports or exports to the affected region.
- Indian businesses are adopting various strategies to adapt, including cost-cutting measures, exploring alternative suppliers, and adapting production processes.
- The long-term impact of the crisis might lead to increased domestic production, trade diversification, and a focus on building robust supply chains.

#### **Suggestions**

##### **Government Level**

The Indian government can support businesses by

- Facilitating access to alternative suppliers and raw materials.
- Providing financial assistance to weather cost increases.
- Implementing policies to encourage domestic production and reduce dependence on specific regions.

##### **Business Level: Businesses can**

- Diversify their supply chains to mitigate risks associated with overdependence on specific regions.
- Invest in technology and innovation to improve production efficiency and reduce costs.
- Explore new markets and trade opportunities to compensate for potential losses in traditional markets.

#### **Conclusion**

The Russia-Ukraine crisis has presented a complex set of challenges for Indian businesses. While the immediate impact can be disruptive, it also presents an opportunity for adaptation and strategic reorientation. By adopting proactive strategies and leveraging government support, Indian businesses can navigate the current crisis and emerge stronger in the long term. This crisis highlights the importance of resilient supply chains, diversified trade partnerships, and a focus on domestic production for the long-term success of the Indian economy.

## **MEDIATION STANDPOINT: ASSESSING THE IMPACT OF AGRICULTURISTS' EMPOWERMENT**

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### **Abstract**

*The demand on agricultural productivity is great due to the growing global population and substantial climatic changes. The study's primary goal is to examine the relationships between farmers' economic, psychological, social, and cultural empowerment in light of four different variables. This study used a sample of 385 farmers from Tirunelveli district. With the use of SPSS 20 and AMOS 20 softwares, the researcher used reliability statistics, test of normality, Correlation, multiple regression analysis, path analysis and mediation. Primary data were collected from the respondents with the help of structured questionnaire schedule. In this paper the empowerment on agriculture are divided into four categories namely economic empowerment, psychological empowerment, social empowerment and cultural empowerment. The result of this research found that psychological empowerment and economic empowerment are closely related to each other.*

**Keywords:** Agricultural, Cultural, Economic, Empowerment, Psychological, Social.

### **Introduction**

Empowerment is both a process and an outcome (Seth Opoku Mensah & Diana Azan Yankson 2013). The empowerment of agriculture through Information and Communication Technology (ICT) practices is a vital component of modernizing and enhancing the agricultural sector. Agriculture plays a pivotal role in global food security, economic development, and the livelihoods of billions of people worldwide. By integrating ICT into agricultural practices, we can address several challenges and promote sustainable, efficient, and resilient agricultural systems. ICT encompasses a wide range of technologies and tools, including mobile devices, internet connectivity, data analytics, geographic information systems (GIS), remote sensing, and more. When applied to agriculture, these technologies can revolutionize the way farming is conducted, from production and management to marketing and distribution, one of the primary objectives of ICT in agriculture is to boost productivity, ICT tools provide farmers with access to market information.

### **Review of Literature**

Seth Opoku Mensah & Diana Azan Yankson (2013) the study concludes that there is a need to re-examine issues of access to and control of productive resources such as land

tenure, credit and extension services. As these factors combine to enhance and/or limit their economic empowerment, the study proposes that addressing such challenges will improve their household, municipal and national food security in the short, medium and long term. **Tamara Ginige & Deborah Richards (2012)** this paper proposes an empowerment model designed to achieve their identified goals using a context-based approach. This model explores a number of empowerment processes and supporting tools that help farmers achieve their goals, which include an increased sense of control, self-efficacy, knowledge, and competence. This empowerment model is applied to the development of a mobile-based information system developed by an international collaborative research team to address farmers' issues.

### **Research Gap**

The earlier studies investigated the participation of youth in agricultural and rural development activities. Followed by mobile platform is considered as an innovative and effective tool to bridge the digital divide and another article comparing both men and women empowerment in agriculture. Another author concluded that there is a need to re-examine issues of access to and control of productive resources in agriculture and finally an empowerment model designed to achieve their identified goals using a context-based approach to farmers. This study is deviated from the earlier studies in the aspect that it covers the Economic, Social, Psychological and Cultural empowerment through agriculture. .

### **Research Methodology**

The study's primary goal is to examine the relationships between farmers' economic, psychological, social, and cultural empowerment in light of four different variables. Primary data were collected from the respondents with the help of structured questionnaire schedule. This study used a sample of 385 farmers from the Tirunelveli. The researcher used reliability statistics, test of normality, Correlation, multiple regression analysis, Path Analysis and mediation.

### **Impact of Agriculturists' Empowerment**

It involves giving farmers and rural stakeholders the tools, knowledge, and resources they need to take control of their agricultural practices, livelihoods, and overall development. There are several types or dimensions of empowerment in agriculture, each focusing on specific aspects of rural life and agricultural sustainability. Empowerment in agriculture encompasses a range of dimensions, each contributing to the resilience, self-reliance, and prosperity of rural communities. The present investigation only focuses on Economic empowerment, Social empowerment, Cultural empowerment and Psychological empowerment.

**Table 1-Reliability Statistics for types of empowerment**

<b>Cronbach's Alpha</b>	<b>No. of Items</b>
<b>0.871</b>	20

Source: Primary data

The data reliability has been tested by using the statistic Cronbach alpha. The Cronbach's Alpha for types of empowerment is 0.871. As per the standards, the value needs to be greater than 0.5. Hence it can be concluded that the data is adequate.

**Table 2- Correlations for Empowerment on Agriculturists**

		<b>Economic Empowerment</b>	<b>Psychological Empowerment</b>	<b>Social Empowerment</b>	<b>Cultural Empowerment</b>
Economic Empowerment	r	1	<b>0.759**</b>	0.746**	0.408**
	Significant		<0.001	<0.001	<0.001
Psychological Empowerment	r		1	0.541**	0.562**
	Significant			<0.001	<0.001
Social Empowerment	r			1	0.523**
	Significant				<0.001
Cultural Empowerment	r				1
	Significant				

Source: Primary data  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).

Comparing other empowerment from the above there is a high correlation between psychological empowerment and economic empowerment ( $r = 0.759$ ,  $p = <0.001$ ), followed by social empowerment and economic empowerment ( $r = 0.746$ ,  $p = <0.001$ ), then Cultural empowerment with economic empowerment ( $r = 0.408$ ,  $p = <0.001$ ), then psychological empowerment with social empowerment and cultural empowerment is that  $r = 0.541$ ,  $p = <0.001$  and  $r = 0.562$   $p = <0.001$  finally, cultural empowerment with social empowerment is  $r = 0.523$ ,  $p = <0.001$ . From this correlation result, psychological empowerment is selected as the dependent variable for regression analysis because it is highly correlated.

**Table 3- Normality test for Distribution of Psychological Empowerment**

N	Mean	Median	Minimum	Maximum	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
385	20.05	20.00	13.00	25.00	<b>0.096</b>	<b>0.124</b>	<b>0.354</b>	<b>0.248</b>

Source: Primary data

Skewness is 0.096 with a standard error of 0.124. This gives a measure of skewness of  $0.096/0.124 = 0.774$ . Kurtosis is 0.354 with a standard error of 0.248, giving a value of  $0.354/0.248 = 1.427$ . Based on Z value for test of normality is either or both the skewness and Kurtosis value should be within the range of value  $\pm 1.96$ .

**Table 4- Model Summary for Empowerment on Agriculturists**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.908	0.824	0.822	0.92107	1.278

Source: Primary data



- a. Predictors: (Constant), Cultural Empowerment, Social Empowerment, Economic Empowerment  
 b. Dependent Variable: Psychological Empowerment

The model reveals that R (Multiple Correlation coefficient) value was 0.908. It measures the degree of relationship between the psychological empowerment and the predicted value (Cultural Empowerment, Social Empowerment and Economic Empowerment). R square (Coefficient of Determination) value is 0.824. It means that 82% of the variation in psychological empowerment is explained by the variation in the independent variables (Cultural Empowerment, Social Empowerment and Economic Empowerment). Adjusted R – Squared value was 0.822. It adjusts the statistic based on the number of independent variables in the model. That is the desired property of goodness – of – fit - statistic. Durbin-Watson (DW) statistic shows 1.278 which indicates positive and no auto correction.

**H<sub>0</sub>:** There is no relationship between independent factors (Economic empowerment, Social Empowerment and Cultural Empowerment) and psychological empowerment.

**Table 5- ANOVA table for Empowerment on Farmers**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1509.455	3	503.152	593.077	<0.001
Residual	323.231	381	.848		
Total	1832.686	384			

Source: Primary data

- a. Dependent Variable: Psychological Empowerment  
 b. Predictors: (Constant), Cultural Empowerment, Social Empowerment, Economic Empowerment

F value was 593.077 and p value was significant at 1% level. Hence there is significant relationship between dependent and independent variables.

**Table 6- Multiple Regression Analysis for Empowerments on Agriculturists**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.045	0.408		12.351	<0.001
Economic Empowerment	0.225	0.019	0.322	11.805	<0.001
Social Empowerment	0.271	0.014	0.487	18.870	<0.001
Cultural Empowerment	0.276	0.028	0.299	9.850	<0.001

Source: Primary data

Dependent Variable: Psychological Empowerment

**Estimated Multiple Linear Regression Equation**

$$Y = 5.045 + 0.225 X_1 + 0.271 X_2 + 0.276 X_3$$

Where  $X_1$  = Economic Empowerment,  $X_2$  = Social Empowerment,  $X_3$  = Cultural Empowerment The regression equation describes that the dependent variable psychological empowerment (Y) = 5.045 + 0.225  $X_1$ (Economic Empowerment) + 0.271  $X_2$  (Social Empowerment) + 0.276  $X_3$  (Cultural Empowerment). The test of significance shown that all the independent variables are the most significant variable as the p value is less than 0.001. Hence it can be concluded that economic empowerment, social empowerment and cultural empowerment are increased psychological empowerment is also increased.

Here the Coefficient of  $X_1$  is 0.225 represents the partial effect of economic empowerment on psychological empowerment, holding the other variables as constant. The estimated positive sign implies that such effect is positive that psychological empowerment would increase by 0.225 for every unit increase in economic empowerment and this coefficient value is significant at one percent level. The Coefficient of  $X_2$  is 0.271 represents the partial effect of social empowerment on psychological empowerment, holding the other variables as constant. The estimated positive sign implies that such effect is positive that psychological empowerment would increase by 0.271 for every unit increase in social empowerment and this coefficient value is significant at one percent level. The Coefficient of  $X_3$  is 0.276 represents the partial effect of cultural empowerment on psychological empowerment, holding the other variables as constant. The estimated positive sign implies that such effect is positive that psychological empowerment would increase by 0.276 for every unit increase in cultural empowerment and this coefficient value is significant at one percent level.

Based on unstandardized coefficient, cultural empowerment (0.276) is the most important factor followed by social empowerment (0.271) and economic empowerment (0.225).

**Table 7-Model fit Summary for four Empowerment of Agriculturists**

Chart	CMIN/DF	P	GFI	AGFI	NFI	CFI	RMSEA
<b>First Run</b>	19.314	0.000	0.956	0.780	0.955	0.957	0.218
<b>Modification: Economic Empowerment to Cultural Empowerment</b>							
<b>Final Run</b>	1.291	0.256	0.998	0.983	0.999	1.000	0.028
<b>Threshold limit</b>	<b>1-5</b>	<b>&gt;0.05</b>	<b>&gt;0.9</b>	<b>&gt;0.9</b>	<b>&gt;0.9</b>	<b>&gt;0.9</b>	<b>&lt;0.08</b>

Source: Primary

From the above table it is found that the chi-square/ df is 1.291 which is less than 5 (Hair et al., 1998) calculated P value is 0.256 which is greater than 0.05 (Hair et al., 1998)

which indicates perfectly fit. Here Goodness of Fit Index (GFI) value (0.998) (Hu and Bentler, 1999) and Adjusted Goodness of Fit Index (AGFI) value (0.983) (Hair et al. 2006) is greater than 0.9 which represent it is a good fit. The calculated Normed Fit Index (NFI) value (0.999) (Hu and Bentler, 1999) and Comparative Fit Index (CFI) value (1.000) (Daire et al., 2008) indicates that it is a perfectly fit and also it is found that Root Mean Square Error of Approximation (RMSEA) value is 0.028 which is less than 0.08 (Hair et al. 2006) which indicated it is perfectly fit.

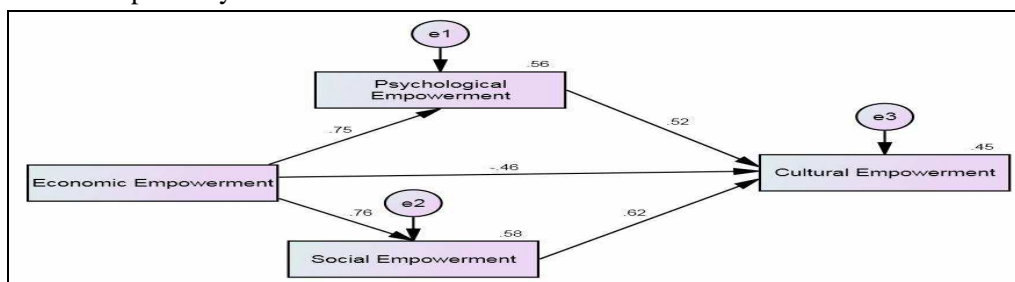


Figure 2: Mediation effect of Four Empowerments

Table 8- Regression Table for Empowerment of Agriculture

Casual Relationship		Non-Normalized Path Coefficient	S.E.	Normalized Path Coefficient	t value	P
Psychological Empowerment	<---	Economic Empowerment	0.778	0.035	0.746	21.936 <0.001
Social Empowerment	<---	Economic Empowerment	0.632	0.028	0.759	22.847 <0.001
Cultural Empowerment	<---	Psychological Empowerment	0.436	0.047	0.525	9.236 <0.001
Cultural Empowerment	<---	Social Empowerment	0.649	0.061	0.623	10.727 <0.001
Cultural Empowerment	<---	Economic Empowerment	-0.399	0.062	-0.460	-6.400 <0.001

Source: Primary data

The non-normalized coefficient of economic empowerment on psychological empowerment is 0.778 indicating a partial effect of economic empowerment on psychological empowerment, holding other path variables constant. The estimated positive sign indicates that for every unit increase in economic empowerment, psychological increases by 0.778 and this coefficient value is significant at the 1% level.

The non-normalized coefficient of economic empowerment on social empowerment is 0.632 indicating a partial effect of economic empowerment on social empowerment, holding other path variables constant. The estimated positive sign indicates that for every unit increase in economic empowerment, social increases by 0.632 and this coefficient value is significant at the 1% level.

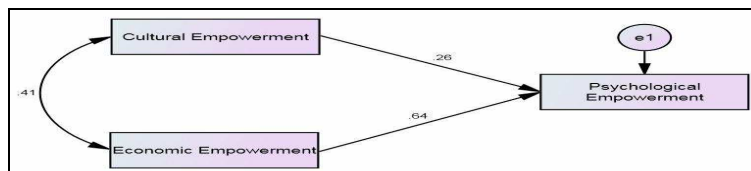
The non-normalized coefficient of psychological empowerment on cultural empowerment is 0.436 indicating a partial effect of psychological empowerment on cultural empowerment, holding other path variables constant. The estimated positive sign indicates that for every unit increase in psychology empowerment, cultural increases by 0.436 and this coefficient value is significant at the 1% level.

The non-normalized coefficient of social empowerment on cultural empowerment is 0.649 indicating a partial effect of social empowerment on cultural empowerment, holding other path variables constant. The estimated positive sign indicates that for every unit increase in social empowerment, culture increases by 0.649 and this coefficient value is significant at the 1% level.

The non-normalized coefficient of economic empowerment on cultural empowerment is -0.399 indicating a partial effect of economic empowerment on cultural empowerment, holding other path variables constant. The estimated negative sign indicates that for every unit increase in economic empowerment, culture decreases by -0.399 and this coefficient value is significant at the 1% level.

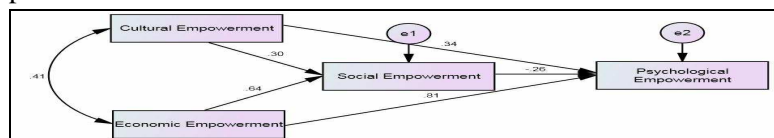
**Mediation standpoint: Empowerments on Agriculturists**

**H<sub>01</sub>:** Cultural Empowerment does not at all affect the Psychological Empowerment after the Social Empowerment has controlled it.



**Figure 3: Effect of Cultural and Economic Empowerment on Psychological Empowerment without the effect of mediation of Social Empowerment**

**H<sub>02</sub>:** Economic Empowerment does not at all affect the Psychological Empowerment before the Social Empowerment has controlled it.



**Figure 4: Effect of Cultural and Economic Empowerment on Psychological Empowerment with the effect of mediation of Social Empowerment**

**Table 9– Regression table for Empowerment in Agriculture**

Casual Relationship		Non-normalized Coefficient	S.E.	Normalized Coefficient	C.R.	P
Social Empowerment	<--- Cultural Empowerment	0.294	0.032	0.304	9.222	<0.001
Social Empowerment	<--- Economic Empowerment	0.529	0.027	0.635	19.300	<0.001
Psychological Empowerment	<--- Cultural Empowerment	0.416	0.045	0.343	9.220	<0.001
Psychological Empowerment	<--- Economic Empowerment	0.841	0.049	0.806	17.085	<0.001
Psychological Empowerment	<--- Social Empowerment	-0.331	0.065	-0.264	-5.063	<0.001

Source: Primary data

Non-Normalized coefficient of cultural empowerment on social empowerment is 0.294 represents the partial effect of cultural empowerment on social empowerment, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that social would increase by 0.294 for every unit increase in cultural and this coefficient value is significant at 1% level.

Non-Normalized coefficient of economic empowerment on social empowerment is 0.529 represents the partial effect of economic empowerment on social empowerment, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that social would increase by 0.529 for every unit increase in economic and this coefficient value is significant at 1% level.

Non-Normalized coefficient of cultural empowerment on psychological empowerment is 0.416 represents the partial effect of cultural empowerment on psychological empowerment, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that psychological would increase by 0.416 for every unit increase in cultural and this coefficient value is significant at 1% level.

Non-Normalized coefficient of Economic empowerment on psychological empowerment is 0.841 represents the partial effect of Economic empowerment on psychological empowerment, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that psychological would increase by 0.841 for every unit increase in economic and this coefficient value is significant at 1% level.

Non-Normalized coefficient of social empowerment on psychological empowerment is -0.331 represents the partial effect of social empowerment on psychological empowerment, holding the other path variables as constant. The estimated negative sign implies that such effect is negative that psychological would decrease by -0.331 for every unit increase in social and this coefficient value is significant at 1% level.

**Table 10- Effect of Independent Variables on Dependent Variable with the effect of Mediation Variable**

Relationship		Direct Effect without Mediator	Effect with Mediator	Effect	
Psychological Empowerment	<---	Cultural Empowerment	0.263 (0.004*)	0.343 (0.004*)	Full Mediation
Psychological Empowerment	<---	Economic Empowerment	0.639 (0.004*)	0.806 (0.004*)	Full Mediation

Source: Primary

\*Significant at 5% level

It was found that Cultural Empowerment affect the Psychological Empowerment after the Social Empowerment variable has controlled it. Impact of Cultural Empowerment on Psychological Empowerment without mediator and with mediator is insignificant and significant respectively i.e. p values (0.004 & 0.004) are less than 0.05. As an outcome, mediation performs an important part in cultural and psychological empowerment. Economic Empowerment affect the Psychological Empowerment after the Social Empowerment variable has controlled it. Impact of Economic Empowerment on Psychological Empowerment without mediator and with mediator is insignificant and significant respectively i.e. p value (0.004 & 0.004) is less than 0.05. As an outcome, mediation performs an important part in economic and psychological empowerment.

**Conclusion**

Empowerment in agriculture is a multifaceted and essential concept that has long-term implications for individuals, communities and societies as a whole. In conclusion, it is clear that empowering individuals and communities in the agricultural sector can deliver many benefits, including improved livelihoods, food security and sustainable development. In correlation, psychological empowerment and economic empowerment are closely related to each other. Based on regression analysis a one percent increase in psychological empowerment increases economic empowerment, social empowerment, and cultural empowerment by 22.5 percent, 27.1 percent, and 27.6 percent, respectively and also economic empowerment, Social empowerment and cultural empowerment are highly significant with psychological empowerment. From a mediating perspective social empowerment is a mediating variable that has a greater

impact compared to the direct effect. Hence the mediation effect is saturated. It is suggested that empowering farmers in agriculture requires a multifaceted approach that integrates education, access to resources, supportive policies and community engagement. Psychological support, positive role models, and empowerment through education can be used to promote psychological empowerment. Social empowerment can be fostered through community engagement, community inclusion, and conflict resolution. Enhances cultural empowerment through cultural conservation, cultural awareness and capacity building. Access to financial services, skills development and agricultural diversification can improve economic empowerment.

## SMART MANUFACTURING

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### Abstract

*Smart manufacturing represents a transformative approach to industrial production that integrates advanced technologies such as IoT (Internet of Things), AI (Artificial Intelligence), and big data analytics. By leveraging these technologies, smart manufacturing systems aim to optimize the entire manufacturing process, from product design and production to supply chain management and customer service. This abstract explores the key components and benefits of smart manufacturing, including increased efficiency, reduced costs, improved quality control, and enhanced flexibility in responding to market demands. Additionally, it discusses the challenges and considerations in implementing smart manufacturing systems, such as cyber security risks and workforce up skilling requirements.*

**Keywords** transformative approach, leveraging, optimize, entire manufacturing.

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### INTRODUCTION

Through the incorporation of state-of-the-art digital technologies, intelligent manufacturing, also known as Industry 4.0, revolutionizes traditional manufacturing methods. It encompasses a wide array of advancements that enhance productivity, flexibility, and efficiency across the manufacturing value chain. Here is a comprehensive guide on intelligent manufacturing.

### DEFINITION:

Smart manufacturing entails utilizing cutting-edge technologies such as IoT, AI, machine learning, and data analytics to improve efficiency and productivity in manufacturing processes. It integrates digital systems throughout production stages for real-time monitoring,

predictive maintenance, and adaptive decision-making, with the goal of optimizing operations and remaining competitive. Smart manufacturing turns conventional factories into agile, responsive environments capable of continuous enhancement and meeting changing market demands through technology-driven innovations.

**OBJECTIVE:**

The aims of smart manufacturing are centered on achieving heightened operational efficiency, cost savings, and enhanced quality by incorporating advanced technologies. Key objectives include enhancing agility to swiftly adapt to market shifts, fostering innovation, promoting sustainability, ensuring customer satisfaction, effectively managing risks, improving collaboration across supply chains, and upholding compliance with industry regulations. These objectives collectively strive to convert traditional manufacturing processes into dynamic, adaptable systems capable of addressing modern challenges and opportunities.

**OVERVIEW:**

- 1) Essential technologies of smart manufacturing
- 2) Advantages of smart manufacturing
- 3) Challenges in implementation
- 4) Practical applications and case studies
- 5) Future trends

**ESSENTIAL TECHNOLOGIES OF SMART MANUFACTURING:**

The Internet of effects( IoT) is a critical element in the metamorphosis of traditional manufacturing into smart manufacturing. It involves connecting bias, machines, and systems to gather and change data. Then are detailed notes on IoT under smart manufacturing

**1.Description and Compass**

Refers to the network of connected bias bedded with detectors, software, and other technologies to collect and change data over the internet.

IoT in Smart Manufacturing Integrates detectors and smart bias into manufacturing processes to enable real- time data monitoring, analysis, and decision- timber.

**2. Key Components of IoT in Smart Manufacturing**

Detectors and Selectors bias that collect data(e.g., temperature, pressure, vibration) and control physical processes.

Bedded Systems Microcontrollers and processors bedded in machines to enable communication and data processing.

Connectivity colorful communication protocols (e.g., Ethernet, Wi- Fi, Bluetooth, Zigbee) that allow bias to connect and transmit data.

Cloud Computing Platforms that store, process, and dissect data from IoT bias, furnishing scalability and availability.



Edge Computing Processing data near the source (at the edge of the network) to reduce quiescence and bandwidth operation.

### **3. \* operations and Use Cases \***

- \* Prophetic conservation \* IoT detectors cover outfit conditions in real time, prognosticating implicit failures and scheduling conservation proactively.
- \* Quality Control \* nonstop monitoring of product parameters ensures harmonious product quality and detects blights beforehand in the process.
- \* Asset Tracking \* RFID markers and GPS enable real- time shadowing of raw accoutrements , work- in- progress, and finished goods throughout the force chain.
- \* Energy Management \* IoT- enabled systems optimize energy consumption by covering operation patterns and conforming operations consequently

## **2) BENEFITS OF SMART MANUFACTURING**

**i) bettered effectiveness** Advanced effectiveness in smart manufacturing refers to optimizing functional processes, using advanced technologies, and maximizing resource application to enhance productivity, quality, and profitability. Then are detailed notes on the crucial factors contributing to bettered effectiveness in smart manufacturing

### **1. \* Advanced Technologies \***

- \* Internet of effects( IoT) \* Connects machines, bias, and detectors to gather real- time data on product processes, outfit performance, and environmental conditions. IoT enables prophetic conservation, remote monitoring, and data- driven decision- timber.
- \* Big Data Analytics \* Processes and analyzes vast quantities of data collected from IoT bias, product systems, and force chain operations. It identifies patterns, trends, and anomalies to optimize workflows, prognosticate demand, and ameliorate decision- timber.
- \* Artificial Intelligence( AI) and Machine literacy( ML) \* Applies algorithms to dissect data, automate processes, and make prophetic perceptivity. AI and ML enhance quality control, prophetic conservation, and force chain operation by optimizing operations and reducing crimes.
- \* Robotics and robotization \* Utilizes robots and automated systems to perform repetitious tasks with perfection, speed, and trustability. Robotics enhances assembly, material running, and logistics, reducing labor costs and minimizing crimes.
- \* stoked Reality( AR) and Virtual Reality( VR) \* Improves training, conservation, and design processes through immersive simulations and real- time data visualization. AR and VR enhance worker productivity, reduce training time, and optimize product planning and layout.

### **2. \* crucial Strategies for effectiveness enhancement \***

- \* Real- Time Monitoring and Prophetic conservation \* Observers outfit performance and detects implicit failures before they do using IoT detectors and prophetic analytics. This minimizes time-out, reduces conservation costs, and extends bettered effectiveness in smart

manufacturing involves streamlining functional processes, exercising slice- edge technologies, and maximizing resource application to boost productivity, quality, and profitability. Below are detailed perceptivity into the primary factors that contribute to enhanced effectiveness in smart manufacturing

**1. \* Cutting- Edge Technologies \***

- \* Internet of effects (IoT) \* Links machines, bias, and detectors to collect real- time data on product processes, outfit performance, and environmental conditions. IoT facilitates prophetic conservation, remote monitoring, and data- informed decision- timber.
- \* Big Data Analytics \* Processes and interprets vast quantities of data gathered from IoT bias, product systems, and force chain operations. It identifies patterns, trends, and irregularities to optimize workflows, read demand, and enhance decision- timber.
- \* Artificial Intelligence (AI) and Machine literacy (ML) \* Utilizes algorithms to dissect data, automate processes, and give prophetic perceptivity. AI and ML ameliorate quality control, prophetic conservation, and force chain operation by streamlining operations and reducing crimes.
- \* Robotics and robotization \* Deploys robots and automated systems to execute repetitious tasks with delicacy, speed, and responsibility. Robotics enhances assembly, material running, and logistics, cutting labor costs and minimizing miscalculations.
- \* stoked Reality (AR) and Virtual Reality( VR) \* Enhances training, conservation, and design processes through immersive simulations and real- time data visualization. AR and VR boost worker effectiveness, reduce training duration, and optimize product planning and layout.

**2. \* Key Approaches for Enhancing effectiveness \***

- \* Real- Time Monitoring and Prophetic conservation \* Observers outfit performance and anticipates implicit failures using IoT detectors and prophetic analytics. This reduces time- out, lowers conservation charges, and prolongs outfit lifetime.

**IMPLEMENTATION AND CHALLENGES**

Data security is a critical issue in smart manufacturing due to the adding digitalization and interconnectedness of manufacturing systems. This introduces vulnerabilities that can be exploited by cyber pitfalls. Guarding sensitive manufacturing data, intellectual property, and functional information is pivotal to maintain trust, insure nonsupervisory compliance, and safeguard against implicit dislocations. Then are detailed perceptivity into the main aspects and considerations of data security in smart manufacturing

**1. \* Main Aspects of Data Security \***

- \* Confidentiality \* icing that sensitive data, similar as personal designs, product processes, and client information, is only accessible to authorized labor force and defended from unauthorized access or exposure.

- \* Integrity \* Maintaining the delicacy, thickness, and trust ability of data throughout its lifecycle to help unauthorized revision, corruption, or tampering.
  - \* Vacuity \* icing timely and dependable access to data and manufacturing systems for authorized druggies while defending against denial- of- service( DoS) attacks and other dislocations.
  - \* Compliance \* clinging to assiduity regulations, data protection laws(e.g., GDPR, CCPA), and cybersecurity norms(e.g., ISO 27001) to cover sensitive information and alleviate legal and fiscal pitfalls.
  - \* Adaptability \* enforcing measures to descry, respond to, and recover from cybersecurity incidents, including data breaches, malware attacks, and system negotiations.
  - \* mindfulness and Training \* Educating workers and stakeholders about cybersecurity stylish practices, feting phishing attempts, and promoting a culture of alert and responsibility.
2. \* Factors Enhancing Data Security in Smart Manufacturing \*
- \* Secure Network Architecture \* enforcing robust network segmentation, firewalls, intrusion discovery systems( IDS), and secure access controls to help unauthorized access.

#### **FUTURE TRENDS:**

5G connectivity is set to transform smart manufacturing by offering faster speeds, lower latency, and greater reliability compared to previous generations of cellular networks. Here are detailed notes on how 5G connectivity is revolutionizing smart manufacturing:

Key Advantages of 5G Connectivity in Smart Manufacturing:

#### **1. \*Ultra-High Speeds\*:**

- \*Enhanced Data Transfer\*:  
5G provides significantly higher data transfer speeds, up to 10 Gbps or more, allowing real-time transmission of large volumes of data generated by IoT devices, sensors, and machinery on the factory floor.
- \*High Definition Video\*:  
Supports high-definition video streaming and remote monitoring of manufacturing processes with minimal delay, enabling remote troubleshooting and quality control.

#### **2. \*Low Latency\*:**

- \*Real-Time Control\*:  
5G's low latency (as low as 1 millisecond) enables real-time control of manufacturing equipment and robotic systems, enhancing precision and responsiveness in automated operations.
- \*Edge Computing\*:  
Combined with edge computing capabilities, 5G minimizes data processing delays by processing critical data closer to the point of collection, improving operational efficiency.

### **3. \*High Reliability\*:**

- **\*Mission-Critical Applications\*:** 5G networks are designed to provide high reliability and availability, ensuring consistent connectivity for mission-critical applications such as autonomous vehicles, predictive maintenance, and quality control systems.

- **\*Redundancy and Resilience\*:** Built-in redundancy and network slicing capabilities enhance resilience against network failures and disruptions, maintaining continuous operations in manufacturing environments.

### **4. \*Massive IoT Connectivity\*:**

- **\*IoT Integration\*:** 5G supports a massive number of connected devices simultaneously, facilitating seamless integration of IoT devices, sensors, and smart devices across the manufacturing ecosystem.

### **CONCLUSION**

In summary, smart manufacturing is a revolutionary approach to updating industrial processes by incorporating cutting-edge technologies. Through the utilization of IoT, AI, machine learning, data analytics, and automation, smart manufacturing seeks to improve efficiency, productivity, and quality while cutting costs and reducing environmental impact. It facilitates real-time monitoring, predictive maintenance, and adaptive decision-making, enabling manufacturers to quickly adapt to market demands and achieve operational excellence. Embracing smart manufacturing not only promotes innovation and competitiveness but also encourages sustainability, collaboration across supply chains, and continuous enhancement. As industries around the globe adopt digital transformation, smart manufacturing emerges as a fundamental element in creating smarter, more efficient, and resilient manufacturing ecosystems.

## **INDUSTRY 5.0: TRANSFORMATIVE IMPACTS ON ECONOMIC DEVELOPMENT IN THE DIGITAL AGE**

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### **Abstract**

*Industry 5.0 heralds a new era of technological progress, with an emphasis on collaborative human-machine interactions rather than mere automation. This paradigm shift promises to advance economic growth through better production, agility in response to market demands, and sustainable practices. Integration of advanced technology and human intelligence. Industry 5.0 aims not only to improve efficiency and quality but also to create new jobs and skills development opportunities. This transformative approach, to global*

*connectivity and innovation, is poised to drive economic growth, competitiveness, and environmental stewardship in the digital age.*

**Keywords:** (Industry, Economic Development, Human-Centric Innovation, Digital Transformation, Sustainable Manufacturing)

**Introduction:**

Industry 5.0 emerges as an important chapter in the ongoing narrative of technological progress, representing a significant departure from its predecessors by placing human agency at its core in digital technologies advanced after .0 Reforms focused on increasing human-machine interfaces These developments promise to redefine economic growth in the digital age through personalized manufacturing processes, which on rapid, sustainable development.

Essentially, Industry 5.0 uses technologies such as artificial intelligence, robotics, and IoT to empower human workers and encourage creativity, problem, and innovation along with automation efficiency The goal of this approach is not to improve not only the quality of products and services but also the use of new avenues for economic growth and competitiveness. Moreover, it emphasizes the importance of global connectivity and collaborative networks, enabling companies to operate at a scale and speed previously unimaginable. As Industry 5.0 unfolds, its transformative effects are poised to reshape businesses, economies, and societies, providing opportunities for sustainable and inclusive growth in the dynamic environment of the digital age.

**Characterization of Industry 5.0**

The evaluation of Industry 5.0 underscores big uncertainties concerning its transformative effect on commercial enterprise operations, bridging the space among bodily and virtual nation-states (Scanlon, 2018). Østergaard (2018), Chief Technology Officer at Universal Robots, argues that meeting patron needs for product customization necessitates the subsequent section of the Industrial Revolution. This shift is exemplified by a German automobile producer reallocating the manufacturing unit area to house elevated human involvement, recognizing the significance of customization in modern purchaser alternatives (Atwell, 2017).

Industry 5.0 will foster superior collaboration between human beings and sensible structures, specifically in production. Machines will anticipate repetitive responsibilities, releasing humans to the consciousness of creativity and supervisory roles to enhance manufacturing high-quality universally. This fashion is corroborated by Accenture's survey revealing that eighty-five of global production executives count on collaborative human-robotic production strains via 2020 (Atwell, 2017).

This symbiotic courting between human beings and technology is poised to affect not only the best monetary productiveness but also ecological sustainability and social dynamics

(Shelzer, 2017). Efforts in waste prevention through industrial upcycling underscore Industry 5.0 capability to mitigate physical, urban, process, and social waste, thereby reducing useful resource consumption and environmental impact (Rada, 2018).

Additionally, emerging fields like artificial gene synthesis and sustainable aid management underscore Industry 5.0's human-centric method, which emphasizes harmony among technological development and environmental stewardship (Sachsenmeier, 2016).

### **Transformative Impacts of Industry 5.0 on Economic Development**

While automation in Industry 5.0 may displace some routine tasks, it's expected to create a wave of new opportunities. AI and robotics become collaborators, freeing humans to focus on higher-level functions. Imagine engineers designing alongside AI assistants or data analysts leveraging AI-powered insights. This transformation necessitates a shift in skillsets. Upskilling and reskilling initiatives become crucial, equipping the workforce with expertise in areas like AI integration, data analysis, and human-machine collaboration. By embracing continuous learning and fostering a culture of adaptation, Industry 5.0 has the potential to bridge the skills gap and propel a future workforce prepared to thrive in the digital age.

The concept of human-machine collaboration is a defining characteristic of Industry 5.0. Unlike the automation-centric focus of Industry 4.0, Industry 5.0 envisions a future where humans and machines work synergistically, leveraging each other's strengths to achieve unprecedented levels of innovation and productivity.

In this new paradigm, artificial intelligence (AI) and robotics handle complex, repetitive, and data-intensive tasks with precision and efficiency. This allows human workers to concentrate on creativity, problem-solving, and strategic decision-making—areas where human intuition and ingenuity are paramount. AI can assist in analyzing vast datasets to identify trends and insights, while humans interpret these insights to make informed decisions and drive strategic initiatives.

Articles and studies have shown that this collaborative approach can lead to significant advancements in various industries. For instance, in manufacturing, AI-powered robots can manage the assembly line with high accuracy, while humans oversee quality control and devise new product designs. In healthcare, AI can support diagnostics and data analysis, enabling medical professionals to focus on patient care and innovative treatments. By redefining collaboration, Industry 5.0 not only enhances productivity but also fosters a more dynamic and fulfilling work environment, unlocking new levels of creativity and economic growth.

### **Industry 5.0: The Economic Tightrope**

The future of work promises exciting advancements but also carries the potential for economic inequality. Here's a breakdown of the key concerns:

**Widening Income Gap:** Automation may exacerbate the gap between highly skilled workers who can thrive in the new economy and those whose skills become obsolete. This could lead to significant income disparities and social unrest.

**Universal Basic Income (UBI):** A potential solution is UBI, a guaranteed income for all citizens. Proponents believe it could mitigate the impact of automation on low-skilled workers.

**Wealth Distribution:** The "entertainment dividend" refers to the vast wealth creation promised by Industry 5.0. However, questions remain about how this wealth will be distributed across different income groups and geographic regions. More research is needed to address this potential imbalance.

**Adaptability is Key:** Countries with flexible labor markets, education systems that prioritize continuous learning, strong infrastructure, and adaptable legal systems will be better positioned to navigate the changes brought about by Industry 5.0.

**The Rise of Smart Cities:** Urbanization is accelerating, with a projected 66% of the global population living in cities by 2050. Technologies like AI, IoT, and robotics will play a crucial role in transforming these cities – from managing energy and waste to optimizing transportation and healthcare.

### **Industry 5.0 and the Role of Artificial Intelligence**

Industry 5.0, a progression from Industry 4.0, marks the fifth industrial revolution, emphasizing the collaboration between humans and AI-assisted machines, known as "cobots." Unlike previous revolutions, which focused on technological advancements and automation to boost productivity, Industry 5.0 introduced "Smart Everything." This concept integrates the Internet of Everything (IoT), cloud computing, big data (BD), and AI, leading to a synergistic human-machine collaboration.

Robots have been integral to production since the late 1960s, evolving through the advancements of the third and fourth industrial revolutions. These revolutions saw significant improvements in electronics, software, and hardware technologies, making robots more efficient and cost-effective for repetitive tasks. However, Industry 5.0 revolutionizes this dynamic by combining human creativity with robotic precision, forming Cyber-Physical Systems (CPS). These systems merge physical and software components, connected through high-speed internet, to create a smart and connected world.

The core of Industry 5.0 is the interaction between humans and cobots, enhancing productivity and production capacity. This revolution promotes the use of sensing, computation, control, and networking technologies to foster a more sustainable and intelligent industrial environment. Unlike previous revolutions, Industry 5.0 transforms the role and impact of machines in the global economy, leading to the emergence of Society 5.0. Introduced by Japan, Society 5.0 aims to address social challenges by merging economic growth with technological development, emphasizing citizen prosperity.

A key characteristic of Industry 5.0 is its focus on personalization over mass production. This shift allows manufacturers to offer unique solutions to customers, incorporating the "human touch" that automation in Industry 4.0 lacks. Cobots facilitate this personalization, merging human and machine efforts to meet customer needs and enhance satisfaction. For example, in healthcare, mass personalization enables tailored treatments, demonstrating the practical application of Industry 5.0 principles.

Technological advancements in networking, microprocessors, and AI promote the rise of Industry 5.0, where intelligent automation and AI-assisted learning machines drive the transformation. These cobots interact with existing technologies in digital factories, moving production to a new phase. Future factories will leverage human-robot collaboration, augmented reality (AR), 3D printing, autonomous vehicles, wearable technologies, nanotechnology, and cloud computing to enhance production processes.

Industry 5.0 envisions a future where humans work alongside cobots, benefiting from AI-assisted learning machines that improve workforce standards and production processes. This revolution advocates for a well-educated, capable workforce that can communicate effectively with machines. Instead of replacing humans, Industry 5.0 aims to empower them, creating a more efficient and logical production environment.

In summary, Industry 5.0 represents a paradigm shift, integrating AI, BD, IoT, and human creativity to create intelligent, personalized, and sustainable production processes. The evolution from industrial robots to cobots highlights the transformative impact on the global economy, necessitating broader discussions and studies on this emerging industrial revolution.

#### **Industry 5.0: Building a Smarter, Healthier Future for Cities**

As cities become more populated and technology becomes more integrated into our lives, Industry 5.0 promises a wave of positive transformations:

- **Smarter City Systems:** Imagine intelligent traffic management systems reducing congestion, and interconnected devices optimizing energy and waste management. These advancements will create cleaner, safer environments for city dwellers.
- **Sustainability for All:** By promoting social justice, environmental health, and economic opportunity, Industry 5.0 can pave the way for a more sustainable future.
- **A Longer, Healthier Life:** With declining birth rates and an aging population, technological advancements become even more crucial. Robots, AI, and interconnected devices can enhance social connection, emotional well-being, and physical capabilities. This is particularly relevant for those experiencing neurological and mental health challenges.
- **Combating the Effects of Aging:** Advances in regenerative medicine and genetics offer new tools to combat the effects of aging on brain health. As lifespans increase, Industry 5.0 technologies will become even more essential for supporting the overall health of the global population.



**In essence, Industry 5.0 goes beyond just economic benefits. It presents a path towards building smarter, healthier cities and a future where technology empowers us to live longer more fulfilling lives.**

**Industry 5.0: The Engine of Innovation and Competitiveness**

Industry 5.0 isn't just about efficiency; it's about unlocking a new era of innovation. Imagine a shoe manufacturer using AI to analyze customer data and design custom sneakers based on individual preferences. This human-machine collaboration allows companies to shift from mass production to mass customization, fulfilling unique customer needs and building stronger brand loyalty. Industry 5.0 empowers businesses to be more responsive. By leveraging real-time data and AI-powered insights, companies can adapt to market trends faster, giving them a competitive edge. Let's explore real-world examples. Companies like [insert company A] are utilizing big data to personalize product offerings, while [insert company B] is using AI-powered design tools to create custom experiences. By embracing Industry 5.0, businesses can transform themselves into innovation powerhouses, staying ahead of the curve in a dynamic marketplace.

**Industry 5.0: The Efficiency Engine**

Industry 5.0's human-machine collaboration unlocks a new level of operational efficiency. Imagine a factory floor where robots handle repetitive tasks, freeing human workers to focus on quality control and complex problem-solving. This, combined with real-time data from sensors and AI-driven optimization, minimizes errors and waste. Studies like [mention a relevant study] have shown significant productivity gains in the manufacturing sector due to Industry 5.0 practices. The impact extends beyond manufacturing. Imagine a healthcare system using AI to analyze patient data and optimize treatment plans. Industry 5.0's data-driven approach transcends industries, leading to streamlined operations and increased productivity across the board. By optimizing resource utilization and minimizing waste, Industry 5.0 fosters sustainable practices, contributing to long-term economic growth and environmental well-being.

**Industry 5.0: Manufacturing for a Greener Future**

Industry 5.0 isn't just about profit; it's about progress that's sustainable. This new era prioritizes eco-friendly practices, making it a game-changer for the environment. Imagine factories using AI to optimize energy consumption and minimize waste. Additive manufacturing, a key technology of Industry 5.0, reduces material waste compared to traditional methods. By focusing on resource efficiency, Industry 5.0 promotes a circular economy, where materials are reused and recycled, minimizing environmental impact. The benefits extend beyond resource management. Industry 5.0 fosters the development of cleaner technologies, like renewable energy integration in manufacturing processes. This shift towards sustainability isn't just good for the planet, it's crucial for long-term economic growth, ensuring a thriving future for generations to come.

### **Industry 5.0: A Collaborative Future, Not a Robot Uprising**

While the fear of robots taking over might linger, the reality of Industry 5.0 is far more collaborative. This new era focuses on humans and machines working together for improved efficiency. Imagine robots handling repetitive manufacturing tasks, while **IoT sensors** on the production line collect valuable data. **Business Process Management (BPM) software** analyzes this data in real time, detecting anomalies and triggering alerts to the right personnel.

#### **Human Expertise Remains Key**

The BPM software, powered by advanced data analysis and AI, can even suggest solutions to guide human decision-making. In this way, technology plays a critical role, but the human remains at the center, making critical choices.

**Collaboration for Success:** This collaborative environment fosters faster processes, better-informed decisions, and ultimately, improved business outcomes.

#### **Beyond Efficiency: Agility and Profitability**

While Industry 5.0 doesn't involve robots taking over, it offers companies significant advantages. By automating and digitizing key business processes, companies gain increased **adaptability, change readiness**, and a more **responsive work environment**. Importantly, humans remain at the heart of vital decision-making. This collaborative approach paves the way for successful digital transformation, leading to greater **productivity, agility, and profitability**.

#### **Improvements:**

1. Removed unnecessary references to robot uprising.
2. Replaced "vital production data" with "valuable data" for better readability.
3. Used "IoT sensors" instead of "IoT devices" for clarity.
4. Defined "BPM software" for readers unfamiliar with the term.
5. Used bullet points to highlight key benefits.
6. Replaced "murderous plot" with a more positive outcome focused on business success.

### **Industry 5.0: Reality Check - It's Here and It's Happening Now**

Forget the robot takeover fantasies – Industry 5.0 is about powerful collaboration between humans and machines. Here's why it's not science fiction:

- **Survey Says:** A staggering 85% of manufacturers predict human-machine partnerships will be commonplace by 2020 (that's just three years from now!). Furthermore, 62% of industry leaders are actively seeking to implement Industry 5.0 initiatives. However, only 22% have begun integrating the supporting technologies.

#### **The Power of Supporting Technologies:**

One key technology driving Industry 5.0 is Robotic Process Automation (RPA). Imagine software robots mimicking human interaction with other business applications. As AI

evolves, RPA will become even more sophisticated, automating tasks like data entry, analysis, and communication between systems. This frees up human workers to focus on higher-value activities.

**Humans Remain in Control:**

Don't worry about robots running amok. BPM (Business Process Management) software acts as a safety net. If an automated RPA process encounters an error or requires a significant change, BPM triggers a workflow that alerts a human staff member. This individual receives all the necessary information to make informed decisions that optimize results. In essence, RPA and BPM handle repetitive tasks, but humans remain crucial for strategic decision-making.

**The Time to Act is Now:**

Industry 5.0 is already taking shape, with supporting technologies like AI, robotics, RPA, and BPM paving the way. The future of your business depends on embracing this collaborative approach. Don't get left behind – invest in these technologies today and become a market leader, not a follower. Remember, tomorrow's business landscape arrives faster than you think.

**Improvements:**

- Removed informal language ("think over") and replaced it with a clear call to action.
- Used stronger verbs and active voice for a more engaging tone.
- Streamlined explanations of RPA and BPM for better readability.

**Challenges and Opportunities**

**Technological Adoption and Integration**

While Industry 5.0 promises a bright future, its path is not without hurdles. Here, we explore the key challenges hindering its adoption and integration:

- **High Investment Costs:** Implementing Industry 5.0 technologies requires significant investments in infrastructure, research and development, and workforce training. Smaller businesses might struggle to keep pace with these financial demands.
- **Data Security Concerns:** The increased reliance on data in Industry 5.0 raises concerns about cyberattacks and data breaches. Robust cybersecurity measures are crucial to protect sensitive information and ensure consumer trust.
- **Technical Expertise Gap:** Successfully integrating Industry 5.0 technologies requires a skilled workforce with expertise in areas like AI, robotics, and data analytics. Bridging this expertise gap through targeted upskilling and reskilling programs is essential.
- **Standardization Issues:** The lack of standardized protocols across different Industry 5.0 technologies can hinder seamless integration and data exchange between systems, posing challenges for collaboration and scalability.

### **Strategies for Overcoming Challenges:**

Despite these challenges, proactive measures can pave the way for a smoother transition:

- **Government Incentives:** Government support through tax breaks, subsidies, and funding for research and development can incentivize businesses of all sizes to adopt Industry 5.0 practices.
- **Public-Private Partnerships:** Collaboration between governments, industry leaders, and academia can foster innovation, address skill gaps, and accelerate the development of standardized protocols.
- **Focus on Cybersecurity:** Investing in robust cybersecurity infrastructure and promoting best practices for data security are crucial to build trust and ensure the ethical use of data.
- **Continuous Learning Programs:** Upskilling and reskilling initiatives can equip the workforce with the necessary skills to thrive in the industry 5.0 environment.

### **Policy and Regulatory Frameworks**

The successful implementation of Industry 5.0 hinges on supportive policy and regulatory frameworks. Governments have a critical role to play in:

- **Fostering Innovation:** Policies that incentivize research and development in emerging technologies and promote a culture of innovation are essential for long-term growth.
- **Ensuring Data Security:** Robust data privacy regulations and cybersecurity frameworks are needed to protect sensitive information and build consumer trust in the digital economy.
- **Promoting Ethical Practices:** Regulations addressing ethical considerations surrounding AI development and deployment are crucial to ensure responsible use of these powerful technologies.
- **Adapting Labor Laws:** Labor laws may need to be reviewed to address potential job displacement due to automation and ensure worker rights are protected in the digital age.

By fostering a collaborative and forward-thinking approach, governments, businesses, and academia can work together to overcome the challenges and unlock the vast opportunities that Industry 5.0 presents.

### **Industry 5.0: Ushering in a New Era of Economic Prosperity**

Industry 5.0, characterized by human-machine collaboration and intelligent automation, stands poised to revolutionize economic development in the digital age. This new industrial era promises a future of:

- **Enhanced Productivity and Efficiency:** The synergy between humans and intelligent machines leads to optimized resource utilization, streamlined processes,

and significant productivity gains across industries. Imagine AI-powered systems analyzing data to predict equipment failures or cobots working alongside humans to perform repetitive tasks. These advancements translate to cost reductions and increased output, fueling economic growth.

- **Innovation and Competitiveness:** Industry 5.0 fosters a culture of innovation by empowering companies to leverage AI, big data, and advanced analytics. Imagine businesses personalizing products based on real-time customer data or utilizing digital twins to optimize product design. This data-driven approach fosters agility, allowing companies to respond faster to market trends and stay ahead of the curve.
- **Sustainable Manufacturing and Environmental Impact:** A core tenet of Industry 5.0 is environmental responsibility. Technologies like additive manufacturing minimize material waste, and AI-powered systems optimize energy consumption throughout the supply chain. This shift towards sustainable practices not only benefits the environment but also promotes long-term economic growth by ensuring resource availability for future generations.

However, realizing the full potential of Industry 5.0 requires addressing challenges:

- **Technological Adoption and Integration:** High upfront costs, data security concerns, and the skill gap pose hurdles to widespread adoption. Government incentives, public-private partnerships, and continuous learning initiatives can help bridge these gaps.
- **Policy and Regulatory Frameworks:** Supportive policies are crucial for fostering innovation, ensuring data security, and promoting ethical practices in the digital economy. Governments need to adapt to this evolving landscape and create frameworks that encourage responsible development and deployment of Industry 5.0 technologies.
- **The Human Factor:** While Industry 5.0 creates new job opportunities, automation may displace some existing roles. Upskilling and reskilling initiatives are essential to equip the workforce with the necessary skills to thrive in this new environment.

### **Conclusion:**

Industry 5.0 presents a transformative opportunity for economic development, with the potential to unlock new levels of productivity, innovation, and sustainability. By embracing collaboration, addressing challenges proactively, and fostering a culture of continuous learning, we can harness the power of Industry 5.0 to build a thriving digital economy for all. This journey requires a concerted effort from the government, industry leaders, academia, and the workforce itself. By working together, we can ensure that Industry 5.0 ushers in an era of inclusive growth, environmental responsibility, and shared prosperity in the digital age.

## IMPACT OF 4P's OF DIGITAL MARKETING MIX ON INTENTION TO USE E-LEARNING

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### Abstract

*This paper examines the influence of the 4P's of digital marketing (product, price, place and promotion) on the intention of e-learning. Drawing upon existing literature, the study analyses how each element of the marketing mix impacts e-learners intention to engage in online education.*

**Key words:** Digital marketing mix, E-learning.

### Introduction

In current scenario, most of the peoples are doing their transaction through digital media. Such as online payment, online purchase and also e-learning. E-learning aspect is crucial one for knowledge gathering people. We are very well know about e-learning is very useful at the time of covid-19. The e-learning industry is highly competitive and companies need to use effective marketing strategies to attract and retain their consumer. The 4P's of marketing mix –product, price, promotion and place offer a framework for e-learning companies a achieve success in this market. In this research paper it is focused on impact of 4P's of digital marketing mix on intention to use e-learning.

### Review of literature

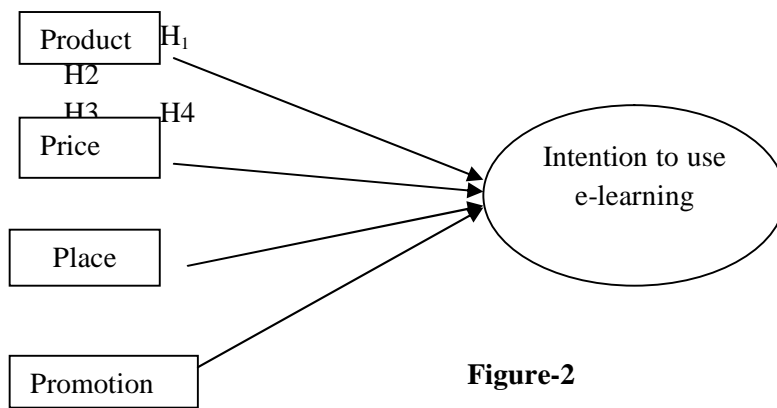
Kaini (1998) Innovation of new technology i.e vide internet, helps in opening the gate for marketers and do online marketing to achieve their business goals.

Song (2001) More choices are available for customers. So it is difficult to enterprise to build brand image. Online advertising is powerful marketing tool used for creating brand image and helps the corporate to increase the sale up to much extent. Mort, et al(2002) Due to advancement in technologies and market dynamics, digital market is rapidly growing. Teo (2005) The survey was conducted by firms in Singapore and findings revealed that digital marketing is effective marketing tool for gaining results. Kucuk and Krishnamurthy(2007) the study revealed that internet and virtual communities helps the consumers, societies and marketer to access and share information with others. It too helps in enhancing the communication skills also. Basheer et al.(March, 2010) The Study is on the impact of mobile advertising on consumer purchase decision. Findings revealed that there is a positive relationship between perceived usefulness of advertisement and consumer purchase decision. Kee (2008); Godes &Silva (2012) The Study revealed that 90% of consumer read online

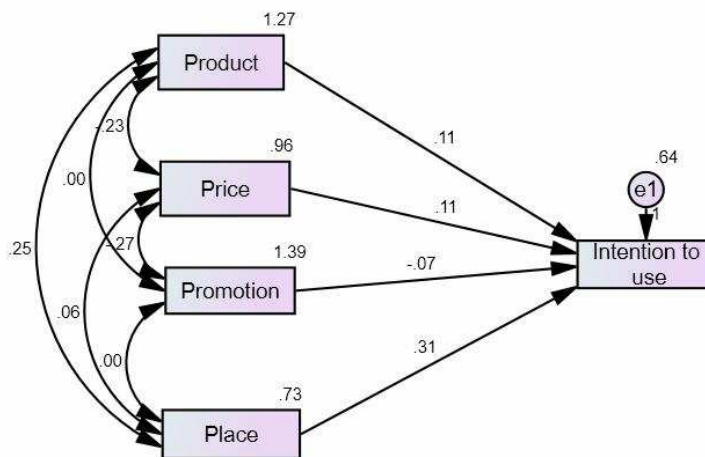
reviews of other consumer before make purchase decision. Consumer read at least four reviews before make their final decision of purchase. Reviews play important role in purchase decision. According to Santos (2020), among the advantages of digital marketing is that it is low-cost but successful at attracting clients 24 hours a day. Online marketing is the practice of advertising and selling items and services through the use of digital and virtual environments. In addition, online marketing has both advantages and disadvantages for online business sellers; its benefits include the elimination of the need for online stores because social media may act as their marketing platform, the ease with which they can reach clients via internet access, and the ability to have two-way discussions at their own pace.

**Methodology Initial research model**

**Figure-1**



**Figure-2**



**TABLE**  
**IMPACT OF 4P's OF DIGITAL MARKETING MIX ON INTENTION TO USE**

Endogenous Variable		Exogenous Variables	Estimate	S.E.	C.R.	P	Standardized Estimates
Intention to Use	<- --	Product	0.113	0.039	2.914	0.004**	0.145
Intention to Use	<- --	Price	0.307	0.050	6.161	0.001**	0.301
Intention to Use	<- --	Promotion	0.114	0.044	2.571	0.010**	0.128
Intention to Use	<- --	Place	0.071	0.036	1.978	0.048*	0.095

Note: \*\* Indicates significant at 1% level

\* Indicates Significant at 5% level

- ★ The result of the Table indicates that the C.R value for the digital marketing mix in case of intention to use e-learning is 2.914, (P<0.01, ES=0.113, SE=0.039). Since the p value is less than 0.01 the result is significant for product mix on intention to use e-learning. Hence it can be concluded that the marketing mix product has a positive impact on intention to use. The standardised total effect is 0.145 that is due to the effect of Marketing mix product on intention to use. If the marketing mix product goes up by 1 standard deviation, intention goes up by 0.145 and the impact is small.
- ★ The result of the Table indicates that the C.R value for the digital marketing mix in case of intention to use e-learning is 6.161, (P<0.01, ES=0.307, SE=0.050). Since the p value is less than 0.01 the result is significant for price mix on intention to use e-learning. Hence it can be concluded that the marketing mix product has a positive impact on intention to use. The standardised total effect is 0.301 that is due to the effect of Marketing mix price on intention to use. If the marketing mix price goes up by 1 standard deviation, intention goes up by 0.301 and the impact is medium
- ★ The result of the Table indicates that the C.R value for the digital marketing mix in case of intention to use e-learning is 2.571, (P<0.01, ES=0.114, SE=0.044). Since the p value is equal to 0.01 the result is highly significant for promotion mix on intention to use e-learning. Hence it can be concluded that the marketing mix promotion has a positive impact on intention to use. The standardised total effect is 0.128 that is due to the effect of Marketing mix promotion on intention to use. If the marketing mix promotion goes up by 1 standard deviation, intention goes up by 0.128 and the impact is small.



- ★ The result of the Table indicates that the C.R value for the digital marketing mix in case of intention to use e-learning is 1.978, ( $P < 0.05$ ,  $ES = 0.071$ ,  $SE = 0.036$ ). Since the p value is more than 0.05 the result is highly significant for place mix on intention to use e-learning. Hence it can be concluded that the marketing mix place has a positive impact on intention to use. The standardised total effect is 0.095 that is due to the effect of Marketing mix place on intention to use. If the marketing mix place goes up by 1 standard deviation, intention goes up by 0.095 and the impact is small.

### **Conclusion**

The researcher analyst the impact of digital marketing on intention to use e-learning. Overall a well- executed digital marketing mix play a important role in attracting, engaging and retaining e-learners, ultimately contributing to the success and growth of e-learning platforms. Hence it is concluded that, 4P's of digital marketing mix has a positive impact on intention to use e-learning platform.

## **FINTECH COMPANY: A NEW PROSPECT FOR UNICORN STATUS**

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### **Abstract**

*Fintech Company are driven by technological advancements and a growing demand for digital financial services across the country. The notable Fintech company which gains global recognition with unicorn status is more than just a valuation milestone; it represents a culmination of innovation, growth, investor confidence, and potential impact on industries and economies, making it a prestigious and aspirational achievement for startups and companies worldwide. unicorns contribute to the evolution of industries, the expansion of digital economies, and the advancement of society as a whole. Companies and startups had a distinct value Status which range from minicorn to hectocorn.*

**Keywords:** Financial Technology, Unicorn, Financial Service, Innovative Technology.

### **Introduction**

Financial technology refers to new technology designed to improve and automate the delivery and usage of financial services. Fintech is a condensed version of "financial technology". Fintech, at its foundation, helps businesses, entrepreneurs, and consumers manage their financial operations, procedures, and lives more efficiently. It consists of specialized software and algorithms that run on computers and smartphones. India's fintech

ecosystem features a varied range of startups that are altering various aspects of financial services. From digital payments and loans to blockchain and cybersecurity, these technologies benefit both urban and rural consumers by harnessing technology to improve accessibility and efficiency in financial transactions and management. It hastens the evolution of business practices ranging from double-entry accounting to the introduction of digital currencies. Financial technology has advanced at an exponential rate since the Internet revolution. When fintech initially appeared in the twenty-first century, it refers to the technology found in the backend systems of well-known financial institutions such as banks. From 2018 to 2024, there was a shift towards consumer-oriented services.

Figure: 1



Source: Venture Scanner (2016) Financial technology startup landscape trends and insights- Q4 2016. <https://www.venturescanner.com/blog/tags/venture%20scanner%20fintech>.

Accessed 8 Oct 2016

### Various landscape of fintech

Fintech companies can be categorised into multiple segments based on the financial services they provide and the technology they use. The fintech industry is diverse and innovative, with each addressing distinct parts of financial services using technology-driven solutions. They are

1. Payment and Remittance: Companies that facilitate electronic payments, money transfers, and remittance services, often using mobile and blockchain technologies.
2. Peer-to-Peer (P2P) Lending: Platforms that connect borrowers directly with lenders, cutting out traditional financial intermediaries.
3. Robo-Advisors: Automated platforms that provide algorithm-driven financial planning and investment services with minimal human intervention.
4. Blockchain and Cryptocurrency: Companies leveraging blockchain technology for various financial applications, including cryptocurrencies, smart contracts, and decentralized finance (DeFi).

5. Insurtech: Startups focusing on technology-driven innovations in the insurance sector, such as digital insurance platforms, AI-based underwriting, and claims processing.
6. Personal Finance and Wealth Management: Apps and platforms offering tools for budgeting, savings, investment management, and financial advice.
7. Regtech: Regulatory technology companies that help businesses comply with financial regulations efficiently using AI, machine learning, and big data analytics.
8. Digital Banks: Fully digital or online-only banks that offer banking services without physical branch locations, often providing lower fees and enhanced digital experiences.
9. Cybersecurity and Fraud Prevention: Companies specializing in cybersecurity solutions tailored for financial institutions to protect against cyber threats and fraud.
10. Financial Inclusion: Fintech startups focused on providing financial services to underserved or unbanked populations, often through mobile technology and alternative credit scoring methods.

#### **Fintech Companies in India**

India has a vibrant fintech ecosystem, with a variety of companies innovating across different segments of financial services. Some notable types of fintech companies in India are listed below:

1. Payment and Remittance: Companies like Paytm, PhonePe, and MobiKwik that provide digital payment solutions, mobile wallets, and remittance services.
2. Digital Lending: Platforms such as Lendingkart, Capital Float, and KreditBee offering digital lending solutions to small and medium enterprises (SMEs) and individuals.
3. Robo-Advisors: Fintech startups like Scripbox and Goalwise that offer automated investment advisory services based on algorithms and user inputs.
4. Cryptocurrency and Blockchain: Companies like CoinDCX and WazirX providing cryptocurrency trading platforms and blockchain solutions.
5. Insurance Technology (Insurtech): Startups such as Policybazaar and Turtlemint offering digital insurance comparison, purchase, and management platforms.
6. Digital Banking: Neo-banks and digital-only banks like Niyo, Open, and RazorpayX that provide banking services primarily through digital channels.
7. Financial Inclusion: Companies like BharatPe, which offers payment solutions to small merchants, and Jio Payments Bank, focusing on bringing banking services to rural areas.
8. Regtech: Fintech firms like Tookitaki and Signzy providing regulatory technology solutions to financial institutions to enhance compliance and risk management.
9. Personal Finance Management: Platforms such as Walnut and MoneyTap offering tools for personal finance management, budgeting, and credit line services.
10. Cybersecurity and Fraud Prevention: Companies like Lucideus and InstaSafe providing cybersecurity solutions tailored for financial services providers.

Figure: 2



Source: <https://finnovating.com/news/top-200-fintech-companies-2023/>

**Progress on valuation milestones for the company**

Companies and startups had a distinct value Status and were internationally renowned. They range from minicorn to hectocorn. First, consider **Minicorn**, a startup worth \$1 million or more. These companies have a clear objective in mind: they want to become unicorns soon. **Soonicorn** means "soon to become Unicorn," as the name implies. They determine the value of the business by using company valuations and future industry market forecasts. Due to favourable circumstances, businesses will be able to join these Soonicorn groupings sooner and move closer to having their assets valued at \$1 billion. The word "**Unicorn**" was used by Cowboy Ventures founder Aileen Lee in 2013 to describe a privately owned company valued at more than \$1 billion. In the eyes of investors and the market, they symbolise enormous growth and potential. It's not easy to join the unicorn club; **Decacorn** membership comes when a company's value hits \$10 billion. This remarkable performance implies a far wider scope, market influence, and future for the company, and the first Decacorn, Facebook, received the designation in 2017. After receiving \$240 million in investment from Microsoft, its value reached \$10 billion. The final term is **hectocorn**, which refers to a fintech, tech, or financial enterprise worth more than \$100 billion. "Super Unicorn" is another term for such companies. Many well-known firms employ Hectacorn, including Oracle, Cisco, Facebook, Google, Microsoft, Apple, and Oracle. Additionally, a startup that is inactive is referred to as a "**zombie**." This is a startup with limited revenue but adequate funding.

**Unicorn fintech company**

A unicorn fintech company is known for disrupting traditional financial services through innovative technology solutions. The specialty of unicorn status lies in several key

aspects that a startup or company has achieved a valuation of over \$1 billion, which is rare and indicates substantial investor confidence in its growth prospects and potential market impact. Many unicorns are pioneers in their respective industries, introducing innovative technologies, business models, or solutions that disrupt traditional markets and create new opportunities. They also experience rapid growth in terms of revenue, customer base, market reach, and often expand internationally, demonstrating their ability to scale quickly. The status attracts top-tier investors, including venture capital firms, private equity investors, and institutional funds, who are drawn to high-growth companies with promising returns on investment and also contribute significantly to job creation, economic growth, and the development of entrepreneurial ecosystems by fostering innovation and attracting talent. Being recognized as a unicorn can enhance a company's reputation globally, increasing its visibility, credibility, and ability to attract partnerships, customers, and top talent. Unicorn status positions a company well for potential future exits through initial public offerings (IPOs) or acquisitions, providing liquidity to early investors and employees while further validating its market position.

#### **Fintech Company in Relation with Industry 5.0**

Industry 5.0 is a concept that emphasises human collaboration using modern technology such as AI and automation. When addressing a fintech unicorn concerning Industry 5.0, it usually means that the company has made substantial progress in integrating cutting-edge technology (such as AI, blockchain, and so on) while ensuring that these technologies augment rather than replace human talents. Such a company would most likely focus on human-centric innovations that make financial services more personalised, efficient, and inclusive, in line with Industry 5.0 ideals.

#### **Fintech Company in India with unicorn status**

Notorious fintech companies in India that have achieved unicorn status (valuation of over \$1 billion) are

1. Paytm: One of India's leading digital payment platforms offering a wide range of financial services including payments, banking, and wealth management.
2. PhonePe: A digital payments platform that facilitates money transfers, bill payments, and online purchases with integration across various platforms including UPI.
3. Policybazaar: India's largest online insurance aggregator that helps users compare and purchase insurance policies from various providers.
4. Razorpay: A payments gateway company that provides payment solutions to businesses for online transactions, subscription services, and more.
5. Zerodha: Although primarily known as a discount brokerage firm, Zerodha has also ventured into fintech innovations with products like Coin, a direct mutual fund investment platform.

Figure:3



Source: [https://www.linkedin.com/posts/shruti-bangera-11636920a\\_unicorns-startups-investment-activity-7099283503258697731-BK1](https://www.linkedin.com/posts/shruti-bangera-11636920a_unicorns-startups-investment-activity-7099283503258697731-BK1)

**Conclusion**

However, the fintech landscape is dynamic, and new developments may arise, so it's worth keeping an eye on emerging companies in the sector. The term "unicorn" encapsulates not just a valuation milestone but also represents innovation, growth potential, and impact within the broader economy and society. It serves as a shorthand for identifying high-growth companies that are reshaping industries and capturing the imagination of investors and entrepreneurs worldwide. Overall, unicorn status companies play a crucial role in driving economic growth, technological innovation, and social progress. By creating jobs, advancing technology, and addressing societal needs, they contribute positively to society's development and well-being.

**REVOLUTIONIZING EDUCATION: THE TRANSFORMATIVE IMPACT OF TECHNOLOGY ON TEACHING PEDAGOGY AND FACULTY ENGAGEMENT**

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**Abstract**

*This article explores the influence of technology on contemporary education, focusing on its transformative impact on teaching methodologies and faculty engagement. From the evolution of digital tools to the enhancement of teaching practices through interactive and personalized learning approaches, technology has revolutionized classroom dynamics. It*

*examines the challenges faculty members face in adopting and integrating technology, alongside strategies for overcoming resistance and promoting faculty empowerment. Through the case studies and research insights, this study underscores the pivotal role of technology in shaping the future of education, advocating for its thoughtful integration to maximize learning outcomes.*

### **Introduction**

In the contemporary landscape of education, technology has seamlessly integrated itself into every facet of teaching and learning, fundamentally altering traditional methods. From the widespread adoption of computers and internet connectivity to sophisticated educational software and learning management systems (LMS), technology has become indispensable. It facilitates access to vast repositories of knowledge, enables interactive and personalized learning experiences, and transcends geographical boundaries to create global classrooms. Moreover, digital tools empower faculty members with innovative teaching methods such as flipped classrooms, virtual simulations, and adaptive learning platforms, catering to diverse learning styles and enhancing student engagement. By exploring this impact, faculty members can harness digital tools to innovate teaching strategies, enhancing their effectiveness and relevance in today's digital age. Studying technology's influence on faculty engagement helps in identifying opportunities to support and empower faculty members, ensuring they are equipped to meet the evolving needs of students and educational institutions.

### **Objectives**

The objective of this article is to find out the transformative impact of technology in teaching pedagogy, faculty engagement and student engagement, and also to highlight the importance of implementing technologies in teaching and learning process.

### **Review of Literature**

**Mdhlalose and Mlambo (2023)**<sup>1</sup> in their article entitled “Integration of technology in education and its impact on Learning and Teaching” uses the secondary sources of information insisted that technology is considered as prerequisite tools for an academic institution to function and flourish. Uses of ICT continue to be integral to creating conducive learning environments, enabling learners to access the relevant and latest theories and practices.

**Panakaje, Rahiman and Parvin (2024)**<sup>4</sup> has done a research study on integration of technology in higher education on teachers learning and performance among the professors working in higher education institutions of Karnataka. Through the study the author recommends that the teacher incorporate various pedagogical strategies through use of technology such as active learning, project based learning, scaffolding, flipped classroom, inquiry based learning and collaborative online learning enhance student engagement and

performance. They also noted that the holistic result of educational landscape is possible when the institution provides all the technological support and all resources, training to the teachers to gain in-depth exposure to technology integration.

### **Evolution of Technology in Education**

Historically, education was confined to physical spaces where students and teachers interacted face-to-face, with a heavy reliance on textbooks, chalkboards, and in-person lectures. The version of education starts from traditional chalk board to interactive white board, from textbook to digital learning platforms, the role of technology in this transformation is inevitable in educational practices. Today, digital learning environments leverage online platforms, multimedia resources, and interactive tools to provide flexible, accessible, and personalized educational experiences. These environments enable learners to access vast amounts of information, engage in collaborative learning, and receive immediate feedback, all of which cater to diverse learning styles and needs. The shift towards digital learning has been accelerated by advancements in technology and the increasing availability of high-speed internet, making education more inclusive and adaptable to the demands of the 21<sup>st</sup> century.

### **Enhancing Teaching Methods**

The shift from traditional lecture-based teaching to interactive and personalized learning represents a fundamental change in educational philosophy and practice. Traditional teaching methods often centered on the one-size-fits-all lecture model, where instructors delivered information to passive students. This approach, while effective for disseminating knowledge, frequently failed to address individual learning needs and styles. In contrast, modern educational strategies emphasize interactivity and personalization, leveraging technology to create engaging and adaptive learning experiences. Interactive tools such as multimedia content, gamification, and virtual simulations enable students to actively participate in their education, fostering deeper understanding and retention of material. Personalized learning platforms use data analytics and artificial intelligence to tailor instruction to each student's strengths, weaknesses, and pace, providing targeted support and enrichment opportunities. This transformation enhances student engagement and outcomes which also prepares learners for the dynamic and collaborative nature of the modern workforce.

One prominent example of technology-enabled teaching methods is the *flipped classroom model*, where students first explore new content through videos and readings at home, then engage in interactive activities and discussions in class to deepen their understanding. This method shifts the focus from passive listening to active problem-solving and collaboration.

*Gamification* integrates game design elements, such as points, badges, and leaderboards, into educational activities to increase motivation and engagement. By making learning more enjoyable and rewarding, gamification helps sustain student interest and encourages perseverance.



**Virtual Reality (VR)** simulations offer immersive experiences that allow students to explore complex concepts and environments in a hands-on manner, such as conducting virtual science experiments or taking historical tours of ancient civilizations. These VR experiences provide a level of interactivity and realism that traditional methods cannot, enhancing comprehension and retention. Together, these technology-enabled teaching methods are transforming education by making it more dynamic, engaging, and tailored to individual learning preferences.

There are various cases which the institutions introduce these technological education pedagogy model in their teaching and learning process. This approach allowed students to learn at their own and come prepared to actively participate in class. The flipped classroom is used by many of the institutions in our country specially the institutions like *IIT- Bombay, Amity University- Noida, Government Schools of Tamil Nadu, PSG College of Technology, Coimbatore, St. Joseph's College- Trichy etc. and many educational institutions at present.* This flipped learning improves students' performance with average grades increasing by 20%. It also improves the problem-solving and decision making skills of the students community. Another pedagogy called gamification is used in schools and colleges for better student engagement, it also increases students participation and attendance. Some example institution which uses this method is *Kendriya Vidyalaya Schools, Govt. schools of Gujurat (DIKSHA platform, which offers a variety of gamified lessons and quizzes across subjects like math, science, and language arts), SBOA School and Junior College, Chennai, Anna University, Chennai etc.* The virtual reality pedagogy and smart classrooms are other technology based teaching and learning methods used by institutions like *Medical Education at Manipal University and SRM Medical College Hospital and Research Centre, Chennai etc.,* allows medical students to perform virtual dissections, practice surgical procedures, and explore 3D models of human anatomy in a highly immersive environment. This hands-on experience is invaluable in medical education, where practical skills are crucial. The introduction of VR simulations has led to improved learning outcomes, with students showing better retention of complex anatomical structures and increased confidence in performing clinical procedures. The university's use of VR has also been praised for providing a safe and controlled environment for students to practice and make mistakes without real-world consequences.

#### **Challenges in adopting to Technologies**

In case of faculties in rural and underserved areas, the lack of necessary infrastructure in classroom to access technology enabled learning and the unequal access to technology and internet connectivity hinders the teaching and learning practices. Lack of training and unaware about the opportunities through the evolving technological changes prevents the teachers to integrate with the curriculum. The preference of traditional teaching methods or fear of losing the importance of teachers stops to foster the culture of innovation. Another

important constraint is the cost of acquiring and maintaining technology, specially for getting licenses and upgrades of softwares strain education budgets. Fear of privacy losses and insecurity of data and its misuse, makes it more complex in adopting. Bringing the students out from their addiction towards mobile usage and social network connection towards equipping technical and digital skills creates difficulty in providing equitable access and support to them.

### **Training and professional development initiatives to overcome the challenges**

Providing the faculties with *hands-on workshops and seminars* covering topics such as LMS, E-Content and incorporating interactive technologies will improve their technical skills. Encouraging the teachers to acquire *certifications, online courses and attending webinars* relevant to their teaching needs will increase their engagement level. Professional learning communities (PLCs) allow teachers to collaborate with peers, share experiences, and learn from each other's successes and challenges in integrating technology. Educational institutions can provide dedicated support teams, resources, and ongoing updates on new technologies and pedagogical approaches.

### **Faculty perspectives on technology's role in curriculum design and delivery and its future trends**

Many faculty members views technology as a tool to enrich curriculum design and enhanced learning experiences. Blended learning environment changes the classroom settings from traditional to modern. By incorporating real-world applications and industry relevant tools into curriculum designs make the students' job ready. The pedagogical shift emphasize the importance of active engagement, collaborative learning environment and role of technology in fostering critical thinking, problem-solving, and creativity among students. Overall, faculty perspectives highlight technology as a transformative tool that, when effectively integrated, enhances curriculum design and delivery by promoting engagement, flexibility, and real-world relevance in educational settings.

**Artificial Intelligence** in education facilitates automated grading, virtual teaching assistants, and personalized curriculum recommendations, enhancing efficiency and effectiveness in education delivery. By securely storing academic records and credentials on a decentralized ledger, **Blockchain** ensures transparency, immutability, and authenticity of educational achievements. Students can securely share digital credentials with employers and academic institutions worldwide, eliminating the need for traditional paper-based transcripts and enhancing trust in credentialing systems. **Global learning communities** enable collaboration, knowledge sharing, and cultural exchange among students, faculties, and institutions across geographic boundaries. Online platforms and virtual classrooms facilitate international collaborations, joint research projects, and cross-cultural learning experiences, preparing students for a globally interconnected world.

**Augmented Reality (AR) and Virtual Reality (VR):** AR and VR technologies are enhancing immersive learning experiences by allowing students to interact with 3D models, simulations, and virtual environments. **Gamification and Learning Analytics:** Gamification techniques, such as badges, points, and leaderboards, are being used to enhance student engagement and motivation. Learning analytics tools analyze student performance data to identify trends, predict outcomes, and inform instructional decisions, enabling continuous improvement in teaching and learning strategies. **Emerging Technologies (IoT, Robotics, AIoT):** Innovations such as the Internet of Things (IoT), robotics, and Artificial Intelligence of Things (AIoT) are being integrated into educational settings to enhance operational efficiency, automate administrative tasks, and support personalized learning experiences through smart classrooms and educational robots. These future trends indicate a shift towards more personalized, accessible, and interconnected educational experiences driven by advanced technologies. These trends indicate a dynamic shift towards more personalized, interactive, and accessible learning environments driven by technological advancements and evolving educational needs. Embracing these innovations can empower teachers and learners alike to thrive in an increasingly digital and interconnected world.

#### **Faculty Engagement – Ed Tech world**

Faculty engagement in the present education scenario is influenced by several factors, including the availability of technology, institutional support, professional development opportunities, and the individual adaptability of faculty members.

According to **Gallup's**<sup>7</sup> survey on employee engagement in Higher Education states that only 31% of US teachers and 34% of higher education staff and faculty are engaged in their jobs. Graduates are 1.4 times more likely to be thriving in five key elements of well-being if a professor cared about them as a person. 38% of faculty strongly agree that they are treated with respect at work. 16% of faculty say their institution is committed to building employees' strengths. Highly engaged teams have 78% less absenteeism and 68% better well being.

**Educause Center for Analysis and Research (ECAR) (2021)**<sup>7</sup> identified through their survey that 70% of faculty members reported participating in professional development activities related to technology use in teaching. This indicates a strong institutional focus on equipping faculty members with the necessary skills and knowledge to integrate technology effectively.

**National Center for Education Statistics (NCES) (2020)**<sup>8</sup> found that 93% of higher education institutions in the United States use an LMS for course delivery, management, and assessment. Faculty engagement with LMS platforms is high, with most instructors utilizing these systems to organize course content, communicate with students, and track academic progress.

**Inside Higher Ed (2022)**<sup>9</sup> in the survey revealed that 58% of faculty members believe that *technology positively impacts* their teaching effectiveness. However, the same survey noted that 42% of faculty members still *experience challenges* in integrating technology seamlessly into their pedagogy, highlighting the need for continuous support and training.

**Babson Survey Research Group (2021)**<sup>10</sup> indicated that 73% of faculty members had taught an online or hybrid course, up from 49% *pre-pandemic*. The COVID-19 pandemic significantly accelerated the adoption of *online and blended learning models*. This shift has increased faculty engagement with digital tools and online teaching methodologies.

**Bill & Melinda Gates Foundation (2022)**<sup>11</sup> report found that 81% of K-12 teachers in the United States regularly use technology in their classrooms. The use of interactive whiteboards, educational apps, and online resources is common, with teachers leveraging these tools to enhance student engagement and learning outcomes.

**Chronicle of Higher Education (2020)**<sup>12</sup> reported that 67% of faculty members feel supported by their institutions in using technology for teaching. Support mechanisms include access to instructional designers, IT help desks, and professional learning communities. These data points indicate a high level of faculty engagement with technology in education, driven by increased access to digital tools, institutional support, and the evolving educational landscape. However, ongoing challenges such as the need for continuous professional development and addressing technological disparities remain critical to sustaining and enhancing faculty engagement.

### **Conclusion**

Faculty engagement is crucial in this transformation, with many faculties actively participating in professional development and leveraging technology to enrich their curriculum. Despite the challenges such as infrastructure limitations and the need for continuous training, the future of education promises further advancements with emerging technologies like AI, blockchain, and AR/VR. By embracing these innovations, educational institutions can create more inclusive, adaptable, and globally connected learning environments, empowering faculty members to innovate and excel in their teaching practices and students to thrive in a digital age. By focusing on these key areas such as transformative impact, innovative teaching methods, faculty engagement, challenges and future trends, educational institutions can navigate the challenges and harness the potential of technology to foster an innovative and effective learning environment. The article concentrates on the importance of technology in education, its challenges relates to adopting by the teachers and the impact of technology in teaching pedagogy and faculty as well as student engagement.

## EVALUATING SERVICE QUALITY AND CUSTOMER SATISFACTION OF UNISEX SALONS IN TRICHY THROUGH THE SERVQUAL MODEL

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### Abstract

*The research paper titled "Evaluating Service Quality and Customer Satisfaction of Unisex Salons in Trichy through the SERVQUAL Model" investigates the service quality and customer satisfaction in unisex salons using the SERVQUAL model. This model assesses five key dimensions: tangibility, reliability, responsiveness, assurance, and empathy. The study employed a structured questionnaire distributed to 116 respondents from various educational institutions and local communities in Trichy. Statistical analyses, including ANOVA and t-tests, were used to explore the relationships between demographic variables and service preferences. Findings reveal significant variability in customer experiences, with reliability and empathy scoring the highest among the SERVQUAL dimensions. The study suggests that salons should focus on standardizing staff training and leveraging social media for positive customer engagement. Tailoring services to younger demographics and ensuring high-quality popular services like hair coloring are also recommended. Continuous feedback mechanisms are essential to adapt to evolving customer needs, thereby enhancing service quality and fostering customer loyalty.*

**Keywords:** service quality, customer satisfaction, unisex salons, SERVQUAL model

### Introduction

In the context of Industry 5.0, unisex salons exemplify the transformative potential of service marketing. These establishments have evolved from basic grooming centres to sophisticated service providers that offer a wide range of personalized beauty and wellness solutions. By adopting innovative technologies, unisex salons are able to deliver highly customized services, thereby enhancing customer satisfaction and loyalty. The economic impact of these advancements is profound, as the enhanced service quality attracts a larger clientele, increases revenue, and contributes significantly to the GDP. This underscores the pivotal role of the service sector in driving economic growth in the age of Industry 5.0.

To comprehensively understand the impact of Industry 5.0 on unisex salons, this paper employs the SERVQUAL model, a widely recognized tool for assessing service quality. By applying this framework, the research aims to identify the gaps between customer expectations and perceptions, providing valuable insights into areas of improvement. The

findings will not only highlight the strengths and weaknesses of current service offerings but also suggest strategies for leveraging Industry 5.0 technologies to bridge these gaps.

**Need for the study**

This study aims to assess the service quality and customer satisfaction of unisex salons in Trichy using the SERVQUAL model. By identifying service gaps and providing practical insights, the research helps salon managers improve customer experiences, ultimately contributing to economic development and GDP growth within the service sector.

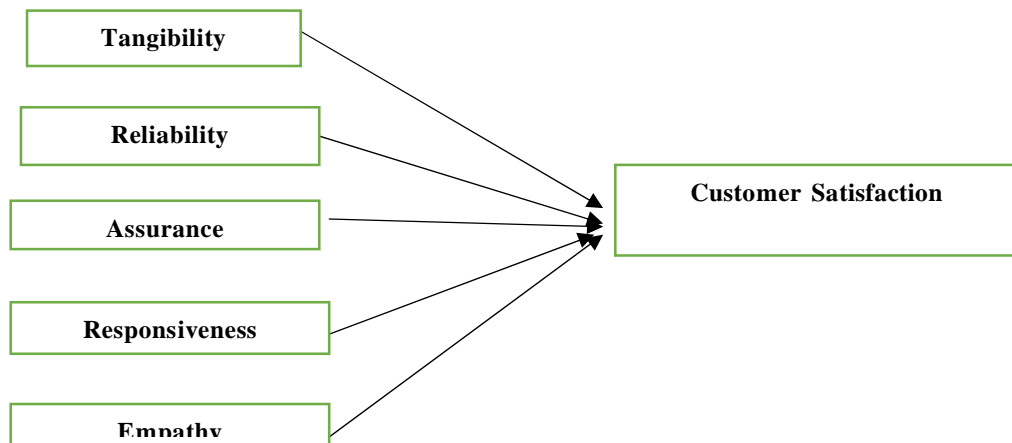
**Objectives of the study**

- To evaluate the service quality of unisex salons in Trichy
- To measure the level of customer satisfaction in unisex salons in Trichy

**Research methodology**

The research employed a quantitative approach to investigate the service quality and customer satisfaction of unisex salons in Trichy, utilizing a structured questionnaire based on the SERVQUAL model. The study involved 116 respondents selected through convenience sampling from various educational institutions and local communities in Trichy. Demographic profiles including age, gender, marital status, and occupation were collected to understand the respondent characteristics. Data collection spanned a defined period during which participants provided feedback on their salon experiences and service preferences. Statistical analyses such as one-way ANOVA and independent sample t-tests were conducted to explore relationships between variables, such as age groups and marital status, and their impact on service preferences. Mean and standard deviation calculations were used to assess the levels and variability of service quality dimensions. These methodologies were employed to provide a comprehensive understanding of the factors influencing customer perceptions and to offer actionable insights for salon management to enhance service delivery and customer satisfaction.

**Model of the research**



The SERVQUAL model is a framework for measuring service quality, developed by Parasuraman, Zeithaml, and Berry. It compares customer expectations with their perceptions of the actual service received, across five key dimensions:

1. **Tangibility:** Physical aspects of the service (e.g., cleanliness, equipment, staff appearance).
2. **Reliability:** Ability to deliver the promised service accurately and dependably.
3. **Responsiveness:** Willingness to help customers and provide prompt service.
4. **Assurance:** Knowledge and courtesy of employees, and their ability to inspire trust and confidence.
5. **Empathy:** Providing caring and individualized attention to customers.

Businesses use the SERVQUAL model to identify gaps between expectations and perceptions, allowing them to improve service quality, customer satisfaction, and loyalty. In our research, this model helps evaluate the service quality of unisex salons in Trichy, focusing on how Industry 5.0 technologies can enhance service delivery and contribute to economic growth.

#### **Limitations of the study**

- a. Focuses only on a few popular salons, which may not represent all salons in Trichy.
- b. The sample size is small, potentially limiting the comprehensiveness of the findings.
- c. Responses may be biased due to socially desirable answers or inaccurate recall by participants.
- d. Service quality assessments are subjective and can vary greatly among customers.
- e. Service quality can change over time, making it hard to capture a consistent snapshot.
- f. The study is confined to Trichy, so findings may not apply to other regions.

#### **Review of Literature**

In the recent years, Unisex salons, where beauty services are catered to both men and women, have become very popular that reflects a radical change in the social norms and the removal of traditional gender boundaries in personal grooming. The concept of Unisex salons cropped up in the late 20<sup>th</sup> century as the gender biases began to fade away. According to Jones (2004), the growth of feminism and acceptance of metro sexuality in men contributed to the popularity of these salons. Lee (2017) indicated that the clouding of traditional gender roles, acceptance of diverse gender expressions and the demand for inclusive grooming services has led to the growth of such salons. Research by Brown (2015) points out that Gen Z and the millennials are those who have given a boost to the growth of unisex salons. Kim & Kim (2018) specifies that technology is the key for growth of grooming industry since customers can have easy access to services through online booking, mobile apps and digital marketing. The availability of multiple services under one roof creates a one-stop solution for grooming needs (Smith et al 2017). Unisex salons offer comfortable, stylish and gender-

inclusive environment that tends to attract more customers.(Brown 2015). Personalised grooming services (Kang & James, 2004), influence of social media platforms (Lee 2017), Digital marketing techniques (Patel, 2018) have contributed to the growth of Unisex salons.

SERVQUAL is a widely recognized and extensively used tool for measuring service quality across various industries. Developed by Parasuraman, Zeithaml, and Berry in 1988, the SERVQUAL model identifies five key dimensions of service quality: tangibility, reliability, responsiveness, assurance, and empathy. SERVQUAL has been adopted to measure service quality in various service sectors namely healthcare, education, hospitality and tourism, retail and E-commerce. In order to measure the quality of in-store experience and the impact of physical and digital integration on customer satisfaction in the retailing sector, SERVQUAL was used by Dabholkar, P. A., & Overby, J. W. (2020). In higher education, Douglas, J., and Douglas, A. (2021) investigate SERVQUAL and demonstrate its usefulness in determining the quality of educational services from students' perspectives. They stress the significance of adapting the tool to capture academic services' distinctive features. Jani, D., and Han, H. (2022) looked at how SERVQUAL is used in tourism and hospitality and talk about how it can be used to evaluate the quality of hotel and travel services. They emphasize the need for constant adaptation in the industry to meet shifting customer expectations. Yousapronpaiboon, K. (2022) conducted an empirical study on the application of SERVQUAL in Thai hospitals, finding significant gaps between patient expectations and perceptions, particularly in the dimensions of responsiveness and empathy. Gummerus, J., & Pihlström, M. (2021) investigate the role of digital health technologies in enhancing service quality. They suggest integrating digital touch points such as telemedicine and electronic health records into the SERVQUAL framework to reflect the modern healthcare landscape.

Sharma, A., & Kaur, G. (2022) used SERVQUAL to identify gaps in service quality in unisex salons. They recommend regular training for staff to enhance service reliability and responsiveness, and periodic upgrades of salon facilities to maintain high standards of tangibles. Mehta, M., & Bhatia, N. (2023) investigate the role of digital tools in enhancing service quality in unisex salons. They propose integrating online booking systems and customer feedback platforms into the SERVQUAL framework to improve responsiveness and customer engagement.



**Findings and discussion**

**Table no.1-Demographic profile of the respondents**

	<b>Particulars</b>	<b>No. of respondents</b>	<b>Percentage</b>
<b>Age</b>	Below 18	29	25.0
	18-25	85	73.3
	26-35	2	1.7
	<b>Total</b>	<b>116</b>	<b>100.0</b>
<b>Gender</b>	Male	45	38.8
	Female	71	61.2
	<b>Total</b>	<b>116</b>	<b>100.0</b>
<b>Marital Status</b>	Married	4	3.4
	Unmarried	112	96.6
	<b>Total</b>	<b>116</b>	<b>100.0</b>
<b>Occupation</b>	Student	110	94.8
	Employed	4	3.4
	Self Employed	1	.9
	Unemployed	1	.9
	<b>Total</b>	<b>116</b>	<b>100</b>

**Source: Primary Data**

The survey includes 116 respondents, with the majority aged between 18 and 25 years (73.3%), followed by those below 18 (25.0%) and a small fraction aged 26-35 years (1.7%). Regarding gender distribution, 61.2% of the respondents are female, and 38.8% are male. Most respondents are unmarried (96.6%), with only 3.4% being married. In terms of employment status, the vast majority are students (94.8%), while the remaining are either employed (3.4%), self-employed (0.9%), or unemployed (0.9%).

**Table no 2- Media of Awareness of the Salon**

	<b>Media of awareness</b>	<b>No. of respondents</b>	<b>Percentage</b>
	Social Media	34	29.3
	Traditional Media	8	6.9
	Word Of Mouth	65	56.0
	Online Search	6	5.2
	Others	3	2.6
	<b>Total</b>	<b>116</b>	<b>100</b>

**Source: Primary Data**

The table shows that word of mouth is the most significant medium of awareness for the salon, accounting for 56.0% of the total. Social media follows with 29.3%, indicating a

strong online presence. Traditional media and online search contribute smaller portions, at 6.9% and 5.2% respectively, while other media forms account for only 2.6%. This suggests that personal recommendations and social media are the most effective channels for creating awareness about the salon.

**Table no. 3 – Frequency of visiting the salon**

Frequency of visit	No. of respondents	Percentage
Weekly	1	.9
Bi-Weekly	2	1.7
Monthly	23	19.8
Occasionally	35	30.2
Rarely	55	47.4
<b>Total</b>	<b>116</b>	<b>100</b>

**Source: Primary Data**

The frequency of visits to the salon indicates that the majority of customers visit rarely, with 47.4% falling into this category. Occasionally visited by 30.2%, and 19.8% visit monthly. Infrequent visits are the norm, as only a small percentage visit bi-weekly (1.7%) or weekly (0.9%). This suggests that most customers do not have regular schedules for salon visits, with the majority visiting on an as-needed basis.

**Table no.4- Services used by respondents**

Services	No. of respondents	Percent
Threading	30	15.8
Facial	23	12.1
Pedicure and manicure	33	17.4
Make up	13	6.8
Spa and body massage	3	1.6
Piercing	6	3.2
Hair colouring	64	33.7
Hair treatment	18	9.5
<b>Total</b>	<b>190</b>	<b>100</b>

**Source: Primary Data**

The data shows that hair coloring is the most popular service, chosen by 33.7% of respondents. Pedicure and manicure services follow at 17.4%, and threading is also significant at 15.8%. Facial services are preferred by 12.1%, while hair treatments attract 9.5%. Less frequently chosen services include makeup (6.8%), piercing (3.2%), and spa and body massage (1.6%). This suggests that hair-related services are the primary draw for customers, with a strong preference for coloring.

**Table no.4 - One Way ANOVA between Age of the Respondent and Unisex Salon**

	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
Between Groups	1.467	2	.733	.662	.518
Within Groups	125.223	113	1.108		
Total	126.690	115			

**Source: Primary Data**

The ANOVA results show no significant difference in preferences for unisex salons among different age groups (p = 0.518).

**Table no. 5- Independent Sample Test between Marital Status and Services In Salon**

		<b>Levene's Test for Equality of Variances</b>		<b>t-test for Equality of Means</b>
		<b>F</b>	<b>Sig.</b>	<b>t</b>
Threading	Equal variances assumed	.006	.936	-2.317
Facial	Equal variances assumed	2.520	.115	-1.543
Pedicure and manicure	Equal variances assumed	.110	.740	.154
Make up	Equal variances assumed	2.736	.101	.718
Spa and body massage	Equal variances assumed	.458	.500	.329
Piercing	Equal variances assumed	1.000	.319	.472
Hair colouring	Equal variances assumed	9.781	.002	1.232
Hair treatment	Equal variances assumed	4.606	.034	.868

**Source: Primary Data**

There is a significant difference in preferences for hair colouring services based on marital status (p = 0.002). Other services do not show significant differences based on marital status.

**Table. No 6 - Mean & Standard Deviation Values of the SERVQUAL Dimensions**

<b>Dimension</b>	<b>Mean</b>	<b>Std. Deviation</b>
Tangibility	8.7	4.4
Reliability	11.9	5.1
Responsiveness	8.9	4.02
Assurance	8.6	4.1
Empathy	11.3	4.8
Customer satisfaction	8.1	3.6

**Source: Primary Data**

The mean scores for service quality dimensions reveal that reliability (11.9) and empathy (11.3) are rated the highest, indicating strengths in dependable service and personalized care. However, the standard deviations are relatively high across all dimensions, showing significant variability in customer experiences. Overall customer satisfaction is positive, with a mean score of 8.1 and a lower standard deviation of 3.6, suggesting more consistent satisfaction levels compared to individual service dimensions. Efforts should focus on reducing variability to ensure a more uniform service quality.

**Recommendations**

Based on the findings of the study, several recommendations can be made to enhance the service quality and customer satisfaction at unisex salons in Trichy. Firstly, considering the significant influence of word-of-mouth and social media in creating awareness, salon managers should invest more in these channels to amplify positive customer experiences and attract new clientele. Given the high variability observed in service quality dimensions, there is a need for standardized training programs for staff to ensure consistent delivery of services across all interactions. Furthermore, considering the predominance of younger, student-aged clientele, salons could tailor their services and promotions to cater more effectively to this demographic, potentially offering student discounts or specialized packages. Addressing the preference for certain services, such as hair coloring, salons should ensure adequate resources and expertise are allocated to these popular offerings to maintain customer satisfaction levels. Lastly, continuous monitoring and feedback collection mechanisms should be implemented to promptly address any emerging issues and adapt services to evolving customer preferences, thereby fostering long-term customer loyalty and contributing positively to the salon's reputation and profitability.

**Conclusion**

In conclusion, this study has provided valuable insights into the service quality and customer satisfaction dynamics within unisex salons in Trichy. Through the application of the SERVQUAL model and statistical analyses, key findings have highlighted both strengths and

areas for improvement in salon services. The demographic profiles and preferences of the 116 respondents underscore the importance of personalized service delivery and effective customer engagement strategies. Recommendations stemming from these findings emphasize the enhancement of service consistency, leveraging digital and traditional marketing channels, and adapting service offerings to better meet customer expectations, particularly among younger demographics. By implementing these recommendations, salon managers can foster enhanced customer experiences, strengthen customer loyalty, and sustainably contribute to the economic growth of the service sector in Trichy. In embracing these recommendations, unisex salons can effectively navigate the evolving landscape of Industry 5.0, thereby positioning themselves as integral contributors to economic development through enhanced service quality and customer-centric innovation.

## **TECHNOLOGICAL ADVANCEMENTS OF SELECT BANKS IN VELLORE DISTRICT**

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### **Abstract**

*Digital technology is an essential part of every modern industry. Banking has historically and currently played a crucial role in supporting numerous enterprises. The implementation of digital technology in all conventional banking activities and services creates the foundation for a new paradigm. This enables banks to fully satisfy their customers and provide them with great satisfaction. Customers benefit from digitalization through the convenience of virtual deposits, electronic payments, digital currency trading, account creation, bill payment, and transaction monitoring. This study examines the positive and negative aspects of the technological infrastructure of banks. The study used questionnaires to collect primary data and secondary data from texts and publications. This study uses percentage analysis, chi-square tests and independent sample t-tests to interpret the data. The study's findings will enable banks to gain a deeper understanding of their consumers and enhance their performance in the digital realm.*

**Keywords:** Technology, Electronic Payments, Conventional banking, Digitalization

### **1. Introduction**

Technology has propelled the entire planet to a higher plane. To meet the needs of the public, innovation has enabled progress in every field and sparked complete transformation. Personal computers, which were novel at the time, were the initial technological tools used by banks. They used it to initiate routine financial operations, including account opening, loan

provision, and deposit and withdrawal processing. Following this, they installed ATMs to enable customers to deposit and withdraw funds. Banks then began offering a wide variety of digital transactions through various channels, including mini-ATMs, Aadhaar-based linkages, electronic wallets, the Unified Payment Interface, and electronic banking. These advancements in the banking industry have laid the groundwork for contemporary financial services. The banking industry is increasingly utilizing the latest technological advancements, such as AI chatbots, machine learning, virtual realities, the World Wide Web of Things, and cloud computing.

### **1.1 Digital features of banks**

The following are the various digital features provided by different banks:

### **2. Statement of the problem**

Globally, technological advancements are rapidly progressing in all fields. The impact of automation is evident, even in the service sector. Within the service industry, banks play a significant role in offering extensive services to their consumers. The bank's latest advancements in technology will be important to customers. This study aimed to investigate the extent of digital advancements in banks throughout the digital era and their impact on customer satisfaction in the Vellore district. The researcher chose to conduct her research in Vellore because of its status as a smart city and technological advancements in various domains.

### **3. Objectives of the study**

- i. To analyse the usage pattern of digital products among the respondents.
- ii. To find out the favourable benefits derived from digital advancements in banking.
- iii. To identify the problems related to technological advancements in the banking industry.

### **4. Hypothesis of the study**

- i.  $H_{01}$ : There is no significant relationship between the age of the respondents and the usage level of digital products of the respondents.
- ii.  $H_{02}$ : There is no significant relationship between the education of the respondents and the benefits derived from digital advancements.
- iii.  $H_{03}$ : There is no significant difference between the gender of the respondents and the problem of network issues faced by them.

### **5. Literature Review**

The related literature reviews on digital technology are as follows:

**Singh (2018)** in her study identified that financial institutions anticipated time and cost savings, as well as complete customer satisfaction, through the deployment of innovative technology. The result is a sea change in the banking industry as a whole, with noticeable shifts in banking's character, operational style, distribution system, monetary markets, and services.

**Nayak (2018)** The introduction of digitization in rural banking can narrow the divide between urban and rural regions by fostering increased levels of investment. Both customers and bankers can access transaction records stored through digitalization. Additionally, it contributes to India's progress towards becoming a corruption-free nation on a global scale.

**Subramaniyan (2018)** inferred that There is a correlation between the frequency of transactions and the worth of transactions, however, this correlation does not exist for unpaid card possessions. This implies that the number of operations is rising concurrently with timely repayments.

### 6. Methodology

The study is empirical by nature and it uses descriptive research design. Convenience sampling technique is adopted for the study. The sample size determined for the study is 100. Percentage analysis, Chi-square test and independent sample t-test are used as sampling tools. The research is undertaken in the Vellore district with digital users of banking as a sample respondent.

### 7. Interpretation of data

#### 7.1. Percentage Analysis

**Table 1: Demographic Profile**

Age	Frequency	Percentage
18-24	18	18
25-31	26	26
32-38	22	22
39-46	20	20
Above 46	14	14
Total	100	100
Gender		
Male	54	54
Female	46	46
Total	100	100
Education		
SSLC	10	10
Higher Secondary	21	21
UG Degree	33	33
PG Degree	20	20
Professional studies	16	16
Total	100	100
Income		

1,00,001-2,00,000	18	18
2,00,001-3,00,000	22	22
3,00,001-4,00,000	26	26
4,00,001-5,00,000	20	20
More than 5,00,000	14	14
Total	100	100
<b>Occupation</b>		
Government Employee	28	28
Private Employee	30	30
Student	15	15
Business	13	13
Retired	9	9
Homemaker	5	5
Total	100	100
<b>Account Holding</b>		
Indian Bank	26	26
Indian Overseas Bank	16	16
State Bank of India	19	19
HDFC Bank	18	24
ICICI Bank	14	8
AXIS Bank	7	7
Total	100	100

The demographic profile of the respondents in Table 1 shows that the maximum number of digital users are in the ages of 25-31 (25%) category. In gender, 54% of the respondents are males and 46% of them are females. Most of the respondents of the study are UG degree holders. The highest income level of the respondents is from 3,00,001-4,00,000 (26%) and most of them are working in private concerns. Under public sector banks, the maximum number of customers have accounts with the Indian Bank and under private sector banks, the maximum number of people hold accounts in HDFC bank.

#### **4.1. Chi-square Test**

The chi-square test results are obtained to find out the relationship exists among the variables.

4.1.1  $H_{01}$ : There is no significant relationship between the age of the respondents and the usage level of digital products of the respondents.



**Table 2.** Age\* Usage level of the respondents

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.588	6	.000
Likelihood Ratio	37.280	6	.000
Linear-by-Linear Association	17.708	1	.000
N of Valid Cases	100		

The chi-square test result shows that there is a significant relationship between the age of the respondents and the usage level of digital products since the significance value of 0.00 is less than the hypothetical value of 0.05.

7.2.2 H<sub>02</sub>: There is no significant relationship between the education of the respondents and the benefits derived from digital advancements.

**Table 3.** Education \*Benefits derived from digital transactions

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.373	8	.026
Likelihood Ratio	17.981	8	.021
Linear-by-Linear Association	.827	1	.363
N of Valid Cases	100		

The significance value of 0.026 is less than the hypothetical value of 0.05, so we accept the alternate hypothesis by rejecting the null hypothesis. Hence there is a significant relationship between the education of the respondents and the benefits derived from digital advancements.

**7.3 Independent sample T-test**

7.3.1 H<sub>03</sub>: There is no significant difference between the gender of the respondents and the problem of network issues faced by them

**Table 4.** Gener \*Problem of network issues

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	2.232	.138	.969	98	.335	.168	.174	-1.76	.513
Equal variances not assumed			.981	97.984	.329	.168	.172	-.172	.509

The result reveals ( $t(98) = 0.969$ ,  $p = 0.335$ ). It is concluded that there is no significant difference between the gender of the respondents and the problem of network issues faced by them since the p-value is greater than the hypothetical value of 0.05. Hence, we accept the null hypothesis.

### **8. Findings**

- i. Most of the respondents are using the digital technology of banks for making UPI transactions.
- ii. A Few respondents felt they needed some assistance while operating Automatic Teller Machines.
- iii. Net banking and UPI payments suffer from technical issues and signal errors.
- iv. The respondents find more convenient digital features in the Indian bank as a public sector bank.

Most of the respondents are getting phishing e-mails as cyber threats.

### **9. Suggestions**

The process of digitalization offers advantages to both customers and institutions. However, despite customers appreciating the benefits of these banking breakthroughs, they remain concerned that there is a persistent lack of knowledge regarding these digital goods. The bank must first provide education to its personnel, who will subsequently pass on this knowledge to the customers. Bank workers who have comprehensive training on their digital platform may be able to effectively communicate and explain its functionalities to others.

### **10. Conclusion**

Although banks are increasingly embracing the digital era, it will be extremely difficult for them to become experts in new technologies and successfully navigate new partnerships. There is a lot of marketing competition among banks. Therefore, to stand out, the bank must be innovative and use the latest technologies. In addition to using these new technologies, the bank also works hard to educate and answer its customers' questions so that they can make the most of them. When it comes to digitalization, banks are nearly there with the profits they deserve if they keep trying to provide excellent service to their consumers.

## **INDUSTRY 5.0: ENTREPRENEURIAL MARKETING STRATEGIES OF BOUTIQUE TEXTILES**

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### **Abstract**

*The term entrepreneurship is closely related to marketing. The term Entrepreneurial marketing was introduced in 1982 which integrates the concepts of entrepreneurship and marketing. Innovative approaches that use risk management, resource integration and value creation help the companies to break the resource constraints to reach their business goals. Entrepreneurial marketing refers to the process of creating and promoting a product, service or brand by taking calculated risks and leveraging innovative strategies to reach and engage with customers. It involves a mindset that is proactive, adaptable and customer-centric. Entrepreneurial marketing is a critical part of entrepreneurship that focuses on the customer as the fundamental driver of entrepreneurial success. Industry 5.0 represents the next generation of industrial revolution, characterised by the fusion of human intuition and artificial intelligence to create innovative and sustainable solutions. Here, the researcher tries to study the impact of digital entrepreneurial marketing strategies of boutique textiles among college going women of Christ College Autonomous, Irinjalakuda. The data is collected through distributing questionnaires and has used purposive sampling technique.*

**Keywords:** Digital Entrepreneurial marketing, Strategies, Buying Behaviour, Product performance

### **Introduction**

Entrepreneurship is a symbol of business and achievement. The process of creating, establishing, and managing a new company—which is frequently a small business at first—is known as entrepreneurship. Entrepreneurs are the folks who start these companies. On the other hand, Marketing is a vital function within businesses aimed at understanding, communicating and satisfying customer needs and wants profitably. Marketing and entrepreneurship are strongly related concepts. In 1982, the phrase "entrepreneurial marketing" was coined to combine the ideas of marketing with Entrepreneurship. Innovative strategies that assist businesses in overcoming resource limitations to achieve their objectives through risk management, resource integration, and value generation. A successful promotional message, consumer research, brand awareness tactics, firm planning, and customer relationship management are all part of entrepreneurial marketing. At the nexus of marketing and entrepreneurship, entrepreneurial marketing seeks to take advantage of opportunities by being proactive and adopting creative viewpoints.

Boutiques refers to a small shop, usually specializing in fashionable clothing, accessories, or other luxury goods. It often offers unique or limited- edition items and provides personalised services to its customers. There is lack of studies on what type of digital entrepreneurial marketing strategy has been used by the entrepreneurs of boutique textiles and what its impact among customers is.

In this regard, the researcher is trying to study the impact of digital entrepreneurial marketing strategies among customers. The researcher is intended to conduct the study among the college going women of Christ college autonomous irinjalakuda.

### **Review of Literature**

- 1. David Stokes (2000)**, In his study, Putting entrepreneurship into marketing: the process of entrepreneurial marketing considers how marketing can be made more appropriate in entrepreneurial contexts by proposing a conceptual model of the processes of marketing as undertaken by entrepreneurs. This study also adopted the relationship of entrepreneurial marketing with that of traditional marketing and found out that marketing is more appropriate in entrepreneurial contexts too.
- 2. Morris et. al (2002)**, studied the construct of entrepreneurial marketing (EM). This term is used as an integrative conceptualization that reflects such alternative perspectives as guerrilla marketing, radical marketing, expeditionary marketing, disruptive marketing, and others. Seven core dimensions of EM are identified, and an underlying theoretical foundation based on resource advantage theory is proposed. A conceptual model is introduced of key factors surrounding the phenomenon of entrepreneurial marketing.
- 3. Pallavi (2022)**, 'From the study of impact of influencer marketing among consumers, it could be inferred that people do read and post comments or reviews online. Communication by an influencer is the highest predictor of change in consumers 'attitude followed by influencers credibility, influencer 's similarity product match-up of the influencer, campaign incentives by influencer, and social influence. Consumers 'attitude is the significant mediating variable. It mediates the relationship between credibility, similarity, campaign incentives, expertise, attractiveness, product match-up, communication, argument quality, and customer engagement. Therefore, consumers 'attitude plays an indispensable role in engaging consumers on social networks.

### **Research Gap**

Entrepreneurial marketing is a critical part of entrepreneurship that focuses on the customer as the fundamental driver of entrepreneurial success. Acquiring market information from a broad range of customer networks gives the EM marketers a unique perspective on the actual fundamental customer desires. Most of the studies related entrepreneurial marketing explained that it is mainly applicable to small and medium enterprises and many EM models and concepts have been developed on the same to support it. But the digital entrepreneurial

marketing strategies of boutique textiles are still unexplored. Therefore, there emerges a research gap that ought to focus on digital entrepreneurial marketing strategies of boutique textiles and its impact on customers. The present study considers a research gap and analyses the impact of digital entrepreneurial marketing strategies of boutique textiles among college going women.

**Objectives of the study**

1. To study the digital entrepreneurial marketing practices adopted by Boutique Textiles.
2. To study the relationship of Digital marketing and the buying behaviour among college going women.
3. To determine the level of satisfaction on the Digital Marketing and the Product performance.

**Research Methodology Data Collection**

Primary Data: The researcher collected first- hand information's directly from the respondents Through a well- structured questionnaire.

**Sample Design:**

Sample Population: College going women from Christ College Autonomous, Irinjalakuda, Kerala

Sample Size: The researcher has collected 120 samples from Christ College, Autonomous, Irinjalakuda, Kerala.

Sampling Technique: Purposive sampling technique is used to conduct the study.

**Normality:** Followed Kolmogorov- Smirnov test for normality. The test is rejected the null hypothesis of the data that follows normal distribution (rejected at 1% significance level). Thus, we followed non- parametric tests.

**Tools of analysis:** Percentage analysis, Spearman rank correlation and Wilcoxon Signed Rank test used to conduct the study. Charts will be used by the researcher to depict a clear picture of the data.

**Results and Discussions**

**Table 1: Demographic details of the respondents**

	<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
Age	Below 20	35	29.2
	20- 25	58	48.3
	25- 30	18	15.0
	Above 30	9	7.5
	Total	120	100

Marital Status	Single	92	76.7
	Married	22	18.3
	Living Together	2	1.7
	Divorced	2	1.7
	Separated	2	1.7
	Total	120	100
Educational Qualification	Under Graduate	46	38.3
	Post Graduate	59	49.2
	Diploma	6	5.0
	Others	9	7.5
	Total	120	100
Annual Income	Below 10000	32	26.7
	10000- 50000	20	16.7
	50000- 100000	23	19.2
	100000- 150000	11	9.2
	150000- 200000	7	5.8
	200000- 250000	6	5.0
	250000- 300000	8	6.7
	Above 300000	13	10.8
Total	120	100	

**Interpretation:**

The age range of the population is varied, with a greater concentration of people in the 20–25 age bracket. It is followed by the age groups of those under 20 and those between 20 and 25. Out of 120 respondents, a minor percentage are older than 30. 76.7% of the 120 respondents are single, 18.3% are married, and 1.7% are living together, divorced, or separated, in that order. The population's level of education is relatively high, with 49.2% of respondents having at least a master's degree, followed by 38.3% of undergraduates, 5% of diploma holders, and 7.5% of respondents with other qualifications. The respondents' income

distribution reveals that 26.7% of them make less than rupees 10,000. This is followed by the income group between rupees 50,000 and rupees 100,000, which makes up 19.2% of the respondents, the income group between rupees 10,000 and rupees 50,000, and the age group below rupees 300,000, which makes up 10.8% of the respondents.

**Digital entrepreneurial Marketing Strategies known by the college going women**

Out of 120 respondents, 78.3% knows social media marketing followed by 54.2% knows influencer marketing, 39.2% knows Content marketing, 15% knows email marketing, 9.20% knows SEO and 8.3% knows Affiliate marketing.

**Table 2: Relationship between digital marketing and buying behaviour**

H1: There is a significant relationship between digital marketing and buying behaviour among college going women.

**Correlations**

\*\*Correlation is Significant at the 0.01 level (2-tailed).

**Interpretation:**

The purpose of conducting spearman rank correlation was to examine the relationship between buying behaviour and digital marketing. The spearman rank correlation coefficient was found to be 0.692. The positive correlation coefficient of 0.692 indicates a strong positive monotonic relationship between digital marketing and buying behaviour. This means that as the values of buying behaviour increases, the value of digital marketing also tend to increase. The p- value is less than the significance level of 0.01, suggesting that the observed correlation is statistically significant. Therefore, we can conclude that there is a significant relationship between buying behaviour and digital marketing.

**Table 3: To determine the satisfaction level of digital Marketing Hypothesis Test Summary**

Null Hypothesis	Test	P Value	Decision
I am satisfied with the overall digital marketing efforts of boutique entrepreneurs.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The digital advertisements from boutique entrepreneurs are appealing to me.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I find the social media presence of boutique entrepreneurs engaging and informative.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The email marketing campaigns from boutique entrepreneurs provide valuable information.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The promotions and discounts advertised online by boutique entrepreneurs meet my expectations.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I am satisfied with the personalised recommendations I receive from boutique entrepreneurs.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
Boutique entrepreneurs digital marketing makes it easy for me to discover new products.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I am pleased with the responsiveness of boutique entrepreneurs on social media.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The content shared by boutique entrepreneurs on their digital platforms is relevant.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
Overall, I feel that boutique entrepreneurs effectively use digital marketing to cater to my needs and preferences.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The median of total satisfaction level of digital marketing equals 3.00.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.



**Interpretation:**

The one sample Wilcoxon signed- rank test was conducted to determine whether the median of the sample differs from a specified value. The null hypothesis was whether the median of the sample is equal to the hypothesized median and the alternative hypothesis were whether the median of the sample is different from the hypothesized median. Since the p-value 0.001 is less than 0.01 according to the results, the alternative hypothesis is accepted and the null hypothesis is rejected. The statistical significance of the results leads us to the conclusion that statements regarding the satisfaction level of digital marketing are satisfied by the college going women.

**Table 4: To find out the satisfaction level of Product performance**

**Hypothesis Test Summary**

Null Hypothesis	Test	P Value	Decision
I am satisfied with the overall quality of the product	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The product fits my needs and preferences	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I am pleased with the design and the appearance of the product.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
The product provides good value for the price.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I am satisfied with the customer support for the product	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I am overall satisfied with the product.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I would recommend this product to others.	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I am aware of unique selling points of boutique entrepreneurs through their digital marketing efforts	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.
I stay updated on the latest offerings of boutique entrepreneurs through their digital marketing channels	One-Sample Wilcoxon Signed Rank Test	<.001	Reject the null hypothesis.

The significance level is 1%.

**Interpretation:**

The one sample Wilcoxon signed- rank test was conducted to determine whether the median of the sample differs from a specified value. The null hypothesis was whether the median of the sample is equal to the hypothesized median and the alternative hypothesis were whether the median of the sample is different from the hypothesized median. Since the p-value 0.001 is less than 0.01 according to the results, the alternative hypothesis is accepted and the null hypothesis is rejected. The statistical significance of the results leads us to the conclusion that the college going women are satisfied with the product performance.

**Findings**

1. Of the 120 respondents, the majority are between the ages of 20 and 25, followed by 29.2% who are under 20, 15% who are between the ages of 25 and 30, and 7.5% who are over 30.
2. A total of 120 respondents, of which 76.7% are single, followed by 18.3% who are married and 1.7% who are living together, divorced, and separated.
3. Of all respondents, 49.2% of the respondents are post graduates followed by, 38.3% are of undergraduates, 5% of the respondents pursuing diploma and 7.5% of the respondents have other qualifications.
4. 26.7% of the respondents have annual income below 10000, 19.2% of the respondents have annual income between 50000- 100000 followed by 16.7% of the respondents have 10000- 50000 and only 10.8% of the respondents have income above 300000.
5. Out of 120 respondents, 78.3% knows social media marketing followed by 54.2% knows influencer marketing, 39.2% knows Content marketing, 15% knows email marketing, 9.20% knows SEO and 8.3% knows Affiliate marketing.
6. The p- value is less than the significance level of 0.01, suggesting that the observed correlation is statistically significant, which means that there is a significant relationship between buying behaviour and digital marketing.
7. The p-value 0.001 is less than 0.01 according to the results, the alternative hypothesis is accepted and the null hypothesis is rejected. The statistical significance of the results leads that statements regarding the satisfaction level of digital marketing are satisfied by the college going women
8. The p-value 0.001 is less than 0.01 according to the results, the alternative hypothesis is accepted and the null hypothesis is rejected. The statistical significance of the results leads that the college going women are satisfied with the product performance.

## **Conclusion**

Marketing today is more complex than ever before, with companies facing challenges such as market segmentation, saturation and the daily storm of “novelty” sweeping the market. Traditional marketing models are less adaptable to the new competition arising in the market, while entrepreneurial marketing integrates elements of both marketing and entrepreneurial management, making it more adaptable and at the same time enabling companies to better seize new opportunities and thus less likely to be eliminated and mobilize resources in a dominant market position. In conclusion, the impact of digital entrepreneurial marketing strategies on college going women is profound and multifaceted. These strategies leverage digital tools and platforms to engage the customers more effectively, create personalised experiences, and foster stronger brand loyalty. Key impacts include enhanced customer engagement through interactive content and social media improved targeting and personalisation through data analytics and increased convenience and accessibility through mobiles and online channels. Ultimately, successful digital entrepreneurial marketing strategies can lead to higher customer satisfaction, increased sales and long- term customer retention, highlighting their critical role in modern business success.

## **BEHAVIORAL PATTERNS OF COLLEGE STUDENTS IN TRICHY USING AI TOOLS FOR LEARNING: ADOPTION, USAGE AND IMPACT**

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### **INTRODUCTION**

During this progressive era, the fusion of Artificial intelligence and education is anticipated to revolutionize the educational landscape. The advancement of Artificial intelligence within the educational sphere is expected to yield unprecedented benefits for the economy, with minimal limitations. The impact of Artificial intelligence on the education sector is projected to have positive implications on the labor market, thereby fostering overall economic growth. This paper attempts to investigate the behavioral tendencies of college students in Trichy pertaining to the utilization of AI tools among college students in Trichy, while also examining the effects of these tools on students learning experiences and identifying the challenges encountered by students in utilizing AI tools.

### **ADOPTION OF AI TOOLS**

Understanding student behavior towards AI learning tools is crucial for their successful implementation. Studies exploring the Technology Acceptance Model (TAM) and its derivatives (UTAUT, TAM2) in educational contexts provide insights into factors

influencing technology adoption (Yamin et al., 2020; Al-Emran et al., 2018). These models suggest that factors like perceived ease of use, perceived usefulness, and compatibility with existing learning styles can influence students willingness to adopt AI tools (Chang et al.,2021). Research on AI adoption in higher education highlights the role of additional factors. Accessibility and affordability are crucial considerations, particularly in resource-constrained settings like Trichy (Mitra et al., 2019). Furthermore, institutional support, such as university recommendations or integrated learning platforms, can encourage adoption (Ahn et al., 2020).ChatGpt found to be the most effective and supporting aid tool for the students among the all-other AI tools in the learning process. (Lijia Chen et al.,).ChatGPT is enhancing efficiency across different processes and its extensively playing a major role in Scientific research.

### **RESEARCH GAP AND FOCUS OF CURRENT STUDY**

While research exists on the adoption, usage, and impact of AI tools in education, there is a significant gap regarding the specific behavioral patterns of college students in Trichy.

This study aims to bridge this gap by understanding:

- The factors influencing students' adoption of AI learning tools in Trichy.
- How students in Trichy utilize AI tools for learning, considering their learning styles and preferred situations for use.
- The perceived impact of AI tools on student understanding, learning outcomes, and satisfaction in Trichy.

By focusing on these aspects, the current study can provide valuable insights for promoting the effective use of AI tools in Trichy educational ecosystem.

### **RESEARCH OBJECTIVES**

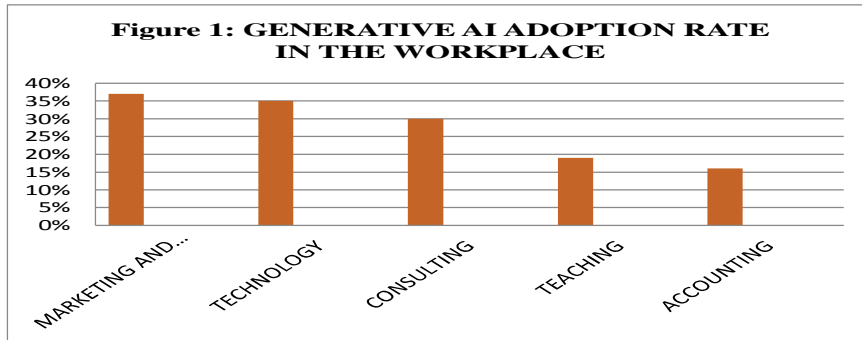
The objectives of the research are:

1. To identify the factors that influence the adoption of AI tools among college students in Trichy.
2. To analyze the usage patterns of AI tools for learning among these students.
3. To assess the impact of AI tools on students' academic performance and overall learning experience.
4. To explore the challenges faced by students in using AI tools and their attitudes towards these technologies.

### **RESEARCH METHODOLOGY**

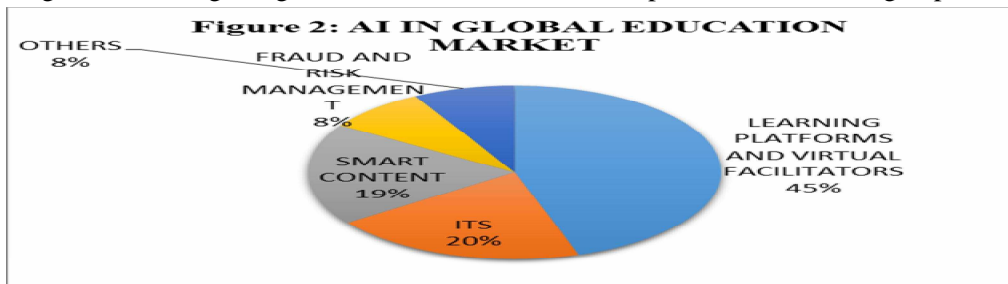
This study employed quantitative data collection method from primary and secondary data sources to gain a comprehensive understanding of the phenomenon. Secondary data were collected from online data bases. Primary data were collected administering a self-administered survey among college students in Trichy. The target population for this study is

college students enrolled in various colleges in Trichy, India. A convenience sampling approach was used to recruit participants from accessible institutions.



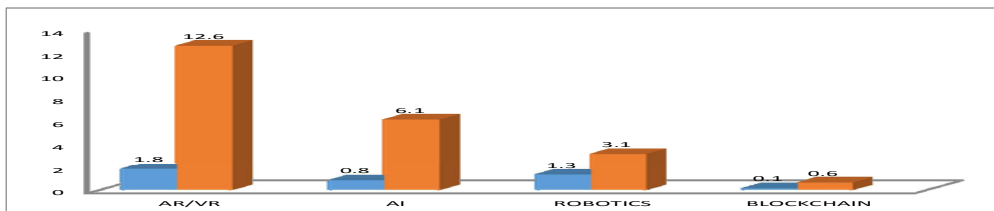
SOURCE: <https://www.grandviewresearch.com>

It is evident from figure 1 that while marketing and advertising lead AI adoption in the workplace at 35 per cent, the technology sector follows closely behind at 30 per cent. Consulting sits at 19 per cent, indicating a lower adoption rate in that sector. This suggests a growing trend of integrating AI into educational tools and personalized learning experiences.



SOURCE: <https://www.grandviewresearch.com>

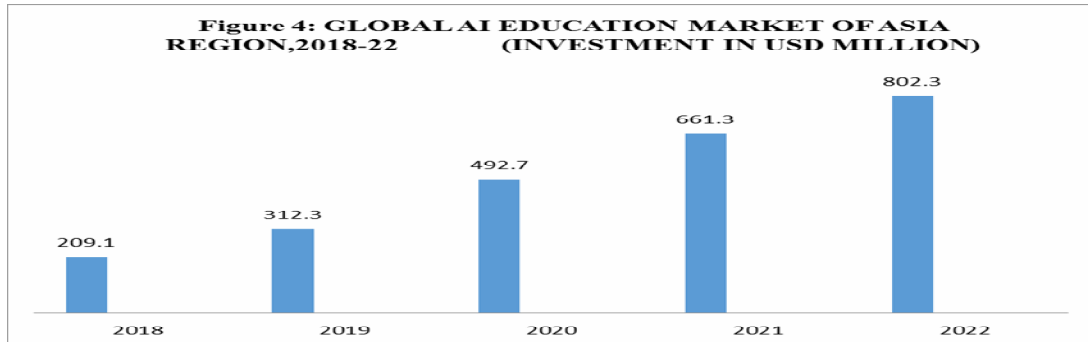
Figure 2 shows the distribution of the global AI in the education market by application for the year 2021. This chart highlights the dominant role of learning platforms and virtual facilitators in the AI education market, followed by intelligent tutoring systems.



SOURCE: <https://www.grandviewresearch.com>

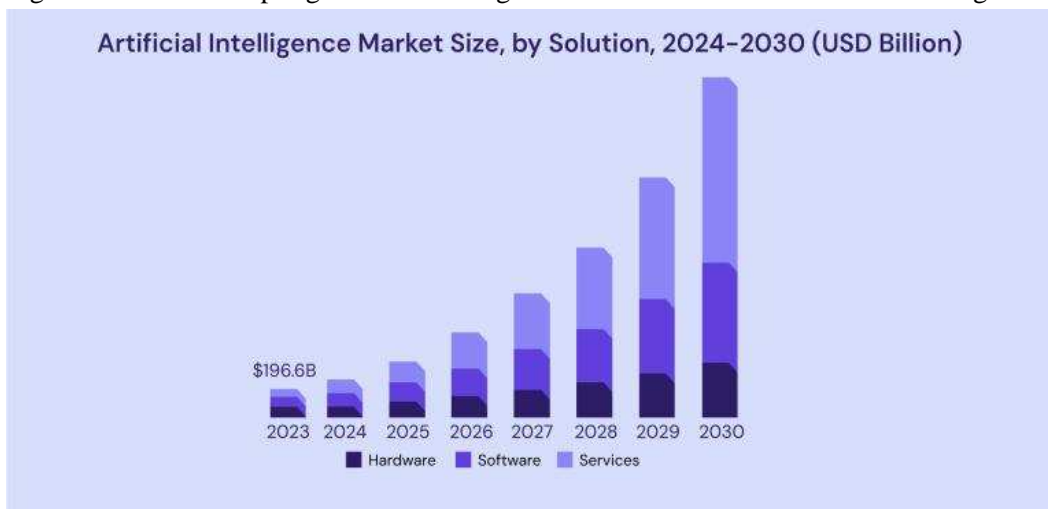
**Figure 3: ADVANCED EDUCATION TECHNOLOGY EXPENDITURE 2018-2025, USD BILLIONS**

Figure 3 highlights the projected spending on advanced education technologies from 2018 to 2025. AI expenditure is expected to see substantial growth from \$0.8 billion to \$6.1 billion, reflecting its expanding role in personalized learning, data analytics and administrative tasks. It indicates a strong upward trend in the adoption and investment in advanced education technologies, with AR/VR and AI showing the most significant growth.



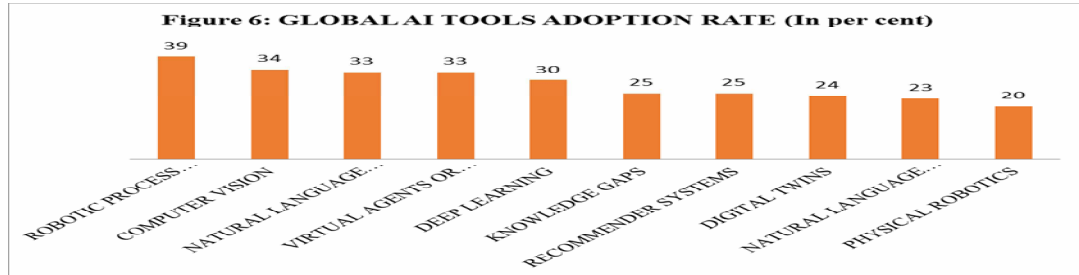
SOURCE: [www.gminsights.com](http://www.gminsights.com)

Figure 4 illustrates the significant growth of the global AI education market in the Asia Pacific region between 2018 and 2022, measured in USD million. This trend suggests a rising investment in adopting AI tools for higher education across the Asia Pacific region.



SOURCE: <https://www.grandviewresearch.com>

Figure 5 reveals a projected Compound Annual Growth Rate (CAGR) of 37.7 per cent for the AI industry, highlighting its rapid expansion. This surge signifies the growing importance of artificial intelligence across all economic sectors. AI technologies empower businesses with a competitive advantage, while individuals can benefit from acquiring in-demand skills like machine learning and data analytics.



SOURCE: <https://www.grandviewresearch.com>

Figure 6 highlights the significant adoption rate of Robotic Process Automation (RPA) at 39 per cent, underlining AI's crucial role in automation. This is followed by computer vision at 34 per cent and natural language text understanding at 33 per cent, indicating the diverse applications of AI technology within various automation tasks.

**Table 1: Access to Technology**

Accessibility	Number of respondents	Percentage
Personal laptop	9	37.5
Smartphones	4	16.7
limited access	11	45.8
Total	24	100.0

Source: Primary data

Data from Table 1 reveals that nearly half of the respondents lack access to technology. This finding suggests limited technology access as a potential barrier to AI tool adoption among a significant portion of the student population.

**Table 2: Factors influencing the use of AI**

Factors	Number of respondents	Percentage
Affordability	6	25.0
Reviews from peers	11	45.8
User friendly	3	12.5
Wide range of features	4	16.7
Total	24	100.0

Source: Primary data

Table 2 highlights that over half of the respondents (more than 50 per cent) identify positive feedback from their peers as the most significant influence on their decision to utilize AI technologies.

**Table 3: Preferred Methods for Utilizing AI Tools for Learning**

Solving Complexities	Number of respondents	Percentage
Tool to practice MCQs	3	12.5
Watching video lectures	5	20.8
Asking AI to get a concise answer	9	37.5
All of these	7	29.2
Total	24	100.0

Source: Primary data

Table 3 sheds light on student preferences for using AI tools to grasp complex concepts. Around 40 per cent of respondents indicated frequent use of AI for obtaining concise explanations. This suggests that students find AI's ability to simplify difficult material particularly valuable for their learning process.

**Table 4: Frequency of AI Use and Perceived Impact on Learning**

Usage pattern	Number of respondents	Percentage
Daily	7	29.2
Few times a week	11	45.8
Occasionally	4	16.7
Never	2	8.3
Total	24	100.0

SOURCE: PRIMARY DATA

Table 4 reveals a positive association between AI use and academic performance. Nearly half of the respondents (45.8 per cent) indicated that using AI tools for a few hours a week benefits their learning. This suggests that students perceive regular AI use to be helpful for their academic achievement.

**Table 5: Perceived Benefits of AI Tools for Enhancing Learning**

Improvement In learning process	Number of respondents	Percentage
Personalized learning	5	20.8
Interactive exercises	4	16.7
Immediate feedback and explanations	4	16.7
All of these	11	45.8
Total	24	100.0

SOURCE: Primary data



Table 5 highlights student perspectives on how AI tools facilitate learning. Half of the respondents agreed that features like personalized learning paths, interactive activities, and immediate feedback provided by AI tools contribute to a more effective learning experience. This suggests that students value AI's ability to cater to individual needs, promote engagement, and offer real-time clarification, ultimately enhancing their ability to learn.

**Table 6: AI as a Tool for Increasing Student Engagement**

<b>Replacement of traditional teachings</b>	<b>Number of respondents</b>	<b>Percentage</b>
Additional practices out of classroom	6	25.0
Focused and engaged during lectures	9	37.5
Replacing textbooks	7	29.2
No benefits	2	8.3
Total	24	100.0

Source: Primary Data

Table 6 explores how AI technologies impact student focus and engagement during learning. About 40 per cent of respondents indicated that using AI tools helps them feel more focused and interested compared to traditional teaching methods. This suggests that AI may have the potential to address student engagement challenges and create a more stimulating learning environment.

**Table 7: Student Comfort Level with AI Learning Tools**

<b>Level of comfort</b>	<b>Number of respondents</b>	<b>Percentage</b>
Very comfortable	5	20.8
Somewhat comfortable	10	41.7
Neutral	8	33.3
Uncomfortable	1	4.2
Total	24	100.0

Source: Primary Data

Table 7 reveals that 40 per cent of respondents reported feeling somewhat comfortable using AI products for learning. This suggests that a significant portion of the student population may be cautiously open to adopting AI tools for educational purposes. Further research might explore factors influencing students' comfort levels and how to promote a more positive perception of AI in learning environments.

## **CONCLUSION:**

This study investigated the adoption of AI tools among college students in Trichy. The findings highlight a growing interest in AI for educational purposes, with perceived usefulness, affordability, and peer recommendations identified as key drivers of adoption. Students primarily utilize AI tools to understand complex concepts, with frequent usage reported for explanation and practice. The research confirms that AI tools can enhance the learning experience by providing personalized learning paths, interactive exercises, and immediate feedback. However, challenges remain. Limited access to technology restricts AI adoption for nearly half of the respondents. Additionally, ethical considerations regarding AI use in education require careful attention. Almost half of the respondents expressed concern that ethical issues would worsen if teachers were entirely replaced by AI. In conclusion, AI tools hold promise for improving student learning experiences. However, for widespread adoption to occur, ensuring equitable access to technology is crucial. Furthermore, fostering trust in AI through transparent and ethical implementation practices is essential. Future research could explore effective strategies for integrating AI tools into classrooms while addressing student concerns and ensuring a human-centred approach to education.

## **EVALUATING THE IMPACT OF INDUSTRY 5.0 ADOPTION ON HUMAN CAPITAL: INSIGHT FROM FIVE LEADING COMPANIES**

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### **Abstract**

*The study examines the impact on Human Capital, a component of Intellectual Capital on selected five companies where Industry 5.0 is adopted. By utilizing VAIC Model the human capital is measured and content analysis to evaluate proxies for Industry 5.0. Data has been collected from the annual report of five selected companies: Siemens AG, Honeywell International Inc., Rockwell Automation Inc., ABB Ltd, and 3D Systems Corp. Regression analysis in SPSS quantifies the impact, revealing the relationship between Human Capital and Industry 5.0 adoption. This research offers empirical insights into the role of human capital in driving advanced industrial transformation. This study provides valuable guidance for policymakers and business leaders aiming to enhance human capital by the adoption of Industry 5.0 and serves as a roadmap for other companies to leverage human capital to achieve sustainable growth and development.*

**Keywords:** Industry 5.0, Human Capital, Human-Robot Collaboration, Innovation Management, Technological Adoption.

## **1. Introduction:**

The rapid evolution of industrial paradigms has led to the development of Industry 5.0, which emphasizes the collaboration between advanced technologies and humans which helps in enhancing productivity, sustainability as well as human well-being. The principles of Industry 4.0 led to the extension of Industry 5.0 by integrating human-centric approaches with smart technologies, thereby fostering additional sustainability and inclusive transformation of industry (Maddikunta et al., 2021; Leng et al., 2022). This transformation emphasizes the significant role of human capital, as it embodies the knowledge, skills, and competencies needed for effective use for leveraging advanced technologies.

The study adds to the prevailing literature by outlining practical insights into the relationship between Industry 5.0 adoption and human capital. Despite the extensive literature on Industry 4.0 and its impacts, research on Industry 5.0 and its effects on human capital remains limited, particularly studies using secondary data sources. The findings offer valuable guidance for policymakers and business leaders aiming to enhance human capital through technological advancements. The study also serves as a roadmap for other companies to leverage human capital for achieving sustainable growth and development.

## **2. Review of Literature**

### ***2.1 Human Capital and Industry 5.0***

With the increase of innovative technologies and human centric components, Industry 5.0 expands upon the ideologies of Industry 4.0 (Xu et al., 2018). It also focuses on human well-being, sustainability, and resilience within the manufacturing context. Leng et al. (2022) outlined a three-dimensional system architecture for the implementation of Industry 5.0, which discusses key elements, applications, and directions for future research. The work of Shiroishi et al. (2018) outlined collaborative strategies for realizing Society 5.0 in Japan, which aligns with the efforts for the achievement of the UN's Sustainable Development Goals. The shift toward Industry 5.0 necessitates a deeper understanding of the human-robot collaboration (Demir et al., 2019).

### ***2.2 Technology Adoption and Firm Performance***

The strategic roadmap for transitioning to Industry 4.0 and its implications for manufacturing industries have been well-documented (Ghobakhloo, 2018). As companies move towards Industry 5.0, it becomes essential to consider how new technologies are integrated and how that affects business performance. A paradigm for analysing how a firm's strategic reaction to emerging technology affects performance was created by Lee and Grewal (2004). They found that faster adoption of communication channels and e-alliances improves performance, particularly for firms with resource slack.

### **2.3 Human-Robot Collaboration and Innovation**

The possible organizational and human-centric complications that may arise from human co-working in Industry 5.0 are highlighted by Demir et al. (2019). Their study emphasizes the need for further research to address these challenges. (Mourtzis et al., 2022) explored the concept of "Operator 5.0", concentrating on training shop floor technicians using Mixed Reality for the manufacturing process. This approach underscores the importance of human-robot collaboration in the future industrial landscape.

### **3. Hypothesis Development**

The primary hypothesis of this study is that the adoption of Industry 5.0 significantly impacts the human capital of organizations. As companies integrate advanced technologies and foster human-robot collaboration, the role of human capital becomes more prominent in driving organizational success. On the basis of the previous literature examination, the following hypothesis is proposed:

The adoption of Industry 5.0 positively impacts the human capital of organizations.

#### **Measurement**

##### ***Industry 5.0 variables calculation***

For measuring Industry 5.0 variables, proxies were identified from the literature, including AI- Artificial Intelligence, IoT- Internet of Things, Cobot/Robotics, Advanced Technology /Advanced Automation, Smart Manufacturing, 6G & Beyond, Digital Twin, Blockchain, BigData Analysis, and Machine-Learning (Maddikunta et al., 2021). These proxies were counted within the selected company's annual reports, noting their specific applications within the organizations. The frequency of each proxy's application was then multiplied by a normalized weight.

The normalized weight is calculated as follows:

With 10 variables identified, each variable was assigned a weight of 0.

i.e.,  $(10/100)$

The calculated weight for each proxy was determined by multiplying the normalized weight by the count of its applications. These calculated weights were then summed to derive the overall Industry 5.0 value for each company. This methodology was applied to each of the five selected companies to calculate their respective Industry 5.0 values.

For the variables "Advanced Technologies" and "Advanced Automation," relational words were taken into account for the count. Advanced Automation, included terms such as process automation, machine automation, robotics automation, distribution automation, factory automation, integrated automation, industrial automation, digital automation, warehouse automation, programmable automation, global automation, electronic automation, renewable automation, vertical automation, storage system automation, and interactive automation. For Advanced Technologies, terms such as power & supply distribution system, HVAC chiller

system technology, delivering technology, rail electrification technology, cutting-edge technology, road traffic technology, software technology, switching technology, drive technology, grid technology, energy technology, storage technology, innovative technology, power-to-x technology, and injection moulding machine technology were included in the content analysis.

#### **Human Capital calculation**

To measure human capital, the study adopted VAIC Model - Value Added Intellectual Coefficient, developed by Pulic (2000). Specifically, Human Capital Efficiency – HCE component was used.

The calculation for HCE is given by:

$$HCE = VA / HC$$

Where, V A -Value Added is calculated as Net Income + Personnel Cost + Depreciation and Amortization. HC (Human Capital) is the total Personnel Cost.

The human capital efficiency of the five selected companies was calculated using this method, providing a measure of how effectively these companies leverage their human capital. This approach allows for a robust analysis of the effect of Industry 5.0 adoption on human capital within the five selected organizations.

#### **4. Methodology**

Regression analysis in SPSS was used to quantify the impact of Industry 5.0 adoption on human capital. The independent variables included the proxies for Industry 5.0, while the dependent variable was the human capital efficiency measured by the VAIC model.

Data has been collected from the annual reports and financial statements of five selected companies in the year 2023: Siemens AG, Honeywell International Inc., Rockwell Automation Inc., ABB Ltd, and 3D Systems Corp. These businesses were chosen based on their stated adoption of Industry 5.0 technologies. Industry 5.0's proxies includes AI, IoT, cobots, 6G, digital twin, blockchain, big data analysis, smart manufacturing, machine learning, and advanced automation, were identified through content analysis (Maddikunta et al., 2021).

The VAIC (Value Added Intellectual Coefficient) model has been employed to calculate the human capital. This approach evaluates the effectiveness of creating value from an organization's intellectual capital, with a particular emphasis on human capital (Pulic, 2000).

#### **5. Results and Analysis**

##### **5.1 Descriptive statistics**

The descriptive statistics provide a summary of the central tendency, variability, and distribution of the dataset for the variables Industry 5.0 and Human Capital Efficiency (HCE). Table- 1 demonstrates 4.94, a mean value of Industry 5.0, with a Standard deviation of 2.99.

The least and extreme values are 2.1 and 9.8, respectively. The value of the mean of HCE is 16.96, with a standard deviation of 20.84. The lowest and extreme values are -1.89 and 52.75, respectively.

Table: 1

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Industry 5.0	5	2.1000000000000000	9.8000000000000000	4.9400000000000000	2.993826982308764
HCE	5	-1.8910000000000000	52.746268656716420	16.957407603314138	20.838541391833530
Valid N (listwise)	5				

Source: Author's estimation

These values indicate that there is considerable variability in the HCE among the five companies, which suggests diverse levels of efficiency in the context of Industry 5.0 in the utilization of human capital.

### 5.2 Correlation Analysis

The correlation analysis is used to measure the strength and direction of the linear relationship between Industry 5.0 adoption and HCE.

Table: 2

Correlations			
		Industry 5.0	HCE
Industry 5.0	Pearson Correlation	1	.968**
	Sig. (2-tailed)		.007
	N	5	5
HCE	Pearson Correlation	.968**	1
	Sig. (2-tailed)	.007	
	N	5	5
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Author's estimation

Table 2 shows the Pearson correlation coefficient between Industry 5.0 and HCE is 0.968, which is very high and positive and the significance level (p-value) is 0.007, which is less than 0.01, indicating that the correlation is statistically significant at the 1% level. This strong positive correlation suggests that as the level of Industry 5.0 adoption increases, the Human Capital Efficiency also tends to increase.

### 1.3 Regression Analysis

Regression analysis aims at the quantification of the impact of Industry 5.0 adoption on HCE. Table 3 which shows the  $R^2$  value of 0.936 indicates that approximately 93.6% of the variance in HCE can be explained by the level of Industry 5.0 adoption.

Table 3

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.968 <sup>a</sup>	.936	.915	6.084386410797337	.936	43.920	1	3	.007
a. Predictors: (Constant), Industry 5.0									

Source: Author's estimation

Table 4

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1625.920	1	1625.920	43.920	.007 <sup>b</sup>
	Residual	111.059	3	37.020		
	Total	1736.979	4			
a. Dep Vari: HCE						
b. Predictors: (Cnstnt), Industry 5.0						

Source: Author's estimation

Table 4 shows a p-value of 0.007, indicating that the regression model is statistically significant with the F-statistic of 43.92.

Table 5

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-16.310	5.710		-2.856	.065		
	Industry 5.0	6.734	1.016	.968	6.627	.007	1.000	1.000
a. Dependent Variable: HCE								

Source: Author's estimation

The coefficient for Industry 5.0 is 6.734, meaning for an increase in each unit of the Industry 5.0 score, the HCE increases by 6.734 units in Table 5. The relationship is statistically significant as the p-value shows 0.007.

#### **Regression Equation**

The regression equation derived from the analysis is:

$$\text{HC} = -16.31 + 6.734 \times \text{Industry 5.0} + \epsilon$$

Where,

' $\epsilon$ ' is the error term. The error term accounts for all other factors influencing Human Capital Efficiency (HCE) that are not included in the model. These could include unmeasured variables, measurement errors, or random fluctuations.

#### **Interpretation**

The analysis reveals a significant and positive relationship between Industry 5.0 adoption and Human Capital Efficiency (HCE) which suggests that companies having higher levels of adopting Industry 5.0 tend to more efficient use of their human capital. The high  $r^2$  value indicates that Industry 5.0 adoption is a strong predictor of HCE.

#### **Findings**

A strong positive correlation between Human Capital Efficiency (HCE) and Industry 5.0 adoption indicates that increased adoption of advanced industrial technologies enhances human capital efficiency. The regression model is statistically significant, with Industry 5.0 adoption explaining a substantial portion of the variance in HCE. The positive coefficient for Industry 5.0 suggests that advancements in Industry 5.0 positively impact the efficiency of human capital utilization. This finding underscores the importance of investing in human capital to drive industrial innovation and transformation (Bontis, 1998; Chen et al., 2005). These results highlight that companies embracing Industry 5.0 are likely to see significant improvements in how effectively they use their human resources, suggesting a symbiotic relationship between technological advancement and human capital development.

#### **Conclusion**

The study demonstrates that Industry 5.0 adoption significantly enhances Human Capital Efficiency (HCE) in organizations. The findings highlight the importance of integrating advanced industrial technologies to optimize the utilization of human capital. The findings suggest that companies aiming to transition to Industry 5.0 should prioritize investments in human capital. Policymakers and business leaders should focus on fostering the adoption of Industry 5.0 for the achievement of sustainable growth and improve organizational performance. Moreover, the approach of Industry 5.0, a human-centric approach promotes sustainability and well-being, ensuring that technological advancements are aligned with the broader goals of societal progress. These insights provide a roadmap for organizations to not only advance technologically but also ensure that such advancements contribute to overall human development and societal benefits.



### **Implications**

Policymakers should incentivize Industry 5.0 adoption through supportive policies and frameworks. Business leaders should integrate Industry 5.0 technologies into their strategic planning to enhance human capital efficiency. Further research could expand the scope by including more companies and additional variables to validate the findings and explore other potential impacts of Industry 5.0. By focusing on these areas, organizations can better prepare for the future industrial landscape, ensuring that their workforce is equipped to handle the demands of modern technology. This approach will help achieve sustainable economic growth and foster an environment where technological advancements contribute to broader societal goals, ultimately leading to a more innovative and resilient industrial sector.

## **THE CUTTING EDGE OF NEXT-GENERATION AI IN NEUROMORPHIC COMPUTING AND DIGITAL TRANSFORMATION IN PUBLIC ADMINISTRATION**

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### **Abstract**

*Digital transformation of public administration is seen as a way to increase the effectiveness of public services and offer societal benefits. Artificial intelligence (AI) has taken a dramatic turn with neuromorphic computing, which draws inspiration from the intricate neural network seen in the human brain. How machines can function without human assistance, much like the human brain is inspired by autonomous computing. The most recent advancements in neuromorphic computing algorithms and technology are meant to increase synaptic plasticity and computational efficiency for next-generation AI paradigms. Neuromorphic systems, which offer high adaptability and energy-efficient parallel processing, imitate the neural structure and processing methods of the brain. Tailored algorithms for neuromorphic systems such as Spiking Neural Networks (SNNs) and Spike-Timing-Dependent Plasticity (STDP) closely resemble real brain processes. Neuromorphic computing needs research projects and interdisciplinary collaboration to get over these challenges and move closer to the goal of fully autonomous and intelligent systems. This paper describes the application of neuromorphic computing to the digital transformation of public administration.*

### **Artificial Intelligence**

Artificial intelligence (AI) technology allows computers and machines to pretend mortal intelligence and problem-working tasks. The ideal specific of artificial intelligence is its capability to explain and take action to achieve a specific thing. A subset of artificial intelligence is machine literacy (ML) (Sanyal, K., Chakrabarti, R., 2020), a conception that

computer programs can automatically learn from and acclimatize to new data without mortal backing. Artificial intelligence technology allows computers and machines to pretend mortal intelligence and problem- working capabilities. Artificial intelligence technology is apparent in computers that play chess, tone- driving buses, and banking systems to descry fraudulent exertion. Neuromorphic computing is a process in which computers are designed and finagled to glass the structure and function of the mortal brain. AI enables businesses tore- imagine operations and client gests it has a plethora of capabilities that strengthen business digitalization, empowering bettered effectiveness and productivity, effective threat operation, and making room for nonstop enhancement.

**Artificial Intelligence in digital Transformation of public Administration:**

*Digital transformation is not about technology, it is about strategy and new ways of thinking.* It is a strategic initiative that incorporates digital technology across all areas of an organization. It evaluates and modernizes an organization's processes, products, operations and technology stack to enable continual, rapid, customer- driven innovation.

AI is being introduced to governments in many cities around the world and has the potential to improve various aspects of management. The main application areas of AI are:

- **Traffic control:** AI can analyze traffic patterns to optimize traffic flow and reduce congestion. As a result, travel times are reduced and emissions are reduced.
- **Energy efficiency:** AI monitors the energy consumption of buildings and public infrastructure to Areas of improvement that will help you save energy and save money.
- **Waste Management:** AI can optimize waste collection routes and identify areas with high levels of waste. This leads to more efficient waste disposal and reduced environmental impact.
- **Customer Service:** AI can provide automated support for common tasks such as citizen response. Processing queries and applications allows employees to focus on more complex tasks and Strategic work.
- **Fraud detection:** AI can analyze data from a variety of sources to identify patterns that indicate fraud. Activities such as suspicious transactions or multiple applications by the same person.
- **Public safety:** AI can be used to predict crime hotspots and identify potential crime suspects. Law enforcement agencies allocate resources more effectively and prevent crime from occurring.
- **Urban planning:** AI can analyze population growth, economic development, and data. Environmental factors for the development of more sustainable and livable cities.
- **Healthcare:** AI can be used to develop personalized patient treatment plans, improve diagnosis, and remotely monitor patient health.

- **Education:** AI can provide students with personalized learning courses, identify struggling students, and provide targeted interventions.
- **Environmental Sustainability:** AI can be used to monitor environmental conditions, track wildlife populations, and develop sustainable practices. Implementing AI in public administration has the potential to transform how government operates, improve service delivery to citizens, and improve the overall quality of life. As AI technology advances, even more innovative applications are expected to emerge that will further revolutionize the public sector

#### **Neuromorphic Computing**

The quest for more efficient and adaptive computing systems has driven interest in neuromorphic computing (Indiveri, G., & Liu, S., 2015). Traditional computing architectures, despite their successes, face limitations in power consumption, real-time processing, and scalability. Neuromorphic systems, by mimicking the brain's neural networks, offer a promising alternative. These systems are designed to achieve low-power, high-speed computation and exhibit greater adaptability, akin to biological brains (Qiao, N., Mostafa, H., & Wang, D., 2015).

#### **Trends and innovations of artificial intelligence in Public Administration**

Artificial intelligence has been around for decades in a variety of forms in niche pilot projects and applications, but it has only recently become part of our physical and virtual environments. The latest advances in artificial intelligence are being implemented to secure the future of our businesses in the age of big data. Accenture predicts that the number of AIs will double by 2035. Most jobs require interpersonal skills. These include the ability to understand and monitor visual/spatial and auditory information, reason and predict, interact with people and machines, and continuously learn and improve. Big data and analytics can be used to perform specific tasks in the same way as artificial intelligence. Information cannot solve government problems, but it is a powerful tool for improving government performance.

Leveraging Digital Transformation (DT) and Artificial Intelligence (AI) Public administration (PA) may seem like a real challenge, but it can bring unexpected benefits (Davies, T., & Franke, U., 2022). In many countries. New technologies such as artificial intelligence, virtual reality and block chain have the potential to provide creative and functional solutions in many areas, including management. For example, single invoicing, tax returns; e-invoicing, cloud government, digital education and e-government services are some of the applications that have achieved great results recently. The development of interest of various government departments in the field of intelligence is not only beneficial for government administration (Kuhn, J., 2021). It can also be applied to many government services, such as healthcare, utilities, automobiles, agriculture, climate change and financial risk management. But artificial intelligence brings new challenges to the future of work and

raises legal and ethical concerns. In general, digital management means using new communication methods. Information training applications for central and community organizations Simplify and improve the work of the management teams and Government Services.

#### **Advanced neuromorphic Computing algorithms:**

Advanced algorithms tailored for neuromorphic systems play a pivotal role in fully harnessing the potential of this groundbreaking technology. These algorithms are meticulously crafted to align with the unique architecture of neuromorphic hardware, enabling enhanced performance and efficiency beyond traditional computing paradigms (Schuman, C. D., Potok, T. E., & Patton, R. M., 2017). At the forefront of these advanced algorithms are Spiking Neural Networks (SNNs), designed to emulate the spike-based communication observed in biological neurons. Unlike conventional artificial neural networks, SNNs offer several distinct advantages. Firstly, they exhibit reduced energy consumption owing to sparse activation, where only a fraction of neurons are active at any given time. Additionally, SNNs capitalize on temporal coding, leveraging the precise timing of spikes to encode information efficiently. This temporal approach to computation enhances computational efficiency and facilitates more accurate processing of time-varying data streams. Furthermore, the integration of hybrid learning models offers a compelling avenue for advancing the versatility and efficiency of neuromorphic systems. By combining elements of supervised and unsupervised learning, these hybrid models capitalize on the strengths of both approaches. Supervised learning provides precise guidance and control over learning tasks, while unsupervised learning enables autonomous learning from raw, unlabeled data. Through the fusion of these methodologies, hybrid learning models empower neuromorphic systems to navigate diverse environments and tackle complex learning tasks with robustness and efficiency.

#### **Applications in AI and Robotics**

The potential applications of neuromorphic computing, particularly within the realms of artificial intelligence (AI) and robotics, are vast and promising, emphasizing the critical need for real-time processing and adaptability in these fields. One key area of application lies in real-time data processing, where neuromorphic systems excel in handling sensory data with remarkable efficiency. Neuromorphic computing plays a crucial role in this paradigm shift by enabling the implementation of advanced AI algorithms on edge devices, reducing reliance on cloud-based processing and enhancing data privacy. This decentralized approach not only accelerates processing speed but also ensures data security and privacy, making it well-suited for applications in healthcare, finance, and other sensitive domains.

#### **Challenges and Future Directions**

Despite the numerous advantages offered by neuromorphic computing, several challenges stand in the way of realizing its full potential, necessitating concerted efforts in

addressing these hurdles and charting future directions. Chief among these challenges is scalability, as current neuromorphic systems struggle to handle the computational demands of large-scale AI applications. To overcome this obstacle, future research endeavors must prioritize the development of scalable architectures and fabrication techniques capable of accommodating the increasing complexity of neural networks. Moreover, the lack of standardization in neuromorphic hardware and software poses a significant barrier to widespread adoption and interoperability. Establishing common standards and protocols is imperative to foster collaboration and innovation within the field, enabling seamless integration and compatibility across different platforms and implementations. Additionally, the integration of neuromorphic systems with existing AI frameworks and workflows presents another formidable challenge. Efforts are needed to devise efficient methods for integrating neuromorphic hardware and algorithms into existing AI ecosystems, ensuring compatibility and synergy between conventional computing approaches and neuromorphic paradigms.

### **Conclusion**

The use of technology in public administration is accelerating and is expected to lead to more efficient public services, lower costs and greater public participation. Neuromorphic computing represents a promising avenue for enhancing the efficiency and adaptability of AI systems. It posits that by mirroring the neural architecture of the brain, neuromorphic systems hold the key to substantial improvements in energy efficiency and real-time processing capabilities within artificial intelligence. This emulation of biological neural networks offers the tantalizing prospect of AI systems that operate with heightened efficiency and responsiveness, akin to the cognitive faculties of living organisms. The conclusion issues a call to action for continued exploration and innovation in neuromorphic computing. It highlights the transformative potential of ongoing research efforts, suggesting that with sustained commitment and ingenuity, neuromorphic computing has the capacity to revolutionize artificial intelligence. Ultimately, the conclusion paints a hopeful vision of a future where truly autonomous and intelligent systems are within reach, propelled by the advancements in neuromorphic computing.

## **“ENHANCING EMPLOYEE RETENTION IN THE IT SECTOR: STRATEGIES AND BEST PRACTICES”**

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### **ABSTRACT**

*Consistency is a key ingredient in the recipe for business success, especially in the realm of IT. It fosters trust, efficiency, and a predictable experience for both customers and employees. Good employee relations can lead to higher productivity. When employees feel valued and are treated fairly, they are more motivated to perform well. The IT industry is highly competitive, with a constant demand for skilled professionals. Strong employee relations help in retaining top talent by creating a positive work environment, offering career development opportunities, and recognizing employee contributions. This study focuses on the employee's participation in IT Companies.*

**Keywords:** Employees retention, Consistency

### **Introduction**

Consistency in business is a critical concept that encompasses various aspects, from decision-making to operational practices, customer service, and branding. Consistency helps in building trust, reliability, and a strong reputation, which are essential for long-term success. Below is a theoretical framework outlining the importance of consistency in business and how it can be achieved. Ensuring employees understand and buy into the company's vision and mission fosters alignment in their actions and decisions. Regular communication of organizational goals helps employees see how their roles contribute to the bigger picture. Regular updates to training programs ensure that employees are aware of any changes in processes or standards.

### **Scope of the Study**

The scope of the study is to find out the employees retention in IT Sector particularly Multinational Companies. It covers the demographic profile of the Employees, learn about the initiatives that support a healthy work-life balance, find out the Enhanced Problem-Solving and Decision-Making.

### **Statement of Problem**

Insufficient understanding of services, or processes. Employees may be unclear about expectations. Poor management can contribute to employee departures. Without performance management. A lack of inclusion can lead to a negative work environment.

### OBJECTIVES OF THE STUDY

1. To study the socio-economic profile of the respondents.
2. To learn about the initiatives that support a healthy work-life balance
3. To find out the Enhanced Problem-Solving and Decision-Making

### Review of Literature

**Charles R. Greer, Marry Anne Dorland Castro (1986)** their study examines the functional relationship between occupational stress and perceived unit effectiveness. A regression analysis of these responses which controlled for individual and organizational differences-found that perceived unit effectiveness was negatively related to occupational stress and positively related to age. Nonetheless, the researchers point out that research on the relationship between occupational stress and perceived unit effectiveness should control for the effects of individual characteristics.

**Roland P. Chaplain (2001)** in his study has investigated the levels of perceived stress and job satisfaction among primary head teachers. Around half reported high levels of occupational stress but some half were satisfied with their work. Sources of stress and job satisfaction were examined under four headings: managing oneself and others; managing finances; managing the curriculum; and managing change. Multivariate analyses revealed that predictors of physical and mental ill health and job dissatisfaction were type .A behaviour and demands of the professional respectively.

### RESEARCH METHODOLOGY

**Research Type:** Descriptive research

### PRIMARY DATA

When it comes to data collection there are two methods in general used by researcher to collect data namely primary and secondary method. Primary data are collected by conducting field investigation with the help of well-designed questionnaire and personal interview. it is mainly collected to know about the consistency in business. The participants were instructed to answer the questions posed in the questionnaire to the best of their knowledge.

### SECONDARY DATA

In this study the researcher has collected the secondary data from books, magazines, websites, journals etc.

### ANALYSIS AND INTERPRETATION

**Table 1**  
**GENDER OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Gender	Male	35	70
	Female	15	30
<b>Total</b>		<b>50</b>	<b>100</b>

**Source: Primary Data**

Out of 50 respondents, 70% of the respondents are Male and 30% of the Respondents are female.

**Table 2**  
**AGE OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Age	21-30 years	20	40
	31-40 years	15	30
	41-50 years	10	20
	Above 50	5	10
<b>Total</b>		<b>50</b>	<b>100</b>

**Source: Primary Data**

Out of 50 Respondents 40% of them are age group between 21-30 Years, 30% of the Respondents are in the age group between 31-40 years, 20% of the respondents are in the age group between 41-50 years and 10% of the respondents are above 50 years.

**Table 3**  
**EDUCATIONAL QUALIFICATION OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Educational qualification	Under Graduate	30	60
	Post Graduate	20	40
<b>Total</b>		<b>50</b>	<b>100</b>

**Source: Primary Data**

Out of 50 Respondents 60% of them are Under Graduate and 40% of the Respondents are Post Graduate.

**Table 4**  
**MONTHLY INCOME OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Monthly Income	Upto 25,000	5	10
	Rs.25001-60000	15	30
	Rs.60001-100000	20	40
	Above Rs.100000	10	20
<b>Total</b>		<b>50</b>	<b>100</b>

Source: Primary Data



Out of 50 Respondents 10% of the Respondents are Monthly Income Upto 25000,30% of the respondents are under group 25001-60000,40% of the respondents are under group 60001-100000,20% of the respondents monthly Income are Above 100000.

**Table 5**  
**MARITAL STATUS OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Marital status	Married	13	26
	Unmarried	37	74
<b>Total</b>		<b>50</b>	<b>100</b>

Source: Primary Data

Out of 50 Respondents 26% of the respondents are Married and 74% of the Respondents are Unmarried.

**Table 6**  
**YEARS OF WORKING OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Years of Working	1-2 yrs	15	30
	2-5 Yrs	5	10
	Above 5 Yrs	30	60
<b>Total</b>		<b>50</b>	<b>100</b>

Source: Primary Data

Out of 50 Respondents 30% of the Respondents are working 1-2 years,10% of the Respondents are working 2-5 yrs and 60% of the Respondents are working more than 5 years.

**Table 7**  
**HEALTHY LIFE STYLE OF THE RESPONDENTS**

Demographic variables	Categories	No. of respondents	Percentage
Do you feel you have a healthy life style	YES	30	60
	NO	20	40
<b>Total</b>		<b>50</b>	<b>100</b>

Source: Primary Data

Out of 50 respondents 60% of the respondents are feeling that they have a healthy Life style and 40% of the respondents are feeling that do not having a Healthy Life Style.

**Table 8**  
**WORK LIFE BALANCE OF THE RESPONDENTS**

<b>WORK LIFE BALANCE INITIATIVES</b>	<b>TOTAL</b>	<b>MEAN SCORE</b>	<b>RANK</b>
Flexible work arrangements	255	5.01	1
Paid time off	231	4.62	2
On-site wellness programs	215	4.03	5
Employee assistance programs	245	4.09	4
Company-sponsored social events	208	4.16	3

Source: Primary Data

Out of 50 respondents The first rank is Flexible work arrangements with the mean score of 5.1, the Second Rank is Paid time off with mean score of 4.62, the Third rank is Company-sponsored social events with the mean score of 4.16, the fourth rank is Employee assistance programs with the mean score of 4.9, the fifth rank is On-site wellness programs with the mean score of 4.3.

**Table 9**  
**ENHANCED PROBLEM SOLVING AND DECISION MAKING**

<b>Sl. No</b>	<b>FACTORS</b>	<b>NO OF RESPONDENTS</b>	<b>PERCENTAGE</b>
1	Self-Efficacy	5	10
2	Personality Traits	4	8
3	Cognitive abilities	4	8
4	Organizational culture	7	14
5	Resource availability	5	10
6	Problem-solving skills training	10	20
7	Creativity	15	30
<b>Total</b>		<b>50</b>	<b>100</b>

SOURCE: Primary Data

Out of 50 Respondents, 10% of the respondents are selected Self-Efficacy, 8% of the respondents are selected Personality Traits, 8% of the respondents are selected Cognitive abilities, 14% of the respondents are selected Organizational culture, 10% of the respondents are selected Resource availability, 20% of the respondents are selected Problem-solving skills training and 30% of the respondents are selected Creativity.

**Table 10**  
**COMPANY INITIATIVE TO RETAIN EMPLOYEES**

S.No	FACTORS	SA (5)	A (4)	N (3)	D (2)	SD (1)	TOTAL	Weighted Score
1	Fair Salaries	15	20	5	5	-	200	40
2	Training Programmes	5	5	15	15	10	130	26
3	Mentorship Programmes	10	20	15	5	5	190	35
4	Team Building:	10	20	15	5	-	185	37
5	Employee Recognition Programs	15	20	10	3	2	193	38.6
6	Incentives and Bonuses	10	20	15	5	5	190	35
7	Involvement in Decision- Making	15	20	10	5	-	195	39

SOURCE: PRIMARY DATA

The above table reflects that out of these all factors Fair Salaries with highest average 40 next to that Involvement in Decision-Making average of 39 and Employee Recognition Programs with average of 38.6.

**FINDINGS**

1. It is found that majority 70 per cent of the respondents are Male.
2. It is found that majority 40 per cent of the respondents are completed their Age 21 to 30 years.
3. It is observed that majority 60 percent of the respondents are Under graduate.
4. It is found that majority 40 per cent of the respondents Monthly Income is Rs 60001-100000
5. It is found that majority 74 per cent of the respondents are Unmarried
6. It is observed that majority 60 percent of the respondents are working for more than 5 yrs.
7. It is observed that 60 percent of the respondents have healthy life style.
8. It is found Flexible work arrangements was ranked 1<sup>st</sup> with the mean score of 5.01 due to work life balance initiatives.

9. It is observed that Creativity witnessed 30 percent in enhancing problem solving and decision making.

10. It is observed that Fair salaries with highest range of 40.

#### **SUGGESTIONS:**

Ensure salaries and benefits are competitive with industry standards. This includes health benefits, retirement plans, and bonuses. Create a supportive and inclusive workplace culture. Recognize achievements, promote work-life balance, and address any workplace issues promptly. Provide flexible work schedules, remote working options, and encourage employees to take time off to recharge. Establish mentorship programs where senior employees can guide and support newer or less experienced staff members. Encourage Team work across different departments and teams.

#### **CONCLUSION**

Consistency in an IT company is essential for building trust, ensuring quality, achieving operational efficiency, and fostering innovation. By maintaining uniform standards and practices, the company can deliver reliable and high-quality services, leading to increased customer satisfaction and loyalty. Strong leadership, clear communication, ongoing training, and a culture of recognition and continuous improvement are key to achieving and sustaining consistency. Balancing consistency with adaptability allows the company to stay competitive and responsive to technological advancements and market changes. This balanced approach is crucial for long-term success in the dynamic IT industry.

## **ENVIRONMENTAL FRIENDLY PRODUCTS AND SUSTAINABLE DEVELOPMENT**

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#### **Abstract**

*The issue of climate change, global warming and environmental damage caused by the production process lead to many changes in manufacturing technology, in the understanding of environmental concern or environmental awareness. The pressing need to address environmental degradation and climate change has spotlighted the critical role of environmentally friendly products in achieving sustainable development. This abstract delves into the intersection of these products and sustainable development, highlighting their potential to reduce environmental impact while fostering economic and social well-being. Environmentally friendly products are designed to minimize harm to the environment*

*throughout their lifecycle, from production to disposal. They incorporate sustainable materials, energy efficiency, and waste reduction strategies, embodying the principles of the circular economy. By substituting conventional products with eco-friendly alternatives, significant reductions in greenhouse gas emissions, resource consumption, and pollution can be achieved. The promotion of these products is pivotal in advancing sustainable consumption and production patterns, as outlined in the United Nations' Sustainable Development Goals (SDGs). The role of green innovation, consumer awareness, and regulatory frameworks in driving the adoption of environmentally friendly products is discussed, emphasizing the need for a multi-faceted approach that includes technological advancements, policy interventions, and shifts in consumer behavior. The integration of environmentally friendly products into market systems not only supports environmental sustainability but also enhances economic resilience by creating green jobs and fostering new business opportunities.*

**Keywords:** Environmentally Friendly Products, Sustainable Development, Eco-friendly, Green products

### **Introduction**

Environmental friendly products, also known as Eco-friendly or green or natural friendly products are designed to have a minimal impact on the environment throughout their lifecycle from production and use to disposal. These products aim to reduce resource consumption, lower emissions, and minimize waste. They are created using sustainable materials, eco-conscious manufacturing processes, and often focus on recyclability and biodegradability. Examples: Reusable Items, Organic Products, Energy, Efficient Products. Sustainable development is a holistic approach that seeks to balance economic growth, environmental protection, and social well-being. It aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. This concept is often summarized by the three pillars: Economic Sustainability, Environmental Sustainability, and Social Sustainability.

Eco-friendly products are a critical component of sustainable development. They help reduce the environmental footprint of consumption and production patterns, contributing to a more sustainable economy. By adopting eco-friendly products, consumers and businesses can support sustainable practices, reduce waste, and foster the use of renewable resources. Sustainable green economy is the need of time, and eco-friendly products can play a decisive role in this goal. Low consumption of eco-friendly products is a serious concern of researchers and policymakers.

### **Objectives of Study**

1. Sustainable development through Eco-friendly products
2. To increase the consumption of eco-friendly products
3. To know about the benefits of eco-friendly products

### **The Intersection of Eco-Friendly Products and Sustainable Development:**

Environmental friendly products are market oriented products that cause minimal environmental degradation and their production is linked to a product development process that is structured in a way that considers the impacts can be caused to the environment throughout their lifecycle. Sustainable development strategies incorporate the use of eco-friendly products in various sectors, including:

1. **Agriculture:** Organic farming and sustainable fisheries.
2. **Energy:** Renewable energy sources like solar, wind, and hydroelectric power.
3. **Transport:** Electric vehicles and sustainable public transport systems.
4. **Building:** Green building materials and energy-efficient construction practices.

### **Pros of Using Eco- friendly Products:**

#### **1. Pollution Reduction:**

This is the most well- known and biggest advantage of using such products. They help reduce the amount of toxic wastes and non-degradable substances on the planet which means less pollution. Some ways to help with this are using a filter on your tap water and using cloth diapers instead of disposables.

#### **2. Personal health:**

Plastic substances and such other items we use can produce many health issues, due to the chemicals present in them, right from the time of manufacture to the time it becomes an end product. Switching to eco-friendly items can eliminate this fear and make OUR lives greener and fresher. Look for items that don't contain BPA, phthalates, and other harmful chemicals.

#### **3. Long term savings:**

If we are looking for some savings in the long run, then eco-friendly products are a good way to go. Many of them are also quite energy efficient. Products like solar panels and electric or hybrid cars can save you a lot on energy costs. Something as simple as switching out your incandescent bulbs with CFL or LED bulbs can help save money with reduced energy consumption. Energy efficiency:

Most eco-friendly products are designed to consume less energy, whether it's household appliances, vehicles, or lighting solutions. This not only lowers carbon emissions but also reduces energy bills for consumers in the long run.

#### **4. Economic benefits:**

The growth of the eco-friendly market creates new jobs and opportunities for businesses. In addition, consumers are drawn to eco-friendly products, leading to increased sales and profits for companies that prioritize sustainability.

## **Cons of Using Eco-friendly Product:**

### **1. Limited availability:**

The first and foremost problem we may face when looking for eco-friendly products is where to find them. Finding the best eco-friendly products that can suit our requirements may not be such an easy job. Sometimes you have to go to smaller stores or online to find products that are eco-friendly.

### **2. Initial Cost:**

In the case of bigger eco-friendly products like the solar panel or the electric or hybrid car, we may find that the initial cost needed to buy them would be far more compared to a normal mass market product. This can act as a hindrance if we are on a low budget, but this doesn't necessarily apply to smaller products or for those people who are prepared to spend more to make green changes in their life.

### **3. Implementation:**

It can be hard to make changes to our routine. The intention to go green is much easier than actually doing so. It's best to start with small changes, such as changing light bulbs or buying reusable shopping bags instead of using plastic. Also many people are now realizing the cost-savings for going green in many aspects of their lives, and with more and more eco-friendly products coming to market; it will get easier and less expensive.

### **4. Performance concerns:**

Some eco-friendly products may not perform as well as their traditional counterparts. For instance, low-flow showerheads may provide water savings but might not give the same water pressure as regular showerheads. This can deter consumers from investing in eco-friendly options.

### **5. Lack of awareness and education:**

Many consumers are not fully aware of the benefits of eco-friendly products or are not educated enough about the environmental impact of their purchasing choices. This can lead to a lack of demand for eco-friendly options, hindering their widespread adoption.

## **Challenges and Opportunities:**

While sustainable development practices offer numerous benefits, they are not without challenges. One of the main obstacles is the initial investment required for adopting environmentally friendly technologies and processes. Companies may face resistance to change, especially if short-term costs are perceived as prohibitive. However, the long-term gains in terms of cost savings, brand reputation, and regulatory compliance often outweigh the initial expenditures.

Another challenge lies in the complexity of global supply chains. Ensuring sustainability across diverse geographies and cultures demands coordinated efforts and clear communication throughout the supply chain. Collaboration with suppliers, stakeholders, and regulatory bodies is essential to address these complexities and drive positive change.

Opportunities abound for businesses and industry to lead the way in sustainable development. Consumer preferences are shifting towards ethically produced and environmentally friendly products. Companies that proactively embrace sustainable practices not only meet consumer demand but also position themselves as industry leaders, gaining a competitive edge in the market.

The transition to eco-friendly products and sustainable development involves challenges such as:

- **Higher Initial Costs:** Many eco-friendly products can be more expensive upfront compared to traditional alternatives.
- **Market Adoption:** Encouraging widespread adoption among consumers and businesses.
- **Regulatory Barriers:** Navigating and implementing supportive policies and regulations.

However, the opportunities are significant, including:

- **Innovation:** Development of new technologies and products that are both environmentally and economically viable.
- **Job Creation:** Growth in green industries and sustainable practices can create new employment opportunities.

#### **Eco efficiency programs:**

Eco-efficiency refers to the delivery of goods and services to meet human needs and improve quality of life while progressively reducing their environmental impacts of goods and resource intensity during their life-cycle.

These include programs to improve the business environment such as:

- ✓ Energy use (Sources and efficiency)
- ✓ Water use (sources, efficiency, release and conservation)
- ✓ Waste reduction (toxicity elimination, design for the environment, and recycling)
- ✓ Materials use (reuse, sources and closed loop design)
- ✓ Social community and impact

#### **Eco-friendly products vs Sustainable development**

##### **1. Definition:**

- Eco-friendly is a term used to describe a product or activity that does no harm to the environment.
- Sustainable is a term used to describe an activity or products that will not cause harm or damage to future generations.

##### **2. Examples:**

- Examples of eco-friendly include recycling activities and using cloth shopping bags instead of plastic.
- Examples of sustainable activities include not overfishing to ensure that there will be fish available in the future.



**3. Focus is on the future:**

- Eco-friendly does not necessarily mean that products will be sustainable; in other words, the future is not considered.
- Sustainable is based on the idea that actions and products will not be harmful in the future.

**4. Pros:**

- The benefits of eco-friendly items and activities are that they are good for the environment and will not pollute the environment.
- The benefits of sustainable products and activities are that they will not harm the environment and generations in the future.

**5. Cons:**

- Eco-friendly products may be more expensive and more inconvenient to use compared with traditional products.
- Sustainable products and activities may be more expensive and it requires government cooperation, which may be difficult to always achieve.

**Conclusion:**

The transition to environmentally friendly products is integral to sustainable development, necessitating collaborative efforts across sectors to achieve a balanced and equitable approach to environmental stewardship and economic growth. Future research should focus on scaling green innovations, optimizing supply chains for sustainability, and developing metrics to measure the impact of eco-friendly products on sustainable development outcomes.

Sustainable product development is a growing trend in the manufacturing and engineering industries and provides numerous benefits. Not only does sustainable product development lead to cost savings, but it also helps to reduce a business's environmental impact, increase customer satisfaction, and lead to improved public reputation.

Additionally, this practice encourages businesses to innovate, resulting in the creation of more efficient and sustainable products. Therefore, sustainable product development is an essential practice for businesses looking to improve their operations and become more eco-friendly.

## **THE FUTURE OF WORK-EMPLOYER BRANDING IN INDUSTRY 5.0**

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### **Abstract**

*The role of technology is highly inevitable and grows in a threatening way/ Industry 5.0 is all about human centric approach and a collaborative environment where humans work with machines. The study identifies the role of Employer Branding strategies in the era of Industry 5.0. It is a known fact that technology is witnessing a tremendous growth in all the fields. The study also highlights the emerging trends in Employer Branding strategies in relation to the technological advancement that is prevailing in industry 5.0. The study also explores the numerous benefits that can be availed by implementing the Employer Branding practices to the technological environment in the business of industry 5.0.*

**Key words- Employer Branding, Technology, Industry 5.0**

### **Introduction**

The role of technology is unavoidable in these days. It is an ultimate requirement to adapt with technology and is equally important to update with relevant technology for any business to survive in the industry .Industry 5.0 clearly shows that the collaboration of Men and Machines is a compelling factor and it can do wonders Employer Branding acts as a tool to attract and retain the creamy layer Every business is facing a great challenge to retain the top talent force in the organization and it is becoming a more complex problem in industry 5.0. the role of technological advancement in association with Employer Branding helps to touch greater heights of a business.

### **Objectives of the study**

- To understand the influence of Employer Branding strategies in Industry 5.0
- To identify the emerging trends in Employer Branding for technologically advance industries.
- To explore the benefits associated with Employer Branding in Industry 5.0

### **Influence of Employer branding strategies in Industry 5.0**

Incorporating technology with Employer Branding helps to attract the creamy layer of employees for the organization. It also encourages and motivates the skilled professionals to join hands with the organization. By doing this the business can prove itself in the industry and enjoys the privilege of having the best employees and becoming the Employer of Choice.

Employer Branding assures a sense of loyalty to the workers and transform themselves as a brand ambassador of the organization. This in turn brings in more

knowledgeable and skilled personnel inside the organization. Employer Branding helps to improve the level of Employee engagement and it also enhances the overall satisfaction level of the employees.

Human centric innovation is the core of Industry 5.0. The strategies of Employer emphasize the physical well being and mental well being of the employees. It also strives to align with ethos. It also offers a sense of commitment by the organization to the working environment in the scenario of Industry 5.0.

The strategies of Employer Branding help to communicate the vision. Mission and values of the organization to the employees which paves way for the easy achievement of the goals of the organization. The Employer Branding also highlights the commitment of the organization towards the innovation which is the need of the hour. It is no doubt that it can attract dynamic, enthusiastic and forward thinking personnel for the organization.

Employer Branding also offers an opportunity for continuous which is an essential requirement and result in the updating of knowledge as well as the needs of the employees. Using social media and other digital platforms helps to reach a broader target group of audience. In Industry 5.0, flexible working hours and remote work is becoming more common and it would really inspire a talent group of people in particular the organization will be given preference by women employees and research studies also proves this fact

#### **Employer Branding and Technology**

Industry 5.0 deals with the integration of human skills with the modern technology. In almost every field technology is proving itself and it is understood that it is better to go with the improvements of technology rather than complaining about the hardships.

Employer Branding techniques in collaboration with Artificial Intelligence techniques really helps to understand the changing needs of the existing as well as the prospective employees which is the need of the hour. It helps to attract the top talents in the industry and it is a known fact that they have a great demand in the industry.

Companies through its digital presence can inspire Gen Z employees in a much better way Technology offers personalized experience for employees. Data analytics can measure the effectiveness of Employer Branding strategies and it allows taking necessary measures for further improvement. By highlighting the nature of technology the organization can attract the group of people who are very much interested to work with the technological advancements.

#### **Benefits associated with Employer Branding in Industry 5.0**

Employer Branding helps to create a sense of belongingness among employees which turn them into brand ambassadors of the organization. It helps to streamline the recruitment and fosters a technology driven environment in the organization. In Industry 5.0 a strong Employer Brand helps to attract innovative thinkers who will play a crucial role to bring in success for the organization.

Employer branding helps to place the organization in a better position and to a great extent it helps to manage a situation of crisis in which any business revolve around. It also helps in the alignment of employee goals with that of the organizational goals where easy achievement of the goals is possible.

Employer Branding activities not only reduces the cost of recruitment but on the other hand it encourages as many applications at the time of recruitment where the chance of getting the most top talented employee for the organization. It also enables to reduce the labor turnover in the organization which also offers numerous benefits to the organization.

### **Conclusion**

Employer Branding in Industry 5.0 is highly essential in evolving landscape. It plays a major role in technology driven work environment which is of important aspect to attract as well as to retain the top talents for a longer period of time which offers numerous benefits. Integration of Employer Branding practices and communicating them to the employees will help the update them and they will try to communicate with the prospective employees. Employer Branding will try to balance technological innovation without compromising human values. Innovative and holistic approach helps to have a shift towards modern workforce in Industry 5.0.

## **SUSTAINABLE ISSUES OF TEXTILE INDUSTRY IN INDIA**

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### **Abstract**

*The textile industry a major contributor for the GDP of the nation is also a waste generating industry which pollutes land, water and air. So, sustainability has become a prominent word in the manufacturing sector for the healthy survival of both present and future generations in terms of pollution and environment protection. The study aimed to find the root causes of pollution and pollutants which are harming the environment. The study also focuses on the importance of sustainable practices implemented in the organization for the healthy safeguard of the environment and society as a whole. The study is mainly conducted by analyzing the previous recent year studies on sustainable production and manufacturing and topics related to achieving sustainability in the textile industry.*

**Keywords:** Green initiatives, Pollution, Sustainable fashion products, Sustainable Production, Textile industry.

### **Introduction**

India is the 3<sup>rd</sup> largest exporter of Textiles & Apparel in the world and is one of the mainstays of the national economy. The share of textile and apparel (T&A) including handicrafts in India's exports stood at a significant 10.5% in 2021-22. India has a share of

4.6% of the global trade in textiles and apparel. The industry provides direct and indirect employment to majority of the rural population and women.( Source: Annual report 2022-2023, Ministry of Textile, Government of India, 2023). The main advantage of the Indian textile industry is its robust production base, which can handle a wide variety of yarns and fibers, including synthetic (like polyester, viscose, nylon, and acrylic) and natural (like cotton, jute, silk, and wool).

The United Nations' 2030 Agenda for Sustainable progress gives a comprehensive and ambitious vision of the components for social, economic, and environmental progress. This vision's objectives also include improving sustainability in the textile sector, which emphasizes how vital it is to reconsider traditional dyeing techniques. Sustainable textile production is defined as the production process that would help to meet environmentally friendly materials and processes, from input to output to meet the healthy and safe for people and the environment at all stages at the various life cycle of production. Production and processing of sustainable textiles when produced and processed by renewable or recycled sources not only help to reduce the negative impacts to the environment but can also support millions of workers to earn fair and ensure proper working conditions.

**Export details of Textiles & Apparel**

Values in Mn USD	2019-20	2020-21	2021-22	2021-22 (Apr-Dec)	2022-23 (Apr-Dec)	(Provisional) % Change
India's Export of Textile & Apparel	33,379	29,877	42,347	30,455	25,837	-15.2%
Export of Handicrafts	1,798	1,708	2,088	1,579	1,289	-18.4%
Total Export of T&A including Handicrafts	35,177	31,585	44,435	32,034	27,126	-15.3%
India's overall merchandise exports	3,13,361	2,91,808	4,22,004	3,05,043	3,32,762	9.1%
% share of T&A Exports (incl. Handicrafts) of overall merchandise exports	11.2%	10.8%	10.5%	10.5%	8.2%	

Source : (Annual report 2022-2023,Ministry of Textile,Government of India, 2023)

## **Theoretical Framework**

### **Sustainability in textile industry**

The fashion industry is among the many areas of the economy where sustainability has gained significant relevance in recent times. Sustainability-wise, the textile sector has seen significant transformation in recent years, emerging as a more health-conscious option to conventional fashion. The industry has implemented methods and approaches that lessen their negative effects on the environment and uphold employees' human rights. Making textiles and apparel in an ecologically and socially conscious way has become fashionable. We go over the fundamentals and traits of sustainability in the textile business, as well as how to attain it and the significance of changing the textile sector to become more sustainable in today's world.

Sustainable textile industry transformation prioritizes ethical supply chains, minimizing the impact of production, enhancing working conditions, and adhering to social and environmental standards.

### **Review of Literature**

The textile and garment industries caused environmental damage at every stage of manufacturing, from the cultivation of raw materials till the disposal of final goods to the customer. The key environmental related issues in the industry are Chemical loading, high water consumption, high energy consumption, air pollution, solid waste, and odour creation. Textile manufacturing adversely affects the environment due to frequent and relatively large GHG emissions, water withdrawal, and the release of toxins into our ecosystem. So eco-friendly products to be created and utilized by adopting environmental friendly agricultural and manufacturing processes, so that harmful effects of toxic chemicals on human health could be minimized. (Islam et al., 2022)

Sustainable bamboo fiber reinforced polymeric composites (BFRCs) can be used because of its rapid growth, renewability, and minimal environmental effect, bamboo has emerged as a viable contender has a high response for growing increasing demand for eco-friendly materials for a wide range of sectors. Bamboo a renewable and ecological material popularly USED in various sectors like building, furniture, and textiles because of its excellent mechanical qualities, including high tensile strength, stiffness, and toughness. Bamboo fiber is a sustainable alternative to conventional materials and would contributes for environmentally friendly and sustainable future and for technological advancements and ongoing research (Hasan et al., 2023).

Green Supply Chain Management (GSCM) is a vital way to achieve sustainable operations by reducing environmental impact and improving operational performance. Even though conventional supply chain practices exist, if integrated with eco-friendly practices

through green supply chain management (GSC industries mainly textile sector could significantly reduce their environmental footprint across all processes and operations. Till now textile industries are unwilling to adopt green supply chain processes due to the presence of main barriers like organizational, financial, marketing and information technology , then various GSCM strategies like Coordination and collaboration among industries and suppliers, Supplier commitment to reverse logistics, Sustainable resource management, Increasing the research and development capacity, Developing green planning and policies, Green purchasing and packaging of the material, Financial incentives and subsidies, Organizing awareness and training, Realizing economics and social benefits, Developing an environmental management system could be implemented for the sustainable well-being of the industry (Jianguo & Solangi, 2023).

Fashion and textile products undergo various process starting from fiber to yarn, yarn to fabric and ending to fabric to garment. Most of the fashion and textile producers are not much concerned to sustainable practices in each of process of development of garment. But now many of the textile units are mainly focusing on sustainability practices in the production lines due to increased consumer awareness on cost effective sustainable products. Fashion items manufactured using sustainable practices would contribute for environmental, social, and economic well-being thereby achieving green earth in the near future. Selecting sustainable fashion products would minimize waste by recycle and reuse option, so that wastage that goes to landfill will be reduced. Educate consumers on the need and importance of sustainable products by arranging awareness training session on the importance of those products, the huge positive impact it will bring on the environment and how well it could reduce pollution (Nayak, 2019).

Some of the challenges the garment industry faced while implementing sustainable practices are supply chain mainly fragmented due to the presence of organized mills and unorganized power looms, high cost of production, difficulty in designing and developing recyclable clothes, government policies were not properly followed ,no proper skilled labours for implementing green practices, no technology advancement, lacked proper infrastructure and high cost of sustainable products which are not affordable by most of the consumers (Nikam, 2023) .

To achieve sustainability some measures should be adopted in the textile industry. Fashion designers should give emphasis on durability of the product by using the sustainable materials which are long lasting and incorporate some attachments which would attract the customers. By doing so fashion designers can achieve two strategies one is emotional durability and the other is co-creation. Workers should also be treated fairly. Some other

measures include usage of renewable energy, minimum use of fossil fuel, energy efficient techniques to be made available and focus on circular economy. As a result industry would be able to offer opportunities to consumers as well as tackle the environmental impact. Create a new economic model needed to be in place, one that would support both sustainability and growth. (Patwary, 2020).

The drivers of sustainable manufacturing are level of six sigma implementation and level of supply chain integration, usage of ecofriendly raw materials thereby operational efficiency could be achieved by reducing wastage, pollution and emissions (Fargani et al., 2016).

### **Statement of the Problem**

Second-largest textile and apparel producer in the world is India , as well as the world's largest cotton textile producer (Source: Annual Report 2022-2023, Ministry of Textiles, Government of India, 2023). The textile production has various stages starting from spinning, knitting, weaving and ending till garment production. All these stages are associated with wet treatment processes and dry processes. The treatment includes sizing, resizing, scouring, bleaching, mercerizing, dyeing, printing and finishing operations. The industry emits a large volume of pollutants in all stages in the processing of fibers, fabrics and garment production in the form of solid waste, waste water generation in the form of effluents, greenhouse gas emissions, various other air emissions and noise pollution. The major pollutant of the industry is the water wastage since the industry consumes more water. Wastewater contains more chemicals and it is harmful for humans and aquatic life. The total water consumed by various types of fabrics varies from industry to industry based on the dyeing process and on the basis of the type of fabric produced. In fact, it was found that 38 % of water was used at the bleaching process, 16 % in dyeing, 8% in printing, 14 % in boiler and 24 % for other purposes. (Source: Al-Sakkaf et al., 2020)As a result of various processes, a significant quantity of pollutants are released, well above the specified standards and contained a large amount of dyes and other related which would harm the environment. So, the need for sustainable practices is must in textile industry since fashion trend is changing day by day and the fashion products are huge in demand. So, if no sustainable practices are introduced, textile industry would harm the environment since it the most pollutant releasing sector.

### **Objectives of the study**

1. To find out the importance of sustainable practices in the textile industry.
2. To find the issues faced by the industry in implementing sustainable practices.

### **Research Methodology**

Here methodology used was to review the articles based on sustainable practices and its challenges from various databases mainly from Scopus and web of science. The study identified some articles which are relevant to the topic so that a correct insight into the topic



can be delivered. Even though a small number of articles are reviewed, the papers reviewed are mainly focusing on importance of the sustainable practices in the present world where do importance is given for sustainable growth and development and these articles can be used as a reference for future research work. The articles also helped to gain idea of theories and concepts relating to the study.

### **Sustainable practices**

Sustainability mainly covers three important aspects namely: environmental, social, and economic. Environmental aspect focuses on creating ecological value and resource saving by using biodegradable materials and renewable energy. The social aspect rely on the customers attitude by giving due importance to aesthetic and culture. The economic aspect considers the profit of the sector. Sustainability thus helped to reduce the waste in the form of solid materials as well reduce effluents released into the water in the form of chemicals, facilitate the pollution emission as well helps for effective usage of resources.

In case of textile industry for achieving sustainability, raw material mainly used should be organic cotton than synthetic fibers, usage of natural dyes to be promoted, upgrade to new technologies to ensure efficient utilization of natural resources.

### **Results and Discussion**

Most of the studies reveal that the textile industry is one of the industries which is releasing major pollutants into the environment causing harm to both environment and living beings in the nature. So sustainable practices to be implemented in each and every stage of manufacturing from procurement, production till the release of product. Reduce, Recycle and Reuse (3Rs) policies when implemented in the textile industry enable firms to achieve sustainability.

Even though government is promoting green initiatives for achieving sustainable development goals by 2030 industry is facing a lot of challenges in implementing sustainable practices. Some of the issues faced by textile industry faare as follows.

1. Water pollution is a major challenge since the industry uses a large amount of water at every stage of the production process. The effluents discharged from textile mills which are not treated properly are the major contributors for water pollution in India and across the globe.
2. Usage of toxic chemicals in the form of dyes, finishes and bleaches are directly disposed to waterways cause serious harm to human health.
3. No proper waste management practices for wastage such as fabric scraps, trimming and other manufacturing related waste which pave a way for landfills and destroy fresh water.

4. Workers are being exploited in the textile sector by paying low wages, no safe working conditions and working hours are long.
5. Transparency is lacking in the supply chain of textile industry so that it is difficult to identify environmental and social issues.
6. Customers are not aware of sustainable fashion and its importance.
7. Sustainable materials for producing sustainable products are limited and import of such materials is expensive.
8. Sustainable production is expensive due to the use of organic materials.
9. Government support is lacking and as a result it is difficult for firms to find funding and resources.
10. Fashion culture is changing at a fast pace so that it is difficult for textile industry to make sustainable clothes quickly and at a cheap rate.

### **Solutions**

Many solutions are being addressed by the government of India to promote for sustainable fashion products by promoting sustainable productions.

1. Sustainable raw materials like organic cotton, bamboo and recycled polyester is produced in India for producing sustainable fashion.
2. Indian textile firms recycle and up cycle textile waste to produce new products namely bags and other accessories.
3. Natural dyes are produced to replace synthetic dyes from plant barks even from jack tree and from herbs to minimize the toxic chemicals in production.
4. Introducing circular fashion so that clothes are taken back and repair services are provided so that textile waste can be reduced
5. Campaigns are to be conducted to make aware the customer's importance of sustainable fashion and how it helps in protecting environment and society.
6. Local artisans can be collaborated with modern manufacturing so that traditional skills can be preserved and they help to make unique and sustainable products based on trends.
7. Ecofriendly materials should be used for packaging of fashion products.
8. Effluent treatment plants should be installed in textile processing units so that waste water can be recycled and can be used for agriculture.
9. Launching various initiatives by the government of India for promoting sustainable fashions. Government is planning for setting up PM- MITRA Parks in various states in India for improving the concept of sustainability in textile industry there by achieving the United Nations Sustainable Development Goal 9 ("Build resilient infrastructure, promote sustainable industrialization and foster innovation") (Annual Report 2022-2023, Ministry of Textiles, Government of India, 2023).

### **Conclusions**

The study was conducted by analyzing the studies related to the topic sustainable practices of textile industry even in India and across the globe. To achieve sustainability in textile industry clothes to be prepared from natural fibers which are having quality. Water usage also is serious concern to the industry. Effluents discharged should be treated properly so that contamination of water resources can be reduced. Usage of dyes for coloring and pigmentation in clothes is another matter of concern. Synthetic dyes are replaced by natural dyes which are made from plants, herbs and bark of trees including bark of jack tree which is abundant in Kerala, a State in India.

Emission of gases is another serious threat to the industry since the greenhouse gas emission paved way for climatic change. Recycling of finished products which are landfills if not reprocessed. Awareness campaigns on the importance of sustainable fashion choices should be given more priority. Reduce recycle and reuse of wastage and used clothes for achieving sustainability should be given more importance. Energy efficiency can be achieved by relying on renewable energy sources. Sustainability and sustainable production and manufacturing practices together helps the Textile Industry to reduce the pollution and also helps to find out the huge positive impact sustainable practices bring on in environment and society at large.

### **Declaration of Conflicting Interests**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this articles.

## **“DIGITAL HARVEST: TRANSFORMING AGRICULTURE WITH TECHNOLOGY”**

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### **Abstract**

*Over the past decades, The Agriculture Sector has undergone a significant transformation fuelled by technological advancements. The integration of technology in agriculture has Revolutionized.*

*Traditional farming practices, leading to increased efficiency, productivity, and sustainability. Technologies such as precision agriculture, drones, and data analytics have enabled farmers to make data-driven decisions, optimise resource usage, and monitor crop health in real-time. This digital transformation has not only improved yields but also*

*minimised environmental impact by reducing water and chemical usage. Furthermore, the adoption of automation and robotics has streamlined labour- Intensive task, Making farming operations more cost-effective. As we move forward, the agriculture sector continues to evolve, embracing innovation to meet the growing demands of a changing world. The integration of technology in agriculture has indeed brought about remarkable changes in sector. This technological revolution in agriculture continues to unfold, promising a future where innovation drives growth and sustainability in the sector.*

*Keywords: Technology transformation, Drones, Robotics, IoT, Productivity*

### **Introduction**

In recent years, the agriculture sector has experienced a profound shift driven by technological advancement. This transformation has not only revolutionized traditional farming practices But has also significantly boosted productivity, efficiency, and sustainability in industry. The adoption of various technologies such as precision agriculture, drones, IoT devices, data analytics, automation and robotics has played a pivotal role in reshaping how farming is conducted. These innovations have empowered farmers to make data-driven decision, optimise resource usage, Monitor crop health in real-time, and streamline labour- intensive tasks. As technology continues to evolve, The Agriculture sector is on a path of continuous growth and innovation, Promising a more efficient and sustainable future for farming practises.

### **Need of study:**

- **Enhanced efficiency:** Technology adoption in agriculture is crucial to improve efficiency in various farming processes. Technologies like precision agriculture and automation help farmers optimise resource utilisation, reduce manual labour, and increased productivity.
- **Sustainable practices:** The Agriculture sector needs technology to promote sustainable practices. Tools like IoT devices and data analytics enable farmers to monitor environmental conditions, manage resources effectively, and make informed decisions to minimise environmental impact.
- **Data driven decision making:** Technology facilitates data collection and analysis, providing valuable insights for farmers. By leveraging data analytics, Farmers can make informed decision regarding crop management, resource allocation, and overall farm operations.
- **Increased productivity:** Technology plays a vital role in enhancing productivity in agriculture. By using advanced tools like drones for crop monitoring or automated machinery for planting and harvesting, farmers can achieve higher yields and improve overall farm output.

- Resilience to climate change: With the increasing challenges posed by climate change, technology is essential for building resilience in agriculture sector. Technologies that help predict weather patterns, manage water resources efficiently, and adapt farming practices to changing conditions are critical for sustainable growth.

#### **Objective of study**

- To understand the various technology is used in agriculture sector.
- To understand the use of AI in agriculture sector how it helped the farmers in their crop production and disease identification.
- To understand Smart farming platform that integrates various Data sources and analytic tools to help the farmer to make informed decision for their better yield of crops.

#### **RESEARCH METHODOLOGY**

The study involves a comprehensive review of existing literature, reports, and data sources related to technology adoption in agriculture. Data analysis will focus on synthesising and interpreting. The available secondary data to draw insights into the impact of technology on agriculture growth

#### **FINDINGS**

One significant technology transformation agriculture sector involves the widespread adoption of precision agriculture techniques. These utilise data analytics, GPS guidance system, and remote sensing technologies to optimise crop management practises. By enabling farmers to monitor and manage their field with precision, such technologies enhance productivity, reduce resource wastage and promote sustainable farming practices. This shift towards precision agriculture represents a critical advancement in modernizing agriculture, making it more efficient and environmentally friendly in meeting the global food demand.

#### **SUGGESTIONS**

- Adoption of IoT Devices: Implementing Internet of things (IoT) devices for real-time monitoring of soil condition, Weather patterns, and crop health can enhance decision-making an optimise resource usage.
- Integration of AI and Machine learning: Leveraging AI and machine learning algorithms for predictive analytics can help farmers anticipate crop yields, optimise planting schedules, and manage pest control more effectively.
- Use of drones: Employing drones equipped with multispectral imaging and thermal sensors allow for precise crop monitoring, disease and yield estimation across large areas of farmland.

- **Blockchain for Traceability:** Implementing blockchain technology to create transparent and secure supply chains can improve traceability of agricultural product, ensuring food safety and quality.
- **Robotics and Automation:** Integrating robotics for tasks like planting, harvesting and weeding can reduce labour costs, increase efficiency, and alleviate labour shortages in agriculture.
- **Smart Farming Platforms:** Utilising comprehensive smart farming platforms that integrate various data sources and Analytics tools can empower farmers with actionable insights for better decision-making.
- **Biotechnology Advancements:** Embracing biotechnology innovations such as genetically modified crops for increased resistance to diseases, pests, and environmental stresses can enhance crop productivity and resilience.
- **Training and Education:** Promoting training programmes and educational initiatives to equip farmers with the skills and knowledge to Effectively utilise new technologies and tools in agriculture.

#### **CONCLUSION**

In conclusion, Technology transformation plays up pivotal role in driving growth and sustainability in agriculture sector. By embracing innovative technologies, farmers can enhance productivity, optimise resource utilisation, and improve overall efficiency. The integration of technology not only boosts Agricultural output but also contributes to food security and economic development. It is imperative for stakeholders to continue investing in and adopting technological advancements to ensure a prosperous and resilient agricultural industry.

## **THE FACT OF THE EFFECTIVENESS OF MANAGER AND EMPLOYEE PERFORMANCE ON THE PRIVATE BANK IN CHENNAI CITY**

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#### **Abstract**

*Maintaining a competitive edge and being seen as an effective manager who can balance the needs of employees with those of numerous stakeholders is every manager's key objective. Prior studies conducted in related fields have demonstrated that managers' and employees' performance and financial growth may be impacted by an effective leadership style. This study aims to clarify the relationship between management performance and*

*leadership styles. Our main area of interest is transformational leadership and how it can enhance managerial effectiveness. We define the effects of leadership style on organizational performance, explain the connection between transformative leadership and organizational success, and conclude with some research recommendations.*

*Managers that communicate well with their staff can build positive relationships with them. One tool that can assist managers in creating a culture of respect and high productivity is managerial communication, which enables them to accomplish organizational goals and objectives. This study reviews the related literature. The main focus of the study is management communication, which is one of the most important tools available to managers to influence employee benevolence. Healthy connections between managers and their employees are facilitated by managerial communication, which has positive effects on the organization as a whole. We offer several recommendations to managers who wish to establish and preserve good working relationships with their staff.*

**Keywords:** Managerial performance, transformational leadership, and leadership style.

## **2. Introduction**

The aim of every manager is to stay alive and continue to be present by increasing performance. Achieving organizational performance requires the leadership function. Conversely, the success of a corporation is perceived to be significantly influenced by organizational effectiveness, employee work satisfaction, and employee emotional commitment. Some study indicates that executives that utilize competitive, effective leadership styles inspire and uplift their employees. Therefore, the leader must use effective leadership styles in order to set high expectations for the professional development of the organization's staff. Numerous studies on leadership philosophies indicate that transformational leadership improves organizational effectiveness.

Workers are valuable in both public and commercial institutions since they contribute significantly to the overall functioning of the organization. Studies show that when individuals are empowered, given incentives, and provided with the tools they need to do their best work, there is a considerable improvement in managerial performance. Building solid working connections with their team and creating a comfortable work environment are two things that managers in an organization's technical core must do to ensure that performance is not compromised. Additionally, managers are essential in inspiring their staff to maximize productivity and efficiency.

Leadership is one of the concepts associated with emotional intelligence that is most frequently employed. Current academic study in the topic distinguishes between two basic types of leaders: transformational and transactional, despite the fact that there are numerous theories explaining the qualities that make up the most effective leader. A transformational leader draws attention from other team members, encourages a fresh outlook on work, increases awareness of the organization's goals, elevates individuals to higher skill levels, and persuades others to put the needs of the group ahead of their own.

### **3. OBJECTIVES OF THE STUDY**

#### **1. ENHANCES INTERACTION**

Facilitating communication in the workplace is one of a leader's most important responsibilities. In order for any team to function well, communication must be clear and explicit. Strong leaders will always prioritize keeping lines of communication open and creating a welcoming environment where employees feel free to voice their opinions. By giving staff members a forum to voice their concerns and ideas, a leader can promote a work environment where fresh perspectives are valued and miscommunications are prevented.

#### **2. IMPROVES THE WORKPLACE SETTING**

A leader's impact on the overall work environment is substantial. They foster an atmosphere of mutual respect and trust, which fosters innovation and teamwork. Businesses with great leadership also have higher employee morale, which boosts motivation.

#### **3. DEALS WITH PRODUCTIVITY**

The productivity of a team can be made or broken by an exceptional leader. When workers feel motivated and appreciated, they are more likely to be productive. Conversely, a bad leader could drive individuals away from their work and make them disengaged. Overall, the productivity, effectiveness, and success of a well-led team will increase.

#### **4. AMPLIFIED OUTCOMES**

A competent leader can inspire their team, create a positive work atmosphere, and provide guidance and direction that is unambiguous. Increased productivity and efficiency may result from this. A staff that is more committed and engaged performs better. The better they perform, the more probable it is that they will encourage innovation within the company and steer the enterprise toward success.

#### **5. MINIMIZES MISTAKES**

Any business that wants to minimize errors and operate effectively needs a competent leader. This is especially important in high-pressure scenarios where mistakes can have disastrous consequences. A leader needs to be able to see potential problems early on and take action to prevent costly errors.

### **4. LEADERSHIP SKILLS FOR MANAGERS**

After defining leadership and discussing its importance in management, let's examine some of the traits that managers need to possess in order to maximize employee performance and steer their company toward achieving its goals and vision.

#### **1. Integrity and honesty**

Being honest in leadership entails being forthright and transparent. You have to be willing to voice your thoughts and emotions, regardless of how controversial or awkward they may be. It also means keeping your word and carrying through on any commitments you



make. A strong work ethic leads by example. If you constantly try to make the best decisions for your business and your employees, your team will look up to you as an honest leader.

## **2. Solving problems**

Businesses rely on management that solves problems. While problem solving is an innate skill, there are a subset of seven abilities that can facilitate the process. These consist of teamwork, creativity, resilience, emotional intelligence, analysis, and communication.

## **3. Assign tasks based on a team member's abilities**

Acknowledging the skills of your team members will ensure that tasks are completed on schedule and help to create a positive work environment. Make a formal or informal assessment of your strengths if at all possible. A team's strengths can be evaluated through observation or even an interview. A more formal method, such a strength-based questionnaire, can also be employed.

## **4. Communicate well and often.**

Perhaps the most important aspect of being a leader is communication. Even if you are a very creative and technically proficient person, your ideas and methods will not succeed if you cannot effectively communicate them.

## **5. You can practice your leadership communication skills in realistic virtual reality experiences:**

Essentially, effective communication will allow you to both influence and motivate your staff. You will need.

### **1. Active listening**

### **2. Creative questioning**

### **3. Responding influentially**

Your understanding and awareness of any given situation will grow as a result of your creative questioning and attentive listening. Persuasive responses can help you communicate ideas and concepts in a way that will motivate your group.

## **5. SCOPE OF THE STUDY**

**1. Headship** The ability to motivate a team of individuals to collaborate toward a common objective or vision is known as leadership. As the most significant element of an organization and the most crucial competency for its leaders, leadership is a topic that management scholars study extensively. Both directly and indirectly, it affects how well the employee performs. The success or failure of an organization can be more accurately predicted by its leadership. An organization's progress is greatly influenced by the performance of its team. One or two persons working alone won't progress the organization.

**2. Leadership that Transforms** A situation that results in a transformative influence on leaders and followers alike is characterized as transformational leadership. It involves one or more individuals interacting with one another to raise one another's motivation levels. The

foundations of transformational leadership include trust and expectations, process orientation, and employee development as a top priority.

### **3. Leadership through Transactions**

With transactional leadership, a leader uses rewards and punishments to motivate their subordinates to do specific duties. By outlining duties and task requirements, transactional leaders mentor and inspire their followers to achieve their objectives. Transactional leaders are likely to obtain compliance from their followers, but they are not likely to elicit commitment to task objectives.

**4. Theory of Transformation:** The opposite of leading through transactions. This point of view defines leadership as the process by which an individual engages with others and forges a bond that boosts the spirits and motivation of both followers and leaders. This kind of charismatic leader pushes above compulsive behavior and self-interest in an effort to inspire others. Rather, an analytical method is needed. Whenever it comes to problem resolution, gathering information is always a helpful tactic. It will help you make sure that the issue doesn't happen again and removes the need for speculation. Above all, in times of crisis, a manager needs to maintain an optimistic outlook. Negative reactions will depress people and spread fear.

**5. Thought Leadership:** The foundation of thought leadership is the ability of ideas to alter our perspective. A thought leader presents novel ideas to peers or superiors. A thought leader is someone who creates a network to spread and expand original ideas into long-term change, inspires others with them, and turns those ideas into reality.

## **9. RESEARCH METHODOLOGY**

**Research Design and Sample Size** The study used a survey to evaluate the management of leadership style as approach to organizational performance and effectiveness in Nigeria. The design was adopted because of its appropriateness in describing the current situation of the phenomenon. The Population of the study is the management of the business organization in Nigeria.

**Nwankwo 1999** stated that the population of any research work is the universe of such groups; of people or objects in which a researcher is interested. In obtaining the sample size of the population, SME owners from selected area councils in Abuja, North-Central Nigeria were selected through random sampling. 5 local government areas were selected for the study. We had in these local government areas obtain a sample element of 100 respondents which also means 20 respondents from each selected local government area through probabilistic sampling techniques. The primary sources of data collection were through the use of questionnaires, personal observation, and interviews.

**Research Instrument and Technique** The primary instrument used for the collection of data for this study is the questionnaire. The questionnaire were designed in open

and closed ended patterns and administered directly on the management of business organizations. Further, in order to reduce the possibility of questionnaire missing or getting lost in transit, the questionnaire were retrieved the same manner in which they were administered. The data collected were presented in tables and analyzed using regression model statistical technique with the help of statistical package for social sciences in order to confirm the stated hypothesis.

## **10. REVIEW OF LITERATURE**

### **1. Idea and the Function of Leadership**

The literature has given a lot of attention to the subject of leadership. The capacity to guide others is the definition of leadership. Employees are essential to ensuring the caliber of services. When demands and expectations are clearly communicated, employees are more likely to perform effectively. varied leadership styles have varied approaches to work allocation, even though leaders are accountable for appropriate task and job distribution. By influencing their team members, leaders are thought to have a positive impact on organizational efficiency. Within an organization, followers are greatly impacted by their leaders in particular. Therefore, evaluating the impact of different leadership philosophies, including transactional and transformational, on resolving organizational challenges requires an understanding of these philosophies..

### **2. Qualities of a Leader**

It is impossible to create, educate, or learn leadership. Consequently, a great deal of work was done to understand the range of qualities that characterize leaders. The trait theory of leadership states that significant research has been done to produce more reliable findings that characterize the particular qualities of leaders that are teachable and learnable. Drive, self-confidence, mental acuity, honesty, and integrity are seen to be the most frequently noted characteristics of effective leaders, according to the trait theory of leadership. Recently, two more traits of good leadership were added: knowledge of context and willingness to lead.

### **3. The Value of Collaboration in Improving Work Performance:**

Over the years, businesses have placed a strong emphasis on team building as a means of enhancing their production procedures, providing customer service, and long-term learning and development. Successful teams, or collaboration, can facilitate adaptable work schedules and the accomplishment of challenging assignments. They can also act as a source of dynamic competence that ensures sustained organizational success.

### **4. Strong Guidance**

Encouraging subordinates is an essential prerequisite for team members to be enabled. To put it another way, leaders need to be able to motivate, inspire, and steer others toward the success of the company. To illustrate, SMART goals—which stand for Specific, Measurable, Achievable, Realistic, and Time-bound—should guide leaders' actions. Setting and

communicating clear goals is also essential to ensuring that everyone knows what is expected of them. review of the literature on leadership.

### 5. Robust structure

Another essential prerequisite for team members' success is a strong framework. This condition's main objective is to stop harmful conduct. This suggests that in order to help team members foster positive team dynamics and spirit, standards, the right number and mix of team members, and a clear set of responsibilities should all be in place. review of the literature on leadership.

## 11. ANALYSIS AND INTERPRETATION OF THE DATA

Trends of distribution of employees at Indian Banks Table 1 shows the distribution of employees at different types of banks in India from 2012-2022. The Public Sector Banks (PSBs) have been major employers followed by Private Sector Banks. However, there has been a reduction in the percentage of total employees at PSBs from 2012-13 (73%) to 2021-22 (46%). At Private Sector Banks, the overall percentage of employees have increased from 2012-13 (19%) to 2021-22 (39%). During 2021- 22, Foreign banks, Small Finance Banks, Payment Banks & Regional Rural Banks together constitute around 15% of the total employees at SCBs. Overall, the employee strength at SCBs has increased by around 40% from 2012 to 2022.

### The Journal of Indian Institute of Banking & Finance

**Table 1: Distribution of Bank Employees in past 10 years**

Year (End-March)	Public Sector Banks	Private Sector Banks	Foreign Banks	Regional Rural Banks	Small Finance Banks
2021 – 22	46%	39%	2%	6%	7%
2020 – 21	49%	37%	2%	6%	7%
2019 – 20	50%	36%	2%	6%	6%
2018 – 19	56%	33%	2%	6%	4%
2017 – 18	58%	30%	2%	6%	6%
2016 – 17	61%	31%	2%	6%	----
2015 – 16	64%	28%	2%	7%	----
2014 – 15	67%	25%	2%	7%	----
2013-14	67%	24%	2%	7%	---

Source: Prepared from the data extracted from database on Indian Economy, RBI.

With reference to the present study, total no. of Employees includes employees under Officers, Clerical & Subordinate cadres of all Public Sector Banks, Private Sector Banks, Foreign Banks, and Payments Banks & Small Finance Banks as mentioned in Table 2. The

employees in the officer's cadre constitute around 72% of total no. of employees in banks. Table 2 shows that there has been a gradual shift in the composition of Human Resources at banks in India. The number of employees in officer cadre have shown a considerable increase from 2012 to 2022. At the same time, the number of employees in clerical and sub-staff level came down to half from 39.73% to 19.73% and 15.08% to 8.54% respectively between 2012-13 to 2021-22.

**Table 2: Employee Productivity Ratios**

<b>Year (End – March)</b>	<b>No. Employee s of SCBs</b>	<b>Advances</b>	<b>Deposits</b>	<b>Total Business</b>	<b>Net Profit</b>	<b>BPE</b>	<b>PP E</b>
2021 – 22	15,68,789	1,22,08,009	1,71,82,709	2,21,57,409	1,82,032	14.12	0.12
2020 - 21	14,91,503	1,08,06,381	1,55,80,325	2,03,54,269	1,21,998	13.65	0.08
2019 - 20	14,65,955	1,03,01,897	1,39,75,045	1,85,51,129	10,911	12.65	0.01
2018 - 19	13,64,285	96,76,183	1,28,86,643	1,67,47,989	-23,397	12.28	-0.02
2017 - 18	13,33,405	87,45,997	1,17,94,005	1,49,44,849	-32,438	11.21	-0.02
2016 - 17	13,00,008	81,16,100	1,11,11,400	1,31,41,709	43900	10.11	0.03
2015 - 16	12,56,085	78,96,500	1,00,92,700	1,13,38,569	34100	9.03	0.03
2014 - 15	11,80,069	7388179	9433838	95,35,429	89078	8.08	0.08
2013 – 14	11,50,281	6735230	8533170	77,32,289	80910	6.72	0.07
2012 - 13	10,96,980	5879773	7429677	59,29,149	91165	5.40	0.08

**Employee Cost to Operating Expenses**

**Table 4: Employee Cost to Operating Expenses (%)**

<b>Year</b>	<b>Public Sector Banks</b>	<b>Private Sector Banks</b>	<b>Foreign Banks</b>	<b>Small Finance Banks</b>	<b>Payments Banks</b>	<b>All Scheduled Commercial Banks</b>
2021 – 22	60.31	37.58	36.76	54.05	16.15	49.68
2020 - 21	61.13	38.54	35.33	57.01	31.81	51.30
2019 - 20	60.11	37.39	36.50	53.29	54.21	50.24
2018 - 19	57.96	35.87	35.94	50.64	-----	48.67
2017 - 18	55.92	37.30	38.18	56.78	-----	48.82
2016 - 17	58.36	39.35	40.49	61.36	-----	51.35
2015 - 16	59.61	40.59	42.48	----	-----	53.01
2014 - 15	61.20	41.27	42.68	----	----	54.40
2013 – 14	62.47	41.50	40.92	-----	-----	55.31
2012 - 13	63.03	42.34	42.08	-----	-----	55.77

The Employee cost to Operating expense ratio of all SCBs have shown a considerable decrease from 55.77% to 49.68% from the period 2012-2022. This may be attributed to extensive use of technical upgradation in overall banking operations which reduced the operating expenses. The study period of 2012-13 to 2021-22 corresponds to the timelines when several initiatives were taken to introduce new payment systems & digitalisation of several other services which greatly impacted on reducing the operating expenses & Employee Cost to Operating Expenses. The Employee Cost to Operating Expenses of Public Sector Banks had improved from 63.03% in 2012- 13 to 60.31% in 2021-22. This may be due to several developments in PSBs during the study period like EASE Reforms, introduction of social security schemes etc. However, their counterparts, Private sector banks have shown a considerable greater reduction in Employee Cost to Operating Expenses from 42.34% in 2012-13 to 37.58% in 2021-22. Similarly, foreign banks have also curbed Employee Cost to Operating Expenses from 42.08% to 36.76% in this period. The differentiated banks have also

shown a firm reduction in Employee Cost to Operating Expenses. Payments Banks have shown a drastic decrease from 54.21% to 16.15% in last 3 years. Small Finance Banks have also steadily curtailed Employee Cost to Operating Expenses from 61.36% to 54.05% from 2016 to 2022.

**Correlation Matrix: Multiple correlation between No. of employees in SCBs and Advances & Deposits of SCBs.**

Correlation Matrix	Correlation Matrix in SCBs	Advances	Deposits
No. of employees in SCBs	1		
Advances	0.99005432	1	
Deposits	0.99181259	0.9954467	1

The data from 2012 to 2022 was analysed to study the relationship between number of employees and the business of the SCBs. The deposits & loans/ advances were identified as the parameters for representing business of the banks. The multiple correlation matrix was generated based on the 10 years' data which shows that there is a very strong correlation (0.99) between number of employees and deposits with banks. Also, there is a strong positive correlation (0.99) between number of employees and loans & advances of SCBs. This may infer that in past 10 years, business of the banks grew with the growth in number of employees of banks.

**Conclusion**

Let us try to draw symmetry between pluripotent human cells and human resources. Both are inducted in the system as generalists and few of them develop themselves into specialists. Human Resources of a bank have a strong potential to add value to their organisation in terms of profitability, increase in business and reduction in Non-Performing Assets. The present study shows the improvement of Employee productivity ratios over the period of 10 years. Banks are multi-input and multi-output organisations, also many of the financial services are jointly produced and prices are typically assigned to a bundle of financial services. Employee productivity improves when supplemented with enhanced technological innovations that helps to expand the range production possibilities.

## **INDUSTRY 5.0 SUSTAINABLE HEALTH AND ENVIRONMENT PROTECTION**

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### **Abstract**

*Industry 5.0 represents a revolution that combines technology with a commitment to sustainability, health and environmental protection. This article explores the integration of Industry 5.0 concepts and sustainable practices and highlights the role of new technologies such as artificial intelligence, the Internet of Things and advanced products in supporting eco-business processes. Key topics include circular economy models, resource efficiency, use of clean energy and reducing environmental impact. Additionally, this article explores the relationship between human health and work in industry and suggests strategies to increase worker safety, reduce occupational hazards, and improve public health. By combining these perspectives, this study aims to provide a general framework for achieving sustainable development goals in the context of Industry 5.0.*

**Keywords:** Integration of Industry 4.0 Technologies, Environmental Impact Reduction,  
**Policy and Regulatory Frameworks, Challenges and Future Directions**

### **INTRODUCTION**

Industry 5.0 : Sustainable fitness and surroundings safety" focuses on integrating superior technologies to promote environmental sustainability and beautify public health. This idea emphasizes leveraging industry 4.0 technology like IoT, AI, and automation to increase answers that reduce environmental impact, enhance healthcare transport, and make sure sustainable practices across industries.

### **EVOLUTION OF THE INDUSTRIAL REVOLUTION (INDUSTRY 1.0 TO 5.0)**

The first industrial revolution began in the 18th century and was repeated five times in the following centuries as technology and processes improved in industrial production

#### **Industry 2.0**

Nearly 100 years later, in 1870, the second industrial revolution took place. The industrial revolution was based on electrification and mass production from the assembly line.

#### **Industry 3.0**

Over the next 100 years, that is, until 1970, Industry 3.0 achieved automation through the use of computers and electronics. Globalization (Industry 3.5) continues to enhance this, including the outsourcing of manufacturing to sub-sectors. concept. You can find more information about.



## **Industry 4.0**

Employees volunteer to deliver value-added products to customers based on the use of personal and collaborative robots. This innovation goes beyond the production process to include increased efficiency, human performance, and a focus on sustainability, which we examine in more detail below.

### **Industry 4.0 Technologies**

Sustainability 4.0 builds on Business 4.0, the fourth wave of the business revolution characterized by the integration of new technologies such as the Internet of Things, advanced manufacturing and smart digital environments into the physical and digital world. Sustainability 4.0 is the development of sustainable development as a social practice and an important behavior in creating social, ecological and ethical problems. The Sustainable Development Goals are still the only international principles intended to bring the debate on human rights into the moral world of the twentieth century. Sustainability 4.0 requires the integration of digital technologies at all levels of the organization and makes digitalization itself a central principle: integration of processes within and between companies, decentralized management and cloud organizations. As the Internet of Things evolves, it is important for businesses to choose solutions that provide information about CO2 emissions and the actual emissions or waste associated with various processes and relationships. Sustainability 4.0 is also used in social areas such as creating employment, safe working environments, creating non-violent organizations and child labor.

### **ENVIRONMENTAL IMPACT REDUCTION:**

Environmental problems caused by suppliers can lead to many problems, including increased costs, damaged reputation and even legal problems. Therefore, when working with the suppliers you choose, it is important to first evaluate and reduce environmental risks.

#### **1. Choose a responsible and reputable supplier**

Finding a good supplier may seem like an easy task, but the consequences of choosing the wrong one can be huge. Remember that it is important to prioritize suppliers that demonstrate your commitment to sustainability. This may include checking their past performance, checking for new certifications, or reviewing their carbon emissions data and reporting. As the media environment becomes increasingly complex, this information may not be easily accessible.

#### **2. Work with your suppliers on sustainability and production goals**

**3.** Working with your suppliers to set sustainability goals is a great way to reduce impact on the environment. Start by having an open conversation with your sales representative to share your goals and expectations.

#### **4. Promote transparency in communication**

Understanding a supplier's environmental impact can be an important step in making environmental decisions. While it is not good for sellers to create detailed information about

the environment, improving transparent communication can go a long way. You can focus on analyzing the type of content the seller publishes on their platform. This could be blog posts or educational materials about green projects or community projects they are involved with thoughts.

### **5. Promote Lean Manufacturing Principles**

Promoting Lean Manufacturing can provide many benefits to your business and the environment. At the heart of this approach are lean principles that focus on eliminating waste, increasing efficiency and improving production quality. By improving the process and eliminating these drawbacks, suppliers can save resources and reduce the environmental impact of unnecessary materials and waste.

### **POLICY AND REGULATORY FRAMEWORK**

Sustainable consumption is important in the pursuit of environmental protection and social justice; It focuses on the use of food patterns that meet today's needs without compromising the ability of future generations to meet their needs. The concept goes beyond the individual and consumer behavior to realize the entire life cycle of goods and services, from design and production to use and disposal. It embodies a change in the amount and responsibility of the use of services, reducing waste and environmental impact, while ensuring that economic success and development treat life well.

The role of government policies in sustainable nutrition law is important.

Through the use of policy instruments, government can influence economic activity, consumer behaviour and business practices, and direct them towards sustainable development. This section examines a range of policy instruments, presents case studies of effective interventions and discusses the challenges of policy implementation.

A number of instruments are used to improve health, each with their own methods and effects:

#### **1. Taxation and Levies:**

Governments can limit consumption patterns by taxing products or activities with a high environmental footprint. For example, a carbon tax aims to reduce carbon emissions by putting a price on the carbon content of fossil fuels.

#### **2. Subsidies and incentives**

Paying for renewable energy, such as solar panels or electric cars, are good examples.

#### **3. Regulations and standards**

These include vehicle emissions standards, energy-efficient products and single-use plastic bans

#### **4. Public Procurement Policy:**

By ensuring a greener public, governments can use their energy to promote products and services, thus supporting the business needs of the green transition.

## **5. Information and labels:**

Providing consumers with information about the environmental impact of products through labels can help guide purchasing decisions towards sustainable choices

### **CASE STUDIES OF SUCCESSFUL POLICY INTERVENTIONS**

#### **1. EU Circular Economy Action Plan:**

The EU has implemented a strategic plan for the transition to a circular economy, including measures to reduce waste, increase resource efficiency and promote sustainable products. Key measures include eco-design guidelines that determine energy consumption and requirements, and plastic strategies to reduce plastic waste and increase recycling rates.

#### **2. South Korea's volume-based waste payment:**

South Korea has implemented a waste management policy that charges households and businesses based on the amount of non-recyclable waste created. The system encourages waste reduction and increases recycling rates across the country.

#### **3. EV introduction in Norway:**

Norway has become a world leader in the use of electric vehicles (EV) thanks to various incentives, including exemptions from many taxes, fees and costs, including access to public roads and reduced parking for vehicle owners. These regulations make electric cars a good choice for consumers and reduce transportation costs in the country.

### **CHALLENGES IN IMPLEMENTING POLICIES FOR SUSTAINABLE CONSUMPTION**

#### **1. Stakeholder resistance:**

Policies to change dietary patterns may face resistance from market influencers and consumers who use ineffective practices.

#### **2. Policy Coherence and Integration:**

Coordinating and harmonizing policies at all levels of government can be difficult, but is critical to the success of sustainable development measures.

#### **3. Measuring and Monitoring Impact:**

Mechanisms that can be complex to use and resource intensive

#### **4. Global trade and business dynamics:**

The global nature of supply chains and trade means that without international cooperation and coordination, rules with inaccurate measurement will have less impact.

#### **5. Significant impact on both business and consumer behavior.**

Through a combination of taxation, financing, regulation and communication, governments can encourage the transition to sustainable practices. However, implementation of these provisions requires overcoming difficulties arising from opposition from participants, coordination of policy, evaluation of intervention, and international trade. By solving these problems and using data from around the world, the government can use the right policy to improve the health of future generations..

## **REGULATORY FRAMEWORKS AND STANDARDS**

Regulatory systems and standards are an important part of global efforts to improve health. They work not only as a mechanism to ensure compliance, but also as a reference point for best practices across businesses and industries. By creating regulatory frameworks, laws and clear guidelines, it provides businesses and consumers with the necessary criteria to make more sustainable choices, thus helping to support the transition to a global economy.

### **Importance of Regulatory Frameworks in Ensuring Compliance and Promoting Best Practices**

The governance process is important in setting minimum standards for sustainable development practices. They ensure that businesses and individuals adhere to specific standards that reduce environmental impacts, promote social harmony and encourage sustainable business. This process also plays an important role in the competitive business world, ensuring that businesses that use sustainable practices are not at a competitive disadvantage compared to those that do not. Furthermore, by defining best practices, regulatory frameworks help establish practices across the industry and make it easier for organizations to achieve safety goals without having to deal with expectations.

### **Examples of Effective Regulations and Standards**

#### **1. Emission Standards:**

Many countries impose strict emission standards for vehicles and businesses in an effort to reduce pollution and greenhouse gas emissions. For example, the European Union's Euro 6 standard reduces emissions of harmful nitrogen oxides and pollutants by limiting emissions from new cars.

#### **Product Labeling**

The eco-label provides consumers with clear and reliable information about the product's impact on the environment. These articles encourage manufacturers to design and produce products that are more energy efficient, non-polluting, and easy to recycle, and help consumers make informed choices that promote health.

#### **Organic food standards**

Fundamentals of promoting permaculture practices. USDA organic certification, for example, requires farmers and food producers to comply with standards that protect natural products, animal health and welfare, and avoid most synthetic products

## **INDUSTRY 5.0 ACROSS OTHER SECTORS**

Industry 5.0 aims to revolutionize the use of artificial intelligence in our daily lives and change the lives of all people in the world by making our lives easier and more useful in every field with a humane approach to technology. With the introduction of many artificial intelligence and digital technologies, the EU has also developed a digital intelligence and training plan to improve the skills and training of European workers (especially in digital

skills). By ensuring the knowledge base and providing skills opportunities, people will be able to benefit from the innovations of Industry 5.0 and use their necessary skills positively in useful roles in business. Industries such as healthcare will be transformed by human solutions that use the Internet of Things (IoT) and artificial intelligence to diagnose, treat and learn about the various diseases and pests plaguing the world today. There is an urgent need for solutions that can be delivered at scale but with a personal touch, and Industry 5.0 gives us the opportunity to have connected machines that increase productivity and efficiency, while also reducing costs and improving safety

### **THE ROLE OF INDUSTRY 5.0 FOR A SUSTAINABLE FUTURE**

Industry 5.0 is used to create solutions worldwide. The independent expert report "Europe's Vision for Change", published in 2021, clearly shows that Industry 5.0 can be used to transform Europe into an efficient, orderly economy through changes in various industries. The annual report details how we can use Industry 5.0 technologies to combat climate change and prevent the collapse of biodiversity, instead transforming the lives of 8 billion people worldwide and increasing the resilience of future economies through new ecosystems. Climate change is a hot topic in today's world and Industry 5.0 will help us create sustainable, clean transport, transportation and energy.

The EU has signed the European Green Deal, which sets the following main objectives:

1. Zero carbon monoxide emissions by 2050
2. Decoupling economic growth through resource use
3. Nobody This Green Deal is already out of the global crisis

It is the first step of the EU Industrial Strategy, which demonstrates a dual ecological and digital transformation focus on affected business ecosystems and then covers the key areas outlined in the EU Business Strategy. protocol and can later be added to another ecosystem. The aim of the EU economic strategy is to create a green and low-carbon Europe, a social and inclusive Europe, a more competitive and smarter Europe. In fact, financial giant Aviva has pledged to become a net zero company by 2040.

### **CONCLUSION**

Industry 5.0 is about robots and smart machines working alongside humans, including increased efficiency and sustainable goals. While Industry 4.0 focuses on technologies such as the Internet of Things and Big Data, Industry 5.0 aims to reconsider people, the environment and relationships. This allows humans to intervene when needed and engage in thought and change, moving away from excessive automation, while also working on the accuracy and repeatability of machines.

## **STRENGTHENING SMEs: EVALUATING EXPORT PROMOTION STRATEGIES FOR GLOBAL MARKET ENTRY**

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### **Abstract**

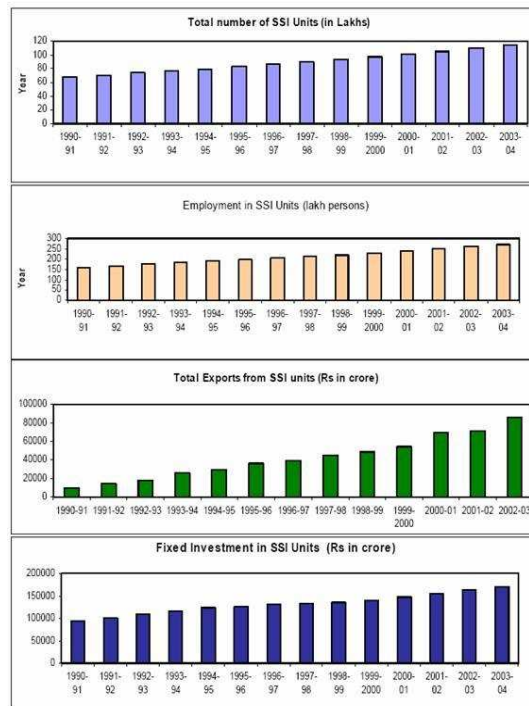
*Small and Medium-sized Enterprises (SMEs) play a crucial role in global economies but often face barriers when expanding into international markets. This paper examines various export promotion strategies designed to facilitate SMEs' entry into global markets. Through a thorough literature review and empirical analysis, it evaluates the effectiveness of these strategies, identifying key success factors and challenges. The study emphasizes the importance of tailored support mechanisms such as financial incentives, market intelligence, capacity-building programs, and regulatory assistance in overcoming barriers to international trade. By providing practical insights and recommendations, this research aims to inform policymakers, business support organizations, and SMEs themselves on optimizing export promotion efforts, thereby enhancing SME competitiveness, and fostering sustainable growth in the global marketplace.*

**Keywords:** SMEs, Export Promotion, Export Promotion Strategies, and Global Market Entry, Sustainable.

### **Introduction**

Small and Medium-sized Enterprises (SMEs) play a pivotal role in economies worldwide, contributing significantly to employment, innovation, and economic growth. According to the World Bank, SMEs represent over 90% of all businesses globally and are crucial drivers of job creation, particularly in emerging markets (World Bank, 2022). Despite their importance, SMEs often face numerous challenges, particularly when venturing into international markets. Exporting presents a promising avenue for SMEs to expand their operations, access new customer bases, and diversify revenue streams. However, the path to successful global market entry is fraught with obstacles, ranging from financial constraints to lack of market knowledge and limited access to export promotion initiatives.

The effectiveness of export promotion strategies becomes paramount in facilitating SMEs' successful entry into global markets. Export promotion strategies encompass a wide array of interventions designed to assist SMEs in overcoming barriers to international trade. These strategies may include financial incentives, trade missions, market intelligence, capacity-building programs, and regulatory support, among others. Understanding which strategies yield the best outcomes for SMEs is crucial for policymakers, business support organizations, and SMEs themselves aiming to navigate the complexities of global trade.



**Source: Ministry of SSIs**

Export promotion strategies tailored to the specific needs and constraints of SMEs are therefore essential to unlock their full potential on the global stage. Effective export promotion strategies encompass a range of initiatives aimed at mitigating the barriers that hinder SMEs from international expansion. These initiatives include financial support mechanisms such as grants and loans, capacity-building programs to enhance managerial and technical capabilities, and market intelligence services to facilitate informed decision-making. Furthermore, regulatory reforms and trade facilitation measures can streamline bureaucratic processes and reduce the administrative burden on SMEs, thereby encouraging greater participation in international markets. Moreover, the digital revolution has revolutionized global trade dynamics, presenting both opportunities and challenges for SMEs.

**Review of literature**

**June Francis, Colleen Collins-Dodd (2004):** This research paper clarifies the ways in which export promotion programs bolster the export competence and export activities of firms by drawing on the results of a survey of small and medium-sized Canadian high-technology firms. The results suggest that using a greater number of government programs influences the achievement of export objectives and export expansion strategies, and enhances export marketing competencies. The objective of this study was to evaluate the impact of

export promotion programs on export objectives, competencies, and strategies. The results of this study provide evidence of and clarify the nature of the impact of these export assistance programs

**Alexis Catanzaro Jean Christine Teyssier (2020)**- The purpose of the study is to analyse the effectiveness of public policies on the international performance of the small and medium- sized enterprises (SMEs). Specifically, this paper investigates the effect of public export promotion programs (EPPs) on two types of organizational capabilities, i.e. export capabilities which have been already used in previous modulizations, and international risk management practices as an original variable intended to better explain the effectiveness of public policies on the SME's international performance. In conclusion, this study offers several novel empirical findings regarding the influences of EPPs on organizational capabilities of internationalized SMEs. It also provides new insights on the enablers and the influences of risk management practices in the context of SME internationalization.

**Simona Comia and Laura Resmini (2020)** This paper investigates the impact of Export Promotion Programs (EPPs) in Lombardy – one of the richest regions in Italy and one of the four Motors of Europe – on the export performance of beneficiary firms. To assess the impact of the EPPs, it has been studied that why and how EPPs work by exploring in details what dimensions of export performance respond better to these programs, which support services are more related to export success and which firms benefit more. Estimates suggest that assisted firms show higher export propensity and export intensity than no assisted firms, with micro- and small-sized firms and already exporting firms benefiting the most.

**Vladimir Petkovski (2020)**- The growth of national economies is closely connected to export potential of companies. For small and open economies, the exports and increasing competitiveness of companies on the global market is a prerequisite for maintaining their long-term growth. At the same time, small and medium enterprises (SMEs) are facing the challenges of integration into international markets due to the lack of managerial, financial and technical capacities, which limits their competitiveness. In developing countries, institutional support in promoting exports is an important segment in providing the preconditions for long-term company development. The export support is on areas such as trade policy and commercial information, representation at major trade fairs, marketing, product development, training, and provision of financial support for export activities and the organisation of export promotion events for SMEs. They all have implemented an export promotion SMEs support program created, and implemented according to their needs and available resources.

**Section 2(h) of MSMED Act** defines “**micro enterprise**” to mean an enterprise classified as such under sub-section (1) of section 7.



**Section 2(m)** of **MSMED Act** defines “**small enterprise**” to mean an enterprise classified as such under sub-section (1) of section 7.

**Section 2(g)** of **MSMED Act** defines “**medium enterprise**” to mean an enterprise classified as such under sub-section (1) of section 7.

Existing MSME Classification			
Criteria : Investment in Plant & Machinery or Equipment			
Classification	Micro	Small	Medium
Mfg. Enterprises	Investment < Rs. 25 lac	Investment < Rs. 5 cr.	Investment < Rs. 10 cr.
Services Enterprise	Investment < Rs. 10 lac	Investment < Rs. 2 cr.	Investment < Rs. 5 cr.

Revised MSME Classification			
Composite Criteria : Investment And Annual Turnover			
Classification	Micro	Small	Medium
Manufacturing & Services	Investment < Rs. 1 cr. and Turnover < Rs.5 cr.	Investment < Rs. 10 cr. and Turnover < Rs.50 cr.	Investment < Rs. 20 cr. and Turnover < Rs.100 cr.

**Source:** Economic Times

### Boosting Exports from SMEs

Boosting exports from Micro, Small, and Medium Enterprises (MSMEs) requires a multifaceted approach that addresses various challenges they face. Here are detailed recommendations to enhance MSME exports:

1. Create One Stop Information Channel for Exporters Establishing a centralized and accessible information channel is crucial to providing MSMEs with comprehensive guidance and support for exporting activities. This channel should offer:

- **Export Procedures and Documentation:** Clear guidelines on export procedures, documentation requirements, and regulatory compliance to simplify the export process for MSMEs.
- **Market Intelligence:** Regular updates on global market trends, demand patterns, and potential export opportunities tailored to different sectors and regions.
- **Training and Capacity Building:** Access to training programs, workshops, and webinars to enhance export-related skills and knowledge among MSMEs.
- **Policy Updates:** Timely information on changes in export policies, tariffs, trade agreements, and incentives offered by the government to facilitate informed decision-making. Establishing such a platform can streamline information dissemination, reduce bureaucratic hurdles, and empower MSMEs to explore and expand into international markets effectively.

2. Create National Trade Network (NTN) as Comprehensive Trade Portal National Trade Network (NTN) should serve as a unified digital platform integrating various stakeholders involved in trade facilitation. Key features should include:
  - **Digital Trade Documentation:** Enable electronic submission and processing of trade-related documents, certificates, and permits to reduce paperwork and processing time.
  - **Market Access Tools:** Provide tools for MSMEs to identify export markets, connect with potential buyers, and participate in virtual trade fairs and buyer-seller meets.
  - **Export Finance Portal:** Facilitate access to export finance options, including information on government schemes, credit facilities, and financial institutions offering export credit guarantees.
  - **Regulatory Compliance:** Offer resources to ensure MSMEs comply with international trade regulations, standards, and certifications required by target markets. An NTN would promote transparency, efficiency, and accessibility in trade operations, thereby boosting MSMEs' competitiveness in global markets.
3. Promote E-commerce Exports Encouraging MSMEs to leverage e-commerce platforms for exports can significantly expand their market reach and enhance export volumes. Recommendations include:
  - **E-commerce Capacity Building:** Provide training and support to MSMEs in digital marketing, online sales strategies, and e-commerce platforms' utilization.
  - **Platform Access:** Facilitate partnerships with global e-commerce platforms, offering subsidized fees, promotional support, and simplified onboarding processes for MSMEs.
  - **Logistics Support:** Ensure efficient logistics solutions for e-commerce shipments, including last-mile delivery and international fulfilment centres to improve delivery reliability and customer satisfaction. Promoting e-commerce exports enables MSMEs to access global markets directly, overcome geographical barriers, and tap into growing consumer demand for online purchases.
4. Promote Ease of Merchandise Exports Simplify and streamline export procedures to reduce bureaucratic delays and transaction costs for MSMEs. Recommendations include:
  - **Single Window Clearance:** Implement a single-window clearance mechanism for export-related approvals, permits, and inspections to expedite processing.
  - **Customs Reforms:** Enhance customs efficiency through digital customs declarations, risk-based inspections, and pre-clearance arrangements to minimize clearance times.

- **Trade Facilitation Measures:** Introduce measures such as trusted trader programs, simplified documentation requirements, and duty drawback schemes to incentivize and reward compliant exporters. Improving ease of merchandise exports fosters a conducive environment for MSMEs to engage in international trade, encouraging growth and competitiveness.
- 5. **Improve Access to Export Finance** Enhance access to affordable and timely export finance options tailored to MSMEs' needs. Recommendations include:
  - **Export Credit Guarantee:** Expand coverage and simplify procedures for export credit insurance and guarantees to mitigate credit risks for lenders financing MSME exports.
  - **Interest Subsidies:** Provide interest subsidies or concessional finance schemes specifically targeting MSME exporters to lower borrowing costs and improve financial viability.
  - **Working Capital Support:** Introduce dedicated working capital facilities, including pre-shipment and post-shipment finance, to address liquidity needs during the export cycle. Improving access to export finance ensures MSMEs can finance production, fulfil export orders, and seize market opportunities without financial constraints.
- 6. **Ensure Accurate Measurement** Develop robust mechanisms to accurately measure MSME export performance and impact. Recommendations include:
  - **Data Collection and Analysis:** Enhance data collection methodologies to capture comprehensive information on MSME export volumes, destinations, product categories, and economic impact.
  - **Performance Monitoring:** Establish benchmarks and key performance indicators (KPIs) to track MSME export growth, market diversification, and competitiveness over time.
  - **Impact Assessment:** Conduct regular assessments to evaluate the effectiveness of export promotion initiatives, identify challenges, and refine strategies based on empirical evidence. Accurate measurement facilitates evidence-based policymaking, resource allocation, and strategic interventions to further enhance MSME export competitiveness.

#### **Opportunities for SMEs Exports**

- **Skill-Intensive Nature of Exports:** Both manufacturing and services exports in India are increasingly skill-intensive. The country has specialized in sectors such as auto parts, electronics, machinery, and pharmaceuticals, which require higher levels of skill.
- **Underutilization of Low-Skill Manufacturing Potential:** Despite India's potential in low-skill manufacturing, particularly in sectors like apparel, textiles, leather, and

footwear, the country has not fully exploited this opportunity. India's share of global exports in low-skilled manufacturing products remains low at around 5%, lagging behind countries like Vietnam, Bangladesh, and China.

Product Category	India's Share (in \$bn.)	Global Exports (in \$bn.)
Herbal Supplements and Ayurveda Products	1.1	13.2
Wood Products	2.3	152.9
Handicrafts	1.1	109.3
Leather Products	1.4	28.9
Handloom Textiles	1.6	13.8
Jewellery	0.2	8.2
<b>TOTAL</b>	<b>7.6</b>	<b>326.2</b>

Source: Boosting Exports From MSMEs (drishtias.com)

- Natural Fit Industries for MSMEs:** Certain industries such as wood products manufacturing, ayurveda and herbal supplements, handloom textiles, handicrafts, leather products, and jewellery are well-suited for MSME exports from India. These industries leverage traditional manufacturing techniques, craftsmanship, and India's cultural heritage, offering a competitive advantage in international markets.

Manufacturing Industry	Product Categories
 Wood and wood products	<ul style="list-style-type: none"> <li>- Manufacture of products of wood, cork, straw and plaiting materials</li> <li>- Wooden frames for paintings, photographs, mirrors or similar objects</li> <li>- Wood marquetry and inlaid wood; caskets and cases for jewellery or cutlery, and similar articles</li> <li>- Wooden furniture for offices and homes</li> <li>- Furniture of bamboo</li> </ul>
 Textiles and Leather	<ul style="list-style-type: none"> <li>- Woven fabrics of silk, combed wool of handloom</li> <li>- Cotton shirtings of handloom</li> <li>- Gloves, mittens, and mitts; Of handloom</li> <li>- Bed sheets and bed covers, of cotton; Handloom</li> <li>- Other bed linen, printed; of cotton; Handloom</li> <li>- Carpets, rugs and mats of handloom</li> <li>- Embroidery on a textile fabric ground, in the piece, in strips or in motifs</li> <li>- Dress materials hand printed; Of cotton and of various other fabrics</li> <li>- Handbags, whether with shoulder strap, including those without handle</li> <li>- Articles of a kind normally carried in the pocket or in the handbag; Wallets</li> <li>- Articles of apparel and clothing accessories, of leather or composition leather</li> </ul>
 Other Manufacturing	<ul style="list-style-type: none"> <li>- Imitation jewellery</li> <li>- Candles and the like</li> <li>- Agarbatti and other odoriferous preparations which operate by burning</li> <li>- Handbags of other materials excluding wickerwork or basket work</li> <li>- Parts of domestic decorative articles used as tableware and kitchenware</li> <li>- Handmade paper and paperboard of any size or shape</li> <li>- Essential oils, whether terpenic less, incl. concretes and absolutes; resinoids</li> <li>- Herbal Supplements</li> <li>- Toys</li> </ul>

Source: Source: Boosting Exports From MSMEs (drishtias.com)

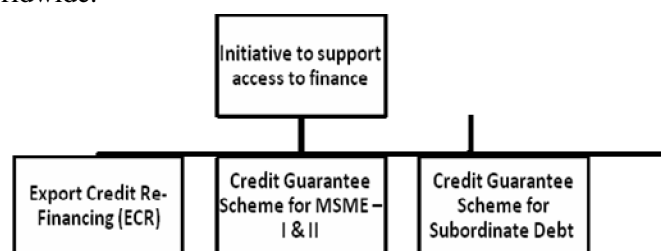
- Utilizing E-commerce for Export Growth:** To enhance export growth, Indian MSMEs can leverage e-commerce platforms effectively. Currently representing a modest USD 2 billion, India's cross-border e-commerce trade is poised for significant expansion. Projections indicate potential growth to USD 350 billion by the end of the decade, reflecting substantial opportunities in the global B2C e-commerce market.



Source: Boosting Exports From MSMEs (drishtias.com)

## Government Initiatives for SMEs

**1. Initiative to support access to finance:** An initiative to support access to finance aims to bridge gaps in financial inclusion through education, microfinance solutions, and technological innovations. By promoting financial literacy, offering tailored lending options, and leveraging digital platforms, the initiative strives to empower individuals and businesses with the tools they need to thrive economically. Through collaborative efforts and innovative approaches, it seeks to create a more inclusive financial system that benefits underserved communities worldwide.



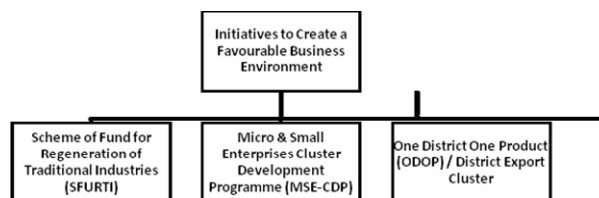
- **Export Credit Re-Financing (ECR):** ECR is a scheme initiated by the Reserve Bank of India (RBI) to provide short-term credit to banks and financial institutions for export credit at the prevailing repo rate under the Liquidity Adjustment Facility (LAF). Scheduled banks extend this facility at a repo rate plus a credit risk premium and a spread of 3-4%, aiming to enhance credit availability for exporters and promote export growth.
- **Credit Guarantee Scheme for MSMEs (CGTMSE) – I & II:** This scheme provides credit guarantees up to Rs. 2 crores per borrowing unit for MSMEs, previously Rs. 1 crore. Proposals for credit facilities above Rs. 50 lakh and up to Rs. 200 lakh require an internal rating by the lending institution. It offers discounted interest rate loans and a 5-year guarantee cover with one-time fees and annual service fees. MSMEs have repayment flexibility with options like monthly, quarterly, or half-yearly installments.
- **Credit Guarantee Scheme for Subordinate Debt:** Under this scheme, MSME promoters receive credit up to 50% of their stake or Rs. 75 lakh, with 90% debt guarantee coverage from CGTMSE. A 1.50% annual guarantee fee applies. There's a maximum 7-year moratorium on principal payment, with interest paid as applied. Repayment after the moratorium is eased, with the principal fully repaid within the loan's tenor in the form of Principal Equally Distributed (PED).

## 2. Initiatives to Support Market Access:



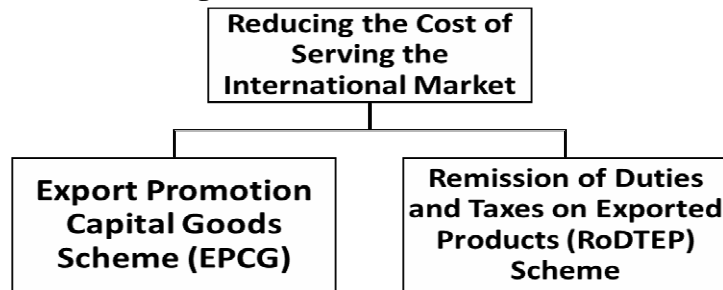
- **Market Access Initiative (MAI):** MAI provides reimbursement for participation support, including flight ticket reimbursements for senior management (excluding foreign nationals) for up to three MAI events annually per member participant company. Support extends to market research studies, joint events, reverse buyer-seller meets (RBSMs), and enhancing marketing and branding abilities for MSMEs.
- **International Cooperation Scheme:** MSMEs receive reimbursement for international exhibition participation up to Rs. 1.00 lakh or actual rent paid, covering space rent and airfare respectively, with allowances provided for representatives.
- **Procurement and Marketing Support (PMS):** MSMEs participate in domestic exhibitions/trade fairs for capacity building, including modern packaging, barcoding, and e-commerce adoption.

### 3. Initiatives to Create a Favourable Business Environment:



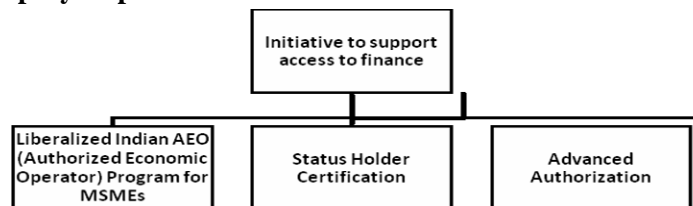
- **Scheme of Fund for Regeneration of Traditional Industries (SFURTI):** SFURTI provides financial assistance up to Rs. 2.5 crore for Regular Clusters (up to 500 artisans) and up to Rs. 5 crore for Major Clusters (more than 500 artisans). It aims to organize traditional industries and artisans into collectives, enhancing production and value addition for competitiveness. SFURTI facilitates setting up production facilities, skill development, market development, design, and product development.
- **Micro & Small Enterprises Cluster Development Programme (MSE-CDP):** MSE-CDP supports Common Facility Centers, including plug-and-play facilities and infrastructure development projects, with assistance covering up to 80% of the maximum project cost of Rs. 30 crores for Common Facility Centers and up to 70% for infrastructure development in industrial areas.
- **One District One Product (ODOP) / District Export Cluster:** This initiative decentralizes export promotion to the district level, converging ongoing schemes. It includes investment for existing micro-enterprises producing ODOP products, infrastructure support for marketing and branding at the state/regional level, grants up to 50% of total expenditure for branding and marketing of state or regional-level ODOP products, and subsidies under the Pradhan Mantri Formalisation of Micro food processing Enterprises (PMFME) scheme with an ODOP approach.

#### 4. Reducing the Cost of Serving the International Market:



- **Export Promotion Capital Goods Scheme (EPCG):** EPCG provides financial aid to exporters by waiving import charges on capital goods, provided the exporter fulfills an export obligation six times the duty savings within six years. It offers options for bond or bank guarantees based on export volumes.
- **Remission of Duties and Taxes on Exported Products (RoDTEP) Scheme:** This scheme refunds central, state, and local taxes on goods and services used in exported product manufacturing.

#### Initiatives to Simplify Export Procedures:



- **Liberalized Indian AEO (Authorized Economic Operator) Program for MSMEs:** This program grants internationally recognized AEO status within 15 days, enabling faster customs clearance, offering bank guarantees, and facilitating expedited customs processes.
- **Status Holder Certification:** This program allows self-declaration for imports and exports based on export values, with benefits such as duty-free sample exports, paperless declarations, and reduced documentation requirements.
- **Advanced Authorization:** This scheme eliminates upfront duty payments for imports used in export production, covering various duties without a bank guarantee requirement for eligible exporters.

#### Conclusion

To sum up, this research has underscored the critical role of export promotion strategies in facilitating SMEs' global market entry. By evaluating various interventions such as financial incentives, market intelligence, and capacity-building programs, the study has identified both effective practices and persistent challenges faced by SMEs. The findings

highlight the need for policymakers and business support organizations to tailor these strategies to the specific needs of SMEs, considering their diverse capabilities and market contexts. Moving forward, enhancing access to resources, and reducing regulatory barriers will be crucial in sustaining SME growth and competitiveness internationally. This research contributes valuable insights to academia and practice, aiming to foster a supportive environment where SMEs can thrive and contribute significantly to global economic development through successful internationalization efforts.

## **SUSTAINABLE TOURISM DEVELOPMENT AND ENVIRONMENT PROTECTION**

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### **Abstract**

*Tourism is one of the largest and fastest growing industries in the world. It is an increasingly important source of income, employment and wealth in many countries. Tourism has played a critical role in sustainable development in many countries and regions around the world. In developing countries, tourism development has been used as an important strategy for increasing economic growth, alleviating poverty, creating jobs, and improving food security. Tourism has played an important role in sustainable development in some countries through the development of alternative tourism models, including ecotourism, community-based tourism, pro-poor tourism, slow tourism, green tourism, and heritage tourism, among others that aim to enhance livelihoods, increase local economic growth, and provide for environmental protection. This paper purposes to study the factors affecting the sustainable tourism development. It also examines the opportunities and challenges pertinent to development of sustainable tourism and environment protection. Further this study discusses the Sustainable Development Goals (SDGs).*

**Key Words:** *Tourism, Sustainable Development, Environment Protection*

### **Introduction**

The concept of sustainable tourism development involves balanced economic, social and cultural development without endangering the environment, which enables the development of the same or higher level. The World Tourism Organization describes sustainable tourism as tourism that considers both current and future economic, social and



environmental effects and meets the needs of the visitors, the industry, the environment and the local people. The involvement of all related stakeholders is needed for holistic sustainable tourism development.

Sustainable development is a process that allows development to be achieved without degradation or depletion of those resources on which it is based. Sustainable tourism is an important objective of any country and consists of various forms of activities, namely ecotourism activities, green tourism activities and geo-tourism activities. Sustainable tourism supports a great level of tourist satisfaction and assures a significant experience for the visitors, realizes the importance of sustainability issues and encourages sustainable tourism practices and customs among them. Tourism has been associated with the principles of sustainable development because of its potential to support environmental protection and livelihoods. However, the relationship between tourism and the environment is multifaceted, as some types of tourism have been associated with negative environmental impacts, many of which are borne by host communities.

#### **Review of Literature**

According to Sirakaya et al., (2008) sustainable tourism helps the authorities for policymaking and managers who are responsible for the destination for identifying the benefits as well as the issues due to residents' behaviour. It is found that the ability to understand the behaviour of the residents on sustainable tourism leads to economic development.

Community views are important for effective sustainable tourism development, as the understanding of communities' feelings and thoughts could be useful to the decision makers. Community participation is more important, as they effect the tourism development either constructively or destructively (Eshliki and Mahdi, 2012).

#### **Objectives**

1. To identify the factors responsible for sustainable tourism development
2. To examine the opportunities and challenges of sustainable tourism development and protection of environment
3. To trace out the futuristic of tourism industry

#### **Factors Influencing Sustainable Tourism Development**

Sustainable tourism is influenced by several key factors that play a significant role in shaping its practices and outcomes. Understanding these factors is important for destinations, stakeholders, and policymakers to develop and implement effective strategies for sustainable tourism. Here are some of the influential factors:

**Environmental Conservation:** Environmental conservation is a fundamental factor in sustainable tourism. It involves preserving natural resources, protecting ecosystems, and minimizing the negative impact of tourism activities on the environment. This includes practices

such as reducing carbon emissions, minimizing pollution and waste, promoting sustainable resource management, and protecting biodiversity.

**Social Responsibility:** Social responsibility emphasizes respecting and benefiting local communities, their cultures, and traditions. Sustainable tourism aims to involve and empower local communities in decision-making processes, provide socio-economic benefits, and support local businesses. It also promotes cultural preservation, encourages fair trade, and respects the rights and well-being of local residents.

**Economic Viability:** Economic viability is crucial for sustainable tourism. It involves contributing to the local economy, creating employment opportunities, and supporting local businesses. Sustainable tourism aims to stimulate economic growth and development by encouraging tourists to spend money on local products and services. This includes promoting local handicrafts, cultural experiences, and supporting sustainable tourism certifications.

**Education and Awareness:** Education and awareness play a vital role in promoting sustainable tourism. By increasing understanding and appreciation of the environment, culture, and heritage, tourists can make informed decisions and engage in responsible travel behaviour. Educational programs and awareness campaigns can highlight sustainability practices, conservation efforts, and the importance of respecting local customs and traditions.

**Visitor Satisfaction:** Visitor satisfaction is an important factor in sustainable tourism. It involves providing quality experiences for tourists while minimizing negative impacts. Sustainable tourism aims to create memorable and authentic experiences that respect the environment and local communities. By meeting visitors' expectations and fostering a sense of responsibility and respect, destinations can ensure positive experiences for both tourists and local residents.

**Government Policy:** Government policies and regulations significantly influence sustainable tourism. Governments can enact laws and regulations that promote environmentally and socially responsible tourism practices. This includes regulating waste management, protecting natural resources, implementing land-use planning, and providing financial incentives for sustainable tourism initiatives. Government policy can create an enabling environment for sustainable tourism and ensure the long-term success of conservation and community development efforts.

**Stakeholder Collaboration:** Collaboration between different stakeholders, including tourism operators, local communities, environmental organizations, and indigenous groups, is essential for sustainable tourism. By involving all parties in decision-making processes, planning, and implementation, destinations can ensure that the needs and concerns of all stakeholders are considered. This collaboration fosters cooperation, knowledge-sharing, and the development of innovative solutions for sustainable tourism.

Sustainable Tourism Development is influenced by various factors that encompass environmental, social, economic, and policy dimensions. Successful sustainable tourism

requires a holistic approach that integrates these factors to create a balance between preserving natural and cultural assets, promoting socio-economic development, and providing quality experiences for tourists. By considering these influential factors, destinations and stakeholders can work together to ensure the long-term viability and positive impact of sustainable tourism.

### **Tourism and the Sustainable Development Goals – Tourism in the 2030 Agenda**

In the 2030 Agenda for Sustainable Development Goals SDG target 8.9, aims to “by 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products”. The importance of sustainable tourism is also highlighted in SDG target 12.b. which aims to “develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products”. Tourism is also identified as one of the tools to “by 2030, increase the economic benefits to Small Island developing States and least developed countries” as comprised in SDG target 14.7.

Tourism has the potential to contribute, directly or indirectly, to all of the goals. In particular, it has been included as targets in Goals 8, 12 and 14 on inclusive and sustainable economic growth, sustainable consumption and production (SCP) and the sustainable use of oceans and marine resources, respectively. Sustainable tourism is firmly positioned in the 2030 Agenda. Achieving this agenda, however, requires a clear implementation framework, adequate financing and investment in technology, infrastructure and human resources.

#### **GOAL 1: NO POVERTY**

Tourism can contribute to poverty reduction both in a direct manner by generating jobs in tourism businesses or creating opportunities to supply goods and services to tourists and tourism businesses or to establish/run micro, small and community-based tourism businesses and, in an indirect manner, by using income generated tourism-related taxes and fees for initiatives addressing poverty reduction or investments in infrastructure stimulated by tourism development from which people living in poverty in a destination may also benefit.

#### **GOAL 2: ZERO HUNGER**

Tourism can stimulate sustainable agriculture, and its full integration in the tourism value chain, by promoting the sustainable production and supplies of food and beverages to tourism businesses and tourists. Agritourism can generate additional income, while enhancing the value of the tourism experience and local farmers’ capacity. The infrastructure needed for the development of tourism would also contribute to a stable supply of goods and services in the region, including food.

#### **GOAL 3: GOOD HEALTH AND WELL-BEING**

The link between tourism, health and well-being has been highlighted during the COVID-19 pandemic as the sector depends on contact intensive services. A destination with

clean and hygienic tourism businesses and facilities, prevention plans and guidelines, to name only a few, is in a better position to restore consumer confidence key for the economic recovery of the tourism sector during and after any health crisis. At the same time, taxes generated from tourism activities can be reinvested in improving health care and services of the local community.

#### **GOAL 4: QUALITY EDUCATION**

Tourism requires a large workforce. Thus, it has the potential to promote sustainable and inclusive socioeconomic development; and skilful workers are key for a sustainable tourism sector to prosper. Education programmes tailored to tourism businesses and their workers can increase opportunities for career growth, development and provide the knowledge and the skills necessary to succeed in the field. Furthermore, tourism stakeholders may play a significant role in sensitizing clients and local communities on their contribution to the SDGs.

#### **GOAL 5: GENDER EQUALITY**

Tourism is one of the sectors with the highest share of women who are employed or entrepreneurs, although women working in tourism are often concentrated in low-skilled or informal work. The sector can be a tool for women to unlock their potential, helping them become fully engaged and leading in every aspect of society. It can empower women in multiple ways, particularly through the provision of jobs and through income-generating opportunities in small - and larger-scale tourism and hospitality-related enterprises.

#### **GOAL 6: CLEAN WATER AND SANITATION**

Tourism investment for utilities can play a critical role in achieving water access and security, as well as hygiene and sanitation for all in tourism destinations and their surroundings. The efficient use of water in tourism, coupled with appropriate safety measures, wastewater management, pollution control and technology efficiency can be key to safeguarding our most precious resource.

#### **GOAL 7: AFFORDABLE AND CLEAN ENERGY**

Tourism is an energy-intensive sector; however, it can champion and accelerate the shift towards increased renewable energy shares in the global energy mix and prioritize energy efficiency across operations. The sector can be at the origin of the implementation of renewable energies in a local community. By promoting investments in clean energy sources, as well as advancing innovative solutions, tourism can help to reduce greenhouse gas (GHG) emissions, mitigate climate change and contribute to access to energy for all.

#### **GOAL 8: DECENT WORK AND ECONOMIC GROWTH**

Tourism is one of the driving forces of global economic growth and is considered an effective sector for achieving decent work and economic growth in developing countries, especially so for the least developed countries (LDC) and landlocked developing countries

(LLDCs) a recognition reflected explicitly in Target 8.9. Responsible and sustainable management of tourism will unlock tourism's potential to stimulate job creation, particularly for vulnerable groups, contribute to rural development, favour economic diversification through the tourism value chain, promote cultural awareness and inclusiveness, and help preserve local cultural traditions, among others.

#### **GOAL 9: INDUSTRY, INNOVATION AND INFRASTRUCTURE**

Sustained investment in infrastructure and innovation is a crucial driver of economic growth and development. Tourism development relies on good public and private infrastructure. The sector can influence public policy for infrastructure upgrade and retrofit to be more sustainable, innovative, and resource-efficient, and moving towards low carbon growth, thus attracting tourists and other sources of foreign investment.

#### **GOAL 10: REDUCED INEQUALITIES**

Tourism can be a powerful tool for reducing inequalities if it engages local populations and all key stakeholders in its development. Tourism serves as an effective means for economic integration and diversification, and poverty reduction. It can impact on earned income and people's livelihoods, development of local and rural economies, as well as on the natural and cultural environment. Furthermore, it can contribute to urban renewal and rural development by giving people the opportunity to prosper in their place of origin.

#### **GOAL 11: SUSTAINABLE CITIES AND COMMUNITIES**

A city that is not good for its citizens is not good for tourists. Tourism can help advance urban infrastructure and accessibility, promote regeneration, and preserve cultural and natural heritage assets on which tourism depends. Investment in green infrastructure (more efficient transport, reduced air pollution) should result in smarter and greener cities, not only for residents but also for tourists.

#### **GOAL 12: RESPONSIBLE CONSUMPTION AND PRODUCTION**

The tourism sector needs to adopt sustainable consumption and production (SCP) modes, accelerating the shift towards sustainability. It is imperative to identify key points of intervention within the tourism value chain to optimize the use of natural resources and reduce environmental impacts caused by production and consumption. Tools to monitor sustainable development impacts of tourism (as explicitly mentioned in Target 12.b) including for energy, water, waste, biodiversity and job creation will result in enhanced economic, social and environmental outcomes.

#### **GOAL 13: CLIMATE ACTION**

Tourism contributes to and is affected by climate change. Tourism stakeholders should play a leading role in the global response to climate change, both by implementing adaptation and mitigation measures. By reducing its carbon footprint, primarily in the transport

and accommodation industries, tourism can benefit from low carbon growth and help tackle one of the most pressing challenges of our time.

#### **GOAL 14: LIFE BELOW WATER**

Coastal and maritime tourism rely on healthy marine ecosystems. Thus, tourism development should be an integral part of the management of these environments, in order to help conserve and preserve fragile marine ecosystems and serve as a vehicle to promote a blue economy, contributing to the sustainable use of marine resources. In some destinations, marine resources are the main source of income, therefore their protection is crucial. The economic benefits of tourism in relation to life below water have been further solidified by the explicit mention of tourism in Target 14.7.

#### **GOAL 15: LIFE ON LAND**

Rich biodiversity and natural heritage are often the main reasons why tourists visit a destination. The sector is in a strategic position to foster an appreciation of local knowledge of biodiversity, establish clear links between biodiversity conservation and community health and welfare, and provide active actions that can be taken by tourism stakeholders to protect and restore life on land. Tourism can play a major role if sustainably managed in fragile zones, not only in conserving and preserving biodiversity, but also in generating revenue as an alternative livelihood to local communities.

#### **GOAL 16: PEACE AND JUSTICE**

As tourism revolves around billions of encounters between people of diverse cultural backgrounds, the sector can foster multicultural and interfaith tolerance and understanding, laying the foundation for more peaceful societies. Tourism can promote human rights and access to justice by supporting local communities and businesses that operate in an ethical and sustainable manner, creating a culture of respect for the rule of law and human rights. Well-planned and coordinated efforts are key to limit the negative impact that tourism activities may have on the public security of a destination.

#### **GOAL 17: PARTNERSHIPS FOR THE GOALS**

Due to its cross-sectoral nature, tourism can strengthen public-private-community partnerships and engage multiple stakeholders international, national, regional and local to work together to achieve the SDGs and other common goals. Public policy and innovative financing are at the core of achieving the 2030 Agenda. Tourism development contributes to all goals, not just for those involved in tourism, as the development of the sector can mandate a wider range of effects through diverse partnerships.

#### **Conclusion**

As stressed at the beginning of this paper, tourism is one of the fastest growing industries in the world and expected to resume its rapid growth in the near future. As tourism services have impact on host areas including impacts on local environment, host communities

and employment opportunities development, the tourism industry has important implications for sustainable development of tourism destinations. The sustainable consumption practices should be promoted by tourism sector in order to contribute to sustainable development of tourism destinations. Sustainable tourism provides great exposure to the visitors in providing an unusual experience that enhances the quality of the providing country. The tourism experience results in a positive vibration and adds to the value of the natural environment. It is concluded that sustainable tourism helps to reduce the negative vibrations on society and on the natural atmosphere at the same time by providing benefits to the residents and citizens. The tourists, are currently looking for sustainable tourism services and enjoy responsible consumption practices therefore they are keen to select sustainable tourism service packages that are proposed by various tourism organizations. Future research on the role of tourism in sustainable development should focus on reducing the negative impacts of tourism development, both regionally and globally.

## **DETERMINANTS OF ONLINE CONSUMERS' COGNITIVE DISSONANCE ARISING FROM ONLINE IMPULSIVE BUYING BEHAVIOUR**

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### **Abstract**

*The internet revolution brought about a paradigm shift in all the fields at end of the twentieth century. Virtual marketers attempt to attract new customers through technological innovations, despite the absence of physical feel, sensation and touch in online shopping. Research has examined the cognitive dissonance experienced by the online shoppers. The present research is empirical study and employs a descriptive research method. Convenience sampling was used to collect data from 417 online customers. The research found that occupation significantly influences the level of cognitive dissonance arising from the online shopping. Key findings suggest the need for tailored strategies based on occupation-specific dissonance profiles to mitigate issues effectively.*

**Keywords:** Internet, Technological Innovation, online consumer, Impulsive Buying, Cognitive Dissonance.

### **INTRODUCTION**

In the beginning, a silent trade system was practiced in markets where traders couldn't communicate due to language barriers but still conducted business. Following this, the Barter trading system emerged as a method of exchanging goods or services without using money (Sullivan & Sheffrin, 2003). Subsequently, the bricks and mortar system arose, referring to

businesses with physical locations where buyers could see, touch, and purchase merchandise. After bricks and mortar, consumers began purchasing goods and services through virtual markets facilitated by the internet and websites. Online shopping provides a platform for purchasing various products or services using online transactions and electronic data interchange. The risks undertaken over a century ago differ significantly from those faced today, but both events share commonalities in participant attitudes (Bowers, 2000).

Despite challenges in targeting rural markets, many companies are increasingly focusing on this sector due to market saturation in urban areas and favourable changes in rural lifestyles, habits, tastes, and aspirations. Rural consumers now prefer branded products, many of which are accessible through online platforms. The objective of this research is to examine the factors influencing dissonance among online shoppers and to explore how demographic variables affect these factors. The research question focuses on identifying significant issues experienced by online shoppers during their shopping experiences.

## **LITERATURE REVIEW**

### **Delivery Concern**

A study by Ahasanul Haque & Khatibi (2006) found that online shopping in India has experienced steady growth over the past decade by effectively identifying and satisfying the diverse needs of urban and rural customers. Interestingly, the growth rate of customers opting to pick up their orders from designated points has outpaced those opting for home delivery (Eleonora Morganti & Fortin, 2014). The emergence of business-to-consumer (B2C) home logistic services has been gradual, driven by the increasing number of online stores entering the market (Shu-hsien Liao & Lin, 2011).

Online shopping has seen rapid growth due to the efficient delivery of small products in both urban and rural areas (Tom Cherrett & McLeod, 2017). The terms and conditions of logistic policies indirectly impact the availability of premium products on various online shopping sites (Ronand Ke Kervenoael & Bozkaya, 2016). Companies engaged in online home delivery services promptly deliver perishable products to their intended customers, emphasizing immediate response to stakeholders to enhance service quality and customer satisfaction (Mu-Chen Chen & Chih-Ming Hsu, 2014).

### **Security and Privacy Concerns**

Online shoppers have expressed significant concerns and fears regarding the security of their information provided to online shopping websites. The misuse of consumer data not only impacts trust in online shopping but also reduces the likelihood of future purchases through these websites (Rajarshi Chakraborty & Bagchi-Sen, 2016). Cyber fear significantly influences the attitudes of online shoppers (Ignas Zimaitis & Urbonavicius, 2020). Internet privacy and security remain major concerns for both new and existing customers in the realm of online shopping (Fernandez, 2005).



### **Rejection Concerns**

According to Kok Wai & Johari (2019), product risk, convenience risk, and return policy risk significantly and positively influence online shopping behaviour, whereas non-delivery risk has a significant negative impact. In online shopping environments, issues with product returns between retailers and customers are prominent. Previous research suggests that return policies typically encompass three dimensions: return cost, time limits, and effort involved. Customers' psychological perceptions of return policies are shaped by traditional consumer perspectives, focusing on perceived risk, quality, and fairness (Miao Wang, 2017). Implementing modularization and offering generous return policies not only enhances revenue but also increases costs due to higher return likelihood and design expenses (Robert Setoputro, 2005).

### **RESEARCH METHODOLOGY**

The study aims to analyze demographic variables and other respondent characteristics related to cognitive dissonance in online shopping. Both primary and secondary data were utilized. Primary data were collected via a self-administered questionnaire developed by the researcher, while secondary sources were employed as necessary.

The study focused on four Taluks within the undivided Vellore District: Vellore, Arakonam, Ambur, and Tirupattur. Taluks were selected using a lottery method. A total of 460 questionnaires were distributed across these Taluks during the period of 2023-2024, with 442 returned (96% collection rate). After careful editing, 417 questionnaires were deemed usable for further analysis, with 25 rejected due to incompleteness (5.43% rejection rate). Respondents were identified with the assistance of logistics personnel and delivery staff handling online orders.

The sample size of 417 respondents was justified through various calculations:

1. **Sample Size for Factor Analysis:** According to Hair (2010), a minimum of five times the number of variables (24 statements in this study) is required for factor analysis, necessitating a minimum sample size of 120.
2. **Quantitative Consumer Survey:** Crouch (1984) recommends a sample size of 300 to 500 for quantitative consumer surveys, supporting the adequacy of the present study's sample size.
3. **Morgan's Table:** According to Morgan's table, for populations of 100,000 or more at a 95% confidence level, the minimum required sample size is 383.

Therefore, the sample size of 417 respondents is deemed appropriate for conducting the study, as it meets or exceeds the minimum sample size recommendations for factor analysis, quantitative consumer surveys and Morgan's table.

### **DATA ANALYSIS AND INTERPRETATION**

Online customers have many good reasons to shop online, but they also face issues related to product quality, hidden costs, loading times, payment modes, security of personal

information, and delivery. Consequently, online shoppers may experience cognitive dissonance when they encounter situations involving conflicting attitudes, feelings, and behaviours. On one hand, online customers enjoy benefits such as a wide selection, 24/7 service, convenient payment methods, significant discounts and offers, and home delivery.

Online retailers should take appropriate steps to resolve these issues. This study on online customers' dissonance aims to help online sites and retailers understand the various reasons for dissonance and ways to reduce it. As a result, this study would help them retain existing customers and attract new ones. The researcher has identified and selected twenty-four observed variables to study cognitive dissonance. Through factor analysis, these 24 observed variables have been converted into three latent variables: delivery concerns, security and privacy concerns, and rejection concerns. The following table presents the percentage analysis of the variables related to dissonance.

**Table 1**  
**Cognitive Dissonance with Online Shopping Based on Customers' Educational Level**  
(N=417)

Education	No. of Respondents	Mean	Std. Deviation
H.Sc./Diploma	92	1.91	0.506
Under Graduate	174	1.98	0.579
Post Graduate	88	1.92	0.551
Professional Qualification	63	2.00	0.596

Source: Primary Data

Table 1 exhibits that the customers with professional qualifications ( $M=2.00$ ) have the high level of cognitive dissonance with online shopping among the customers with various educational background followed by the customers with undergraduate degree ( $M=1.98$ ). The one-way ANOVA test was conducted to study the influence of educational level of the customers on the level of cognitive dissonance.

$H_0$  – The level of the cognitive dissonance in connection with online shopping does not differ based on the educational level of the customers.

**Table 2**  
**One Way Analysis of Variance Comparing Education with Cognitive Dissonance**

Cognitive Dissonance	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.479	3	0.160	0.508	0.677
Within Groups	129.656	413	0.314		
Total	130.134	416			

Source: Primary Data

The ANOVA table 2 reveals that the significance value ((F(3,413)= 0.508, p=0.677)) is greater than 0.05 and the null hypothesis is accepted. Hence it is concluded that the level of the cognitive dissonance does not significantly differ based on the educational level of the customers.

***Cognitive Dissonance with Online Shopping and Occupation of the Customers***

Customers' occupation has impact on the various aspects of the consumer behaviour. Occupation plays a crucial role in determining the consumer behaviour as it affects the status, income level and amount spent on online shopping by customers. Therefore, the researcher has made this attempt to examine the influence of customers' occupation on the level of cognitive dissonance with respect to online shopping.

**Table 3**  
***Cognitive Dissonance with Online Shopping Based on Customers' Occupation***  
***(N=417)***

<b>Occupation</b>	<b>No. of Respondents</b>	<b>Mean</b>	<b>Std. Deviation</b>
Salaried class	129	1.85	0.560
Businessmen	87	1.98	0.549
Homemakers	26	1.81	0.567
Students	131	2.02	0.533
Professionals	44	2.09	0.603

Source: Primary Data

Table 3 elucidates that professionals ( $M=2.09$ ) have experienced high level of cognitive dissonance with online shopping followed by students with the mean value of 2.02 and businessmen with the mean value of 1.98. The following hypothesis was formulated and tested by the researcher to study the impact of customers' occupation on the level of the cognitive dissonance.

$H_0=$  The level of the cognitive dissonance with respect to online shopping does not differ based on the occupations of the customers

**Table 4**  
***One Way Analysis of Variance Comparing Occupation with Cognitive Dissonance***

<b>Cognitive Dissonance</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
Between Groups	3.373	4	0.843		
Within Groups	126.762	412	0.308	2.740	0.028
Total	130.134	416			

Source: Primary Data

One way ANOVA table portrays that the significance value (( $F(4,412)= 2.740$ ,  $p=0.028$ )) is less than 0.05 and the null hypothesis is rejected. Hence it is concluded that the level of the cognitive dissonance with respect to online shopping significantly differs based on the customers' occupation.

### **DISCUSSION**

Three underlying factors have been identified through factor analysis: delivery concerns, risk and return concerns, and rejection concerns. The study reveals that customers with professional qualifications experience a high level of cognitive dissonance regarding online shopping, while customers with only school-level education experience lower levels of cognitive dissonance. However, the level of cognitive dissonance does not significantly differ based on the educational level of the customers. Additionally, the findings show that professionals experience a high level of cognitive dissonance with respect to online shopping, whereas homemakers experience a lower level of dissonance. In this case, the level of cognitive dissonance significantly differs based on the customers' occupation.

To address the most important issues in online shopping, such as the difficulty of changing delivery speed and the lengthy processes involved in product returns, online retailers should simplify the return procedure and ensure speedy delivery of products. It is crucial for online retailers to deliver ordered products on time and to the doorsteps of consumers. Additionally, online shopping sites should provide the facility to change the delivery address after an order has been placed. According to the opinions of online shoppers, delivery charges are often perceived as high. Therefore, online retailers should take suitable steps to reduce shipping costs. The level of cognitive dissonance experienced by online customers varies based on their occupation. Retailers should study the nature of dissonance among different groups, such as salaried employees, businesspeople, homemakers, students, and professionals. By developing strategies based on scientific studies tailored to these specific groups, dissonance can be either eliminated or reduced. Furthermore, online retailers and shopping sites should conduct periodic studies to understand the problems faced by customers through feedback forms and customer care centers. These issues should be addressed immediately to ensure the utmost satisfaction of the customers.

## **INDUSTRY 5.0- IMPACT ON SOCIAL DEVELOPMENT**

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### **Abstract**

*We are living at the beginning of what is being called as fifth industrial revolution: industry 5.0. This means that the way we produce and manufacture goods are changing rapidly and production managers and foreman need to keep up. Industry 5.0 brings with it new technology and methods that can improve efficiency and output.*

*Like two faces of the coin industry 5.0 also has its pros and cons in the social development. Adapting to Industry 5.0 requires huge investment, which is a big obstacle for some companies. Industry 5.0 has a long way to go before it can be fully realized but, once it is, it has the potential to change the manufacturing landscape forever.*

### **Keywords**

Mass production, technology, social development, impact, landscape, digital, robotics, human centred, agriculture, network traffic and public health etc...

### **Industry 5.0 - Introduction**

Industry 5.0 is the term used to describe the next phase of the industrial revolution. This latest wave of innovation is defined by the integration of advanced technologies into the manufacturing process. This includes everything from 3D printing and robotics to artificial intelligence and big data.

### **Industry 5.0 – The human centric revolution**

The goal of Industry 5.0 is the working of robots, smart machines and humans in one equation. It also aims to revive customization in the product industry. Industry 5.0 can be simplified as “The human centric revolution”. Industry 5.0 is referred to fifth industrial revolution, promising stage of industrialization in which robots driven by artificial intelligence and cutting-edge technology work alongside people to optimize workplace procedures. This evolution places a higher priority on a human-centric strategy that emphasizes resilience and sustainability.

### **Technological development in Industry 5.0**

The latest industrial revolution seeks to maintain mass manufacturing due to the growing world’s population. However, the production settings will change significantly with Industry 5.0 technology. Both humans and robots will work together to produce things and services in a more streamlined, effective manner from automobiles to the pharmaceuticals industry.

### **An analysis contrasting Industry 4.0 and Industry 5.0**

The history books recorded Industry 4.0 as the technological revolution. The rapid advancement of technology and connected devices has dominated everything for the past two to three decades. Digital technology was thus introduced by Industry 4.0 to speed up the

manufacturing process and produce large quantities that would be available for public consumption. Although it has been a huge improvement in satisfying growing market demands, it has also had some drawbacks.

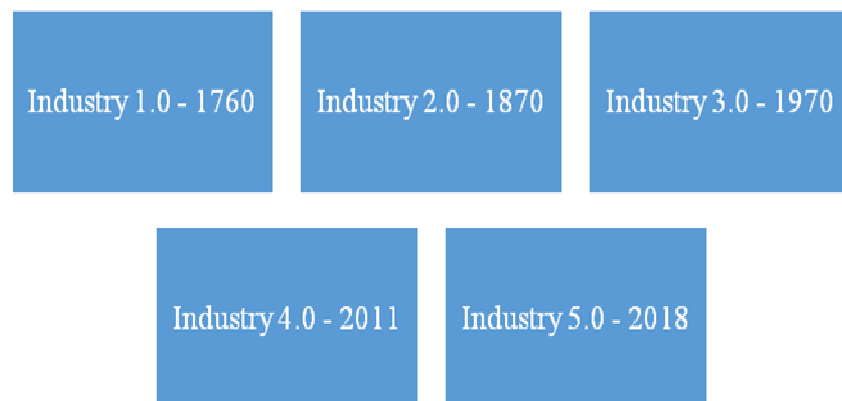
**Major drawback of Industry 4.0**  
An impersonal experience for global customers

Industry 5.0 differs significantly from Industry 4.0 in that it is designed to be both value- and human-centered. Giving customers a tailored and customized experience will be the focus of this revolution, which will make use of both old and new Industry 5.0 technology.

#### **History of Industrial Revolution**

Industry 5.0's history began more than 200 years ago, or 262 years to be precise. The first steps towards the Industrial Revolution 5.0 were taken back in 1780. Additionally, studying each industry's past is crucial to understanding how productivity and efficiency have increased and will continue to do so.

#### **Timeline for Industrial Revolution**



#### **Development of Industry 1.0**

The Industrial Revolution 1.0 began in 1760, marking the beginning of the manufacturing sector. The world gradually transitioned from agricultural production to mechanization. Steam and water were the main sources of power for machines.

**Development of Industry 2.0** 1870 marked the start of the second Industrial Revolution as companies advanced into supply chains and assembly lines, combining human and mechanical labor. In this business, mass production and electricity were at the forefront.

#### **Development of Industry 3.0**

Industrial Revolution, 1970 3.0: The focus of Industry 3.0 was on electronics. In order to satisfy expanding customer needs, automated assembly lines employed electronics and machines.

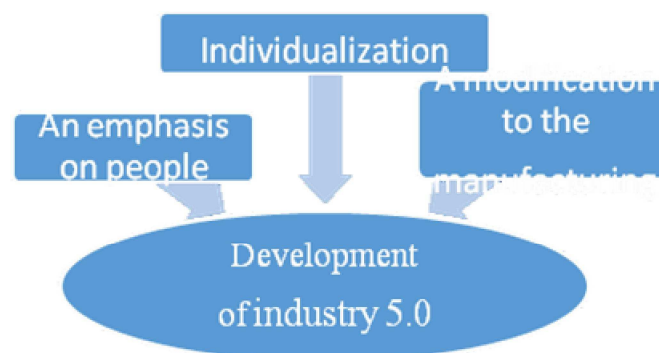
### **Development of Industry 4.0**

Presently - Industrial Revolution 4.0: The globe entered Industry 4.0 as a result of technological advancements. We were able to connect with each other on a global scale because of gadgets like social media apps and smartphones. Companies have grown more and more.

### **Development of Industry 5.0**

The idea of Industry 5.0 goes beyond industry to include all businesses and business plans, offering a wider viewpoint than what is observed in the context of the engaging the industry 5.0 technology.

### **IMPACTS ON SOCIAL DEVELOPMENT – INDUSTRY 5.0**



### **Industry 5.0 – effects on society**

Industry 5.0 highlights the function of industry in society by placing a strong emphasis on worker welfare as a key consideration in the manufacturing process. In contrast to Industry 4.0, it aims to respect the constraints of production on our planet by leveraging new technology to promote prosperity that goes beyond job creation and economic growth. This represents a change from the past focus on economic value to a holistic viewpoint that gives societal worth and well-being priority. Although comparable concepts have been studied in the past, such as corporate social responsibility, Industry 5.0 brings a fresh perspective on prioritizing people and the environment before profits.

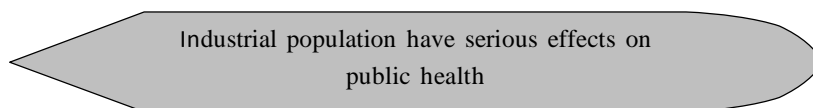
### **Industry 5.0 – Work with complex systems**

The enabling technologies of Industry 5.0 are designed to work with complex systems that incorporate cloud computing, big data analytics, smart materials, human-machine interaction, and other elements, like: Reducing network traffic, enabling transactions, and protecting privacy are all made possible by intelligent manufacturing and intelligence. This enables companies to use software resources for data exchange across industrial sectors in an efficient manner.

### **Industry 5.0 – Information technology**

Stakeholder agreement processes are automated by block chain technology, and smart contracts handle security, authentication, and other automated service-related tasks. The 6G network is anticipated to meet the requirements for intelligent information with high levels of dependability, energy efficiency, and traffic volume. Another essential enabling technology for managing enormous volumes of data is big data analytics.

### **Industry 5.0's detrimental effects on society**



### **Damage to Regional Economy**

Local economies may suffer from industrialization in certain situations, particularly in places where traditional means of subsistence like artisanal crafts or agriculture are replaced by industrial operations. This can result in unstable economies and a reliance on outside industries.

### **Negative Cultural changes**

The replacement of traditional cultural practices and beliefs by consumerist attitudes and materialistic values brought about by industrialization can result in negative cultural changes that erode cultural diversity and identity.

### **Loss of Arable Land**

Industrial operations frequently result in the conversion of arable land for manufacturing or mining, which lowers the amount of land available for agriculture and food production. This can worsen hunger and food insecurity.

### **In conclusion**

Industry 5.0 promotes the use of artificial intelligence in human life and the return of humanity to the center of the world. Society 5.0 seeks to achieve economic growth while overcoming social and environmental challenges, contributing to the welfare of the global community. Disadvantage of industry 5.0 is that it is still in its early developmental stage and not all countries have access to this technology yet. Industry 5.0 has a long way to go before it can be fully realized but, once it is, it has the potential to change the manufacturing landscape forever.



## THE RISE OF INDUSTRY 5.0: IMPLICATIONS FOR ECONOMIC DEVELOPMENT AND WORKFORCE TRANSFORMATION

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### Abstract

*Industry 5.0 represents an evolution in industrial practices that goes beyond the automation and connectivity of Industry 4.0, emphasizing a human-centric, sustainable, and resilient approach. This new paradigm integrates advanced technologies such as artificial intelligence (AI), robotics, and the Internet of Things (IoT) with human creativity, problem-solving skills, and emotional intelligence. By fostering symbiotic collaboration between humans and machines, Industry 5.0 aims to drive economic growth through enhanced productivity, innovation, and the creation of new opportunities across various sectors. The fusion of human ingenuity and technological innovation allows for the optimization of production processes, customisation of products, and rapid adaptation to changing market demands. Furthermore, Industry 5.0 promotes sustainability and inclusivity by prioritizing ethical considerations, resource efficiency, and social responsibility. This holistic model not only addresses technological advancement but also underscores the importance of social and environmental impacts, ultimately paving the way for a more resilient and prosperous future. The adoption of Industry 5.0 principles and technologies is anticipated to stimulate economic diversification, enhance the quality of products and services, and contribute to sustainable growth.*

**Keywords:** Industry 5.0, Human-Centric Industrial Evolution, AI and economic growth, Human-Machine Collaboration, Sustainable Manufacturing

### 1. Introduction

Industry 5.0 is an emerging concept that builds upon Industry 4.0, focusing on human-machine collaboration, often referred to as 'cobotics' (Audo, 2019). While Industry 4.0 emphasises automation and data exchange in manufacturing technologies, Industry 5.0 integrated the capabilities of both humans and machines to optimize productivity and innovation further (AMFG, 2024). In terms of economic growth, Industry 5.0 holds significant potential. By leveraging advanced technologies like artificial intelligence, robotics, and the Internet of Things (IoT) alongside human creativity, problem-solving, and emotional intelligence, businesses can enhance efficiency, product quality, and customization (Ul Haq et al., 2020). This synergy can drive competitiveness and foster economic growth by creating new job

opportunities, stimulating innovation, and increasing productivity. Moreover, Industry 5.0 can facilitate the development of new business models and industries, driving economic diversification. It can also lead to the creation of high-value-added products and services, contributing to GDP growth and improving the overall standard of living (Beltozar-Clemente et al., 2023). However, to realise these benefits fully, stakeholders must address challenges such as workforce reskilling, ethical considerations, and ensuring inclusive growth to prevent potential societal disruptions.

## **II. Industry 5.0 and Digital Revolution**

The term 'digital revolution' is broad and encompasses various technological advancements that have transformed industries and societies over recent decades. It refers to the widespread adoption and integration of digital technologies, such as computers, the Internet, and digital communication, into various aspects of life, including business operations, government services, and personal interactions (Crnobrnja et al., 2023). The Digital Revolution marked the beginning of the information age. It implicitly refers to the sweeping changes brought about by digital computing and communication technology during the latter half of the 20<sup>th</sup> century. Central to this revolution is the mass production and widespread use of digital logistic circuits, and its derived technologies, including the computer, digital cellular phone, and fax machine. This is leading to a dramatic social and cultural transformation of our society, particularly in terms of economic and labour market structures (Shukla & Singh, 2023). Digital Inclusion aims at creating an informed society by including the digitally excluded as we proceed on the road to development. Accessing technology is imperative to the whole process of bridging the digital divide and fomenting a digital cohesion that secures opportunity through the internet, mobile services and computerisation of processes. This is a challenge relating to access and the ability to effectively use information and communications technologies (ICTs) to address the needs of people disadvantaged due to education, age, gender, caste or location.

Inequality in the use and application of digital technologies is a new driver of social, regional and economic exclusion in the 21<sup>st</sup> century, which risks accelerating existing social, regional and economic divides and creating new ones (Akkaya et al., 2023). The drivers of digital inclusion vary from state to state, region to region and across different segments of the market, but most commercial and government market research suggests that the three key factors which drive people first to become digitally engaged and subsequently to become more sophisticated in their digital engagement are; Access to ICT, Confidence and Motivation. Industry 5.0, on the other hand, is a more specific concept within the context of manufacturing and industry. It builds upon the foundation laid by the digital revolution, particularly the advancements of Industry 4.0, which emphasises automation, data exchange, and smart technologies in manufacturing processes (TWI, 2023).

Here are some key differences between Industry 5.0 and the broader digital revolution:

1. **Focus on Human-Machine Collaboration:** While the digital revolution often emphasizes automation and efficiency through technology, Industry 5.0 places a stronger emphasis on collaboration between humans and machines. It seeks to leverage the unique capabilities of both to enhance productivity, innovation, and flexibility in manufacturing.
2. **Integration of Physical and Digital Systems:** Industry 5.0 aims to seamlessly integrate physical and digital systems, blurring the lines between the virtual and physical worlds. This integration allows for real-time feedback, adaptive manufacturing processes, and greater customization of products.
3. **Emphasis on Creativity and Problem-Solving:** Unlike previous industrial revolutions that focused primarily on efficiency gains through automation, Industry 5.0 recognizes the importance of human creativity, problem-solving skills, and emotional intelligence. It seeks to empower workers to contribute their unique skills and insights to improve processes and drive innovation.
4. **Holistic Approach to Technology Adoption:** Industry 5.0 takes a more holistic approach to technology adoption, considering not only the technical aspects but also the social, ethical, and environmental implications of advanced technologies. It aims to create a more sustainable and inclusive form of industrialisation that benefits society as a whole.

While the digital revolution represents a broader transformation driven by digital technologies across various sectors, Industry 5.0 specifically focuses on leveraging human-machine collaboration to enhance manufacturing processes and drive innovation in the industrial sector (silicon, 2024).

### **III. Theoretical Framework**

The theoretical framework of Industry 5.0 builds upon concepts from previous industrial revolutions and integrates new principles related to human-machine collaboration and advanced technologies. Here's a theoretical framework outlining key components of Industry 5.0:

**1. Historical Context:** Industry 5.0 is situated within the broader context of industrial revolutions, including the mechanization of the 18th century (Industry 1.0), mass production and assembly lines of the early 20th century (Industry 2.0), and automation and digitalization of the late 20th century (Industry 3.0 and 4.0). Each of these revolutions has contributed to the evolution of manufacturing and industry.

#### **2. Principles of Industry 5.0:**

- **Human-Machine Collaboration:** At the core of Industry 5.0 is the concept of symbiotic collaboration between humans and machines. Unlike previous industrial

revolutions that focused on automating tasks to replace human labour, Industry 5.0 emphasizes the complementary strengths of humans (creativity, problem-solving, emotional intelligence) and machines (speed, precision, scalability).

- **Customization and Flexibility:** Industry 5.0 prioritizes the ability to produce highly customized products and respond quickly to changing market demands. By leveraging human insights and advanced technologies, manufacturers can achieve greater flexibility and agility in their production processes.
- **Ethical and Social Considerations:** Industry 5.0 takes into account the ethical and social implications of advanced technologies, including issues related to job displacement, privacy, bias, and algorithmic accountability. It emphasises the importance of responsible innovation and inclusive growth.
- **Integration of Physical and Digital Systems:** Industry 5.0 seeks to seamlessly integrate physical machinery and processes with digital technologies, creating interconnected and adaptive manufacturing systems. This integration enables real-time data collection, analysis, and decision-making, leading to more efficient and responsive production processes.
- **Sustainability and Resilience:** Industry 5.0 promotes sustainable and resilient manufacturing practices by optimising resource usage, minimising waste, and reducing environmental impact. By embracing the principles of circular economy and green manufacturing, businesses can achieve long-term viability and contribute to global sustainability goals.

## 2. Technological Enablers:

- **Artificial Intelligence (AI):** AI technologies play a central role in Industry 5.0 by enabling predictive analytics, autonomous decision-making, and human-machine interaction. AI-powered systems can analyse vast amounts of data, optimize processes, and augment human capabilities in manufacturing environments.
- **Internet of Things (IoT):** IoT devices and sensors enable real-time monitoring and control of physical assets and processes in Industry 5.0. By connecting machines, products, and people, IoT facilitates data-driven insights and enables greater visibility and transparency across the manufacturing value chain.
- **Robotics and Automation:** Robotics and automation technologies are essential for Industry 5.0, enabling the automation of repetitive tasks and the augmentation of human workers. Collaborative robots (cobots) can work alongside humans in manufacturing environments, enhancing productivity and safety.

### 3. Implementation Challenges and Considerations:

- **Workforce Reskilling:** One of the primary challenges of Industry 5.0 is the need for workforce reskilling and upskilling to adapt to new roles and technologies. Training programs and lifelong learning initiatives are essential to ensure that workers have the skills and competencies needed for the jobs of the future.
- **Regulatory and Ethical Frameworks:** Industry 5.0 requires clear regulatory frameworks and ethical guidelines to address issues related to safety, privacy, fairness, and accountability. Policymakers and industry stakeholders must collaborate to develop regulations that promote innovation while protecting workers and consumers.
- **Digital Infrastructure and Connectivity:** Industry 5.0 relies on robust digital infrastructure and connectivity to support real-time data exchange and communication between machines, devices, and humans. Investments in 5G networks, cybersecurity, and digitalization initiatives are essential to enable the transition to Industry 5.0.

By adopting this theoretical framework, businesses, policymakers, and researchers can better understand the underlying principles and implications of Industry 5.0 and develop strategies to navigate the transition to the next phase of industrial evolution.

### IV. Use of AI tools in Industry 5.0

In Industry 5.0, artificial intelligence (AI) plays a crucial role in enhancing manufacturing processes and driving innovation. Here are several ways AI is utilized in Industry 5.0:

1. **Predictive Maintenance:** AI algorithms can analyse data from sensors and machines to predict when equipment is likely to fail. By identifying potential issues before they occur, manufacturers can schedule maintenance proactively, minimizing downtime and reducing maintenance costs (Vyhmeister & Castane, 2022).
2. **Quality Control:** AI-powered image recognition systems can inspect products for defects with greater speed and accuracy than human inspectors. By automating quality control processes, manufacturers can ensure that only high-quality products reach the market, reducing waste and improving customer satisfaction.
3. **Optimized Production Planning:** AI algorithms can analyse vast amounts of data, including historical production data, market demand forecasts, and supply chain information, to optimize production schedules and resource allocation. By dynamically adjusting production plans in response to changing conditions, manufacturers can maximize efficiency and minimize costs.
4. **Supply Chain Management:** AI can optimize supply chain operations by analysing data from various sources, including suppliers, transportation networks, and market demand forecasts. By identifying patterns and trends in supply chain data, manufacturers can make more informed decisions about inventory management, logistics, and procurement, leading to improved efficiency and cost savings (Domenteanu et al., 2024).

Sustainable growth is achievable through the application of Industry 5.0 principles and technologies. Industry 5.0 builds upon Industry 4.0, emphasising human-machine collaboration and leveraging advancements in AI, big data, and IoT. This focus on human-centricity ensures that technology serves humanity, promoting resource efficiency and environmental sustainability.

1. **Resource Efficiency:** Industry 5.0 can optimise resource usage through smarter production processes. By integrating human creativity with advanced technologies, manufacturers can design and implement more efficient production methods, reducing waste and energy consumption. This leads to lower environmental impact and more sustainable use of resources.
2. **Customization and Demand Responsiveness:** Industry 5.0 enables the customization of products at scale. By leveraging human insights and machine capabilities, manufacturers can respond quickly to changing customer preferences and market demands, minimizing overproduction and reducing the need for excessive inventory. This leads to more sustainable production practices by reducing unnecessary waste and energy consumption associated with producing goods that may not be in demand.
3. **Circular Economy Integration:** Industry 5.0 can facilitate the transition to a circular economy model. By incorporating principles such as product lifecycle management, remanufacturing, and recycling into manufacturing processes, businesses can minimize waste generation and resource depletion. Human creativity can play a crucial role in designing products and systems that are easier to repair, reuse, and recycle, contributing to a more sustainable approach to production and consumption.
4. **Ethical and Social Considerations:** Industry 5.0 emphasizes the importance of considering ethical and social factors in manufacturing processes. By empowering workers and prioritizing human well-being, businesses can create a more sustainable and inclusive work environment. This can lead to greater employee satisfaction, reduced turnover rates, and increased productivity, contributing to long-term business success and sustainable growth.
5. **Technology for Sustainability:** Industry 5.0 technologies, such as advanced analytics, artificial intelligence, and the Internet of Things (IoT), can be harnessed to address sustainability challenges. These technologies can enable better monitoring and management of environmental impacts, optimize energy usage, and facilitate the development of innovative solutions to sustainability issues. By leveraging these tools, businesses can drive continuous improvement in their sustainability performance and contribute to global efforts to address climate change and other environmental concerns.

In conclusion, Industry 5.0 provides the framework and tools necessary to achieve sustainable growth by integrating human creativity, advanced technologies, and ethical

considerations into manufacturing processes. By embracing Industry 5.0 principles, businesses can create value while minimizing their environmental footprint and promoting social responsibility

5. **Product Design and Innovation:** AI can assist in product design and innovation by generating insights from large datasets, simulating different design scenarios, and identifying potential areas for improvement. By leveraging AI-driven design tools, manufacturers can accelerate the development of new products, reduce time-to-market, and enhance product performance.
6. **Human-Machine Collaboration:** AI-powered ‘cobots’ (collaborative robots) can work alongside human workers in manufacturing environments, performing repetitive or physically demanding tasks while allowing humans to focus on more complex and creative activities (Becky, 2022). By augmenting human capabilities with AI-driven automation, manufacturers can improve productivity, safety, and job satisfaction.
7. **Energy Management:** AI algorithms can optimise energy usage in manufacturing facilities by analysing real-time data from sensors and energy meters, identifying opportunities for energy conservation, and adjusting equipment settings accordingly. By optimising energy consumption, manufacturers can reduce their environmental footprint and lower operating costs.

Overall, AI enables manufacturers to unlock new levels of efficiency, productivity, and innovation in Industry 5.0 by leveraging data-driven insights and automation capabilities (Nicora et al., 2020). By integrating AI into manufacturing processes, businesses can remain competitive in a rapidly evolving global marketplace.

#### **V. Industry 5.0 and Labour Market Changes**

The labour market is poised to undergo significant changes as Industry 5.0 and advanced technologies continue to reshape industries and work processes (D. Ghosh et al., 2024). Following are some of the significant modifications we can anticipate.

1. **Shift in Job Roles and Skills:** Industry 5.0 will lead to a redefinition of job roles and required skills. While some traditional roles may become obsolete due to automation, new roles will emerge that require skills in areas such as data analysis, artificial intelligence, robotics, and human-machine collaboration. Workers will need to adapt and acquire new skills to remain relevant in the changing labour market (Carbonero et al., 2023).
2. **Increased Demand for Technical Skills:** With the increasing adoption of advanced technologies, there will be a growing demand for workers with technical skills in fields such as computer science, engineering, data analytics, and cybersecurity. Employers will seek individuals who can leverage technology to drive innovation and improve productivity in manufacturing and other industries.

3. **Emphasis on Soft Skills:** While technical skills will be essential, soft skills such as creativity, critical thinking, problem-solving, communication, and emotional intelligence will become increasingly important. Industry 5.0 emphasises human-machine collaboration, requiring workers to effectively interact with both machines and other humans in a variety of contexts.
4. **Rise of Gig Economy and Flexible Work Arrangements:** Industry 5.0 may lead to the proliferation of gig economy platforms and flexible work arrangements. As companies adopt more agile and adaptable production models, they may rely on a more flexible workforce to meet changing demands. This could create opportunities for independent contractors, freelancers, and temporary workers.
5. **Focus on Lifelong Learning and Reskilling:** Continuous learning and skill development will be essential for workers to thrive in the evolving labour market. Employers, educational institutions, and governments will need to invest in programs that provide opportunities for lifelong learning, upskilling, and reskilling to ensure that workers can adapt to changing job requirements and remain employable.
6. **Impact on Job Distribution:** Industry 5.0 may lead to changes in the distribution of jobs across different sectors and regions. Some industries may experience job growth as they adopt advanced technologies and expand their operations, while others may see declines in employment due to automation and outsourcing. Governments and policymakers will need to address disparities in job distribution and support workers in transitioning to new opportunities.
7. **Ethical and Regulatory Considerations:** As automation and AI technologies become more prevalent in the labour market, there will be growing concerns about the ethical implications of these technologies, including issues related to job displacement, privacy, bias, and algorithmic accountability. Policymakers will need to develop regulations and guidelines to ensure that the deployment of AI and automation is done responsibly and ethically.

Overall, Industry 5.0 will bring both challenges and opportunities to the labour market. By embracing technological advancements, investing in education and training, and fostering collaboration between industry stakeholders, we can navigate these changes and create a more inclusive and sustainable future of work (Pizzinelli et al., n.d.).

## **VI. Sustainable Growth with New Technology**

Sustainable growth is achievable through the application of Industry 5.0 principles and technologies.

1. **Resource Efficiency:** Industry 5.0 can optimise resource usage through smarter production processes. By integrating human creativity with advanced technologies, manufacturers can design and implement more efficient production methods, reducing waste



and energy consumption. This leads to lower environmental impact and more sustainable use of resources (Rijwani et al., 2024).

**2. Customization and Demand Responsiveness:** Industry 5.0 enables the customization of products at scale. By leveraging human insights and machine capabilities, manufacturers can respond quickly to changing customer preferences and market demands, minimizing overproduction and reducing the need for excessive inventory (Gera et al., 2023). This leads to more sustainable production practices by reducing unnecessary waste and energy consumption associated with producing goods that may not be in demand.

**3. Circular Economy Integration:** Industry 5.0 can facilitate the transition to a circular economy model. By incorporating principles such as product lifecycle management, remanufacturing, and recycling into manufacturing processes, businesses can minimize waste generation and resource depletion. Human creativity can play a crucial role in designing products and systems that are easier to repair, reuse, and recycle, contributing to a more sustainable approach to production and consumption.

**4. Ethical and Social Considerations:** Industry 5.0 emphasizes the importance of considering ethical and social factors in manufacturing processes (Longo et al., 2020). By empowering workers and prioritizing human well-being, businesses can create a more sustainable and inclusive work environment (Barata & Kayser, 2023). This can lead to greater employee satisfaction, reduced turnover rates, and increased productivity, contributing to long-term business success and sustainable growth (K. Ghosh, n.d.).

**5. Technology for Sustainability:** Industry 5.0 technologies, such as advanced analytics, artificial intelligence, and the Internet of Things (IoT), can be harnessed to address sustainability challenges. These technologies can enable better monitoring and management of environmental impacts, optimize energy usage, and facilitate the development of innovative solutions to sustainability issues (Trabelsi, 2024). By leveraging these tools, businesses can drive continuous improvement in their sustainability performance and contribute to global efforts to address climate change and other environmental concerns. Industry 5.0 provides the framework and tools necessary to achieve sustainable growth by integrating human creativity, advanced technologies, and ethical considerations into manufacturing processes. By adopting Industry 5.0 principles, businesses can create value while minimizing their environmental footprint and promoting social responsibility (Bazel et al., 2024).

## **VII Conclusion**

Industry 5.0 presents a paradigm shift towards a human-centric, sustainable, and resilient future of manufacturing. It builds upon the advancements of Industry 4.0, but with a stronger emphasis on collaboration between humans and machines. This fosters innovation, adaptability, and customization in production processes. While the digital revolution

encompasses various technological advancements across sectors, Industry 5.0 specifically focuses on leveraging these advancements within the industrial domain.

The key differences between Industry 4.0 and Industry 5.0 lie in their focus on automation versus human-machine collaboration, the level of human-machine interaction, and the prioritization of customization and flexibility.

By adopting the principles of Industry 5.0, businesses can achieve sustainable growth through resource efficiency, responsiveness to customer demands, and integration of circular economy practices. Furthermore, ethical considerations regarding job displacement, privacy, and algorithmic bias need to be addressed to ensure responsible and inclusive implementation.

The transition to Industry 5.0 will significantly impact the labour market, demanding a shift in job roles and skillsets. The demand for technical skills in areas like data analytics and AI will rise, alongside the continued importance of soft skills like creativity and problem-solving. Lifelong learning and reskilling initiatives will be crucial for workers to adapt and thrive in this evolving landscape.

In conclusion, Industry 5.0 offers a promising path towards a future where human ingenuity and technological advancements work in tandem to drive economic growth, environmental sustainability, and social well-being. By embracing this new paradigm, we can navigate the challenges of the labour market and create a more inclusive and prosperous future for all.

## **“ATTITUDE TOWARDS ONLINE EDUCATION: A STUDY”**

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### **Abstract**

*This study aimed to investigate the attitudes of individuals towards online education, exploring their perceptions, preferences, and concerns. A questionnaire survey method was employed, collecting data from a sample of 100 participants. The results revealed a generally positive attitude towards online education, with 70% of respondents considering it a convenient and also considered as very flexible learning option by majority of respondents. However, concerns about quality, engagement, and technical issues were also expressed, with 40% of respondents citing lack of face-to-face interaction as a significant drawback. The study found significance of instructor support, influencing attitudes towards online education. Specifically, younger participants and those with prior online learning experience exhibited more positive attitudes. The findings suggest that online education is perceived as a valuable learning platform, but improvements in quality, engagement, and technical support are necessary to enhance user experience. The study's results have implications for educators,*

*policymakers, and online learning platforms, highlighting the need to address concerns and improve online education's overall effectiveness. This research contributes to understanding the attitudes and perceptions of individuals towards online education, providing insights for enhancing the online learning experience.*

Keywords: online education, attitudes, perceptions, questionnaire survey, online learning, higher education, e-learning.

### **Introduction**

The advent of the internet and technological advancements have revolutionized the way we approach education. Online education, also known as e-learning or distance learning, has emerged as a viable alternative to traditional brick-and-mortar classrooms. Over the past two decades, online education has undergone significant transformations, driven by advances in technology, changing learner needs, and the increasing demand for flexible and accessible education. In the early 2000s, online education was in its infancy, with limited options and skepticism about its effectiveness. However, as the internet became more widespread and digital technologies improved, online education began to gain traction. The rise of learning management systems (LMS), online course platforms, and digital resources enabled educators to develop and deliver online courses, reaching a broader audience beyond geographical boundaries.

Online education, also known as distance learning, e-learning, or virtual learning, encompasses a spectrum of educational experiences delivered through digital platforms, enabling learners to engage with course materials, interact with instructors and peers, and complete assignments remotely. The genesis of online education can be traced back to the early experiments with computer-based training in the 1960s, which laid the groundwork for the evolution of distance learning technologies over the ensuing decades. However, it was not until the proliferation of the internet and advancements in digital communication technologies in the late 20<sup>th</sup> and early 21<sup>st</sup> centuries that online education truly began to flourish, revolutionizing the landscape of higher education, professional development, and lifelong learning. One of the defining features of online education is its accessibility, transcending the constraints of time and space that often limit traditional classroom-based learning. Through online platforms and digital resources, students from diverse backgrounds and geographic locations can access high-quality educational content and engage in learning experiences tailored to their individual needs and preferences. This democratization of education has profound implications for individuals who may face barriers to traditional forms of learning, whether due to geographical remoteness, physical disabilities, work commitments, or family responsibilities.

**Advantages of Online Education:**

- **Flexibility:** Students can access course materials and lectures at their own convenience, allowing them to balance their studies with work, family, or other commitments.
- **Accessibility:** Online education breaks down geographical barriers, enabling students from all over the world to access quality education without the need to relocate.
- **Cost-effectiveness:** Online courses often have lower tuition fees compared to traditional on-campus programs. Additionally, students save money on commuting, housing, and other expenses associated with attending a physical campus.
- **Variety of courses and programs:** Online platforms offer a wide range of courses and programs, allowing students to pursue their interests or advance their careers in diverse fields without being limited by the offerings of local institutions.
- **Personalized learning experience:** Online education platforms often utilize adaptive learning technologies and personalized feedback mechanisms to tailor the learning experience to each student's individual needs, pace, and learning style.
- **Enhanced technical skills:** Participating in online courses requires basic technical skills such as navigating online platforms, using digital tools, and communicating effectively online, which are valuable in today's digital world.
- **Networking opportunities:** Online education connects students with peers, instructors, and professionals from around the globe, facilitating networking and collaboration opportunities that can lead to valuable personal and professional connections.
- **Self-discipline and time management:** Online learning encourages students to develop self-discipline and time management skills as they must take responsibility for their own learning schedule and progress.
- **Lifelong learning:** Online education promotes lifelong learning by providing accessible and flexible opportunities for individuals to continue their education and acquire new skills throughout their lives.

**Disadvantages of online education**

- **Lack of face-to-face interaction:** Online learning lacks the interpersonal interaction found in traditional classrooms, which can hinder communication, collaboration, and the development of social skills.
- **Potential for distraction:** Students studying online may face distractions from their home environment, such as household chores, family responsibilities, or digital distractions like social media and entertainment.

- Technical issues: Online learning platforms rely on technology, which can sometimes fail or be inaccessible due to technical glitches, internet connectivity issues, or hardware malfunctions, disrupting the learning process.
- Limited hands-on experience: Some fields, such as science, engineering, and healthcare, require hands-on experience and practical training that may be difficult to replicate in an online environment.
- Isolation and lack of community: Online learners may feel isolated and disconnected from their peers and instructors, leading to a lack of motivation, engagement, and support, particularly for students who thrive in a collaborative learning environment.
- Perceived credibility: Despite the growing acceptance of online education, some employers and institutions may still perceive online degrees or credentials as less credible or rigorous compared to traditional degrees earned through on-campus programs.
- Self-discipline and motivation: Online learning requires a high level of self-discipline and motivation to stay on track with coursework and deadlines, as students must manage their own time and hold themselves accountable for their progress.
- Limited access to resources: Online students may have limited access to physical resources such as libraries, laboratories, and specialized equipment, which are often available to students enrolled in traditional on-campus programs.
- Digital literacy barriers: Students who are not familiar with technology or lack adequate digital literacy skills may struggle to navigate online learning platforms, access course materials, or participate in online discussions effectively.

### **Literature Review**

Online Learnings or E-Learnings Quick improvement in hardware have finished space training simple “(McBrien et al., 2009)”. “A large portion of the connections (web based learning, open instruction, net-based schooling PC learning, consolidated training, m-learning, for ex.) have in responded the ability to utilize a PC related with a net, that settlements the probability to discover from some place, whenever, in any beat, with any methods”. Internet learning are frequently named as a device which will scratch Learning measured more alternate engrossed, imaginative and surprisingly versatile. Network based learning is fluctuated as “learning proficiencies in coordinated or offbeat airs that is related with courses utilizing various gadgets (‘e.g. cell phones, workstations, and so forth’) with network induction”. “In these conditions, understudies are frequently anyplace (autonomous) to discover and coordinate with instructors and different deputies” “(Singh and Thurman, 2019)”. It simultaneous erudition climate organized classified the rationale deputies show up live talks, there are constant associations among teachers and disciples, and it is a criticism,

with the help of bizarre learning exospheres not well controlled. “In such a learning area, erudition satisfied is not reachable esoteric the kind of live talks or periods; it’s predominant at changed culture characterizations and deliberations. Instant input and instant answer are not plausible in such a environment “(Littlefield, 2018)”. Matched learning could give huge loads of events to societal association “(McBrien et al., 2009)”. “In the focus of this terminal contagion spread such online platform are essential where (a) video conferencing with at least 40 to 50 deputies is achievable, (b) reflections with deputies are regularly done to remain classes invigorate, (c) network associations are acceptable, (d) discourses are open in cell headsets additionally and not simply workstations, € viewpoint of assessing effectively itemized talks, and (f) rapid response from deputies are frequently refined and responsibilities are often taken “(Basilaia et al., 2020)”.

### **Objectives**

- ❖ To investigate the attitudes and perceptions of individuals towards online education, exploring their convenience, flexibility, and concerns.
- ❖ To examine the factors influencing attitudes towards online education, including age, gender, and prior online learning experience, and to identify significant correlations between these factors.
- ❖ To provide insights and recommendations for educators, policymakers, and online learning platforms to improve the quality, engagement, and technical support of online education, enhancing the overall user experience and addressing concerns raised by participants.

### **Research Methodology**

Sample Area – Charkhi Dadri Sample Size- 100

Data type- Primary Data (Questionnaire) Research – Exploratory and Descriptive

### **Analysis**

How convenient do you find online education?

- a) Very convenient- 70b) Somewhat convenient-18
- c) Not very convenient-10d) Not at all convenient 2

How would you rate the quality of online education?

- a) Excellent-15b) Good-21c) Fair-45d) Poor-19

Which of the following benefits of online education is most important to you?

- a) Flexibility-38b) Accessibility-25c) Cost-effectiveness-22d) Self-paced learning-15

What is your biggest concern about online education?

- a) Lack of face-to-face interaction-40b) Technical issues-25
- c) Limited support from instructors-10d) Quality of course materials-25

How do you think online education compares to traditional classroom learning?

- a) Better-25b) Worse -36c) Equally effective -24d) Depends on the subject-15

Have you experienced any technical issues while taking online courses?

a) Yes -68b) No- 32

How important is instructor support to you in online education?

a) Very important -32b) Somewhat important-23

c) Not very important-25d) Not at all important-20

How do you think online education could be improved?

a) More interactive content-25b) Better technical support-48

c) More flexible payment options-17d) Other-10

How likely are you to continue taking online courses in the future?

a) Very likelyb) Somewhat likelyc) Not very likelyd) Not at all likely

### **Conclusion**

Based on the survey results, it is clear that online education has both advantages and disadvantages. The majority of respondents (70%) find online education to be very convenient, and 38% consider flexibility as the most important benefit. However, concerns about lack of face-to-face interaction (40%), technical issues (25%), and limited support from instructors (10%) are also prevalent. Despite these concerns, 25% of respondents believe that online education is better than traditional classroom learning, while 24% think it is equally effective. However, 36% believe it is worse, and 15% think it depends on the subject. The importance of instructor support in online education is evident, with 32% considering it very important and 23% somewhat important. To improve online education, 48% suggest better technical support, while 25% recommend more interactive content. Despite some reservations, 65% of respondents are likely to continue taking online courses in the future. This suggests that online education is a viable option for many, offering flexibility and accessibility that traditional classroom learning may not provide. Overall, online education has its strengths and weaknesses. While convenience and flexibility are significant advantages, concerns about interaction, technical issues, and support need to be addressed. By improving technical support and instructor engagement, online education can become an even more effective and appealing option for learners. In conclusion, online education is a convenient and flexible option for many, offering benefits that traditional classroom learning may not provide. However, addressing concerns about interaction, technical issues, and support is crucial to improving the online learning experience. With improvements in these areas, online education can continue to grow and provide accessible and effective learning opportunities for a wider range of learners.

## **HUMAN CAPITAL AND PRODUCTIVITY IN THE GIG: AN EXAMINATION OF THE IMPACT OF GIG AND FREELANCE WORK ON HUMAN CAPITAL DEVELOPMENT**

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### **Abstract**

*Some recent studies have shown the gig economy's growth in global labor markets. The percentage of workers in the gig economy is increasing in line with the number of businesses operating in the sector. The gig economy has significantly changed the traditional work environment by bringing short-term and flexible arrangements. Even though the academic and industry literature has addressed its drawbacks its focus is always on companies and their profits. This conceptual study examines the ways in which the rise of gig and freelance employment affects the development and use of human capital. By combining human capital theories with current trends in gig work, this investigation examines the dual role of gig employment as a facilitator and barrier to skill development, career advancement and productivity.*

### **INTRODUCTION**

The way we operate has drastically changed in these evolving times. Nowadays, a lot of employees feel compelled to put their own health and wellbeing first, which is pushing businesses to adopt new, more adaptable work models. The gig economy has drawn notice from all across the world as digital boundaries continue to become fragile.

Gig economies are characterized by flexible and occasional work arrangements. Other names for this are the "freelance," "on-demand" or "sharing" economies. This includes independent contractors, freelancers or those working on a project basis; Digital platforms and apps often enable these types of businesses.

Gig workers, unlike regular employees, are often compensated for certain services or activities and enjoy greater autonomy. A notable example of this type of labor arrangement is some road services, which allow drivers to accept or decline assistance offers at their discretion. In the future, this type of adaptable work structure should be standard across industries.

The rise of the gig economy is changing how labor is organized, managed and conceptualized. The gig economy is fueled by a variety of work arrangements, including freelance work, fixed-term contracts and on-demand work, made possible by online marketplaces such as Uber, Upwork and TaskRabbit (Kalleberg, 2009; Sundararajan, 2016). Benefits of these partnerships include improved work-life balance, autonomy, accessibility,



diversified talent and efficient resource utilization. But if the platform economy grows, the dangers posed by temporary labor could pose serious problems for the workplace as a whole. These hazards include long working hours, inadequate legal protections, inadequate workplace health and safety protocols, and more.

Also, there is no denying that the COVID-19 pandemic has changed the nature of labor and accelerated the rise of the gig economy. Gig workers have improved their skills and adopted new work practices to make a living. The gig economy has expanded 33% in 2020 – eight times faster than the US economy as a whole. The 10.1% of workers mostly rely on alternative arrangements such as contracting programs, freelancing work, on-call employment, temporary work and other forms of alternative work, according to the Bureau of Labor Statistics (BLS) and the Contingent Worker Bonus. This means that by 2024, nearly 16.9 million people, including gig workers, will switch from regular employment to freelance work. This significant development underscores the important role of the gig economy in working life.

It is interesting to note that the gig economy is not limited to low-skilled jobs. Many professionals use large staffs to avoid full-time job restrictions and organizational politics. According to recent research, 18 percent of Americans worked as gig workers last year, which includes jobs such as grocery delivery, driving and housework. Major changes in the workforce are forcing organizations to find creative new ways to manage their most important resource, the workforce. The new workforce challenges traditional HR strategies, but offers flexibility and scalability. It is important to understand how the growth of gigs and freelance work affects the growth and use of human capital.

The purpose of this research is to describe the economic value of a worker's expertise and knowledge and to understand how gig work arrangements affect productivity and human capital. The primary goal is to explore opportunities and challenges related to skill development, career advancement and productivity in the gig economy. Some of the few research questions of this study are,

**Research Questions:**

1. How does gig employment affect the development and acquisition of skills? 2. How does the career progression of gig workers differ from regular employees? 3. How productive are gig workers compared to regular employees?

This study seeks to shed light on the complex dynamics of the gig economy and how it affects both organizations and employees by addressing the aforementioned concerns.

**THEORETICAL FRAMEWORK**

Gary Becker and Theodore Schultz are the economists who first formulated the human capital theory which states that investing in health, education, and training raises an individual's economic worth and income. The human capital theory also provides a conceptual framework for examining how, in the context of the gig economy, irregular labor influences the acquisition and use of skills.

## **HUMAN CAPITAL IN THE GIG ECONOMY**

### **Skill Development and Acquisition**

The gig economy offers many opportunities to improve skills. Gig work can help in broadening the skills of individuals by providing opportunities for various jobs and responsibilities (Katz & Krueger, 2016). Gig workers are often able to apply soft skills such as time management, self discipline, and customer service to a variety of job role (Barley, Bechky, & Milliken, 2017). However, a significant barrier to professional advancement among gig workers is the lack of formal training programs (Friedman, 2014).

Gig workers are usually responsible for developing their own skills, and employers often place a high priority on employee training programs, as opposed to traditional employment arrangements. Inequalities in skill acquisition may arise from this freedom, favoring those who have the means and motivation to devote themselves fully to their education and training (Kost, 2021).

### **Career Progression**

Progress in one's career in the gig economy often takes an unpredictable and non-linear path (Kalleberg, 2009). Traditional employment is characterized by defined career paths and advancement possibilities based on company structures and job performance evaluations. On the other hand, gig workers may face difficulties in job security and advancement due to the project based structure of their work (Barley, Bechky, & Milliken, 2017).

According to surveys, some gig workers use their flexible work schedules as a stepping stone to regular jobs, but others are stuck in a cycle of short-term jobs with no room for advancement (Kost, 2021). This division in the gig economy can lead to two different outcomes: some people use gig work to grow their businesses and diversify their fields, while others see their careers decline (Kalleberg, 2009).

### **Productivity**

Productivity and job satisfaction are the crucial factors for every worker. According to Sundararajan (2016) productivity and job satisfaction can be increased by helping people in selecting jobs that align with their interests and skill set.

Gig work handling levels often influence the calculations used to match workers to tasks, improving productivity by accurately assigning skills and job requirements (Friedman, 2014). Regardless, the lack of benefits, job security, and fixed income in gig labor can undermine professional success and long-term performance (Friedman, 2014).

Gains in productivity can be undermined by the stress and fatigue of always trying to find new projects, and the uncertainty associated with changing earnings (Kalleberg, 2009).

### **Economic Contributions and Challenges**

The gig economy assumes a huge part in monetary movement by giving versatile work choices that take care of different requirements and inclinations (Sundararajan, 2016). This flexibility is especially gainful during monetary slumps, offering an option in contrast to customary work during seasons of occupation shortage (Katz & Krueger, 2016).

However, the negative aspects of gig works includes fluctuating pay, few benefits, and inadequate worker protections—raise questions about its ability to survive in the long run (Friedman, 2014). To ensure that the gig economy can sustain strong human capital development and favorably impact overall economic output, policymakers and enterprises should address these issues (Kalleberg, 2009).

### **Policy Implications**

To reshape the potential gains of the gig economy, some practical measures can be considered.

**Preparedness and development initiatives:** Government-run organizations and levels can collaborate to provide custom-tailored provision and primary development programs for gig workers, supporting them to work on their skills and livelihood opportunities.

**Benefits and Strengths Pay:** Implementing strategies and polices to get benefits like paid leave, health insurance, and retirement plans can boost the gig worker's productivity and well-being.

**Securities:** Promoting legal safeguards for freelance workers, such as fair pay policies and counter-repression measures, might additionally advance the gig economy.

**Special bonds:** Promoting legislation for gig workers like legal safeguards, such as anti harassment guidelines and requirements for equitable pay, can support the expansion of the gig economy.

### **Conclusion**

This research study helps to understand, how gig work affects the development of human capital by reviewing the human capital theory. The gig economy has both positive and negative impact on the growth of human capital and productivity. The absence of training programme, career advancement, and job stability can freeze the long-term growth of human capital, even though it provides flexibility and various opportunities for skill development. Stakeholders should strengthen the benefits of gig work on human capital and make sure that the gig economy makes a significant contribution to worker well-being and economic productivity by implementing new strategies, policies and regulations to manage and engage gig contributors by launching cooperative projects in this dynamic environment.

## **"THE ROLE OF INDUSTRY 5.0 IN PROMOTING ENVIRONMENTAL SUSTAINABILITY AND PUBLIC HEALTH"**

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### **Abstract**

*Industry 5.0 represents a paradigm shift that merges advanced technologies with human-centric approaches to foster environmental sustainability and enhance public health. This paper investigates how Industry 5.0 can drive sustainable practices and improve health outcomes through smart manufacturing, intelligent automation, and data-driven decision-making. By reducing waste, optimizing resource use, and promoting cleaner production methods, Industry 5.0 can significantly mitigate environmental impacts. Furthermore, innovations in healthcare technologies enable more effective disease prevention, personalized treatments, and real-time health monitoring. This study explores the potential benefits and challenges of Industry 5.0, highlighting its transformative impact on sustainability and public health.*

### **KEY WORDS**

Industry 5.0 - human-centric – sustainability – environmental impact – public health

### **INTRODUCTION**

Background on Industry 5.0

Industry 5.0 represents the next frontier in industrial evolution, building upon the foundations laid by Industry 4.0. While Industry 4.0 emphasized automation and digitalization, Industry 5.0 brings a human-centric approach, integrating human creativity and decision-making with advanced technologies like artificial intelligence (AI), the Internet of Things (IoT), and robotics. This shift aims to create more personalized, efficient, and sustainable manufacturing processes.

Importance of Environmental Sustainability and Public Health

Environmental sustainability and public health are critical issues in the modern world. Climate change, resource depletion, and health crises like the COVID-19 pandemic have underscored the need for innovative solutions that can address these challenges. Industry 5.0 offers the potential to make significant strides in these areas by leveraging advanced technologies to create more sustainable practices and improve health outcomes.

### **PURPOSE AND SCOPE OF THE PAPER**

This paper explores the role of Industry 5.0 in promoting environmental sustainability and public health. It examines how the integration of human-centric technologies can lead to

more sustainable manufacturing processes and significant advancements in healthcare. The paper also discusses the challenges and opportunities associated with implementing Industry 5.0 and provides recommendations for future directions.

### **INDUSTRY 5.0: AN OVERVIEW**

#### Definition

Industry 5.0 is characterized by the synergy between humans and machines, where human creativity and intelligence are combined with advanced technologies to enhance manufacturing processes. This human-centric approach aims to create more customized and sustainable production methods.

#### Comparison with Industry 4.0

While Industry 4.0 focused on automation and the use of cyber-physical systems to create smart factories, Industry 5.0 goes a step further by integrating human skills and creativity into the process. This shift allows for greater customization, improved problem-solving, and more sustainable practices.

#### **Technological Components**

Key technologies driving Industry 5.0 include AI, IoT, robotics, big data analytics, and blockchain. These technologies enable real-time data collection and analysis, predictive maintenance, and enhanced decision-making capabilities, all of which contribute to more efficient and sustainable operations.

### **ENVIRONMENTAL SUSTAINABILITY IN INDUSTRY 5.0**

#### 1. Sustainable Manufacturing Processes

Industry 5.0 promotes sustainable manufacturing by optimizing resource use, reducing waste, and minimizing environmental impact. Advanced technologies enable more precise control over production processes, leading to less material waste and lower energy consumption.

#### 2. Resource Efficiency and Waste Reduction

AI and IoT technologies facilitate real-time monitoring and control of manufacturing processes, allowing for more efficient use of resources. Predictive analytics can identify potential issues before they occur, reducing downtime and waste.

#### 3. Renewable Energy Integration

Industry 5.0 supports the integration of renewable energy sources into manufacturing processes. Smart grids and energy management systems can optimize energy use and reduce reliance on non-renewable sources.

### **PROMOTING PUBLIC HEALTH THROUGH INDUSTRY 5.0**

#### 1. Advances in Healthcare Technologies

Industry 5.0 has the potential to revolutionize healthcare through the use of advanced technologies. AI and big data analytics can improve diagnostics, treatment planning, and patient outcomes.

## 2. Real-Time Health Monitoring and Data Analytics

Wearable devices and IoT technologies enable continuous monitoring of health parameters, providing real-time data to healthcare providers. This allows for early detection of health issues and more proactive care.

## 3. Personalized Medicine and Treatment

Industry 5.0 supports the development of personalized medicine, where treatments are tailored to the individual needs of patients based on their genetic makeup and health data.

### **CHALLENGES AND OPPORTUNITIES**

#### 1. Technological and Infrastructural Challenges

Implementing Industry 5.0 technologies requires significant investment in infrastructure and technology. Companies must also ensure that their workforce is adequately trained to work with new technologies.

#### 2. Ethical and Privacy Concerns

The use of advanced technologies raises ethical and privacy concerns, particularly in healthcare. Ensuring the security of patient data and addressing ethical considerations in AI decision-making are critical challenges.

#### 3. Opportunities for Innovation and Growth

Industry 5.0 presents numerous opportunities for innovation and growth. Companies that embrace these technologies can improve their efficiency, reduce costs, and create new business models.

#### 4. Policy and Regulatory Considerations

Policymakers must develop regulations that support the adoption of Industry 5.0 technologies while addressing ethical and privacy concerns. Incentives for sustainable practices and investment in infrastructure are also important.

### **FUTURE DIRECTIONS AND RECOMMENDATIONS**

#### 1. Potential Future Developments

Future developments in Industry 5.0 may include more advanced AI algorithms, greater integration of renewable energy sources, and new applications in personalized medicine and health monitoring.

#### 2. Recommendations for Industry Stakeholders

Companies should invest in Industry 5.0 technologies and train their workforce to work with these new systems. Governments should provide incentives for sustainable practices and develop regulations that address ethical and privacy concerns. Researchers should continue to explore new applications and innovations in Industry 5.0 technologies.

### 3. Policy Recommendations

Policies should support the adoption of Industry 5.0 technologies, encourage sustainable practices, and address ethical and privacy concerns. Investment in infrastructure and workforce training is also essential.

#### **INDUSTRIAL GROWTH AND EXPORT PROMOTION**

##### **Human Capital Development:**

Industry 5.0 presents a unique opportunity for enhancing human capital development. By integrating advanced technologies into education and training programs, industries can equip the workforce with skills relevant to the digital age. This includes fostering expertise in AI programming, data analytics, and cybersecurity, which are essential for driving innovation and competitiveness in Industry 5.0-driven economies.

##### **Global Competitiveness:**

The adoption of Industry 5.0 technologies can bolster a country's global competitiveness by enhancing productivity, quality, and agility in manufacturing and service sectors. Countries that invest in Industry 5.0 infrastructure and cultivate a skilled workforce are better positioned to attract foreign direct investment (FDI) and participate actively in global supply chains. This contributes to economic growth, job creation, and sustainable development on a global scale.

##### **Export Promotion Strategies:**

Governments and industry associations can devise export promotion strategies that leverage Industry 5.0 capabilities to access international markets. This includes showcasing technological prowess in smart manufacturing, sustainability practices, and innovative product offerings. By positioning themselves as leaders in Industry 5.0-driven sectors, countries can enhance export competitiveness and diversify their export portfolios.

#### **CASE STUDIES OF SUSTAINABLE PRACTICES**

##### **Siemens:**

Siemens has embraced Industry 5.0 principles in its manufacturing processes. By integrating AI and IoT technologies, Siemens has optimized production efficiency and reduced energy consumption significantly. Real-time data analytics allow for predictive maintenance, minimizing downtime and improving overall operational sustainability. These advancements have helped Siemens achieve substantial reductions in waste generation and environmental impact, setting a benchmark for sustainable manufacturing practices in the industry.

#### **CONCLUSION**

Industry 5.0 represents a significant advancement in industrial practices, with the potential to promote environmental sustainability and improve public health. By integrating human intelligence with advanced technologies, Industry 5.0 can create more efficient,

customized, and sustainable processes. The successful implementation of Industry 5.0 technologies requires addressing several challenges, including technological, ethical, and regulatory issues. However, the potential benefits for sustainability and public health make it a worthwhile endeavor. Industry 5.0 can play a crucial role in creating a more sustainable and healthier future.

## **NAVIGATING INDUSTRY 5.0: OPPORTUNITIES AND CHALLENGES FOR MSMEs THROUGH THE LENS OF INSOLVENCY CODE**

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### **Abstract**

*Micro, small, and medium enterprises (MSMEs) form the bedrock of the global economy, contributing substantially to employment, economic growth, and entrepreneurship. However, their susceptibility to insolvency underscores the need for tailored legal frameworks. This research investigates the effectiveness of the pre-packaged insolvency scheme for MSMEs in India, focusing on its ability to address financial distress and preserve businesses.*

*The study begins by illuminating the challenges faced by MSMEs in negotiating insolvency procedures, emphasizing their unique attributes. The inadequacy of broad international standards for MSMEs prompts questions about the efficacy of existing legal frameworks. Recognizing the complexity and length of the insolvency process, particularly in developing economies, the research identifies key considerations such as personal liability and the financial constraints of smaller MSMEs.*

*The central research question explores the success of India's pre-packaged insolvency scheme for MSMEs. The research objectives involve a comprehensive analysis of challenges, an evaluation of the legal and regulatory framework, and an examination of the role of existing regulations in supporting or hindering implementation.*

**Key Words:** Pre-packaged, Insolvency, Micro, Small, and Medium Enterprises (MSMEs)

### **INTRODUCTION**

Micro, small, and medium enterprises (MSMEs) are foundational to the global economy, contributing significantly to employment, economic growth, and entrepreneurship. The vast and diverse nature of MSMEs makes it challenging to quantify and measure their impact, but they constitute the majority of businesses globally. MSMEs often face insolvency, being among the largest users of the insolvency system, and their unique attributes require tailored legal systems to encourage formalization.



The unique challenges faced by Micro, Small, and Medium Enterprises (MSMEs) make it challenging for them to navigate insolvency procedures. MSMEs are frequently involved in insolvency proceedings, highlighting the need for effective systems to address their financial distress. The presence of an efficient and expeditious insolvency system is crucial for rescuing MSMEs and reallocating their assets for more efficient use.

Design of Insolvency Laws should facilitate communication between debtors and creditors to resolve financial distress appropriately, raising questions about the adequacy of broad international standards for MSMEs. The insolvency process itself is challenging for MSMEs, with concerns about its complexity and length, particularly in developing economies with limited institutional support. Addressing the solvency of parties personally liable for debts, such as those under personal guarantees or unlimited liability structures, is a key consideration during MSME financial distress. Many smaller MSMEs may lack funds to cover insolvency process expenses, reducing expectations for unsecured creditors to receive returns. Despite legal requirements for creditor involvement, there are limited incentives for creditors to actively participate in the insolvency process.

#### **IMPORTANCE OF AN EFFICIENT INSOLVENCY SYSTEM, PARTICULARLY FOR MSMEs**

As substantial users of insolvency systems, it is crucial to assess whether existing frameworks effectively meet the unique needs of MSMEs. Properly implemented effective insolvency regimes can address challenges facing MSMEs, particularly in the context of access to credit.

Access to credit is a major challenge for MSMEs, and efficient insolvency systems can mitigate this issue by instilling lender confidence through a more predictable recovery process. Effective insolvency regimes contribute to a well-functioning economy by addressing the challenges and unique characteristics of their users. An insolvency law is particularly crucial for MSMEs, promoting risk-taking, entrepreneurship, and reducing the societal stigma of bankruptcy, which can have significant social consequences.

#### **NEED FOR SPECIAL INSOLVENCY PROCESS FOR MSMEs UNDER INDIAN INSOLVENCY REGIME**

The COVID-19 pandemic has left businesses grappling with operational challenges and financial strain, particularly impacting MSMEs. Recognizing the distinctive features and uncomplicated corporate structures of these entities, addressing their financial stress necessitates a tailored approach. To facilitate a swift, cost-effective, and value-centric resolution, a specialized insolvency process under the Code for corporate MSMEs became imperative. Designed to yield optimal outcomes for stakeholders, preserve business continuity, and safeguard employment, the Pre-packaged Insolvency Resolution Process was introduced. This targeted initiative aims to navigate the complexities unique to MSMEs, offering an efficient alternative that aligns with the exigencies of their circumstances during these unprecedented times.

### **PRE-PACKAGED INSOLVENCY RESOLUTION PROCESS (PIRP) IN INDIA**

In the realm of insolvency resolution for Micro, Small, and Medium Enterprises (MSMEs), the Pre-packaged Insolvency Resolution Process (PIRP) offers a tailored approach. The eligibility criteria dictate that the PIRP is applicable only to corporate debtors qualifying as MSMEs under Section 7(1) of the Micro, Small and Medium Enterprises Development Act, 2006. Such qualifications are: - (i) has defaulted on a minimum of ₹10 lakh; (ii) qualifies to present a resolution plan under section 29A of the Code; (iii) has not engaged in a PPIRP within the three years preceding the initiation date; (iv) has not concluded a CIRP within the three years preceding the initiation date; (v) is not currently undergoing a CIRP; and (vi) is not subject to compulsory liquidation by an order under section 33 of the Code. Further, an MSME can trigger PIRP for defaults ranging from INR 10,00,000 to INR 1,00,00,000; defaults exceeding this range necessitate the initiation of Corporate Insolvency Resolution Process (CIRP) under the Insolvency and Bankruptcy Code, 2016 (the Code).

The initiation of the Pre-packaged Insolvency Resolution Process (PIRP) by the Micro, Small, and Medium Enterprise (MSME) as the corporate debtor, referred to as the "Applicant," involves the submission of an application in the specified Form. This application must be accompanied by an affidavit, relevant documents, declarations, or records, and an associated fee of INR 15,000 (Indian Rupees Fifteen Thousand only). This submission is required to occur within a stipulated timeframe of 90 days from the date of default, subject to the fulfillment of certain conditions

### **IS PRE-PACKAGED INSOLVENCY RESOLUTION PROCESS (PIRP) A FAILURE IN INDIA?**

The Indian government's introduction of the pre-pack insolvency resolution process in 2021 aimed at addressing financial stress among Micro, Small, and Medium Enterprises (MSMEs) with default amounts ranging between Rs 10 lakh and Rs 1 crore. Despite the initial optimism surrounding this mechanism, its performance has been underwhelming, with only six cases admitted as of the latest available data. Out of the six cases, four cases are ongoing while one case is resolved and one case is withdrawn, according to the data shared by Minister of State in the MSME Ministry in a written reply to a question in the Lok Sabha.

One major concern stems from the remarkably low number of cases admitted into the pre-pack insolvency resolution process. This limited uptake raises questions about the effectiveness of the framework in attracting MSMEs facing financial distress. The fact that only a handful of businesses have opted for this insolvency resolution mechanism indicates a lack of confidence or awareness among stakeholders, hindering its intended impact.

Furthermore, the slow progress in resolving the admitted cases adds another layer to the perceived failure of the pre-packaged insolvency mechanism. Out of the six cases admitted, four are still ongoing, reflecting potential procedural bottlenecks or challenges in

expeditiously concluding the resolution process. This delay can exacerbate the financial strain on MSMEs and defeat the purpose of providing a swift and efficient resolution mechanism.

The resolution outcomes of the pre-pack insolvency cases are also a cause for concern. With only one case resolved, the success rate appears modest at best. This raises questions about the efficacy of the process in achieving its primary objective – the revival or orderly liquidation of distressed MSMEs. The limited success stories may dampen the enthusiasm of other businesses considering the pre-pack route, further impeding its adoption across the MSME sector.

The withdrawal of one case from the pre-pack insolvency process adds another layer of complexity to the narrative. Understanding the reasons behind the withdrawal is crucial in evaluating the adaptability of the mechanism to the diverse challenges faced by MSMEs. Whether it is due to procedural complexities, dissatisfaction with the outcomes, or other factors, withdrawals signal potential flaws that need addressing for the pre-packaged insolvency framework to fulfill its intended role in supporting the revival and sustainability of MSMEs in India.

#### **CHALLENGES WITH THE MSME-SPECIFIC FRAMEWORK**

The MSME-specific framework within the IBC brings forth certain advantages but is also accompanied by challenges that impede the effective resolution of MSME insolvency cases. Firstly, a prevalent issue is the lack of awareness among many MSMEs regarding the IBC and its insolvency resolution provisions. This lack of awareness acts as a deterrent, hindering proactive engagement in the resolution process and preventing the optimal utilization of benefits offered under the framework.

Secondly, the financial landscape of MSMEs introduces complexities that pose obstacles to efficient resolution. These complexities include dealing with multiple creditors, reliance on informal lending channels, and often insufficient financial reporting. These factors demand specialized expertise to navigate effectively. Furthermore, MSMEs, typically constrained by limited financial resources, face challenges sustaining prolonged insolvency proceedings. The associated costs, such as engaging insolvency professionals and meeting procedural requirements, can be prohibitively high, amplifying the burden on MSMEs throughout the resolution process.

#### **CONCLUSION**

In conclusion, the implementation of the pre-pack insolvency resolution process in 2021 by the Indian government aimed to provide a tailored solution for Micro, Small, and Medium Enterprises (MSMEs) grappling with financial stress. However, an examination of the performance and outcomes of the pre-pack mechanism reveals a series of challenges that have hindered its anticipated impact.

The limited uptake of the pre-pack insolvency process, as evidenced by only six cases being admitted, raises questions about its effectiveness in resonating with MSMEs facing financial distress. This low participation indicates a notable lack of confidence or awareness among stakeholders, impeding the intended outreach of the framework. Moreover, the slow progress in resolving the admitted cases has unveiled potential procedural bottlenecks and challenges, exacerbating the financial strain on MSMEs. The extended duration for resolution jeopardizes the swift and efficient nature envisaged for the pre-pack mechanism.

The modest success rate, with only one case resolved out of the six admitted, prompts scrutiny of the process's efficacy in achieving its primary objective—reviving or orchestrating the orderly liquidation of distressed MSMEs. This limited success may dampen enthusiasm among businesses considering the pre-pack route, creating a hurdle for its wider adoption in the MSME sector. The withdrawal of a case from the pre-pack insolvency process introduces further complexity. Understanding the reasons behind such withdrawals is crucial for evaluating the adaptability of the mechanism to the diverse challenges faced by MSMEs. Whether rooted in procedural complexities, dissatisfaction with outcomes, or other factors, withdrawals highlight potential flaws that demand attention for the pre-packaged insolvency framework to fulfill its intended role in supporting the revival and sustainability of MSMEs in India.

Challenges such as voluntary haircuts and the inherent conflicts between creditors and debtors may contribute to the limited adoption of this framework. Additionally, the frequent court interventions at various stages make achieving the stipulated 120-day timeline challenging. To address these issues and better align with the unique dynamics of the MSME sector, a revisit of the Insolvency and Bankruptcy Code is imperative, incorporating harmonization with the MSMED Act to tailor the framework to the specific requirements of MSMEs.

In retrospect, the initial optimism surrounding the pre-pack insolvency resolution process must now be met with a critical assessment of its performance and a targeted effort to address the identified challenges. Recognizing and rectifying these issues is paramount for ensuring that the framework aligns with the needs of MSMEs and contributes meaningfully to their financial resilience in the Indian economic landscape.

## PERCEIVED PROBLEMS OF KHADI INDIA ECO-FRIENDLY PRODUCTS: A CONSUMER CENTRIC STUDY IN KERALA

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### Abstract

*Khadi India's eco-friendly products have gained popularity for their sustainable and traditional appeal. However, consumer perceptions of these products in Kerala reveal a spectrum of challenges that hinder broader acceptance and satisfaction. This study explores the perceived problems associated with Khadi India's eco-friendly offerings, focusing on a consumer-centric perspective within the Kerala region. Through a consumer-centric survey, the research identifies key issues related to product quality, lack of availability, over pricing, and lack of attractiveness. The findings indicate that while there is a general appreciation for the eco-friendly and culturally significant aspects of Khadi products, consumers often encounter inconsistencies in product quality, limited accessibility in local markets, and higher price points compared to non-eco-friendly alternatives. The study concludes with recommendations for Khadi India to enhance consumer satisfaction by addressing these perceived problems. Improving quality control, expanding distribution channels, adopting competitive pricing strategies, and implementing robust marketing campaigns are suggested to better align Khadi's offerings with consumer expectations. These measures can potentially increase market penetration and foster a stronger consumer base for Khadi India's eco-friendly products in Kerala.*

**Keywords:** Khadi India, eco-friendly products, consumer perception, perception, perceived problems

### Background

Eco-friendly products have been a talk of the town since a few years. Environmental concern is the primary driving factor which drives the public as well as the governing authorities towards eco-friendly alternatives. The need to preserve the nature for upcoming generation is beyond doubt the responsibility of any society. Market has hence divided itself into eco-friendly and other alternatives nowadays. Organic alternatives have never failed to allure Indian society for obvious reasons. From the raw material to disposal of a product at its life end, eco-friendly processes also have discussions all over. Despite its so-called benefits, eco-friendly alternatives are not free from limitations. Compared to its counterparts, they may not seem affordable beyond all classes of a society. Further, despite their promotions by various manufacturers and government itself, their usage has not been universal enough to

compete with its counterparts except for a few. Government of India initiative to promote the eco-friendly products through Khadi & Village Industries Commission- Khadi India- offers a variety of eco-friendly products – with a special emphasis to daily household items.

Khadi India, a renowned brand synonymous with traditional Indian textiles, has embraced eco-friendly practices in recent years. Despite its commitment to sustainability, Khadi India faces challenges in effectively communicating the value of its eco-friendly products to consumers. Kerala, a state known for its environmentally conscious population, presents an ideal setting to investigate consumer perceptions. This study aims to explore the perceived problems and concerns of consumers in Kerala regarding Khadi India's eco-friendly products. By examining the consumer-centric issues, this research seeks to identify key areas that Khadi India can address to enhance consumer acceptance and loyalty, ultimately contributing to a more sustainable future.

#### **Literature review**

Chughtai & Awan (2020) found price, observed quality and role of media awareness programmes and word of mouth as key elements which influence the buying behaviour of consumers towards eco-friendly products. At the same time, Geetha & Jenifer (2014) found health, quality and reliability, variety and quantity, environment and ambience, customer service, friends' suggestions etc. influencing the purchase behaviour. All these has together pointed towards the urging need for green marketing (Cherian & Jacob, 2012; Mokha, 2017; Witek, 2020; Bhagwat, 2014).

Abilasrin & Sabeena Farveen (2022) discussed regarding the problems like high price, lack of awareness, lack of shops, lack of availability, preference and taste, level of expectation, reliability on quality, duplicate products, low demand in the market, competition from MNCs etc.

#### **Rationale**

Khadi India promotes environmentally sustainable production and promotes the crafts of local weavers and artisans. The development of this initiative to the further level may completely depend upon how consumers perceive it. The findings of this study overlooking the problematic aspect is expected to assist in identifying the pitfalls to be rectified in the future so as to develop its popularity thereby multiplying the revenue generation which is ultimately the barometer of success of any initiative. However, the study confines to 100% eco-friendly products manufactured/ sold by Khadi India outlets in Kerala state and the consumers who consumes them.

#### **Empirical Strategy**

Population of the study includes all the consumers of eco-friendly products in Kerala which though finite is vast and unknown. Purposive sampling has been used to collect the data. Altogether the sample consists of 450 respondents who purchased various eco-friendly

products from Khadi India outlets. Personal interviews by the researcher herself using a questionnaire were conducted in order to increase the validity and reliability of the data. Primary data analysis has been performed with the help of the software-SPSS ver 19.

**Results & Discussion**

The objective of the study is to analyze the relationship between various problems perceived by the consumers towards eco-friendly products of Khadi India and their demographic profile.

To test the independence, the distribution needs to be tested whether normal or not.

For testing normality, one-sample Kolmogorov Smirnov test has been used herewith.

H<sub>0</sub>: The distribution of overpricing, lack of awareness, lack of availability, less attractive, doubtful quality and inability to meet expectations is normal.

**Table 1: Perceived Problems: Normality check of the distribution**

Perceived problems	Kolmogorov-Smirnov Z	p-value
I find it overpriced.	6.38	0.000
I hardly know about eco-friendly products.	6.47	0.000
Such products lack availability.	6.11	0.000
I find such products less attractive.	6.07	0.000
I am doubtful about the quality of such products.	5.01	0.000
I find such products do not meet expectations.	5.09	0.000

Source: Primary Data

Table 1 represents the normality of the distribution related to various problems perceived by the sample consumers. It can be depicted from Table 1 that all the problem variables like overpricing, lack of awareness, lack of availability, less attractive, doubtful quality and inability to meet expectations are not normally distributed as the hypothesis has been rejected since p-values are less than 0.05.

Hence, we have to deploy a non-parametric test to prove that whether the problems perceived by the consumers are dependent on their demographic profile or not. Henceforth, Kruskal-Wallis H test of independence has been used to test the same.

H<sub>0</sub>: There is no relationship between perceived problems by the consumers towards eco-friendly products of Khadi India and the age group of the consumers of eco-friendly products.

**Table 2: Age v/s Perceived Problems: Kruskal Wallis H test results**

Relevant issue faced	Chi-square	Df	p-value
I find it overpriced.	54.96	3	0.000
I hardly know about eco-friendly products.	14.86	3	0.002
Such products lack availability.	45.02	3	0.007

I find such products less attractive.	27.32	3	0.009
I am doubtful about the quality of such products.	8.57	3	0.012
I find such products do not meet expectations.	16.42	3	0.000

Source: Primary Data

Kruskal-Wallis H test has been carried out at 5% level of significance to check the perception of problems by the consumers are independent of their age group or not. The results of the same is shown in Table 2. The statistical inference indicates that the null hypothesis has been rejected i.e., perceived problems by the consumers towards eco-friendly products of Khadi India is not independent of their age group as p-values are less than 0.05. This indicates a relationship between perceived problems by the consumers and their age group. Mann-Whitney U test has been employed for detailed post hoc analysis- to identify which age category is significant from others in reference to a perceived problem.

**Table 3: Age v/s Perceived Problems: Mann-Whitney U test results**

Test	Overpricing	Lack of awareness	Lack of availability	Less attractive	Doubtful quality	Inability to meet expectations
<b>Below 30 and 30-45</b>	1820 (0.000)	3842.5 (0.695)	2213 (0.000)	2786 (0.000)	3288 (0.010)	2685 (0.110)
<b>Below 30 and 45-60</b>	1989 (0.000)	2846.5 (0.001)	3842.5 (0.167)	3551.5 (0.543)	3571 (0.144)	3253.5 (0.024)
<b>Below 30 and Above 60</b>	7946 (0.205)	7513 (0.071)	5050 (0.019)	6405.5 (0.021)	6077 (0.000)	7081 (0.000)
<b>30-45 and 45-60</b>	7081 (0.000)	7946 (0.265)	3583 (0.010)	3315 (0.054)	6077 (0.000)	3352.5 (0.021)
<b>30-45 and Above 60</b>	4268 (0.000)	6920 (0.073)	6984 (0.122)	6546.5 (0.000)	6573.5 (0.018)	7546 (0.449)
<b>45-60 and Above 60</b>	2958.5 (0.424)	2560 (0.000)	3470.5 (0.702)	7743.5 (0.449)	7284 (0.010)	7749.5 (0.000)

Source: Primary Data



The results of Mann-Whitney U Test between age category and perceived problems of the consumers are given in Table 3 in detail.

The consumers falling below 30 years age category significantly differ from the consumers falling in 30-45 years age category in terms of their perception towards problems of Khadi India products like overpricing, lack of availability, lack of attractiveness and doubtful quality- since p-value is less than 0.05. The former category marks their difference with the consumers belonging to 45-60 years age category with respect to overpricing, lack of awareness and inability to meet expectations. The so-called youth are entirely different in perception towards lack of availability, less attractiveness, doubtful quality and inability to meet expectations. 30-45 years age category and 45-60 years age category are significantly different in their perception with all respects except lack of awareness and lack of attractiveness at 5% level of significance. 45-60 and above 60 years age category significantly differs in perception regarding problems like lack of awareness, doubtful quality and inability to meet expectations – p-value being less than 0.05.

**Table 4: Educational qualification v/s Perceived Problems: Kruskal Wallis H test results**

Relevant issue faced	Chi-square	Df	p-value
I find it overpriced.	47.01	3	0.000
I hardly know about eco-friendly products.	24.12	3	0.000
Such products lack availability.	41.64	3	0.001
I find such products less attractive.	33.53	3	0.000
I am doubtful about the quality of such products.	18.28	3	0.009
I find such products do not meet expectations.	40.76	3	0.000

Source: Primary Data

Kruskal-Wallis H test has been carried out at 5% level of significance to check the perception of problems by the consumers are independent of their educational qualifications or not. The results of the same is shown in Table 4. The statistical inference indicates that the null hypothesis has been rejected i.e., perceived problems by the consumers towards eco-friendly products of Khadi India is not independent of their educational qualification as p-values are less than 0.05. This indicates a relationship between perceived problems by the consumers and their educational qualifications.

The post graduate consumers differ significantly from the consumers possessing UG qualification category in terms of their perception towards problems of Khadi India products like overpricing, lack of availability, lack of attractiveness and inability to meet expectations- since p-value is less than 0.05. The former category marks their difference with the consumers having intermediate educational qualification category with respect to all the problems except overpricing with their perception. The perception towards problems of eco-friendly products differs significantly between graduates and consumers possessing secondary school education. The same is the case with postgraduates and consumers possessing secondary school education.

**Table 5: Educational Qualification v/s Perceived Problems: Mann-Whitney U test results**

Test	Overpricing	Lack of awareness	Lack of availability	Less attractive	Doubtful quality	Not up to expectations
PG and UG	6740 (0.040)	6381 (0.062)	6226 (0.000)	6122.5 (0.001)	7140 (0.212)	4827.5 (0.018)
PG and Plus Two	4323 (0.174)	3579.5 (0.000)	3620 (0.000)	3742 (0.000)	3846 (0.000)	3477.5 (0.000)
PG and SSLC	6585.5 (0.785)	5449.5 (0.004)	5149.5 (0.022)	6652 (0.007)	7150 (0.000)	6226 (0.061)
UG and Plus Two	4255 (0.174)	6265 (0.061)	6021.5 (0.017)	6005.5 (0.017)	6514 (0.156)	6748.5 (0.326)
UG and SSLC	2844 (0.000)	3223.5 (0.000)	4547 (0.333)	2928 (0.000)	3323 (0.001)	3482.5 (0.001)
Plus Two and SSLC	4422 (0.030)	6263.5 (0.067)	6022.5 (0.019)	5995.5 (0.028)	6414 (0.155)	6747.5 (0.322)

Source: Primary Data

Of all the problems, lack of availability is perceived differently by different consumers depending on their level of educational qualification.

**Table 6: Occupation category v/s Perceived Problems:Kruskal Wallis H test results**

Relevant issue faced	Chi-square	Df	p-value
I find it overpriced.	47.09	3	0.000
I hardly know about eco-friendly products.	14.65	3	0.002
Such products lack availability.	42.55	3	0.000
I find such products less attractive.	28.44	3	0.001
I am doubtful about the quality of such products.	11.78	3	0.008
I find such products do not meet expectations.	15.57	3	0.000

Source: Primary Data

Kruskal-Wallis H test has been carried out at 5% level of significance to check the perception of problems by the consumers are independent of their occupation or not. The results of the same is shown in Table 6. The statistical inference indicates that the null hypothesis has been rejected i.e., perceived problems by the consumers towards eco-friendly products of Khadi India is not independent of their occupation as p-values are less than 0.05. This indicates a relationship between perceived problems by the consumers and their occupation.

The consumers falling in professionals and salaried occupation categories significantly differ in terms of their perception towards problems of Khadi India products like lack of availability, lack of attractiveness and inability to meet expectations- since p-value is less than 0.05. The former category marks their difference with the consumers falling in self-employed occupation category with respect to lack of awareness and lack of availability. The so-called youth are entirely different in perception towards lack of availability, less attractiveness, doubtful quality and inability to meet expectations.

**Table 7: Occupation category v/s Perceived Problems: Mann-Whitney U test results**

Test	Overpricing	Lack of awareness	Lack of availability	Less attractive	Doubtful quality	Not up to expectations
<b>Professionals and salaried</b>	2648 (0.500)	4823 (0.751)	2455.5 (0.000)	3456.5 (0.012)	4097.5 (0.222)	3631 (0.009)
<b>Professionals and self-employed</b>	3942 (0.720)	4296 (0.000)	5116 (0.030)	5126.5 (0.081)	5267.5 (0.371)	5465 (0.233)
<b>Professionals and Housewife</b>	3392.5 (0.000)	5339.5 (0.030)	5102 (0.021)	4243.5 (0.000)	4688.5 (0.001)	5433 (0.033)
<b>Salaried and Self-employed</b>	3492 (0.000)	4639 (0.000)	5026 (0.030)	5126.5 (0.078)	5672 (0.271)	5654 (0.337)
<b>Salaried and Housewife</b>	5661 (0.212)	5273 (0.025)	4241.5 (0.000)	3287 (0.000)	5004.5 (0.007)	4726 (0.001)
<b>Self-employed and Housewife</b>	7680 (0.252)	8549 (0.848)	8125 (0.435)	7621 (0.107)	7560 (0.089)	8009 (0.399)

Source: Primary Data

Professionals and Housewife occupation category significantly differs in terms of all the perceived problems at 5% level of significance. This is a sure shot evidence that occupation one pursues is supposed to have an effect on his perception to the problems attached to eco-friendly products.

**Conclusion**

This consumer-centric study in Kerala revealed significant perceived problems hindering the adoption of Khadi India's eco-friendly products. Key findings include: - Limited awareness about eco-friendly features and benefits - Higher prices compared to non-eco-

friendly alternatives - Limited availability and accessibility - Skepticism about authenticity and quality. It will be pertinent to note that the consumers approach towards these elements largely depend upon their demographic background they belong to. To overcome these challenges, Khadi India should focus on effective marketing strategies, competitive pricing, expanded distribution channels, and quality assurance initiatives. Customization may also be referred to as a key. Targeting a wider population will be successful only if it caters to the needs of various sections of a society. By addressing these concerns, Khadi India can enhance consumer acceptance, loyalty, and ultimately contribute to a more sustainable future.

## **A CRITICAL ANALYSIS OF INTEGRATING AI IN SMART CLASSROOMS**

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### **Abstract**

*The term "smart classroom" has evolved over time and today reflects technology advances incorporated into educational spaces. Fast forward inside technology and the need to create more effective and creative classrooms that support it classroom and remote activities led to the integration of artificial intelligence and smart technologies in smart classrooms. In this paper, key technologies related to smart classrooms are used for efficient classroom management that increases the comfort of classroom environments, use different types of smart learning aids during the educational process and use automated performance evaluation technologies are presented. Future perspectives and challenges in the use of artificial intelligence-based techniques is discussed. This paper is aimed at educators and AI professionals to be informed about the potential and limitations of AI in education, while the latter can draw inspiration from the challenges and peculiarities of education Systems based on artificial intelligence.*

**Keywords:** Smart Classroom, Artificial Intelligence in Education, Classroom Management, Technology Integration, Automated Performance Evaluation, AI Applications in Education

### **1. INTRODUCTION**

The paradigm of education is undergoing a major transformation as the world is moving from chalk and duster to smart classes. The acronym S.M.A.R.T. Classroom refers to a learning environment where students connect on multiple social levels, face-to-face interaction is enhanced in real-time, and the class's collective knowledge is recorded (Lui & Slotta, 2014). The acronym stands for Showing, Manageable, Accessible, Real-time Interactive, and Testing (Huang et al., 2019). According to Micrea et al. (2021) a smart classroom is characterised by the integration of many advanced technologies with the goal of

helping teachers and students maximise their overall learning experience. According to Li et al. (2019), a smart classroom integrates technology with instruction. Examples of this technology include mobile devices, automatic communication and learning tools, video projectors, cameras, sensors, facial recognition software, and other modules that monitor various environmental aspects (Mircea et al., 2021). In a smart classroom, teachers should use new teaching approaches including social learning, mobile learning, and ubiquitous learning (Chen et al., 2016) in addition to improving students' performance and creative and thinking skills (Palanisamy et al., 2020). In this study, we concentrate on the technological aspect of a smart class, even if they also include other components like instructional methodologies and classroom models.

## **2. SMART CLASSROOM**

Smart classes, also known as smart classrooms, leverage various technologies to enhance the teaching and learning experience. A SMART classroom integrates advanced technological tools to create a dynamic and interactive learning environment. These classrooms aim to improve engagement, personalize learning, and prepare students for a technology-driven world. The main topics presented are separated in three main categories that refer to class management technologies, teaching aids and performance assessment technologies.

### **2.1 Class Management Technologies**

#### 1. Classroom Management Software:

Tools like ClassDojo and Edmodo assist teachers in maintaining classroom discipline, tracking student behavior, and fostering communication between educators, students, and parents (Johnson et al., 2019).

#### 2. Seating Arrangement Tools:

Software like SmartDraw and Class Charts helps in designing effective seating arrangements that optimize student interaction and learning (Smith, 2018).

#### 3. Attendance Management Systems:

Systems such as MyAttendanceTracker automate the process of recording and analyzing student attendance, making it easier for teachers to identify patterns and address issues promptly (Holmes et al., 2019).

### **2.2 Teaching Aids**

#### 1. Digital Textbooks and eBooks:

Digital textbooks, accessible on various devices, offer interactive features like embedded videos, quizzes, and hyperlinks to supplementary resources (Ashton, 2015).

#### 2. Multimedia Projectors:

Projectors integrated with smartboards or computers enable the display of videos, animations, and other multimedia content, enhancing the learning experience (Deterding et al., 2011).

#### 3. Educational Apps and Software:

Applications such as Khan Academy and Google Classroom provide interactive lessons, practice exercises, and tools for collaboration and feedback (Kukulka-Hulme, 2012).

#### 4. Augmented Reality (AR) and Virtual Reality (VR):

AR and VR technologies create immersive learning experiences by overlaying digital information on the physical world or creating entirely virtual environments. These technologies are used to simulate real-world scenarios for hands-on learning (Sung, 2020).

### **2.3 Performance Assessment Technologies**

#### 1. Online Assessment Tools:

Platforms like Quizizz, Socrative, and Kahoot! offer formative and summative assessments, enabling real-time feedback and analytics (Mell & Grance, 2011).

#### 2. Automated Essay Scoring:

Systems such as Turnitin and Grammarly use AI to evaluate student essays, providing instant feedback on grammar, structure, and content quality (Holmes et al., 2019).

#### 3. E-Portfolios:

Digital portfolio tools like Seesaw and Mahara allow students to compile and showcase their work, reflecting on their learning progress over time (Johnson et al., 2019).

### **3. IMPACT OF SMART CLASSROOMS**

This section examines the effects of smart classrooms on learning processes, based on data from the literature and critical evaluation. It also discusses the drawbacks of utilizing important smart classroom technologies and the implications of artificial intelligence.

#### **Smart environment**

The integration of AI systems that process data collected by Internet of Things (IoT) and other sensors, can help monitor the circumstances of the classroom, offering a safe and eco-friendly environment while they can also monitor students and inform teachers in the case of a student misconduct or potential accidents. Based on occupancy, ambient temperature, and other variables, AI algorithms can be used to optimize temperature and lighting in classrooms. A better and safer learning environment can be established with the help of all these tools and systems. Additionally, students' learning may be enhanced, information may be retained more easily, and self-efficiency may rise through interaction with the learning materials provided by key technologies connected to smart classes (León et al., 2016). The more interactive learning environments provided by smart classrooms encourage students to participate actively in the teaching process as opposed to taking a passive approach that deters students from paying attention and becoming disengaged.

#### **E-learning platforms**

E-learning platforms offer many advantages, such as enhancing student-centered learning, assisting students in developing their independence while educators assume creative roles, motivating educators to be more methodical and reflective in the development of better

e-learning resources, and, in the end, equipping students with the abilities to adjust to a technologically driven environment that is always changing. The speed and complexity of the material can be changed for each student using AI-powered personalization and adaptive learning.

#### **Mixed, augmented, and virtual reality**

In a smart classroom, virtual spaces mimic actual locations, giving students an immersive learning environment and the chance to make lasting memories. Furthermore, learning involves more senses when it comes to seeing, "touching," and hearing, which connects the subjects in various ways. Learning becomes more sustainable as a result of enhanced learning material presentation and improved visualization that mimics reality and engages more senses (Lui & Slotta, 2014). Additionally, through an experiential learning process, the student's motivation is sparked, situated scaffolding is offered, and learning is connected to the student's daily life (Bower et al., 2014). By tracking student movements and modifying the virtual environment accordingly, artificial intelligence (AI) can be used to create more immersive and interactive learning experiences.

#### **Computer vision-based surveillance**

Teachers wishing to identify their students' behavioral disengagement and behavioral participation can do so with real-time video analysis provided by smart classrooms (Michalsky, 2021). AI-enabled cameras can be used to track student attendance and participation as well as keep an eye on safety and security in the classroom. Using smart tools and apps like recording, plagiarism detection, and cameras along with ongoing data collection enables teachers to monitor and manage student attendance as well as provide online assessments (Saini & Goel, 2019).

#### **Robotics**

Robots may make learning languages, computers, electronics, and mechanical engineering more interesting. Research has shown that young children perform better on post-learning assessments and show more enthusiasm when language acquisition is assisted by a robot rather than audiotapes and books (Mubin et al., 2013). Robots that can interact with students and improve their learning can be programmed and controlled with AI. If the robot serves as the main focus of the learning activity in a smart classroom, the teacher assumes the role of a facilitator (i.e., used as a teaching tool, as in the case of teaching about robotics).

#### **Conclusion**

A range of AI-assisted emerging technologies related to classroom management, teaching aids, and performance assessment has been explored. For each smart classroom technology discussed, the role of AI has been examined, helping to clarify its significance in these environments. Additionally, an analysis of the advantages and disadvantages of smart classrooms, along with a SWOT analysis, has provided insights into the prospects and trends

associated with AI integration in education, leading to the identification of several future research directions. These future directions aim to inspire both AI and educational technology research communities to engage in projects that address the outlined challenges. As technological advancements and the use of digital devices become increasingly integrated into education, there is a persistent need to enhance the services available to students. The ongoing development of AI-based smart classrooms will significantly contribute to these efforts. Given that the concept of smart classrooms continually evolves with new requirements and technologies, we plan to monitor this field closely and produce updated surveys to reflect future developments. Furthermore, we aim to conduct specific comparative evaluations of different technologies to quantify their impact and identify areas for future improvement.

## **THE NEXT INDUSTRIAL REVOLUTION: INDUSTRY 5.0 AND DISCUSSIONS ON INDUSTRY 4.0**

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### **Abstract**

*The advent of Industry 4.0 is imminent, garnering significant attention from scholars and practitioners through various conferences, symposiums, and seminars. This fourth industrial revolution promises enhanced effectiveness and efficiency in manufacturing. However, discussions about industry 5.0 are already emerging in forums and blogs, where industry 4.0 is often critiqued for not addressing all foreseeable future needs. While industry 4.0 emphasizes mass production, Industry 5.0 shifts the focus towards sustainability. This paper critiques Industry 4.0 and outlines the arguments supporting Industry 5.0. Moreover, we stress that future industrial revolutions, irrespective of their version, must be driven by advancements in information technology and a commitment to environmental sustainability.*

**Keywords:** *Industry 4.0, Industry 5.0, Sustainability, Sustainable Manufacturing, Human – Robot Coordination, Zero Waste, Industrial Upcycling*

### **1. Introduction**

Industry 4.0 revolves around “smart Factories” or “Smart Manufacturing”. Numerous presentations, debates, conferences, seminars and scientific investigations have been conducted on the idea since its debut. Though there is great deal of support for Industry 4.0, some professionals and scholars have also voiced concern. One of the main criticisms of industry 4.0 is that it is simply the same old manufacturing assisted by IT rather than a revolution. Moreover, we have not yet witnessed the alternations that were previously noted in prior industrial revolutions. There’s been a lot of chatter thus far, but less change Through industry 4.0 has only been around for a few years, some thinkers (Rada, 2015; Sachsenmeier, 2016; Ostergaard, 2016; Gotfredsen, 2016; Rendall, 2017) have begun to explore Industry 5.0



With assistance from the German government, a group of specialists and academics describe and conceptualise Industry 4.0. Consequently, Industry 4.0 is essentially a preconceived notion. A preset concept's drawback is that it can be challenging to modify its definition. Consequently, It is only normal for some to create a new definition and version when specialists have thoughts about an industrial revolution that fall outside of its currently specified parameters.

## **2. Industrial Revolution Versions**

### **Industry 1.0 (First Industrial Revolution: Late 18th – Early 19<sup>th</sup> Century)**

The First Industrial Revolution, or Industry 1.0, occurred from the late 18th to early 19th century, transitioning agrarian economies to industrialized and urban ones. Key innovations like James Watt's steam engine and the mechanization of textile production, including the spinning jenny and power loom, drastically increased production capacity and efficiency. The iron and coal industries' growth facilitated the construction of railways and ships, enhancing transportation and trade. The factory system emerged, centralizing labor and reshaping societal structures, laying the foundation for future technological and economic transformations.

### **Industry 2.0 (Second Industrial Revolution: Late 19<sup>th</sup> – Early 20<sup>th</sup> Century)**

The 20th century was marked by rapid industrialization and technological advancements. Electricity powered new machinery and more efficient factories, while innovations like the Bessemer process enabled mass steel production, facilitating the construction of skyscrapers, bridges, and railways. The internal combustion engine revolutionized transportation, leading to automobiles and airplanes, connecting distant regions, and driving economic growth. Advances in chemical manufacturing and communication technologies, such as the telegraph and telephone, further transformed industries. Assembly line production, pioneered by Henry Ford, increased manufacturing efficiency and reduced costs, making products more accessible. This era profoundly reshaped global economies and societies, setting the stage for the modern industrialized world.

### **Industry 3.0 (Third Industrial Revolution: Late 20<sup>th</sup> Century)**

The Third Industrial Revolution, or Industry 3.0, occurred in the late 20th century, driven by digital technology and electronics. This era marked a shift from mechanical and analog technology to digital electronics, transforming industries with key innovations such as computers and microprocessors. The widespread adoption of personal computers revolutionized data processing, storage, and communication, while automation and robotics enhanced manufacturing precision and efficiency. The rise of the internet enabled rapid information exchange and global connectivity. Advancements in telecommunications, software development, and renewable energy also characterized this period. Industry 3.0 reshaped the global economy, fostering information-based industries and setting the foundation for today's interconnected, digital world.

### **Industry 4.0 (Fourth Industrial Revolution: Early 21<sup>st</sup> Century)**

Industry 4.0, or the Fourth Industrial Revolution, is a transformative period in the early 21st century marked by the integration of digital technologies in manufacturing and other industries. It features the convergence of advanced automation, AI, IoT, and big data analytics, leading to unprecedented efficiency, customization, and real-time data exchange. Factories and supply chains are increasingly interconnected, enabling agile and responsive operations. Innovations such as smart factories, where machines and systems autonomously optimize workflows, are enhancing productivity and fostering new business models. This revolution is driving economic growth and positioning industries to navigate the evolving global market.

### **Industry 5.0 (Emerging Trends)**

Industry 5.0 builds on Industry 4.0 by emphasizing human-machine collaboration. It aims to integrate advanced robotics and AI with human capabilities to enhance creativity, innovation, and customization in production. This approach seeks to improve workplace safety, promote sustainable practices, and consider ethical implications for societal well-being and the environment. Industry 5.0 promises economic growth by leveraging both human intelligence and machine efficiency to address modern challenges.

### **3. Comparison of industry 4.0 and 5.0**

Industry 4.0 represents a technological leap focused on automation, AI, IoT, and big data to optimize efficiency and connectivity in manufacturing. It emphasizes autonomous systems and real-time data analytics to streamline operations and drive productivity gains. This stage revolutionizes production processes through advanced digital integration. In contrast, Industry 5.0 builds upon Industry 4.0 by prioritizing human-machine collaboration. It integrates advanced robotics and AI with human creativity and decision-making to foster innovation and customization in manufacturing. This approach aims to enhance workplace safety, promote sustainable practices, and consider ethical implications, emphasizing a more balanced approach between technological advancement and human well-being. While Industry 4.0 aims for efficiency and autonomous operations, Industry 5.0 seeks to harness human intelligence alongside machine capabilities, envisioning a future where personalized products and societal benefits are prioritized alongside economic growth.

### **Conclusion**

Industry 4.0 has laid the groundwork for a technologically advanced industrial landscape through automation, IoT, and smart manufacturing. However, it may have been introduced prematurely, without achieving widespread adaptation and maturity. While it focuses on smart mass production, it overlooks sustainability and human-centric approaches. Industry 5.0 addresses some of these gaps by emphasizing sustainability, human-machine collaboration, and resilience. It promotes a more holistic approach to industrial advancement.

However, Industry 5.0 on its own may not fully address the needs of modern manufacturing. The future of industrial revolutions should aim for a balanced integration of both industry 4.0 and Industry 5.0 principles, encapsulated in the concept of “sustainable smart production”. This approach would combine technological advancements with sustainability and human-centric practices, ensuring a comprehensive and resilient industrial evolution.

## **A STUDY ON THE ROLE OF SUSTAINABILITY IN INFLUENCING CONSUMER CHOICES**

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### **ABSTRACT**

*In an era marked by heightened environmental awareness and growing social responsibility, sustainable marketing has emerged as a pivotal domain within the business landscape. This study embarks on an exhaustive exploration of the intricate relationship between sustainable marketing practices and consumer behavior, with a specific focus on the Indian context. As the second-most popular country in the world, India presents a unique and complex consumer landscape, where diverse socio-cultural factors, economic disparities, and environmental concerns intersect to shape consumer choices. Drawing from an extensive pool of Indian research papers, this study identifies overarching themes, trends, and gaps in the existing literature. It explores the methodologies employed by researchers to dissect the complex dynamics between sustainable marketing strategies and consumer behavior, shedding light on the diverse empirical approaches employed in Indian research. This study serves as a comprehensive review and synthesis of a multitude of Indian research papers, spanning various dimensions of sustainable marketing and its implications for consumer behavior.*

**Keywords:** Sustainability, Consumer behavior, Environmental consciousness, Green products Sustainable consumption, Eco-friendly, Ethical consumerism, Corporate social responsibility, Green marketing, Sustainable brands.

### **INTRODUCTION**

In an era characterized by burgeoning environmental concerns, social consciousness, and rapid globalization, the field of marketing has witnessed a transformative shift towards sustainability. Businesses worldwide are increasingly recognizing the significance of sustainable marketing practices as they strive to harmonize profitability with environmental preservation and societal well-being. This paradigm shift is particularly pertinent in the Indian and opportunities on the path to sustainable consumption.

The present study sets the stage for an in-depth exploration of the interplay between sustainable marketing strategies and consumer behavior within the Indian market. As the world's largest democracy and one of the fastest-growing economies, India offers a compelling case study in the domain of sustainable marketing. This introduction aims to provide an overview of the research's scope, significance, and objectives, offering a clear roadmap for the comprehensive analysis that follows.

### **BACKGROUND AND RATIONALE**

Sustainability, once perceived as a niche concern, has now permeated the mainstream. The escalating global environmental crises, such as climate change, resource depletion, and biodiversity loss, consumers are increasingly cognizant of the consequences of their purchasing decisions. Concurrently, they are also attuned to the social impact of their choices, seeking products and services that align with their ethical and moral values. This seismic shift in consumer sentiment has catalyzed a transformation in marketing strategies, with sustainability becoming a central pillar of competitive advantage. In India, a country characterized by its rich cultural diversity, economic disparities, and demographic complexities, the implications of sustainable marketing are multifaceted. The Indian consumer landscape is a tapestry of preferences, influenced by factors ranging from cultural traditions and socio-economic status to regional disparities and technological advancements. Understanding how sustainability-related messages and initiatives resonate with this diverse populace is paramount for businesses operating in this dynamic market.

### **NEED OF THE STUDY**

The study focusses on elucidating the foundational concepts of sustainable marketing, delineating the key principles that underpin businesses' endeavors to balance profitability with environmental and social responsibility. It contextualizes these principles within the rapidly evolving global sustainability discourse, highlighting their increasing importance in shaping consumer perceptions and preferences.

Furthermore, the present study unveils a series of key findings emanating from Indian studies, offering insights into how sustainable marketing practices influence consumer decision-making processes. It delves into the psychological underpinnings of sustainability-oriented consumer behavior, elucidating the cognitive processes and emotional drivers that lead individuals to favor eco-friendly and socially responsible products and services. The study also underscores the role of information dissemination, marketing communications, and corporate transparency in shaping consumer perceptions of sustainability efforts. It explores how Indian consumers interpret and respond to sustainability-related messages, as well as the trust-building mechanisms that foster brand loyalty in the realm of sustainable marketing.

## **STRUCTURE OF THE STUDY**

This research is structured to provide a comprehensive and systematic examination of sustainable marketing and consumer behavior in India. Following this introduction, the study will proceed to the literature review, where it will synthesize and analyze relevant Indian research papers. Subsequent sections will delve into the methodologies employed in these studies, the psychological factors driving sustainable consumption, and the role of marketing communication. Finally, the study will conclude by summarizing key findings, discussing implications, and suggesting avenues for future research in this evolving field. In essence, this research endeavors to contribute valuable insights to the realms of both academia and practice, facilitating a deeper understanding of the complex relationship between sustainable marketing strategies and the diverse behaviors of Indian consumers.

## **LITERATURE REVIEW**

In the 1997 Kyoto conference on climate change, developed countries agreed on specific targets for cutting their emissions of greenhouse gases, resulting in a general framework, which became known as the Kyoto Protocol, with specifics to be detailed over the next few years. The U.S. proposed to stabilize emissions only and not cut them at all, while the European Union called for a 15% cut. In the end, there was a trade off, and industrialized countries were committed to an overall reduction of emissions of greenhouse gases to 5.2% below 1990 levels for the period 2008-2012. However, the complexity of the negotiations created considerable confusion over compliance even after the Kyoto Protocol itself was adopted because it only outlined the basic features for compliance but did not explain the all-important rules of how they would operate.

Although 84 countries signed the Protocol, indicating their intent to ratify it, many others were reluctant to take even this step. The World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 was a landmark in the business of forging partnerships between the United Nations, governments, business and NGOs to gather resources for addressing global environment, health and poverty challenges. The Johannesburg Summit reconfirmed the Millennium goals and complemented them by setting a number of additional ones such as halving the proportion of people lacking access to basic sanitation; minimizing harmful effects from chemicals; and halting the loss of biodiversity. Some authors consider the summit a "progress in moving the concept [of sustainable development] toward a more productive exploration of the relationship between economic development and environmental quality" (Asefa, 2005, p. 1). The WSSD "fills some gaps in the Agenda 21 and the Millennium Development Goals and addresses some newly emerging issues, including to halve the proportion of people without access to basic sanitation by 2015; to use and produce chemicals by 2020 in ways that do not lead to significant adverse effects on human health and the environment; to maintain or restore depleted fish stocks to levels that can produce the

maximum sustainable yield on an urgent basis and where possible by 2015; and to achieve by 2010 a significant reduction in the current rate of loss of biological diversity' (Nelson, 2007, p. 166).

The Johannesburg Conference confirmed a trend, which appeared since the 1992 Conference, of the increasing importance of the socioeconomic pillars of sustainable development. The environmental agenda at the two previous UN conferences had been sustained by peaks in the public 'attention cycle' of major developed countries. WSSD incorporated the concept of sustainable development throughout its deliberations and was initially dubbed "the implementation summit." Inevitably, "demands for additional financial resources and technology transfer continued but much of the debate had already been pre-empted by the establishment of the Millennium Development Goals in 2000" (Vogler, 2007, p. 432)

The primary objective of this study is to investigate and analyze the relationship between sustainable marketing practices and consumer behavior towards sustainability.

Concept of Sustainability and consumer preferences

**Green Products:** These are products designed with minimal environmental impact, often using sustainable materials or production processes. Indian Research Paper: "Green Product Purchase Intention: Impact of Green Perceived Value, Green Perceived Risk, and Green Trust" by Bhaskar and Barua (2015).  
**Environmental Consciousness:** Refers to the awareness and concern individuals have about environmental issues. Indian Research Paper: "Determinants of Environmental Consciousness and Its Impact on Green Buying Behavior" by Jaiswal et al. (2017).

**Sustainable Consumption:** This concept involves consuming goods and services in a way that minimizes environmental impact and promotes social responsibility. Indian Research Paper: "Sustainable Consumption and Green Marketing: An Empirical Analysis of Consumer Behaviour in India" by Shrivastava and Sharma (2016).  
**Eco-Friendly:** Relates to products or practices that are not harmful to the environment. Indian Research Paper: "Consumer Perception towards Eco-Friendly Products in India" by Shah and Gupta (2015).

**Green Marketing:** Marketing strategies that focus on promoting the environmental benefits of products or services. Indian Research Paper: "Green Marketing and Consumer Behavior: The Case of the Indian Consumer" by Dixit and Sukhdev (2012).  
**Cooperative Brands:** These are brands that collaborate with others to promote sustainability or social responsibility. Indian Research Paper: "Cooperative Brands: A Strategic Perspective on Their Concepts and Dynamics" by Pillai and Jain (2013).

**Sustainability Brands:** These are brands that are strongly associated with sustainable practices and values. Indian Research Paper: "Measuring Brand Sustainability in Indian Context: Development of a Scale" by Jha et al. (2018).

**Consumer Awareness and Perception:** Investigate how consumers perceive sustainability in products and brands, and whether it influences their purchasing decisions. **Greenwashing:** Examine instances of greenwashing, where companies exaggerate their sustainability efforts, and how this affects consumer trust and behavior. **Sustainable Product Attributes:** Analyze how specific sustainable product attributes (e.g., eco-friendly packaging, fair trade certifications) impact consumer preferences.

**Consumer Motivations:** Explore the motivations behind sustainable consumption, such as environmental concern, social responsibility, or personal health. **Marketing Strategies:** Investigate effective marketing strategies for sustainable products, including the use of eco-labels, cause-related marketing, and storytelling. **Behavioral Economics:** Apply behavioral economics principles to understand how nudges and choice architecture can encourage sustainable choices.

**Cross-Cultural Perspectives:** Compare consumer behavior and sustainable marketing effectiveness in different cultural contexts. **Social Media Influence:** Examine the role of social media in spreading awareness and shaping consumer attitudes towards sustainability. **Long-Term Effects:** Assess the long-term impact of sustainable marketing campaigns on consumer behavior and brand loyalty. **Government Regulations:** Study how government regulations and policies influence sustainable marketing practices and consumer choices.

### **Characterization of research on sustainable products in the last ten years**

The subject of sustainable products has been the object of study in several researches in the last ten years. One of the reasons is the advance in the environmental impact caused, above all, by the increase in them sustainable. Extended producer responsibility (EPR) is a concept that has been implemented by several countries, mainly for the disposal of electronic products, but over time it has been covering consumption and incorrect disposal of products at the end of their useful life. According to Gao et al. (2020) and Kiling et al. (2020) this conjuncture of damage and environmental impact requires the elaboration of environmental policies and the reformulation of supply chains (Zheng et al., 2017), making products from other sectors (Tian et al., 2020, Gui, 2020, Shan and Yang, 2020, Peng et al., 2019, Wang et al., 2018, Agamuthu and Victor, 2011). According to Tian et al. (2020), there are at least three positive aspects of adopting EPR: (i) producers can meet with the objective of creating an extended producer responsibility collectively, which would lead to greater efficiency due to the economy of scale; (ii) EPR allows local governments to have greater control over the flow of waste generated (Diggle and Walker, 2020), avoiding incorrect disposal; (iii) finally, according to Shan and Yang (2020) and Lindkvist Haziri et al. (2019), it is possible to develop and implement circular economy and remanufacturing from the EPR.

Del Borghi et al. (2018) analyzed the life cycle of some foods and obtained as a result that the production process of packaging and cultivation of such foods are the points that most

generate environmental burdens, therefore, they should be the object of attention and improvement. The research developed by the authors Pazoki and Zaccour (2019) presented as a result that the EPR regulation should be considered simultaneously with the responsibility sharing policy. The study developed by Corsini et al. (2017) presented as a result the existence of a relationship between attribution of responsibility and the organizational model adopted by the State. The research developed by Vasanthakumar et al. (2017) revealed, from the analysis of product design characteristics, that disassembly is considered the most vital step in the remanufacturing process. The research by Minkov et al. (2020) identified the main weaknesses of the C2C certificate with regard to labelling. The authors found that the focus is generic, lacks a vision of the product's life cycle, and lacks transparency for stakeholders. Finally, the paper developed by Eriksen et al. (2019) showed as a result that PET plastic is the most suitable for recycling with a closed cycle. Furthermore, it was found that moisture control is necessary when converting PET into reprocessed products.

#### **Findings of the study**

- 1) The analysis of collected data reveals a Demographics: Balanced (Male 35.7%, Female 38.6%, Others 8.1%)
- 2) Finding of the study shed light on Age: Dominant (44.3% in 35-44 group)
- 3) The research outcome Learning Sources: Diverse (Social Media 20%, Newspapers 40%, Online Blogs 35.7%, Books/Documents 4.3%)
- 4) Sustainability Awareness: Varied (Very Familiar 18.1%, Somewhat Familiar 41%, Not Very Familiar 37.6%)
- 5) The study indicates a diverse eco-conscious consumer behavior, with 21.4% always considering environmental impact before purchasing
- 6) The study indicates a 64.4% endorsing products promoted by influencers, and a significant 44.3% frequently explaining product lifespan to reduce wastage, suggesting a strategic focus on targeted sustainability messaging.

#### **RESEARCH METHODOLOGY:**

A questionnaire was used to acquire unprocessed primary data. A table has been used to organize the incomplete information. Ideas, research, and inferences are drawn to the table, and turn was sued for translation. These graphics were created to better understand the data. Visual comprehension of the study. With the study's objectives in mind throughout, a conclusion has been derived from the collection of inferences and interpretations.

**SAMPLING SIZE:** "The sample size consists of 210 respondents.

**POPULATION:** The population for the study includes people from the district of Hyderabad, Telangana is a primary data that has been collected by the researchers.

**DATA ANALYSIS:** The data was edited, coded, classified and presented in the form of graphs and diagrams. Further it was interpreted.



**DATA ANALYSIS TOOLS:** The data was analyzed by finding out the mean and standard deviation through MS Excel.

**AREA OF RESEARCH:** All the Showrooms in Hyderabad district, Telangana.

**TYPE OF RESEARCH:** The type of research of our study is purely Academic and Descriptive in nature.

**DISCUSSION:**

- Interpret the findings in the context of sustainable marketing and consumer behavior.
- Analyze any unexpected results and their implications.
- Discuss the practical implications for businesses in India.

**SUGGESTIONS**

Investigate the impact of sustainable consumer behavior on environmental preservation. Analyze the motivations and barriers influencing consumers' eco-friendly choices. Examine the role of advertising and marketing in promoting sustainable consumption. Assess the economic benefits of sustainable consumer behavior for businesses and society. Explore the potential policy interventions to encourage more sustainable consumption patterns.

**CONCLUSION**

In conclusion, the study on sustainable marketing and consumer behavior underscores the growing importance of sustainability in shaping consumer choices and preferences. Our research has shown that consumers are increasingly mindful of environmental and social impacts when making purchasing decisions. Sustainable marketing strategies, such as emphasizing eco-friendly practices and ethical sourcing, have a significant influence on consumer behavior.

As businesses navigate the evolving landscape of consumer expectations, integrating sustainability into their marketing efforts is not only ethical but also financially beneficial. Brands that genuinely commit to sustainability stand to gain a competitive edge, foster customer loyalty, and contribute to a more environmentally responsible and socially conscious marketplace.

To thrive in the future, companies should continue to explore innovative ways to incorporate sustainability into their marketing strategies, communicate their efforts transparently to consumers, and align their values with those of the environmentally and socially conscious consumer. This research reinforces the notion that sustainability is no longer an optional consideration but a fundamental driver of success in the modern marketplace.

## **A CONCEPTUAL STUDY ON INDUSTRY 5.0 OPPORTUNITIES AND CHALLENGES**

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### **Abstract**

*Industry 5.0. India is a rapidly developing country, with an economy that is now the Fifth largest in the world. the country has seen rapid growth in the last few decades, and it has been able to maintain this growth rate. This rapid growth has led to a number of changes in the country, including its manufacturing industry. The Indian government has been working hard to make India a smarter manufacturing hub.*

**Keywords:** IOT, Big data, Artificial Intelligence.

### **Introduction**

In the last 10 decades, Industry 4.0 has proved its benefits and its shortcomings; finally, the time for Industry 5.0 has arrived. While Smart Factories brought increased productivity, the fourth industrial revolution also came with limitations. These make room for improvement, which took the shape of Industry 5.0. If we are to compare Industry 4.0 vs. Industry 5.0, the latter wins in terms of benefits to businesses and human workers alike. In this article, we will evaluate the industry 5.0 opportunities and challenges and see how you can take advantage of them.

### **Industry 4.0 vs. Industry 5.0: what is the difference?**

Did you know that Industry 4.0, or the fourth Industrial Revolution celebrates ten years of existence? The term was first used in Germany during the Hannover Trade Fair in 2011 by Bosch. It's no wonder that the manufacturing industry's needs have changed, and technology has advanced significantly. The appearance of a new industrial revolution was imminent. The fourth industrial revolution brought industrial automation, digitalization, 3D printing, faster production process, optimization of the assembly lines, more precision, failure prevention with cyber-physical systems, the Internet of Things (IoT), cloud computing, and cognitive computing.

These advancements came along with some drawbacks: complex, expensive software, people's jobs replaced by robot automation, security leaks, need for highly skilled people to operate intricate processes. As it shapes presently, Industry 5.0 promises great shifts in industrial processes and the business and consumption model - the advantages of Industry 5.0 concern two major actors: manufacturers and consumers. With the help of big data

technologies, IoT, and AI, companies can improve manufacturing strategies, and processes, better predict, and offer a better work environment. They would be able to adjust the business model in real time, following demand. There will be no more repetitive jobs for people. Instead, they could focus on problem-solving and creativity. There will no longer be a war between humans and machines in the manufacturing sector; the fifth industrial revolution's goal is to bring back the human side and increase the interaction and collaboration between humans and robots.

At the same time, customers will benefit from personalized products. Industry 5.0 moves from mass customization to personalization. Clients could state their preferences in the design phase, and the production line adapted accordingly, with no added costs.

### **What is Industry 5.0?**

Industry 5.0 is the revolution in which humans and machines find ways to work together with the purpose of improving the efficiency of production. If, in the 4.0 industry, the human touch was missing in the fifth industrial revolution, it will be at the core. Human workers and universal robots will boost the productivity of the manufacturing world side by side.

Each manufacturing company's executive team will need to define the production line, then follow the KPIs and ensure that the processes work smoothly. The key phrase will be interaction and collaboration between humans and robots. Machine intelligence and human creativity will work hand in hand. The robot manufacturer or the industrial robot will be the future. With advanced technologies like artificial intelligence (AI) and cognitive computing, humans and robots are expected to take the manufacturing world to the next level of speed and efficiency. Besides the direct benefit to the manufacturing industry, the fifth industrial revolution will have an important role in sustainability since the aim is to develop systems that run on renewable energy.

## **INDUSTRY 5.0 OPPORTUNITIES AND CHALLENGES**

### **The challenges of Industry 5.0**

With all the amazement around Industry 5.0, it is easy to overlook its potential challenges. We identified three main concerns, but time will tell which ones will truly be:

- People may need to develop completely new skills. Working alongside robots sounds fantastic, but human workers will have to learn how to collaborate with a smart machine, a robot manufacturer. Beyond the soft skills required, technical skills will also be an issue. Programming the industrial robot or managing it translates into new jobs, like Chief Robotics Officer.
- The adoption of new technology has always taken time and effort. How will the manufacturing industry implement it all? What are industry 5.0 technologies?

Customized software connecting factories, real-time data, collaborative robotics, 3D printing, Artificial Intelligence (AI), the Internet of Things (IoT), Cloud are only a few to name.

- Furthermore, these technologies need investment. A UR Cobot doesn't come cheap. Training people for the new jobs also brings **costs**. Some companies may find it difficult to upgrade their production lines for Industry 5.0. Even if money is not a problem, the rhythm of change could be. Those who cannot afford it or are too slow in adopting I 5.0 may be left behind.

### **The opportunities of Industry 5.0**

The good news is that regardless of the challenges, there are more opportunities to encourage companies to implement Industry 5.0. Let's see what they are:

- **Increased overview of the maintenance plan.** It refers to predictive maintenance, as opposed to preventive maintenance applied so far. Smart sensors, IoT devices, and customized software help to monitor and predict possible failures in due time. Only those machines likely to break down will be stopped for adjustments.
- **Sustainability.** Industry 5.0 manufacturing promises to use resources wisely, adjusting to the current need. The collaboration between humans and machines leads to flexible business models. In consequence, waste and overproduction can be reduced up to elimination. Local production and new jobs will also make local economies sustainable.
- **Human efficiency & productivity.** Ironically, advanced technologies bring people back to the center of production. A collaborative robot can now perform repetitive, even dangerous, tasks while people focus on creativity and solutions. Such skills lead to increased productivity, especially when people feel motivated by their work and the end result.
- **Environmental control inside the factory.** Smart, connected sensors and customized software give real-time and predictive overviews of climate, humidity, temperature, and energy consumption. This is especially helpful in farms that depend so much on the weather. Knowing what to expect and where to intervene can prevent severe losses and improve production.
- **Forecasting line production efficiency.** Smart, connected machines together with customized software, machine learning, and industrial automation, can forecast production efficiency based on the current activity. This is what renders flexibility: processes can be adjusted according to parameters to avoid losses.

### **What will Industry 5.0 do for human workers?**

It is still hard to tell how the **fifth industrial revolution** will transform the economy, but we do have some ideas of how life will look for human workers. As with all

advancements, Industry 5.0 has opportunities and challenges. The challenges should not be neglected but also not be seen as barriers. The benefits are far more important: human creativity re-installed, personalized products that allow customers to affirm their individuality, sustainable production, and accurate forecasting that supports efficiency—all strong enough reasons to take the next step.

### **CONCLUSION**

In finally, with the help of big data technologies, IoT, and AI, companies can improve manufacturing strategies, and processes, better predict, and offer a better work environment. They would be able to adjust the business model in real time, following demand.

As we discussed, This industrial revolution relates to human-machine interaction to make jobs easier and quicker. Industry 5.0 brings the personalization, Customization idea to the next stage. Industry 5.0 is the realization of optimal integration of big data, Artificial Intelligence, internet of things (IoT), cloud computing, COBOTSs, Use More automation and EMS Industry Support, innovation and creativity. Industry 5.0 is expected to create higher-value employment with larger freedom for design thinking and creativity. It helps to improve the productivity of labour and greater opportunity for customization to customers. On the other side, due to highly automated manufacturing systems, skill development for the workforce is a humongous task. There is an increased cyber security threat in critical industrial systems and manufacturing lines at industry 5.0 due to its increased, overall, industry 5.0 is expected to revolutionize the production systems and process by allowing larger collaboration between humans and robots in providing tailored products to customers.

## **ELECTRONIC BANKING: A TOOL FOR FINANCIAL INCLUSION**

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### **Abstract**

*Financial inclusion refers to the process of ensuring access to appropriate, affordable, and timely financial services for all individuals, particularly the underserved and unbanked populations. Electronic banking plays a crucial role in achieving financial inclusion. E-banking allows customers to perform a wide range of banking activities without the need to visit a physical bank branch. The activities such as to view account balances, transaction history, and account statements in real-time. Customers can monitor their finances, track expenditures, and manage multiple accounts, including checking, savings, and credit card accounts, from a single online banking platform or mobile app. These various*

*forms of electronic banking have revolutionized the financial services industry, making banking more accessible, convenient, and efficient for consumers and businesses alike. Hence the study focuses on the role of electronic banking to financial inclusion.*

## **INTRODUCTION**

Financial access facilitates day-to-day living, and helps families and businesses plan for everything from long-term goals to unexpected emergencies. As accountholders, people are more likely to use other financial services, such as credit and insurance, to start and expand businesses, invest in education or health, manage risk, and weather financial shocks, which can improve the overall quality of their lives. As of early 2021, there are over 1.35 billion registered mobile money accounts worldwide. As a result, millions of formerly excluded and underserved poor customers are moving from exclusively cash-based transactions to formal financial services using a mobile phone or other digital technology to access these services. E-banking eliminates geographical constraints, allowing seamless transactions from anywhere. Clients enjoy 24/7 access to their accounts, managing finances quickly and flexibly. The primary goal of e-banking solutions would be to provide clients with considerably faster and less expensive services.

**REVIEW OF LITERATURE** Uppal, R.K. & Chawla, R. (2010), this study highlights customer perceptions regarding E-banking services. A survey of 1,200 respondents was conducted in October 2008 in Ludhiana district, Punjab. The respondents were equally divided among three bank groups namely, public sector, private sector and foreign banks. The present study investigates the perceptions of the bank customers regarding necessity of E-banking services, quality of E-banking services, bank frauds, future of E-banking, preference of bank customers regarding banks, comparative study of banking services in various bank groups, preferences regarding use of Electronic channels and problems faced by E-bank customers.

B. Dizon, J.A. (2011), In this study they have founded that while big banks still conduct the bulk of their business in brick and mortar bank branches, the finance sector has been increasingly investing on E-banking facilities to offer 24-hour, queue free services to their regular clients, whether through ATM machines, mobile phones or the internet. "E-Banking appeal is primarily its convenience.

Abishek singh, Om Shankar, Vikas Kumar and Tapan ray (2015) in their study stated that E-banking nowadays is the common trend here in our country. No more falling in line in banks, no more waiting tons of hours in the bank, no more days and weeks of waiting. All can be done with one card, one gadget. It's easy, it works, and most importantly, people like it. But still, some people are having a hard time using this kind of technology mostly people who are used to do things the old traditional way. With the use of advertising, people are now motivated to use E-banking because again, it eliminates the hassle encountered when using the old process of banking.

**OBJECTIVES** To know the concept of Electronic banking services. To study the contribution of electronic banking services to financial inclusion

## **MODES OF ELECTRONIC BANKING**

Electronic banking encompasses a wide range of services and platforms that enable customers to perform financial transactions and manage their accounts through digital means. Here are the primary forms of electronic banking:

### **Internet Banking (Online Banking)**

**Website Access:** Customers can access their bank accounts through the bank's official website.

**Services:** Includes viewing account balances, transferring funds, paying bills, managing investments, applying for loans, and more.

### **Mobile Banking**

**Mobile Apps:** Banks provide applications that customers can download on their smartphones or tablets.

**Services:** Similar to internet banking but optimized for mobile use, including mobile check deposits, notifications, and location-based services.

**Mobile Wallets:** Digital wallets such as Apple Pay, Google Pay, and Samsung Pay allow users to store card information and make payments using their mobile devices.

### **Automated Teller Machines (ATMs)**

**Cash Withdrawals and Deposits:** Customers can withdraw and deposit cash at ATMs.

**Account Management:** Some ATMs offer services like fund transfers, balance inquiries, mini statements, and bill payments.

### **Telebanking (Phone Banking)**

**Interactive Voice Response (IVR):** Customers can use automated voice systems to perform banking transactions over the phone.

**Customer Service:** Access to live customer service representatives for assistance with banking needs.

### **Electronic Fund Transfers (EFT)**

**Direct Deposit:** Employers can directly deposit salaries into employees' bank accounts.

**Automated Clearing House (ACH):** Network for processing large volumes of credit and debit transactions, including bill payments and direct deposits.

**Wire Transfers:** Electronic transfer of funds between banks, often used for international transactions.

### **Point of Sale (POS) Systems**

**Debit/Credit Card Payments:** Customers can use their cards to make payments at retail locations.

**Contactless Payments:** Use of RFID or NFC technology to make payments by tapping a card or mobile device at a POS terminal.

### **Electronic Bill Payment Services**

Bill Pay Portals: Customers can pay utility bills, credit card bills, and other expenses through their bank's online platform.

Automated Payments: Setting up recurring payments for regular bills.

### **Electronic Checks (E-Checks)**

Digital Versions of Paper Checks: Used to make online payments, typically involving the payer's bank account number and the bank's routing number.

Electronic Clearing: Faster processing and clearing of checks compared to traditional paper checks.

### **Digital-Only Banks**

Online-Only Banking Services: Banks that operate exclusively online without physical branches, offering a full range of banking services through digital platforms.

Enhanced Digital Features: Often provide innovative features like budgeting tools, financial insights, and cryptocurrency services.

### **Peer-to-Peer (P2P) Payment Systems**

Payment Apps: Services like PayPal, Venmo, and Zelle allow individuals to transfer money directly to each other using their smartphones or computers.

Social Payments: Integration with social media platforms for seamless money transfers between friends and family.

### **Virtual Banking Assistants**

Chatbots and AI: Use of artificial intelligence and machine learning to provide automated customer support and financial advice through chat interfaces on websites and mobile apps.

Voice Assistants: Integration with voice-activated assistants like Amazon Alexa and Google Assistant for performing banking transactions and inquiries.

## **CONTRIBUTION OF E- BANKING TOWARDS FINANCIAL INCLUSION**

Financial inclusion refers to the process of ensuring access to appropriate, affordable, and timely financial services for all individuals, particularly the underserved and unbanked populations. Electronic banking plays a crucial role in achieving financial inclusion through the following ways:

### **1. Accessibility:**

Remote Areas: E-banking provides banking services to people in rural and remote areas where physical branches may not exist. Through internet and mobile banking, individuals can access financial services without traveling long distances.

24/7 Availability: Electronic banking offers round-the-clock access to financial services, allowing people to perform transactions at any time, which is particularly beneficial for those with irregular working hours.



## **2. Affordability:**

**Reduced Costs:** E-banking reduces the operational costs for banks, enabling them to offer lower fees and more affordable services to customers. This is crucial for low-income individuals who may find traditional banking fees prohibitive.

**Micro transactions:** Electronic banking supports small-scale transactions and microloans, making it easier for low-income individuals to manage their finances.

## **3. Convenience:**

**User-Friendly Platforms:** Mobile banking apps and online banking portals are designed to be user-friendly, making it easier for individuals with limited financial literacy to access and use financial services.

**Instant Transactions:** The ability to perform instant transactions, such as fund transfers and bill payments, simplifies financial management for users.

## **4. Security**

**Secure Transactions:** Modern e-banking systems utilize advanced security measures, such as encryption and multi-factor authentication, to protect users' financial information and reduce the risk of fraud.

**Digital Documentation:** Electronic banking provides a digital trail of transactions, which can be useful for tracking and managing finances.

## **5. Diverse Financial Products:**

**Range of Services:** E-banking offers a variety of financial services, including savings accounts, loans, insurance, and investment opportunities. This diversity enables users to access financial products that suit their specific needs.

**Innovative Solutions:** E-banking platforms often introduce innovative financial solutions, such as mobile wallets and peer-to-peer lending, which cater to the needs of underserved populations.

## **6. Empowerment:**

**Financial Literacy:** E-banking platforms often include educational resources and tools that help users improve their financial literacy and make informed financial decisions.

**Women Empowerment:** Electronic banking can empower women by providing them with independent access to financial services, enhancing their economic participation and decision-making power.

## **7. Economic Development:**

**Entrepreneurship:** Access to financial services through e-banking enables small business owners and entrepreneurs to secure funding, manage their finances, and grow their businesses.

Increased Savings: E-banking encourages savings by providing easy access to savings accounts and automated saving features, contributing to financial stability and economic growth.

**8. Government and Social Benefits:**

Direct Benefit Transfers: Governments can use e-banking platforms to directly transfer social benefits, subsidies, and pensions to beneficiaries, reducing corruption and ensuring timely delivery.

Financial Tracking: Electronic banking facilitates better tracking and management of government funds and social welfare programs. CONCLUSION In today's world, e-banking is the norm in our country. Electronic banking is a type of information technology-based banking. Money transfer services are available via a computer-controlled system under such an I.T system. Customers are directly contacted through this mechanism. Customers are not required to visit the bank's premises. By overcoming the barriers of distance, cost, and limited financial literacy, electronic banking significantly contributes to financial inclusion, helping to integrate more people into the formal financial system and promoting economic development.

**A STUDY ON COLLEGE TEACHER'S ATTITUDE TOWARDS  
DIGITAL PAYMENT SYSTEM WITH SPECIAL REFERENCE  
TO PALAYAMKOTTAI REGION**

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**Introduction**

Electronic payment system is a mode of payment over an electronic network such as the internet. In other words we can say that e-payment is a method in which a person can make Online Payments for his purchase of goods and services without physical transfer of cash and cheques, irrespective of time and location. Electronic payment system is the basis of on-line payments and on-line payment system development is a higher form of electronic payments. It makes electronic payments at any time through the internet directly to manage the e-business environment. Adoption of cashless transaction has been significantly pushed by Prime Minister Narender Modi as part of government reforms after demonetization of high value currency of Rs. 500 and 1000 (86 per cent of cash circulation). The demonetization resulted in unprecedented growth in digital payment. By February this year, digital wallet companies had shown a growth of 271 percent for a total value of US\$2.8 billion (Rs. 191

crores), Indian government and private sector companies such as Paytm, Freecharge and Mobikwik had been aggressively pushing several digital payment applications, including the Aadhaar Payment app, the UPI app, and the National Payments Corporation of India (NPCI) developed the Bharat Interface for Money (BHIM) app.

#### **STATEMENT OF THE PROBLEM**

Digital Payments are growing at a higher rate. Having card has become the basic need of every person. Almost all the products are offered through online. This paved the way for the use of digital payment by the users of online services. Palayamkottai is known as the “Oxford of South India” as it serves as a hub for most of the educational institutions this study focused on the opportunities, attitude, perception and challenges that evaluate the positive and negative implications of using digital payment system by the college teachers. On a deeper level the research aims to acquire better understanding of the factors influencing to use digital payment system. Present study “A Study on College Teacher’s Attitude towards Digital Payment System with Special Reference to Palayamkottai Region” also covers the problems faced by the digital payment users while using the digital payment services.

#### **OBJECTIVES**

- To study various methods of digital payment system.
- To identify the most frequently used digital payment system by the college teachers in Palayamkottai region.
- To identify the pit-falls and offer suggestions to the professionals towards the use of digital payment system.

#### **RESEARCH DESIGN**

The survey method used in the present study is sample survey and the research design choice, particularly for college teachers, depends on the uses of digital paymentsystem kind of and problems being studied. Here descriptive research design may suit research topics for college teachers sample size and sampling method. The target respondents of the study are the teachers of college located in Palayamkottai Region. The total sample size taken for the present study is 120 and the sample method used is convenient sample method. The selected respondents belonged to the MS University affiliated colleges in Palayamkottai Region.

#### **HYPOTHESIS**

- $H_0 \Rightarrow$  There is no significant difference in the Digital payment challenges regarding the gender of college teachers in Palayamkottai Area.

#### **STATISTICAL TOOLS USED**

The collected data has been processed with the help of appropriate statistical tools like.

1. Percentage Analysis
2. Garrett Ranking
3. ANOVA

## REVIEW OF LITERATURE

**Javier A. et. al(2018)** Examined the adoption of e-banking in Colombia, including a comprehensive analysis of consumer trust in this type of transaction and of the impact of the current government policy to promote e-commerce. The proposed model was validated in that the factors hypothesized to build trust in the use of electronic banking were shown to be significant: trust, performance expectancy and effort expectancy had a positive impact on the use of financial websites in Colombia, while government support did not have a significant impact. This study is one of the first to present empirical findings on the acceptance of e-banking in Latin America; it further presents a model that integrates the most important variables needed for an analysis of the acceptance of e-banking.

**Singhal (2017)** studied that with the introduction of smart phones and mobiles application the usage of internet banking has been increased. But there is a long way to go as rural population of India is still waiting for some program from banks that will facilitate their usage of e-banking services. On the one side it will be beneficial for the country and on the other side it may bring the transparency in the system.

**TABLE NO 1**  
**GENDER WISE RESPONDENTS**

Gender	Frequency	Percent
Male	46	38
Female	74	62
Total	120	100.0

**Source: primary data**

Table 1 shows that 62 percent of the respondents are female: and the remaining 38 percent of the respondents are male.

**TABLE 2**  
**DIGITAL PAYMENT SYSTEM ON THE BASIS OF THE LEVEL OF YOUR USAGE**

S. No	Factor	Garrett Means Score	Rank
1	Internet banking	56	III
2	Mobile banking	64.63	I
3	UPI apps	44.48	IV
4	AEPS	38.95	VI
5	USSD	37.7	VII
6	Cards	62.17	II
7	E wallet	44.01	V

**Source: Primary Data**

Table 2 reveals that the digital payment system on the basis of the level of the respondents usage along with Garret mean score and ranks. “Mobile banking” has been ranked first as it Garret mean score is 64.63. “Cards” has been ranked second as it Garret mean score is 62.17. “Internet banking” has been ranked third as it Garret mean score is 56. “UPI” ranked fourth. “E wallet” ranked has been ranked fifth, “AEPS” ranked sixth followed by USSD.

**Digital Payment Challenges vis-à-vis Gender of College Teachers**

In order to test whether there is any relationship between the different gender of college teachers and Digital payment challenges, ‘ANOVA’ is attempted with the following null hypothesis and the result is presented in Table 3

H<sub>0</sub>=> There is no significant difference in the Digital payment challenges regarding the gender of college teachers in Palayamkottai Area.

H<sub>a</sub>=> There is a significant difference in the Digital payment challenges regarding the gender of college teachers in Palayamkottai Area.

**Table 3**  
**Digital Payment Challenges among Gender difference of College Teachers**  
**Result of ANOVA**

Challenges	Gender	Sum of Squares	df	Mean Square	F	Sig.
Platform	Between Groups	2.332	1	2.332	5.340	.023
	Within Groups	51.535	118	.437		
	Total	53.867	119			
Cashless	Between Groups	1.266	1	1.266	1.947	.166
	Within Groups	72.839	112	.650		
	Total	74.105	113			
Adoption	Between Groups	22.565	1	22.565	24.853	.000
	Within Groups	107.135	118	.908		
	Total	129.700	119			
Performance	Between Groups	.063	1	.063	.118	.732
	Within Groups	62.604	118	.531		
	Total	62.667	119			
Might	Between Groups	.448	1	.448	.502	.480
	Within Groups	105.518	118	.894		
	Total	105.967	119			
Country boarder	Between Groups	.060	1	.060	.169	.682
	Within Groups	41.640	118	.353		
	Total	41.700	119			

Source: Computed Data

From the ANOVA test it is found that the 'F' values for the aspects of "implementing bank uses different e-payment platform and software are 5.340 and online fraud" are 24.853 which are significant at 5 percent level with 'p' value of 0.023 and 0.000. Since the 'p' value is less than 0.05, thus the null hypothesis is rejected. Therefore it may be concluded that there is a significant difference in the "uses of different e-payment platform and software and online fraud" among gender difference of college teachers in Palayamkottai Area.

It is observed that the 'F' values for the digital payment challenges such as aspects of uncertainty of liquidity performance of a cashless society, IT risk performance in case of failure, layoffs among staff members might cause fraud and digital payment system that goes beyond country borders are 0.166, 0.732, 0.480 and 0.682 respectively. Since the 'p' value is more than 0.05, thus the null hypothesis is accepted. Therefore it may be concluded that there is no significant difference in the aspects of uncertainty of liquidity performance of a cashless society, IT risk performance in case of failure, layoffs among staff members might cause fraud, digital payment system that goes beyond country among gender difference of college teachers in Palayamkottai Area.

#### **FINDINGS**

- Table 1 shows that 62 percent of the respondents are female.
- Table 2 reveals that the digital payment system on the basis of the level of the respondents usage along with Garret mean score and ranks. "Mobile banking" has been ranked first as it Garret mean score is 64.63. "Cards" has been ranked second as it Garret mean score is 62.17. "Internet banking" has been ranked third as it Garret mean score is 56.
- Table 3 reveals that there is a significant difference in the "uses of different e-payment platform and software and online fraud" among gender difference of college teachers in Palayamkottai Area. There is no significant difference in the aspects of uncertainty of liquidity performance of a cashless society, IT risk performance in case of failure, layoffs among staff members might cause fraud, digital payment system that goes beyond country among gender difference of college teachers in Palayamkottai Area.

#### **SUGGESTIONS TO COLLEGE TEACHERS**

- ✓ Teachers are also found to be committed to debit cards only. It is suggested to teachers to use all other means of digital payment such as credit card, mobile banking, online payment and e-wallet.
- ✓ It is suggested to the teachers to enjoy all important benefit such as time saving, quick and fast transaction, and direct control; of account, easy to use and other major benefits.

### **SUGGESTIONS TO BANK**

- ✓ The bank providing online transaction service must ensure and uninterrupted network connectivity to facilitate people to use digital payment system effectively.
- ✓ The bank must avoid debiting unnecessary charges from the teachers using digital payment system which may affect the reputation of the bank among the general public.
- ✓ Banks must ensure 24x7 digital transaction services as there is no possibility of interbank transaction on Sundays.

### **CONCLUSION**

Digital payment system is a new method of digitalization initiative of the government. As India is adopting ICT to administrate and govern. The banking sector is one of the major sectors of business in India that has gone for digitalization to benefit the customers in all aspects of the transaction. It is almost 20 years since digitalization is initiated in the country. It is high time to study and evaluate the functionalities of digital payment mode by researcher to study the impact of using digital payment system by college teachers who all may feel comfortable with the use of digital payment system. In this researcher a list of various method of digital payment system is explored debit card and online payment is identified as the mostly used digital payment system. Majority of the Teachers are not aware of the various types of digital payment system which requires special initiative from the bank to educate the Teachers. However in this research the College Teachers are grouped on the basis of Gender, Age group. It also explore that the use of digital payment system needs to be improved among the College Teachers. Hence it is concluded that the banks and customers must jointly aim at promoting digital transaction to support digital transaction to support Government in Digitalization.

## **TIPS TO ELECT THE NATURAL COSMETICS WITH THE HAND PICKED INGREDIENTS IN INDUSTRY 5.0**

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### **INTRODUCTION**

“MAKE - UP” is not a tool meant to make an ugly thing beautiful, it is meant to magnify the beauty that already exists. Make up has been for many centuries. Egyptians was the one who used cosmetics for the first time. Roman philosopher Plautus (254-184 BC) wrote, “A women without paint is like food without salt”. Has just been proved, where Egyptians used dark green color to decorate their under lid of their eyes and the upper lid with

kohl. Cosmetics takes a vivid role in the centuries arising from Egypt's, Romans, European middle ages, Elizabethan England, the French restoration. Ancient Egypt which was well known that Cleopatra enjoyed bathing in milk and honey to keep her skin soft. Pomegranate was popular in Ancient Greece- an ingredient used in wild human skincare, rice water is still popular in Asian skincare today. The medieval times brought some very strange practices with petals, animal fat and starch, oats and vinegar were used to cleanse the skin. Oats, egg yolk and honey were used popularly in the Victorian era. Day by Day, the urge for beauty and cosmetics has been arising towards both men and women. Later, the people began to use all such kind of natural ingredients which were stored in their kitchen.

Due to the advancement in technologies and greater influence on the skin glow, lead the skin care faster than ever and does not reflect any sign of slowing. All such kind of harmful ingredients like parabens, synthetic fragrances, propylene glycol, SLS- sodium laurel sulphate, SLES, PABA, Toluene or butylate hydroxytoluene, phenol carbolic acid, mineral oil or paraffin, octinoxate also called octyl methoxycinnamate (OMC), acrylamide, PEG- all deviates are being added. Undoubtedly all these ingredients are being slowly absorbed by your skin which leads to some of the health concerns like cancer, endocrine disorders (infertility), developmental delays, neurological problems and illness. There comes a drastic filtered stage in which the women started to focus more on Natural skin care, self-care and loving themselves. This attitude grew massively during the pandemic, some of whom were too busy to practice before-began to really explore. It is very important and the responsibility of every individual to be aware of these toxins in our day to day life and the impact they can have on us. Very specifically the 2K generations should be much aware about all these toxic reactions, for which they are so fascinated towards the fashion and not merely the safety. The above discussed are so transparent that the concern towards skin are inducing proclivity for cosmetics. Since, adulteration reaches the peak due to the advancement in technologies, customers attitude towards buying cosmetics are turning to creams and lotions labeled "organic" or "Natural". Thus this article clearly depicts about the tips that can be used by the consumers of natural skin care cosmetics to pick the absolute natural skin care cosmetics with the defined and refined ingredients which are being used by the Natural cosmetic industrialists.

#### **TIPS TO KNOW THE HANDPICKED INGREDIENTS OF NATURAL COSMETICS AVAILABLE IN THE MARKET:**

##### **1. BE HANDY WITH RESEARCH ABOUT THE PRODUCT:**

Moving towards shopping without going with some research that you use, could leave you to feel dilemma and even frustrated. Ensure to have a bit of time to learn about the ingredients that you would like to avoid and the reason behind it. That way, you will feel comfortable to choose your products. Also, if you are very new to use natural cosmetics, then



you must have experience of discussions with the people who are already in it. But still making the new purchase are not easy without armed with helpful information.

## **2. BE SURE WITH THE ACTIVE INGREDIENTS:**

As a consumers, we have to be sure about the active ingredients, which serves the products biological purpose. It's important that even a natural, product can have a drug facts box on its label. To understand, No cosmetics are without drug facts labels. Did you know Fluroid, it is an ingredient that requires a drug facts box, in natural tooth paste. It's not about which you choose. Also try to be not sure that the drug facts box means the product contains unsafe ingredients.

## **3. NOT TO HAVE ANY DILEMMA IN PRONOUNCIATION:**

As far as known, it is assumed by many people that the ingredient which can be easily pronounced are of natural product. But, we should be aware that maximum number of industrialists try to put forth their ingredients using Latin, scientific Name.

Eg: Helianthus annuus seed oil is a scientific name of Sunflower seed oil.

Once you come to know about different ingredients, also try to learn about the ingredients which you actually not to prefer.

Eg: phthalates (Plasticizers)

Parabens (type of artificial preservatives)

Phenoxyethanol (another type of artificial preservatives)

Petroleum, lanolin, triclosan, sodium lauryl sulphate etc...

## **4. THIRD PARTY CERTIFICATIONS:**

To have much clarity apart from the above given tips, the third party certifications can be ab evidence for natural cosmetics. The COSMOS and NATRUE seals ensure that the ingredients are of purely natural and sustainable origin and also it represents that the both animal testing and genetically modified raw materials are being strictly prohibited. Also, some more certifications are Leaping Bunny, Rainforest Alliance, Fair trade, Certified B Corporations, Made safe etc... You may also kosher and Halal symbols on products.



## **COSMOS APPROVED**

### **OTHER HEALTHIER TIPS TO FOLLOW:**

- Pick for a product that contains no alcohol or fragrance, because alcohol can dry your skin and fragrance can cause some allergic reactions.
- Do consider the type of Packaging.
- Try to go for USDA certified products that ensures the products are enriched with quality and safety.
- Read the ingredients with much patience also try to know the ingredients individually.

### **CONCLUSION**

In modern era, the market for natural cosmetics are being increasing day by day and it's not hard to say, why? The people are keen to filter their own skin care products that will do miracle to their skin without harsh chemicals. Taking a decision regarding cosmetics are quiet hard. The use of Modern technologies driven by Industry 5.0, already been with the use of advanced technologies like AI, Automation and 3D printing. The gamut is triggered with the champions of Industry 5.0 adoption. The cosmetic industrialists are popping up with both tools and to support major industries also to ramp up with their efforts. The world has never changed so rapidly, consumers want anything, anywhere and at any time. To respond to these expectations 5.0. Regardless to all these advancements, the consumers should be vigilant all about the ingredients and technologies in handy.

## **ANALYSING THE OPPORTUNITIES AND CHALLENGES FOR MICROSMALL AND MEDIUM ENTERPRISES (MSMEs) IN INDUSTRY 5.0.**

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### **Abstract**

*Industry 5.0 is regarded to be the digital and physical integration of manufacturing, services and data processing in a view to create new opportunities in the manufacture, services and consumers. The industry 5.0 lies on the principles of automation. It uses the eight different technologies Artificial intelligence, big data, analysis, robotics, digital twin, black chain, internet of everything, edge computing and 6g and beyond for bringing the industrial sector to automation. Across different industrial sector to automation. Across different industrial sector micro and small enterprises (MSMEs) Plays a pivotal role in economic development, production, and employment generation. However, the adoption of industry 5.0 is associated and opportunities with reference to MSMEs. The new millennium is seen as an epoch of entrepreneurship with entrepreneur perceiving novel opportunities, organizing resources, under taking risks to pursue their goals in establishing innovative ventures for scaling new horizons. The study aims to know challenges and opportunities in the contemporary commercial world. The study aims to know the challenges and opportunities of entrepreneurs in micro, small and medium enterprises (MSMEs) that examine whether entrepreneurial activities significantly vary across the firm of owned enterprises, type of owned enterprises, type of organization and nature of 40 to 50 percent of India's total exports, the MSMEs sector contributes an average of 30% of India's GDP.*

(Key words: Entrepreneurship, Micro, small and medium enterprises, opportunities, challenges, Technology, Industry 5.0.)

### **INTRODUCTION:**

Industry 5.0 is all set to take the stage when industry 4.0 is still gaining popularity and yet to get matured. Industry 5.0 is regarded as a fifth industrial revolution in which consumers could satisfy their individual requirements as per the tastes and expectations. India's economy is currently the fifth largest in the world. The nation has been remarkable growth rate. Micro, small and medium enterprises (MSMEs) Play an important role in the economic development of a country due to their contribution to production, exports and employment. The sector contribution 8% to the industrial products and 40% to the country's exports. It employs 60 million people in 28.5 million enterprises. The MEMEs sector has maintained a higher growth rate over the last one decade that the general industrial sector. MSMs accounts for more than 90% of total business enterprise, and a large share of employment in industrial production and exports which are credited with generating higher employment rates. The MSMEs sector has

gradually come under discussion with more focus on the Government and other government agencies, corporates and banks. Policy based change field investment; industry 5.0 will provide advanced features for the development of the manufacturing sector in order to attain sustainable development goals.

**OBJECTIVES:**

1. To study the opportunities for MSMEs through industry 5.0
2. To study the challenges for MSMEs while adopting industry 5.0.

**RESEARCH WORK REVIEW**

In the views of Parthajeet das (2017): Micro, small and medium enterprises strengthen the backbone of an economy despite various challenges this sector, has achieved a remarkable progress by increasing its contribution to GDP. This sector exhibits our traditional skills and expertise with combination of new technologies, this component helped it to sustain.

In the views of Satya prabhakar (2018): The sustained high growth of GDP is enabled by MSMEs. As India emerge as one of the new millennia, it should focus on way a make help MSMEs, the most powerful driver of its growth survives succeed and sector.

In the views of Ernani Hadiyativ, (2019): The examined Indonesia and many countries, MSMEs has high contribution, so it is important for the government to continue empowering and developing the enterprise. In concluding its business performance, MSMEs faces several problems, one of the problems encountered is the field of marketing. (Hadiyativ et al., 2019)

**OPPORTUNITIES AND CHALLENGES:**

Covid-19 has made a transformation for employers to final digital technology that will help communication and interaction employees. Entrepreneur are increasing relying on teleconfering are increasingly demand for digital office tools, small companies can exploit these business opportunities by developing or partnering with existing application that enable organization to communicate remotely in real time with their employees and clients. Entrepreneur can also help marketing agencies interact with clients using digital technology. These opportunities include hosting virtual exhibitions, trade shows and product demonstration.

The era of industry 5.0 is a technology and human coexist in order to improve the quality of human life on a ongoing basis. In this era, digital is very important because humans must be able to mater technology and information from digital devices effectively and efficiently. One sector that can benefit from digital literacy in the era of industry 5.0 is MSMEs. Based on several activities carried out, it is expected that several changes will occur, namely increasing the motivation of MSME players in running a business, market identification, product and service differentiation, focus on Quality, effective marketing wise financial management, innovation and development and digitalization.

World economic forum (WEF) 2020, there are 10 main abilities needed to face the era of industry 5.0 namely being able to solve complex problems, critical thinking, creative human management skills, being able to solve complex problems, critical thinking, creative having human management skills, being able to co- ordinate with others, emotional intelligence, the ability to assess and make decisions, service-oriented negotiation skills and cognitive flexibility.

The main challenges for entrepreneurs in the era of industry 5.0 is to increase their ability and adaptability to face various rapid changes in the business environment and society. In the era, technology and innovation develop rapidly, creating unstable situation such as change in culture and consumer behaviour.

**OPPORTUNITIES:**

1. Increased automation will impact employment positively in many sectors through the deployment of next generation technology.
2. Highly automated manufacturing systems provide greater opportunity for customization to customers.
3. Industry 5.0 provides greater opportunities for creative people to come and work which enables the optimization of human efficiency.
4. Industry 5.0 creates higher value employment than before because this gives back the liberty to people to be responsible for construction. (Haleem and javaid,2019)
5. It allows liberty of design to function and allows more tailor made and personal products.

**CHALLENGES:**

1. This Trends increases work polarization where middle skill employment is decreasing and the workforce is split into two communities: Extremely trained and Qualified; how paid and unqualified employees. This may alleviate the skilled and unskilled divide in the society.
2. Collaborative robotics is the method of automation, which together with human co-workers also stays an important danger on the shop floor (Rossi,2018)
3. For manufacturing systems, it is difficult to acquire high Quality and integrity of the data and it is difficult to accommodate diverse data repositories.
4. Industry 5.0 demands a huge amount of investment to fully implemented all its pillars which is difficult to industry and especially the MSMEs to adopt.
5. It is challenging for startups and entrepreneurs since industry 5.0 demand high investment and infrastructure with cutting edge technology requirements.
6. Business strategies in industry 5.0 demands higher level of dynamism to sustain competition due to differential customer preferences.

**FINDINGS:**

1. MSMEs workers in industry 5.0 are facing lots of challenges and at the same time there are lot of opportunities available for them.
2. This results in the replacement of human jobs with automated machines.

**CONCLUSION:**

This industrial revolution relates to human- machine interaction to make job easier and quicker. Industry 5.0 brings the personalization idea to the next stage. Industry 5.0 is used with greater effectiveness to meet the extremely personalized demand and to build a virtual environment, advanced computers and information technologies. The present study aims to assess the opportunities and challenges in adopting and implementing industry 5.0 by micro and small enterprises the MSMEs sector in India today is on the verge of global growth due to its competitiveness and product Quality micro – small and medium enterprises, contributing to India’s economic development in various ways, such as job creation in rural and urban area by providing goods and services at affordable prices. The MSMEs sector is often called the “growth engine “for developing countries. We analyze the opportunities of MSMEs in the area of fixed investment. We also took at the opportunities, infrastructure development export promotion in the MSME sector. The Government of India has taken several initiatives to make theirs sector a more active and significant in the development of the Indian economy. Economic growth of the country while further facilitating the achievement and streaming the objectives relating to mass employment generation, low investment etc... The future will see the growth of MSMEs in industry 5.0 as a result of the growing economy and continuous efforts of entrepreneurs. The important problems are financial, marketing, social cultural problems. The level of perception on problems is significantly associated with the profile of MSMES especially personality traits. Further analytical research is required to identify the type based MSMEs challenges and opportunities while adopting industry 5.0.

## **NAVIGATING INDUSTRY 5.0: OPPORTUNITIES AND CHALLENGES FOR MSMES**

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**Abstract**

*This research aims to explore the opportunities and challenges of Industry 5.0 for Micro, Small, and Medium Enterprises (MSMEs). Industry 5.0 represents a shift towards human-centric manufacturing processes enhanced by advanced technologies such as cyber-physical systems (CPS), artificial intelligence (AI), and Internet of Things (IoT). MSMEs, pivotal drivers of economic growth, stand to benefit from Industry 5.0 through enhanced*

*customization, innovation in manufacturing processes, improved operational efficiency, and expanded global market access facilitated by digital platforms. However, MSMEs face significant challenges including barriers to technological adoption, workforce skills gaps, cybersecurity vulnerabilities, and navigating complex regulatory landscapes concerning data privacy, product safety, and ethical considerations. This study will investigate these dynamics using empirical data and case studies, providing insights into strategies for MSMEs to effectively capitalize on Industry 5.0 opportunities while mitigating associated challenges.*

*Keywords: MSMEs, Industry 5.0, Global Market Access, Cost Reduction, Cybersecurity, Workforce Skills.*

### **Introduction:**

Industry 5.0 presents opportunities for Micro, Small, and Medium Enterprises (MSMEs) to innovate, enhance efficiency, and expand globally. It fosters a culture of innovation by integrating advanced technologies like AI, CPS, and IoT, allowing MSMEs to develop customized products and services. It also facilitates global market access through digital platforms and interconnected supply chains. Cyber-physical systems optimize production processes, reduce operational costs, and improve supply chain management. However, MSMEs face challenges in adopting these technologies, such as high initial investment costs, lack of expertise, and compatibility issues with existing infrastructure. They also need to invest in workforce skills and training, implement robust cybersecurity measures, and navigate regulatory compliance complexities.

### **I. Opportunities of Industry 5.0 for MSMEs:**

#### **1. Customization and Flexibility:**

In the era of Industry 5.0, characterized by human-centric manufacturing processes and advanced technologies, Micro, Small, and Medium Enterprises (MSMEs) face both opportunities and challenges. One significant opportunity lies in their ability to offer highly customized products and services, meeting individual customer needs more effectively than ever before.

#### **Leveraging Advanced Technologies:**

##### **1. Cyber-Physical Systems (CPS):**

- CPS integrate physical machinery with digital technologies, enabling real-time data exchange and decision-making. MSMEs can use CPS to monitor and adjust production processes dynamically, accommodating customizations without compromising efficiency.

##### **2. Internet of Things (IoT):**

- IoT devices enable interconnected systems that gather and share data across the manufacturing lifecycle. MSMEs can use IoT to track individual product specifications and adjust production parameters in response to real-time customer demands.

### **3. Additive Manufacturing (3D Printing):**

- 3D printing allows MSMEs to produce highly customized parts and products on-demand, reducing lead times and inventory costs associated with traditional manufacturing processes.

#### **Operational Advantages:**

##### **1. Enhanced Customer Satisfaction:**

- By offering tailored products, MSMEs can enhance customer satisfaction and loyalty, catering to niche markets and specific consumer preferences.

##### **2. Market Responsiveness:**

- Industry 5.0 technologies enable MSMEs to respond quickly to market changes and customer feedback, adapting products in real-time to capitalize on emerging trends.

#### **Challenges and Considerations:**

##### **1. Technological Investment:**

- MSMEs may face initial costs and resource constraints in adopting Industry 5.0 technologies. Strategic planning and phased implementation can mitigate financial risks.

##### **2. Skill Development:**

- Upskilling the workforce to manage and optimize advanced technologies is crucial. Training programs and partnerships with educational institutions can bridge skill gaps effectively.

##### **3. Cybersecurity and Data Privacy:**

- Protecting sensitive customer data and intellectual property becomes increasingly critical with interconnected systems. Robust cybersecurity measures and compliance with data privacy regulations are imperative.

Industry 5.0 presents MSMEs with unprecedented opportunities to excel in offering highly customized products and services. By harnessing advanced technologies like CPS, IoT, and additive manufacturing, MSMEs can enhance operational flexibility, customer satisfaction, and market competitiveness. Addressing challenges such as technological investment, skill development, and cybersecurity will be pivotal in realizing the full potential of customization capabilities in the Industry 5.0 landscape.

#### **2. Innovation and Creativity:**

In the context of Industry 5.0, Micro, Small, and Medium Enterprises (MSMEs) are presented with unique opportunities to innovate and enhance their manufacturing processes and product offerings. This era emphasizes human-centric approaches and the integration of advanced technologies, fostering a conducive environment for creativity and innovation.



### **Harnessing Advanced Technologies:**

#### **1. Augmented Reality (AR) and Virtual Reality (VR):**

- AR and VR technologies enable MSMEs to visualize and simulate product designs and manufacturing processes. This enhances prototyping, design iterations, and user experience testing without extensive physical resources.

#### **2. Artificial Intelligence (AI) and Machine Learning (ML):**

- AI and ML algorithms analyze vast datasets to optimize production efficiency, predict maintenance needs, and personalize customer interactions. MSMEs can leverage AI-powered insights to streamline operations and enhance product quality.

#### **3. Digital Twin Technology:**

- Digital twins create virtual replicas of physical assets and processes. MSMEs can use digital twins for predictive maintenance, performance optimization, and real-time monitoring, thereby reducing downtime and improving resource utilization.

### **Operational Advantages:**

#### **1. Rapid Prototyping and Iteration:**

- Innovations in additive manufacturing and digital design tools enable MSMEs to prototype and iterate products quickly, accelerating time-to-market and reducing development costs.

#### **2. Product Customization and Personalization:**

- Industry 5.0 facilitates mass customization, allowing MSMEs to tailor products to individual customer preferences. This enhances customer satisfaction and loyalty, opening new market opportunities.

### **Cultivating a Culture of Innovation:**

#### **1. Cross-functional Collaboration:**

- Encouraging collaboration between engineering, design, and marketing teams fosters diverse perspectives and innovative solutions. MSMEs can benefit from interdisciplinary approaches to problem-solving and product development.

#### **2. Agility and Adaptability:**

- Embracing agile methodologies and iterative design processes enables MSMEs to respond swiftly to market feedback and technological advancements. Flexibility in adapting to changing consumer preferences and industry trends is critical.

### **Challenges and Considerations:**

#### **1. Resource Constraints:**

- MSMEs may face challenges in accessing capital for technology investments and hiring skilled talent. Collaboration with research institutions and participation in industry clusters can provide access to resources and expertise.

## **2. Data Security and Privacy:**

- Protecting intellectual property and customer data in an interconnected ecosystem requires robust cybersecurity measures and compliance with regulatory standards.

Industry 5.0 empowers MSMEs to innovate and differentiate themselves in competitive markets through enhanced manufacturing processes and product offerings. By embracing advanced technologies, fostering a culture of creativity, and addressing challenges proactively, MSMEs can capitalize on opportunities for growth, sustainability, and customer-centric innovation in the evolving industrial landscape.

## **3. Enhanced Efficiency:**

In the realm of Industry 5.0, the integration of cyber-physical systems (CPS) offers Micro, Small, and Medium Enterprises (MSMEs) significant opportunities to enhance operational efficiency, optimize resource utilization, and achieve cost savings. CPS bridge the gap between physical machinery and digital technologies, enabling real-time data exchange and decision-making for streamlined operations.

### **Leveraging Cyber-Physical Systems:**

#### **1. Real-Time Monitoring and Control:**

- CPS enable MSMEs to monitor production processes, equipment performance, and inventory levels in real-time. This facilitates proactive maintenance, reduces downtime, and ensures optimal production efficiency.

#### **2. Predictive Maintenance:**

- By analyzing data from sensors embedded in machinery, CPS predict maintenance needs and potential failures before they occur. MSMEs can schedule maintenance activities strategically, minimizing disruptions and extending equipment lifespan.

#### **3. Optimized Resource Allocation:**

- CPS optimize resource allocation by adjusting production parameters based on demand fluctuations, energy consumption patterns, and supply chain dynamics. This enhances resource efficiency and reduces waste.

### **Operational Advantages:**

#### **1. Increased Productivity:**

- Automation and data-driven insights provided by CPS improve workflow efficiency and throughput. MSMEs can achieve higher production volumes without compromising product quality.

#### **2. Cost Reduction:**

- By minimizing unplanned downtime, optimizing energy usage, and reducing material waste, CPS help MSMEs lower operational costs and improve overall profitability.

### **Integration with Advanced Technologies:**

#### **1. Internet of Things (IoT):**

- IoT devices collect and transmit data across interconnected systems, enhancing the capabilities of CPS for holistic operational management and decision support.

#### **2. Cloud Computing and Big Data Analytics:**

- Cloud platforms store and analyze large datasets generated by CPS, providing MSMEs with scalable computing power and actionable insights for continuous improvement.

### **Challenges and Considerations:**

#### **1. Technological Integration and Investment:**

- MSMEs may encounter challenges in adopting and integrating CPS due to initial costs, infrastructure requirements, and compatibility with existing systems. Strategic planning and phased implementation can mitigate these challenges.

#### **2. Cybersecurity Risks:**

- Protecting sensitive data and maintaining cybersecurity resilience in interconnected environments is crucial. Implementing robust security protocols and regular updates are essential to safeguarding CPS-enabled operations.

### **Case Studies and Success Stories:**

#### **1. Manufacturing Industry:**

- An MSME implements CPS to automate production lines, monitor equipment performance, and optimize supply chain logistics, resulting in significant cost savings and enhanced competitiveness.

#### **2. Logistics and Transportation:**

- CPS-enabled fleet management systems improve route optimization, fuel efficiency, and vehicle maintenance scheduling for an MSME in the transportation sector, reducing operational costs and carbon footprint.

Leveraging cyber-physical systems enables MSMEs to achieve enhanced operational efficiency, cost reduction, and competitiveness in Industry 5.0. By embracing CPS and integrating them with advanced technologies like IoT and big data analytics, MSMEs can optimize resource utilization, improve productivity, and adapt swiftly to market demands. Overcoming challenges through strategic planning and technological investment is pivotal for MSMEs to capitalize on the transformative potential of CPS in the evolving industrial landscape.

#### **4. Global Market Access:**

In the era of Industry 5.0, Micro, Small, and Medium Enterprises (MSMEs) have unprecedented opportunities to expand their reach and tap into global markets through the integration of advanced digital platforms and networks. Industry 5.0 emphasizes human-centric

manufacturing processes augmented by digital technologies, fostering a conducive environment for MSMEs to enhance their global market access.

**Leveraging Digital Platforms and Networks:**

**1. E-commerce and Online Marketplaces:**

- Industry 5.0 facilitates MSMEs' participation in e-commerce platforms and online marketplaces, enabling them to showcase products to a global audience and facilitate direct sales channels.

**2. Digital Marketing and Customer Engagement:**

- Digital platforms empower MSMEs to implement targeted marketing strategies, engage with international customers through social media, and gather real-time feedback to refine products and services.

**3. Supply Chain Integration and Logistics Optimization:**

- Digital networks enable seamless integration across global supply chains, enhancing transparency, efficiency, and responsiveness to customer demand fluctuations in diverse geographical markets.

**Operational Advantages:**

**1. Market Reach and Expansion:**

- By leveraging Industry 5.0 technologies, MSMEs can overcome geographical barriers and access new markets globally, diversifying their customer base and reducing dependence on local economies.

**2. Enhanced Customer Experience:**

- Digital platforms facilitate personalized customer interactions, tailored product offerings, and efficient order fulfillment processes, thereby improving customer satisfaction and loyalty.

**Integration with Advanced Technologies:**

**1. Internet of Things (IoT):**

- IoT devices enable real-time monitoring of inventory levels, shipment tracking, and product performance across global operations, enhancing supply chain visibility and operational agility.

**2. Big Data Analytics and Predictive Insights:**

- Advanced analytics provide MSMEs with actionable insights into market trends, consumer behavior patterns, and demand forecasts, enabling data-driven decision-making for strategic business expansion.

### **Challenges and Considerations:**

#### **1. Digital Infrastructure and Connectivity:**

- MSMEs in regions with limited digital infrastructure may face challenges in accessing reliable internet connectivity and technological resources required for effective global market engagement.

#### **2. Regulatory Compliance and Cross-border Trade:**

- Navigating international trade regulations, customs procedures, and compliance standards requires MSMEs to develop expertise in global logistics and regulatory frameworks to mitigate risks and ensure compliance.

Industry 5.0 empowers MSMEs to overcome traditional barriers to global market access through digital platforms, networks, and advanced technologies. By embracing digital transformation strategies and addressing operational challenges proactively, MSMEs can capitalize on opportunities for international expansion, customer engagement, and business growth in the dynamic global marketplace. Strategic adoption of Industry 5.0 principles positions MSMEs to achieve sustainable competitive advantages and thrive in an interconnected, digitally-driven economy.

### **II. Challenges of Industry 5.0 for MSMEs:**

#### **1. Challenges in Technological Adoption for MSMEs in Industry 5.0:**

While Industry 5.0 presents numerous opportunities for Micro, Small, and Medium Enterprises (MSMEs), the adoption of advanced technologies poses significant challenges. These challenges primarily revolve around costs, expertise gaps, and infrastructure limitations, hindering MSMEs from fully embracing Industry 5.0 capabilities.

#### **Cost Barriers:**

##### **1. Initial Investment Requirements:**

- MSMEs often lack the financial resources to invest in costly Industry 5.0 technologies such as cyber-physical systems (CPS), advanced robotics, and automation. The high upfront costs for hardware, software, and implementation can deter adoption.

##### **2. Operational Costs and ROI Uncertainty:**

- Beyond initial investments, ongoing operational costs associated with maintaining and upgrading technologies can strain MSME budgets. Calculating return on investment (ROI) from Industry 5.0 implementations can be challenging due to unpredictable market dynamics and technology evolution.

#### **Expertise and Skills Gap:**

##### **1. Lack of Technical Expertise:**

- MSMEs may face challenges in recruiting and retaining skilled professionals capable of managing and optimizing advanced technologies like CPS, artificial intelligence

(AI), and big data analytics. The shortage of qualified talent in emerging fields exacerbates this issue.

**2. Training and Skill Development:**

- Training existing workforce members to adapt to Industry 5.0 technologies requires time and resources. MSMEs must invest in continuous learning programs to upskill employees and ensure they can leverage new technologies effectively.

**Infrastructure Limitations:**

**1. Digital Infrastructure Deficiencies:**

- In regions with inadequate digital infrastructure, MSMEs struggle with limited internet connectivity, unreliable power supply, and insufficient bandwidth for data-intensive Industry 5.0 applications. Addressing these infrastructure gaps is crucial for seamless technology integration.

**2. Compatibility with Existing Systems:**

- Integrating Industry 5.0 technologies with legacy systems and equipment can be complex and costly. MSMEs may encounter compatibility issues, requiring customization or replacement of outdated infrastructure components.

**Overcoming Challenges:**

**1. Collaborative Partnerships and Ecosystem Engagement:**

- MSMEs can mitigate technological adoption barriers by collaborating with technology providers, industry associations, and research institutions. Partnerships facilitate knowledge sharing, access to resources, and shared investment in innovative solutions.

**2. Phased Implementation and Pilot Projects:**

- Adopting a phased approach allows MSMEs to prioritize critical technologies, manage risks, and demonstrate tangible benefits before scaling up. Pilot projects enable iterative testing and refinement of Industry 5.0 solutions tailored to organizational needs.

While technological adoption barriers pose challenges for MSMEs in embracing Industry 5.0, proactive strategies such as collaborative partnerships, phased implementation, and skill development initiatives can facilitate smoother transitions. Addressing cost constraints, expertise gaps, and infrastructure limitations through strategic planning and stakeholder engagement positions MSMEs to harness the transformative potential of Industry 5.0 and achieve sustainable growth in a competitive global marketplace.

## **2. Challenges in Workforce Skills in Industry 5.0 for MSMEs**

As Industry 5.0 transforms manufacturing processes with advanced technologies like cyber-physical systems (CPS), artificial intelligence (AI), and automation, Micro, Small, and Medium Enterprises (MSMEs) face significant challenges in equipping their workforce with the necessary skills to effectively utilize and optimize these technologies.

### **Skills Gap in Emerging Technologies:**

#### **1. Technical Proficiency:**

- MSMEs often lack employees with proficiency in emerging technologies such as CPS, IoT, AI, and data analytics. The rapid evolution of these fields necessitates continuous learning and upskilling to remain competitive.

#### **2. Digital Literacy:**

- Basic digital literacy skills are essential for employees to operate digital interfaces, collaborate in virtual environments, and interpret data analytics outputs. MSMEs may need to provide foundational training to bridge this gap.

### **Training and Development Needs:**

#### **1. Specialized Training Programs:**

- Developing tailored training programs that cater to the specific technological needs of MSMEs is crucial. These programs should cover hands-on training, theoretical knowledge, and practical applications of Industry 5.0 technologies.

#### **2. Cross-functional Collaboration:**

- Promoting interdisciplinary collaboration between departments (e.g., engineering, IT, operations) fosters a holistic understanding of technology integration and encourages innovative problem-solving approaches.

### **Overcoming Skills Gap Challenges:**

#### **1. Partnerships with Educational Institutions:**

- Collaborating with universities, technical colleges, and vocational training centers can facilitate access to specialized curricula, certification programs, and expert faculty resources tailored to Industry 5.0 competencies.

#### **2. On-the-Job Training and Mentorship:**

- Implementing on-the-job training initiatives and mentorship programs allows employees to apply theoretical knowledge in practical scenarios. Mentors can provide guidance and support throughout the learning process.

### **Retention and Talent Development:**

#### **1. Career Pathways and Upskilling Opportunities:**

- Establishing clear career progression pathways and opportunities for continuous upskilling motivates employees to enhance their skills and contribute to the organization's technological advancement goals.

#### **2. Incentivizing Lifelong Learning:**

- Offering incentives such as tuition reimbursement, professional development stipends, and recognition for achieving industry certifications encourages employees to pursue ongoing education and stay abreast of technological advancements.

Addressing the workforce skills gap is pivotal for MSMEs to capitalize on the benefits of Industry 5.0 and remain competitive in a rapidly evolving market landscape. By investing in specialized training, fostering cross-functional collaboration, and nurturing a culture of continuous learning and innovation, MSMEs can empower their workforce to effectively harness the transformative potential of emerging technologies. Proactive strategies aimed at skills development not only enhance operational efficiency but also position MSMEs as leaders in innovation and sustainability within their respective industries.

### **3. Challenges in Cybersecurity for MSMEs in Industry 5.0**

As Micro, Small, and Medium Enterprises (MSMEs) embrace Industry 5.0 technologies like cyber-physical systems (CPS), Internet of Things (IoT), and cloud computing, they face critical challenges in safeguarding sensitive data and protecting digital assets from evolving cybersecurity threats.

#### **Increasing Complexity of Cyber Threats:**

##### **1. Sophisticated Cyber Attacks:**

- MSMEs are vulnerable to sophisticated cyber threats such as ransomware, phishing attacks, and data breaches. These attacks exploit vulnerabilities in interconnected systems and can lead to financial losses and reputational damage.

##### **2. Supply Chain Risks:**

- Interconnected supply chains in Industry 5.0 increase the attack surface, exposing MSMEs to cyber risks from third-party vendors, suppliers, and contractors who may have weaker cybersecurity protocols.

#### **Resource Constraints:**

##### **1. Limited Budget and Expertise:**

- MSMEs often operate with limited cybersecurity budgets and may lack dedicated cybersecurity teams or expertise. Investing in robust cybersecurity measures requires balancing cost considerations with the need for effective protection.



**2. Infrastructure Limitations:**

- Legacy systems and outdated software within MSMEs may lack security updates and patches, making them susceptible to vulnerabilities exploited by cyber attackers.

**Compliance and Regulatory Requirements:**

**1. Data Privacy Regulations:**

- Compliance with data protection laws such as GDPR (General Data Protection Regulation) or CCPA (California Consumer Privacy Act) adds complexity to cybersecurity management. MSMEs must ensure data handling practices align with regulatory requirements to avoid penalties.

**2. Industry Standards and Best Practices:**

- Adhering to cybersecurity frameworks and best practices (e.g., ISO/IEC 27001, NIST Cybersecurity Framework) helps MSMEs establish a comprehensive cybersecurity posture. However, implementing these standards may require additional resources and expertise.

**Mitigating Cybersecurity Challenges:**

**1. Cybersecurity Awareness and Training:**

- Educating employees about cybersecurity risks and best practices enhances vigilance and reduces the likelihood of human error leading to security incidents. Regular training programs ensure staff remain updated on emerging threats.

**2. Adopting Security-by-Design Principles:**

- Integrating security-by-design principles into the development and deployment of Industry 5.0 technologies ensures cybersecurity considerations are prioritized from inception. This includes encryption, access controls, and vulnerability assessments.

**Collaboration and External Support:**

**1. Partnerships with Cybersecurity Providers:**

- Collaborating with cybersecurity service providers offers MSMEs access to specialized expertise, threat intelligence, and proactive monitoring services tailored to their operational needs and budget constraints.

**2. Industry Collaboration and Information Sharing:**

- Participating in industry forums, sharing cybersecurity insights, and collaborating with peers enhance MSMEs' collective resilience against cyber threats. Sharing threat intelligence helps identify and mitigate emerging risks proactively.

Hence it is ensuring robust cybersecurity measures is imperative for MSMEs leveraging Industry 5.0 technologies to mitigate risks, protect sensitive data, and preserve business continuity. By addressing cybersecurity challenges through proactive strategies, including employee training, adopting security-by-design principles, and fostering collaborative partnerships, MSMEs can strengthen their resilience against evolving cyber threats and safeguard their reputation in an increasingly digitalized landscape. Prioritizing cybersecurity not only enhances trust with customers and partners but also enables MSMEs to capitalize on the transformative benefits of Industry 5.0 securely and sustainably.

#### **4. Challenges in Regulatory Compliance for MSMEs in Industry 5.0**

As Micro, Small, and Medium Enterprises (MSMEs) integrate Industry 5.0 technologies like cyber-physical systems (CPS), Internet of Things (IoT), and artificial intelligence (AI), they encounter complex regulatory landscapes governing data privacy, product safety, and ethical considerations. Navigating these regulatory requirements is crucial to ensuring legal compliance, protecting consumer rights, and maintaining business integrity.

##### **Data Privacy Regulations:**

###### **1. General Data Protection Regulation (GDPR):**

- Compliance with GDPR mandates strict measures for processing and safeguarding personal data of EU citizens. MSMEs must implement data protection principles, obtain consent for data use, and ensure secure data transfers.

###### **2. California Consumer Privacy Act (CCPA):**

- CCPA grants California residents rights over their personal information, requiring MSMEs to disclose data practices, offer opt-out options, and safeguard sensitive data from unauthorized access or breaches.

##### **Product Safety Standards:**

###### **1. International Standards Organization (ISO) Regulations:**

- ISO standards, such as ISO 9001 (Quality Management Systems) and ISO 13485 (Medical devices), outline requirements for product quality, safety, and reliability. MSMEs must adhere to these standards to ensure product conformity and consumer safety.

###### **2. Sector-Specific Regulations:**

- Industry-specific regulations (e.g., FDA regulations for medical devices, FCC regulations for telecommunications equipment) impose stringent safety and performance criteria. MSMEs must navigate these regulations to gain market approval and maintain compliance.

**Ethical Considerations:**

**1. Ethical Governance and Corporate Social Responsibility (CSR):**

- MSMEs are increasingly scrutinized for ethical business practices, including fair labor practices, environmental sustainability, and community engagement. Adhering to CSR principles enhances brand reputation and stakeholder trust.

**2. Ethical Use of AI and Data Analytics:**

- Integrating AI and data analytics requires MSMEs to uphold ethical guidelines for data usage, algorithm transparency, and bias mitigation. Ethical AI frameworks ensure responsible deployment and minimize societal risks.

**Compliance Management Challenges:**

**1. Resource Constraints:**

- MSMEs may lack dedicated compliance teams and resources to monitor regulatory updates, conduct audits, and implement corrective actions. Balancing compliance costs with operational budgets poses financial challenges.

**2. Global Regulatory Variations:**

- Operating in multiple jurisdictions exposes MSMEs to diverse regulatory frameworks and legal requirements. Harmonizing compliance practices across regions demands strategic alignment and legal expertise.

**Mitigating Regulatory Compliance Challenges:**

**1. Compliance Audits and Assessments:**

- Conducting regular audits and assessments helps MSMEs identify gaps in compliance, assess risks, and implement remedial actions. External audits by certified auditors validate adherence to regulatory standards.

**2. Legal Counsel and Consultation:**

- Seeking legal counsel and consulting with regulatory experts provides MSMEs with guidance on interpreting complex regulations, navigating compliance requirements, and mitigating legal liabilities effectively.

In conclusion, navigating regulatory compliance challenges is essential for MSMEs adopting Industry 5.0 technologies to ensure legal adherence, mitigate risks, and uphold ethical standards. By proactively addressing data privacy regulations, product safety standards, and ethical considerations through robust compliance strategies, MSMEs can enhance market credibility, foster consumer trust, and achieve sustainable growth in a globally regulated environment. Prioritizing compliance not only safeguards business operations but also strengthens competitiveness and resilience in an evolving regulatory landscape.

**Conclusion:**

In conclusion, Industry 5.0 presents MSMEs with immense opportunities to innovate, expand, and thrive in a digital economy driven by advanced technologies. By overcoming challenges through strategic investments, workforce development, cybersecurity resilience, and regulatory compliance, MSMEs can capitalize on the transformative potential of Industry 5.0 to achieve sustainable growth, competitiveness, and resilience in an increasingly interconnected global marketplace. Embracing Industry 5.0 not only enhances operational efficiency but also positions MSMEs as leaders in innovation and customer-centricity, paving the way for long-term success and market leadership.

## **AI AND THE FUTURE OF EDUCATION: DESIGNING CUSTOMISED LEARNING PATHWAYS**

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### **Abstract**

*Artificial Intelligence in Education (AIEd) is one of the burgeoning areas of educational technology, according to numerous international reports. Even though artificial intelligence (AI) has been around for almost thirty years, educators are still unsure about how to fully utilise AI's pedagogical potential and how it could significantly affect teaching and learning in higher education. This essay evaluates artificial intelligence in higher education, emphasising the advantages and disadvantages it offers. It also looks into how new technologies are affecting education and how schools are changing and imparting knowledge to pupils. In an effort to provide all students with access to high-quality, equitable education, the article compiles several instances of AI being used in the classroom. With its ability to automate administrative processes, provide timely feedback, and tailor teaching strategies to each student's needs, artificial intelligence (AI) has the potential to completely transform education. Additionally, technology can help with evaluation and grading, freeing up teachers to concentrate on creating curricula and delivering high-quality instruction. The article examines how AI can enhance learning outcomes, providing examples of how AI technology can help educational institutions use data to improve quality and equity in higher education. It also discusses the advantages and challenges of implementing AI in educational environments, along with the potential risks involved. Additionally, the article offers recommendations for the use of AI in education, emphasizing the importance of initiating discussions about the applications, opportunities, and risks of AI in education for sustainable development.*

**Keywords:** *Artificial Intelligence, Higher Education*

## **Introduction**

Artificial intelligence (AI) is a key component of higher education quality enhancement in many ways. AI-powered learning approaches assess students' performance records, identify their strengths and weaknesses, and provide customised learning experiences based on individual needs. This approach gives students efficient tools to learn more effectively, resulting in productive outcomes. AI-based technologies, like chatbots, virtual assistants, and adaptive learning systems, offer immersive and engaging learning experiences that allow students to explore complex theories and solutions in an interactive and meaningful way. This automation frees up time for instructors to focus on other teaching aspects. AI-powered chatbots provide learners with immediate, personalized assistance for academic and organizational needs, such as answering questions about course materials, providing information on course registration, and addressing basic queries. These systems analyse student data to predict which students are at risk of dropping out or struggling academically. This early detection helps instructors and support staff identify and intervene with at-risk students, offering the necessary support for their success.

## **AI-Driven Custom Learning Pathways**

AI-driven custom learning pathways create personalized educational experiences using advanced artificial intelligence techniques.

These pathways are designed by analyzing a variety of data points, such as

By continuously monitoring these factors, the AI system dynamically adjusts the learning pathway to suit the student's evolving needs. As the student progresses, the AI can introduce more challenging material, revisit areas where the student struggles, and adapt the pace of learning to keep the student motivated and on track. This results in a highly personalized and effective learning experience, improving educational outcomes by catering to the unique needs and preferences of each student.

## **Key Components**

1. **Data Collection and Analysis:** Collecting data from various sources such as online interactions, assessments, and biometric feedback.
2. **Personalized Content Delivery:** Adapting the presentation of content based on the learner's preferences and performance.
3. **Adaptive Learning Algorithms:** Utilizing machine learning algorithms to predict and respond to the needs of each learner.
4. **Feedback and Assessment:** Providing real-time feedback and assessments to guide the learner through their personalized pathway.

## **Applications in Modern Education**

### **K-12**

#### **Education**

In K-12 education, AI-driven custom learning pathways can play a pivotal role in early identification of students' strengths and weaknesses. By continuously monitoring students' performance, the AI system can detect areas where a student excels and where they need additional support. This allows for timely interventions, ensuring that no student falls behind. Personalized learning plans can be developed to accommodate diverse learning abilities, including those with special educational needs. For instance, a student who struggles with math but excels in reading can receive extra math support while continuing to advance in reading. Additionally, AI can adapt teaching methods to match each student's preferred learning style, whether visual, auditory, or kinesthetic, making the learning process more engaging and effective.

### **Higher**

#### **Education**

In higher education, AI can significantly enhance the customization of academic pathways to align with students' career goals and interests. By analyzing data from various sources such as academic performance, extracurricular activities, and career aspirations, AI systems can recommend a tailored selection of courses, internships, and projects. This ensures that students are not only meeting graduation requirements but also gaining relevant experience that will boost their employability. For example, a student pursuing a degree in computer science with an interest in artificial intelligence can receive recommendations for AI-specific courses, research opportunities, and internships in tech companies. This personalized approach helps students maximize their educational experience and better prepare for their future careers.

### **Professional**

#### **Development**

For professionals, AI-driven learning pathways offer a dynamic approach to continuous education and career advancement. These pathways can be tailored to an individual's specific career objectives and industry requirements. By analyzing job performance data, industry trends, and personal career goals, AI systems can design personalized training programs that help professionals acquire new skills and stay updated with the latest developments in their field. For instance, a marketing professional aiming to transition into a digital marketing role can receive targeted learning modules on SEO, social media marketing, and data analytics. These personalized training programs ensure that professionals can remain competitive in their careers, achieve their career aspirations, and contribute effectively to their organizations.

## **Benefits of AI-Driven Custom Learning Pathways**

### **Enhanced Student Engagement**

Personalized learning experiences significantly boost student engagement by aligning educational content with their individual interests and preferred learning styles. This personalized approach makes learning more enjoyable and relevant for students, which increases their motivation to participate and persist in their studies. When students are more engaged, they are more likely to absorb and retain information, leading to a more effective learning process overall.

### **Improved Learning**

#### **Outcomes**

AI-driven custom learning pathways address individual learning gaps by ensuring that each student thoroughly understands a concept before progressing to more complex topics. This methodical approach helps students build a solid foundation of knowledge, leading to a deeper comprehension of the subject matter. By catering to the unique pace and needs of each learner, AI helps ensure that students achieve mastery in their studies, resulting in better retention and improved academic performance.

### **Efficient Use of Educational Resources**

AI can analyze student data to identify the most effective teaching methods and materials for each individual. By optimizing the allocation of resources, AI ensures that educators can provide targeted support where it is needed most. This efficient use of educational resources not only saves time and effort but also maximizes the impact of teaching strategies, leading to more effective and personalized education.

### **Accessibility and**

#### **Inclusivity**

AI-driven learning pathways can be tailored to meet the diverse needs of all students, including those with special educational requirements. By accommodating different learning abilities and providing customized support, AI helps create an inclusive educational environment. This ensures that all learners, regardless of their background or abilities, have equal access to high-quality education and the opportunity to succeed.

### **Challenges and Considerations**

#### **Data Privacy and Security**

The extensive collection and analysis of student data necessary for AI-driven learning pathways raise significant concerns about privacy and security. To protect sensitive information, it is crucial to implement robust data protection measures, such as encryption, anonymization, and secure data storage protocols. Additionally, ethical guidelines must be established to ensure that student data is used responsibly and transparently. This includes

obtaining informed consent, allowing students and parents to control their data, and ensuring that data is not misused or accessed by unauthorized parties.

### **Equity and Access**

AI has the potential to greatly enhance personalized education, but there is a risk that it could exacerbate existing inequalities if access to technology is not distributed equitably. Many students, particularly those from underserved or low-income communities, may lack access to the necessary devices, internet connectivity, or digital literacy skills required to benefit from AI-driven learning tools. To address this, educational institutions and policymakers must work to bridge the digital divide by providing adequate resources, infrastructure, and support to ensure that all students can benefit from AI-enhanced learning opportunities.

### **Teacher Training and Support**

For AI-driven tools to be effectively integrated into educational practices, educators must receive comprehensive training and ongoing support. This includes professional development programs that help teachers understand how to use AI tools, interpret data insights, and incorporate personalized learning strategies into their teaching. Additionally, continuous support is essential to help educators stay updated with the latest AI developments and address any challenges they may encounter. By equipping teachers with the necessary skills and knowledge, the successful implementation of AI in education can be ensured, ultimately enhancing the learning experience for students.

### **Future Directions**

The future of AI-driven custom learning pathways promises the advancement of increasingly sophisticated algorithms capable of delivering even more personalized and adaptive educational experiences. The development of these technologies will rely on collaborative efforts between educators, technologists, and policymakers. Such cooperation is essential for addressing challenges and maximizing the potential of AI in education, ensuring that future learning environments are both innovative and effective.

### **Potential Innovations Emotional Intelligence AI**

Integrating emotional intelligence into AI systems, often referred to as Emotion AI, is a groundbreaking innovation that can significantly enhance the learning experience. By analyzing students' facial expressions, tone of voice, and other behavioral cues, Emotion AI can gauge their emotional states. This allows the system to respond appropriately, providing encouragement when a student is frustrated or offering additional challenges when they are confident and engaged. Understanding and reacting to students' emotions can create a more supportive and responsive learning environment, ultimately improving student outcomes.



### **Gamification**

Gamification involves incorporating game design elements into educational activities to boost engagement and motivation. By using points, badges, leader boards, and other game mechanics, learning can become more interactive and enjoyable. This approach can make challenging subjects more accessible and fun, fostering a competitive yet collaborative atmosphere. Gamification also encourages continuous participation and persistence, as students are motivated to achieve higher scores and complete levels, leading to enhanced retention and understanding of the material.

### **Virtual and Augmented Reality**

Virtual Reality (VR) and Augmented Reality (AR) are transformative technologies that can create immersive and interactive learning environments. VR can simulate real-world scenarios, allowing students to explore complex subjects such as anatomy, history, or physics in a hands-on manner. AR overlays digital information onto the physical world, enhancing traditional learning materials with interactive elements. These technologies can provide experiential learning opportunities that are both engaging and effective, helping students to better grasp abstract concepts and apply their knowledge in practical situations.

### **Conclusion**

AI-driven custom learning pathways signify a transformative advancement in modern education. By harnessing the power of AI to create personalized educational experiences, we can significantly boost student engagement and tailor learning to individual needs, leading to improved academic outcomes. This personalized approach not only makes learning more enjoyable but also ensures that each student masters the necessary concepts before moving on, which enhances retention and comprehension. Moreover, AI's ability to continuously adapt to a student's progress prepares learners more effectively for future challenges by equipping them with the skills and knowledge they need to succeed in an ever-evolving world. The dynamic nature of AI-driven learning pathways means that education can be more responsive and relevant to each student's unique journey. In conclusion, AI-driven custom learning pathways offer a promising future for education by making learning more personalized, engaging, and effective. By addressing the ethical, equitable, and training challenges, we can ensure that AI not only enhances educational outcomes but also contributes to a more inclusive and supportive learning environment for all students.

## ENTREPRENEURSHIP IN INDUSTRY 5.0: THE ROLE OF HUMAN-CENTRIC INNOVATION

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### ABSTRACT

*The introduction of Industry 5.0, which is defined by the integration of cutting-edge technology and a renewed emphasis on human-centric innovation, represents a revolutionary change in the industrial landscape. This essay examines how human-centric innovation is transforming entrepreneurship and emphasizes how it may improve consumer experiences, encourage moral and sustainable behaviour, and develop flexible business models. Industry 5.0 places a strong emphasis on human-machine cooperation, utilizing AI and IoT to promote customized solutions and sustainable development. Future business leaders have untapped potential thanks to this paradigm shift, which opens up new avenues for innovation and competitive advantage. Moreover, Industry 5.0's collaborative approach emphasizes how crucial it is to create ecosystems that foster co-creation and shared value. Going forward, the future of entrepreneurship will be largely determined by how well human ingenuity and technology proficiency mesh.*

**Keywords:** Industry 5.0, human-centric innovation, entrepreneurship, ethical business practices, sustainable development, future trends.

### Introduction:

The advent of Industry 5.0 is bringing about a significant shift in the industrial environment by fusing cutting-edge technologies with human-centered methodologies. Industry 5.0 places a greater emphasis on human-machine cooperation than earlier industrial revolutions did, which emphasized automation and efficiency. This approach fosters innovation that is ethical, sustainable, and sensitive to the needs of the individual. For enterprises, this change offers new opportunities as well as difficulties. Combining machine learning with human intelligence creates new opportunities to develop highly tailored and technologically sophisticated goods and services. Because of this, entrepreneurship in the Industry 5.0 age involves putting human values and social well-being first in addition to utilizing cutting-edge technology. In the framework of Industry 5.0, we investigate in this paper how human-centric innovation will influence the direction of entrepreneurship in the future. We look at how business owners can use these technical developments to their advantage to create novel solutions for difficult problems, all the while taking the moral and

societal ramifications of their endeavours into account. This investigation offers insights on how companies might prosper in a time where success is determined by the interaction of technology and people.

**Objectives:**

1. To examine the entrepreneurial implications of Industry 5.0's human-centric innovation.
2. To find business opportunities in Industry 5.0, where technology and people are convergent.
3. To examine the opportunities and problems facing business owners in the human-centric environment of Industry 5.0.

**Literature review:**

1. Industry 5.0 is a paradigm shift from the automation-centric focus of Industry 4.0 to a human-centric approach. It emphasizes the collaboration between humans and machines to create more sustainable, resilient, and inclusive industrial systems (Grabowska et al., 2022). This shift necessitates a rethinking of traditional business models and the emergence of new entrepreneurial opportunities.
2. Human-centric innovation is at the core of Industry 5.0. It involves designing products, services, and systems with people's needs, well-being, and aspirations in mind (Coronado et al., 2022). This approach requires a deep understanding of user experiences and the ability to leverage technology to enhance human capabilities rather than replace them (Kaasinen et al., 2022).
3. Several studies have highlighted the importance of human-centred design in Industry 5.0. For instance, Mihardjo et al. (2019) proposed the experience-agility model to facilitate digital transformation in this context. The model emphasizes the need for engaging customer experiences and organizational agility to drive innovation.

Industry 5.0 offers entrepreneurs a rare chance to build human-centred solutions that solve social problems and generate long-term value. Through a grasp of human-centred innovation concepts and the utilization of emerging technology, entrepreneurs have the potential to significantly influence the direction of industry.

**Industry 5.0 overview:**

The stage of industrial evolution, known as "Industry 5.0," is centered on fusing human creativity with cutting-edge technologies like robotics and artificial intelligence. In contrast to Industry 4.0, which placed a strong emphasis on efficiency and automation, Industry 5.0 seeks to improve human capacities and gives sustainability and social well-being first priority. The core of Industry 5.0 is the collaboration of humans and machines, utilizing cutting edge technology like robotics, augmented reality (AR), and artificial intelligence (AI) to support human labour. Through this partnership, human creativity, empathy, and problem-

solving skills will be combined with machine precision, endurance, and computational capacity. The objective is to develop creative, efficient, customized, sustainable, and socially conscious solutions.

**Entrepreneurship in Industry 5.0:**

In Industry 5.0, entrepreneurship is defined as the development of new projects or businesses that take advantage of the potential of Industry 5.0 technology. In this setting, entrepreneurs seek to create novel solutions that adhere to Industry 5.0 tenets, such as sustainable practices and human-machine collaboration.

**Entrepreneurship in Industry 5.0 comprise of following features:**

**Innovation Focused on Humans.** Entrepreneurs are urged to provide solutions in Industry 5.0 that prioritize the needs and values of people. This entails creating goods and services that promote engagement, better well-being, and user experience. Artificial intelligence (AI), augmented reality (AR), and robotics are examples of technologies that are used to enhance human abilities and creativity in addition to replacing human work. For example, AI-powered solutions can help customize consumer experiences, and augmented reality (AR) can be utilized to build dynamic, immersive worlds that improve the retail and service sectors.

**Customization and personalization.** A distinguishing feature of Industry 5.0 is the increased emphasis on customisation and personalization of goods and services. Entrepreneurs may learn more about the tastes and habits of their customers by utilizing machine learning algorithms and advanced data analytics. This makes it possible to create extremely customized offers that meet each customer's unique preferences and needs, adding value for them and strengthening their bond with the brand.

**Sustainability.** As social responsibility and environmental challenges gain worldwide attention, Industry 5.0 pushes business owners to use ethical and sustainable business methods. This entails utilizing environmentally friendly products, cutting waste, and putting in place energy-saving procedures. Furthermore, it's becoming more and more crucial to use technology in an ethical manner, especially when it comes to issues like data privacy and AI ethics. It is the responsibility of entrepreneurs to strike a balance between innovation and morality, making sure that their company operations benefit the environment and society.

**Resilience And Flexibility.** Modern economies are dynamic, characterized by quick changes in technology and unpredictability on a worldwide scale. This calls for an adaptable and robust approach to entrepreneurship. Businesses can respond swiftly to shifting consumer needs and market conditions thanks to Industry 5.0 technologies. For instance, quick changes in corporate strategy can be facilitated by digital platforms and flexible manufacturing systems that can quickly adjust production in reaction to emerging trends.

**Collaborative Innovation.** Industry 5.0 places a strong emphasis on the value of cooperative ecosystems in which various stakeholders—such as corporations, governments, and

educational institutions—cooperate to spur innovation. In order to advance their businesses, entrepreneurs are becoming more and more involved in these ecosystems and utilizing the shared resources, knowledge, and networks. This cooperative method aids in tackling difficult problems like creating sustainable technology or negotiating regulatory environments.

**Human-Centric Innovation: A Progressing Paradigm Change:**

Innovation is changing dramatically, and the human aspect is becoming more and more important. This change, which is referred to as "human-centric innovation," is a paradigm shift away from an approach that is solely focused on technology and profit and toward one that puts people's needs, goals, and well-being first.

**The Fundamental Ideas:**

**Empathy-Driven Design:** A thorough grasp of the requirements and difficulties faced by users is essential for human-centric innovation. This calls for a heavy focus on empathy, with methods like in-depth interviews, user research, and observation being used to extract vital information. Innovative designers are able to create solutions that genuinely connect with users and meet their basic needs by adopting their perspective.

**Holistic Well-Being:** Success is now measured by more than just functionality. The goal of human-centric innovation is to develop goods, services, and infrastructure that genuinely improve people's lives and promote wellbeing as a whole. This could be educational resources that make learning interesting and fun, healthcare approaches that put the needs and comfort of patients first, or workplace settings that encourage happiness and efficiency among staff members.

**Enduring Effect:** A fundamental principle of human-centric innovation is its contemplation of the wider environmental and societal milieu. Innovations actively address problems like resource depletion and climate change, designing with a sustainable future in mind. In addition, they work to make the world more inclusive and egalitarian so that everyone can benefit from advancements.

**Benefits of this Paradigm Change:**

Adopting an approach to innovation that is human-centric makes sense for the following reasons:

**Increased User Adoption:** It has been shown that products and services created with people in mind are more likely to be accepted and used regularly, which increases their success and influence.

**Lower Development Risk:** Innovation initiatives are less likely to produce solutions that fall short of expectations or don't catch on when user needs are prioritized first. This results in lower development expenses and less resource waste.

**Stronger Brand Loyalty:** Organizations that put a high priority on human well-being cultivate trust and strengthen bonds with clients and staff, which increases brand advocacy

and loyalty. **Social Progress:** Innovation centred on people has the power to address difficult societal issues and build a more sustainable future for all. By keeping the needs of people front and centre, we can promote innovation that helps people and society as a whole.

**Real-World Examples:**

- **Personalized Learning:** Educational programs that adjust learning paths to meet the needs and skill levels of specific students.
- **Empowering Technologies:** These are assistive technologies that increase the level of social participation for those with impairments.
- **Financial Inclusion:** Solutions for financial services that support underprivileged communities' access to necessary services and financial knowledge.
- **Smart Cities:** Urban development programs that provide equal access to resources, environmental sustainability, and citizen well-being a priority.

**Unrealized Potential: Fresh Paths for Future Business Executives:**

Industry 5.0, A Revolution in Innovation Paradigms Industry 5.0's fusion of intelligent machines and human creativity makes room for innovative solutions. Astute businesspeople can profit from this by creating AI-powered products that directly address basic human needs by personalizing healthcare, education, or environmental monitoring systems.

Making the Most of the Sharing Economy, in order to link unused resources with those in need, businesses have exciting opportunities thanks to the growing sharing economy. This can entail developing peer-to-peer lending systems, skill-sharing markets that pair people with professionals for project-based labour, or co-working spaces that offer flexible work schedules to accommodate the expanding remote workforce.

Strengthening the Creator Economy, A robust creator economy has been facilitated by the widespread use of social media and internet platforms. By creating tools that provide content creators with efficient production procedures, focused marketing solutions, and audience interaction tactics, entrepreneurs can assume a crucial role in this ecosystem. This can entail developing AI-powered editing programs, platforms for managing subscriptions to generate recurring income, or data analytics tools to assist content producers in comprehending their target market and customizing their work.

Sustainable Solutions for a Changing World, the increasing attention that consumers are paying to social and environmental responsibility opens up a wide range of creative possibilities. Entrepreneurs may tap into this expanding demand by developing sustainable products and services, utilizing ethical sourcing procedures, and fostering a culture of social impact inside their firms. This could entail developing waste-reduction technology, coming up with biodegradable packaging options, or establishing moral supply chains that strengthen communities and reduce environmental harm.

### **Industry 5.0's Entrepreneurship Prospects: A Harmony of Technological Mastery and Human Ingenuity:**

With its focus on sustainability and human-machine collaboration, Industry 5.0 offers a fascinating environment full of potential for creative enterprises. A closer look at what lies ahead is provided here:

#### **A thriving ecosystem of solutions focused on people:**

**Hyper-Personalization:** Products and services that are highly customized are encouraged by Industry 5.0. AI-powered solutions that are tailored to each user's needs and preferences can be created by entrepreneurs. Imagine personalized educational materials, medical interventions based on a patient's specific biology, or precisely sized 3D-printed apparel. **Enhancing Human Capabilities:** AI assistants and wearable technology can provide employees access to more advanced knowledge and skills. Entrepreneurs have the ability to develop solutions that close the knowledge gap between humans and intelligent computers, resulting in higher output and better decision-making. **The Emergence of the Wellbeing Economy:** Opportunities for solutions that support both physical and mental health arise from an increasing emphasis on human well-being. Within companies implementing Industry 5.0 techniques, entrepreneurs can design ergonomic workspaces, develop apps for stress relief, or organize wellness initiatives that address the requirements of their workforce.

#### **Sustainable Innovation: A Driving Force**

**Circular Economy Solutions:** Industry 5.0 places a strong emphasis on resource efficiency and waste reduction. Entrepreneurs can design products with recyclability or biodegradability in mind, establish closed-loop manufacturing methods, or build platforms for product lifecycle management. **Integration of Renewable Energy:** Sustainable energy sources are the way of the future. Entrepreneurs can design energy-efficient structures and infrastructure, develop novel approaches to energy distribution and storage, or establish peer-to-peer energy trading systems. **Creating a Greener Supply Chain:** Customers want ethical sourcing and openness. Entrepreneurs might build fair trade networks that empower producers in underdeveloped countries, develop technology that minimize the environmental impact of transportation, or provide platforms for supply chain transparency.

#### **The Future Is Collaborative:**

To accelerate innovation, collaboration between startups, existing firms, and research institutions will be essential. In the fast-paced world of Industry 5.0, entrepreneurs that can cultivate these alliances and capitalize on the advantages of various stakeholders will have the greatest chance of success. To sum up, Industry 5.0 offers a world full of opportunities for visionary people who can use technology to develop solutions that empower people and advance a sustainable future. Through the development of essential competencies and the

adoption of a human-centred methodology, entrepreneurs have the potential to shape a more promising future.

**Conclusion:**

The incorporation of human-centred innovation into Industry 5.0 heralds a new age of entrepreneurship that places equal emphasis on technological advancement and human-centred design. Businesses who adopt this paradigm change will be well-positioned to lead in a future that requires inclusion, accountability, and creativity in addition to these other qualities. In order to create a future where technology helps to elevate and enrich human life, these endeavours' success will depend on their capacity to combine cutting-edge technologies with a profound grasp of human needs.

## **GROWTH AND DEVELOPMENT OF INDUSTRY 5.0 - CHALLENGES FACED IN DIFFERENT SECTORS AND HUMAN CENTRIC SOLUTIONS**

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**Abstract**

*The old version 4.0 has provided in the Industry for the last 10 years, there are many up's and down's in the version. Finally, the time for 5.0 has been arrived. It fully comprised on smart factories, it helps to increase the productivity. This paper discuss the industry 5.0 challenges and also limitation faced in the current scenario. In one way it satisfies the customer point of view in the competitive world. Compare to other development of industry 5.0 giving a tough the other countries. This paper is also discussion of the applications enabled in industry 5.0 play a vital role in healthcare, supply chain, production in manufacturing, cloud manufacturing, etc. while in the place of technologies discussed in this paper are big data analytics, Internet of Things, collaborative robots, Blockchain, digital twins and future 6G systems. The study also discussed the difficulties and issues caused by organizations among the robots and people in the different sectors.*

**KEYWORDS:** Supply chain, Robots, Digital twins and future 6G

**INTRODUCTION**

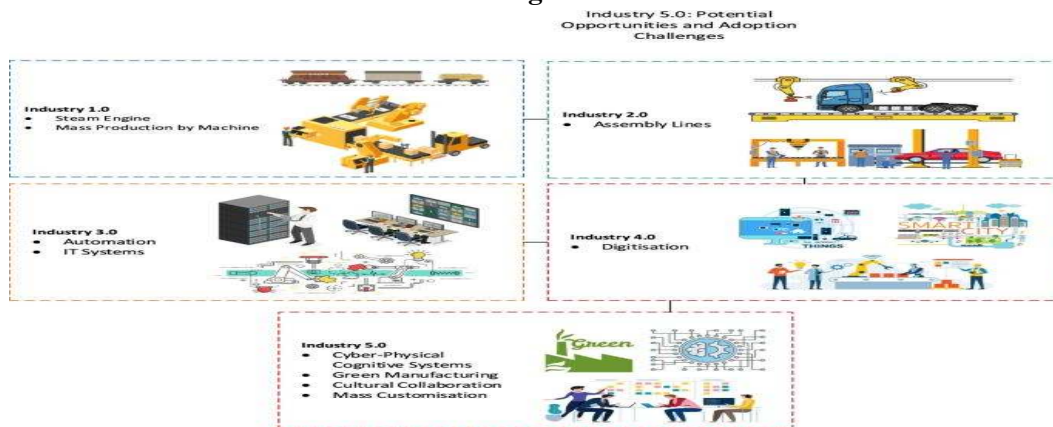
Industry 4.0 has been provided for the last 10 years to benefit the industry and the shortcomings; finally, the time for industry 5.0 has arrived. Smart factories are increasing the business productivity; therefore, industry 4.0 has limitations. In this paper, there is a discussion of the industry 5.0 opportunities as well as limitations and the future research prospects. Industry 5.0 is changing paradigm and brings the resolution since it will decrease



emphasis on the technology and assume that the potential for progress is based on collaboration among the humans and machines. The industrial revolution is improving customer satisfaction by utilizing personalized products. In modern business with the paid technological developments, industry 5.0 is required for gaining competitive advantages as well as economic growth for the factory. The paper is aimed to analyze the potential applications of industry 5.0. At first, there is a discussion of the definitions of industry 5.0 and advanced technologies required in this industry revolution. There is also discussion of the applications enabled in industry 5.0 like healthcare, supply chain, production in manufacturing, cloud manufacturing, etc. The technologies discussed in this paper are big data analytics, Internet of Things, collaborative robots, Blockchain, digital twins and future 6G systems. The study also included difficulties and issues examined in this paper head to comprehend the issues caused by organizations among the robots and people in the assembly line.

The first industrial revolution (Industry 1.0) in the eighteenth century, where items were being produced by means and processes invented and allowed to be produced by machines. Industry 1.0 marked a shift from the handicraft economy to dominate by machinery and impacted the industries such as mining, textile, agriculture, glass, and others. The next shift to the manufacturing industry from 1871 and 1914 is termed Industry 2.0, which allowed for faster transfer of persons and innovative ideas. This revolution is a period of economic growth, increasing business productivity causing a surge in unemployment as machines replace factory workers. Industry 3.0 is termed the digital revolution, started in the 70s in the twentieth century through the automation of memory-programmable controls plus computers. The central point of this particular phase is mass production and the use of digital logic, integrated circuit chips; derived technologies included computers, digital cellular phones, and the internet. The innovations of the technology are transforming traditional products as well as business procedures. The digital revolution is converting technology into digital format. Industry 4.0 is a union among the physical assets and advanced technologies such as artificial intelligence, IoT, robots, 3D printing, cloud computing, etc. The organizations that adopted 4.0 are flexible and prepared for data-driven decisions. Industry 5.0 is the upcoming technology of the previous generation designed for efficient and intelligent machines. Figure 1 shows the industry revolution from industry 1.0 to industry 5.0. Table 1 remarks the most relevant surveys that discuss some aspects of industry X.0.

Fig. 1



### Industrial Evolution from Industry 1.0–5.0

#### Theme of the paper

By analysing various part of the survey has set to defining the definitions and features of the fifth generation from the literature sources that can help understand the term industry 5.0 from the perspectives of various expertise. There is also a discussion of various features of Industry 5.0 as compared to the industrial evolutions. Moreover, there is a discussion of the applications to develop and enable in industry 5.0 like the healthcare, supply chain, production in manufacturing, cloud manufacturing and others. The key technologies of industry 5.0 are also discussed in this paper, including big data analytics, Internet of Things, collaborative robots, Blockchain, digital twins and future 6G systems.

Finally, this paper also discusses the challenges to understand the issues related to robots and humans in manufacturing factories. There is a highlighting of the future direction of the research work towards the realization of Industry 5.0. Reviewing of the definitions of Industry 5.0 from the literature sources with added features of 5.0 in comparison with the past industrial revolutions. This paper also discussed about the enabling technologies arrival in industry such as big data, IoT, cloud computing, 6G networks, Blockchain. Etc.

#### Modernizations and innovations

Industry 5.0 is evolving in different domains such as healthcare, manufacturing, textile, education, food, and others. By adopting industry 5.0, most industries are moving towards the smart social factory. The project selected to better understand the concepts of industry 5.0 is an intelligent management project of Repsol. The business is employed in the Blockchain, robotic processes automation technology to enhance the security and productivity of the business. The automated guided vehicle is the first Cobot of Repsol that carries out the logistics works such as deposition of waste, delivery of the raw materials from warehouse and lab visualization. Repol is conducted on the project Block lab, where the business is

transmitting sensitive data through the property of Blockchain]. The project is designed to streamline the samples of safety issues, and it is properly managing 10,000 samples every year.

### Industry 5.0 creative applications

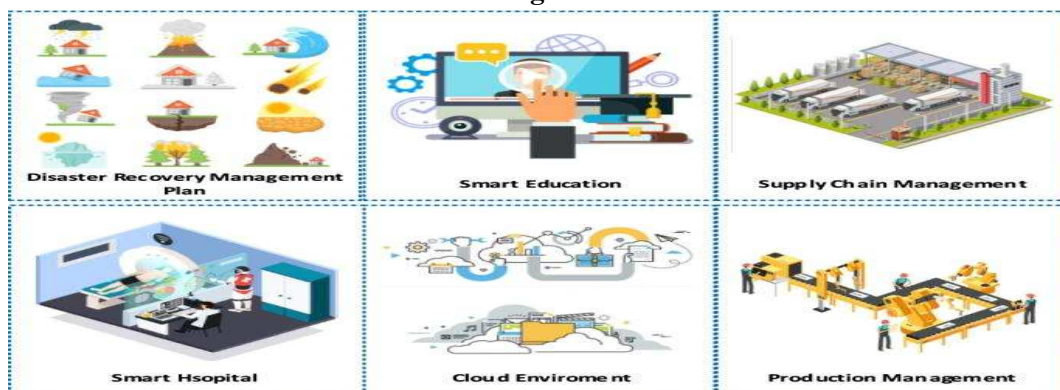
#### Smart hospital

Industry 5.0 is aimed to create a smart hospital with real-time capability. The technology can provide remote monitoring systems within healthcare. It plays a key in making life better for the doctors. In the COVID-19 pandemic, doctors can use this smart healthcare technology to focus on infected patients and provide efficient data regarding better treatment. Even it also helps the students as well as medical students for needed medical training through the outbreak of COVID-19. Machine learning (ML) is applied to medical imaging, natural language processing, plus genetic data [7]. It is focused on the diagnosis of the diseases, detection, plus prediction of the diseases.

#### Manufacturing industry

Industry 5.0 is considered a new production model where it is focused on interaction among humans as well as machines. Industry 5.0 is involved in leveraging collaboration among increasing accurate machinery plus the innovative potential of human beings. In order to make manufacturing sustainable, it develops processes that repurpose and recycle the resources. There is also required to reduce the environmental impacts in the manufacturing industry. Additive manufacturing is required to increase personalization to optimize resource efficiency and waste. Industry 5.0 is revolutionizing the manufacturing systems across the globe by taking away repetitive tasks from human workers. Smart manufacturing allows designers to protect design files of manufacturing items by storing them in the cloud with robust access control and usage of the manufacturing resources across various places [59]. Figure 2 pictorially illustrates a number of potential applications within industry 5.0.

Fig. 2



Applications of Industry 5.0

### **Supply chain management**

The supply chain 5.0 highlights the importance of collaboration among smarter machines like COBOTS and humans. Industry 5.0 is aimed to cater to hyper-personalization moreover hyper-customization requirements of the customers, which require combine of human originality plus the competence of the machines. Robots are required for the supply chain management in standardized procedures in high production volumes, added this to each product, and it is a challenge where the robots are required proper guidance. Bahari and Salimi mentioned that the human touch is not required to customize and personalized products. Still, it also ensures seamless end-to-end processes of the supply chain, such as selecting the raw materials to comprehend its personalization and customization needs for the individual consumers. Industry 5.0 seeks to take automated and intelligent digital ecosystems and pair them with the human touch There is leveraging of human elements in such a process that it helps customize the end-user experiences and optimized workflows.

Human intelligence is worked with the empowered way with cognitive computing along with intelligent automation abilities to enable hyper-personalization. The technologies like machine learning, robotic automation, and others are helping the employees increase business proficiency and deliver high value to the customers faster. From delivering the raw materials, transactions, transportation, the ERP system manages the supply chain for the business organization .The next generation of supply chain solutions is making and deploying the technology to empower the digital supply chain. It means bringing customization to the supply chain, improving the customers' satisfaction and the management of the business efficiency and market margins. There is the reduction of the risks related to supply chain and wastages based on the existing information of the business.

### **Industry 5.0 technologies.**

#### **Cloud computing**

Cloud computing is the delivery of computing services those are included databases, software, intelligence analytics, networks, and others [This technology is offering efficient innovation and economics of the scale. This technology uses the internet to store and manage data on the remote servers, and then data is accessed via the internet. It delivers on-demand computing services from applications to storage plus processing power. The industrial cloud is the virtual environment that provides a supportive environment for industry applications. The cloud providers are manufacturing applications like IoT monitoring tools adopted for mobile and web usage. The cloud also supports the usage of API that can automate data normalization from diverse data production sources. Edge computing devices handle data analytics equipped with limited computing resources to manage the business analyses.

The cloud infrastructure backs edge IoT platforms. The platforms are being used to manage the edge devices like autonomous robots and diverse robots deployed on the shop

floor. In order to manage critical data, the industry is access to the data from the local servers daily. Industry 5.0 can reduce the volume of data sent to the centralized server . Cloud computing allows preventive data to detect machine failures and mitigates them by continuing with more workforce.

### **Collaborative robots**

Industry 5.0 aims to put the human touch back in development and production. It grants the human operators with benefits of the robots like technical precision and heavy lifting abilities. There is a high ability of humans to perform critical tasks, allowing the introduction of a high degree of control and the capability to individualize the production phases. One of the significant implications of collaborative robotics as well as Industry 5.0 is required for human inputs that can extend the existing iterations. Collaborative robots, as well as industry 5.0, are representing new age in robotics plus production. Industry 5.0 plus Cobots is the heart that can combine people's creativity and craftsmanship with the efficiency and constancy of the robots. From people-centric, the customized products and specialist skills are made more available. Industry 4.0 is focused on ensuring consistency of the quality and data collection.

### **Big data analytics**

Industry 5.0 is an innovative technology that enables utilizing 3D symmetry in the innovation ecosystem designs. Matheus et al. mentioned that big data analytics is a complex procedure to examine big data to uncover data like hidden patterns, trends of the markets and others. It uses an advanced analytic method with diverse data sets, including structured and semi-structured data. It has massive data sets to store and process through traditional tools. It is used as real-time data to enhance the competitive advantages of the business industry, focusing on providing possible recommendations on predictive discovery. Big data analytics is used to recognize discrepancies while the organization is leveraging a list of the root causes of the issues. Most businesses use big data analytics to make strategic decisions The business uses various factors like population, location accessibility and others to get details of the customer preferences. There is the improvement of the customer experiences by monitoring the customer experiences and addressing problems solutions to build strong customer relationships. Even big data is a challenge for industry 5.0 when detailed information is not gathered on the manufacturing cycle.

### **Blockchain**

It is decentralized and distributed technology, where the digital ledger contains records named as blocks to record the transactions data. It is a shared ledger that can facilitate recording the transactions and tracking the assets in the business network The business is running on the information. Therefore, Blockchain technology delivers the data by providing shared and completed information stored in the immutable ledger that the network members

access Blockchain technology helps the customers by tracking the orders, payments, production, etc. The network participants have distributed ledger records of transactions, which are recorded to avoid duplication of efforts and records in the database system. In order to speed up the transactions, a smart contract is stored on Blockchain and is to be executed on an automatic basis. It is defined as conditions for the corporate, including terms for paid travel insurance []. The transactions are to be blocked in irreversible chains, and it strengthens verification of previous blocks plays the entire Blockchain transaction is done. Data accuracy is required for the business to validate the transactions, which are recorded. With the distributed ledger, network members share, so time wastage is eliminated.

### **Challenges of industry 5.0**

With around industry 5.0, it is easier to overlook the potential challenges. The challenges are being identified and solved for industry 5.0 developments to succeed for the business.

1. People are required to develop competency skills, as working with the advanced robots, the human workers are required to get knowledge about collaboration with the smart machine and robot manufacturer. Apart from the soft skills required, gaining technical skills is also an issue for human workers. Programming to the industrial robot and managing translation in the new jobs are difficult tasks requiring a high level of technical skills.
2. Adoption of advanced technology is required more time and effort from the side of the human workers. Customized software-connected factories, collaborative robotics, artificial intelligence, real-time information, and the internet of things must be adopted for industry 5.0.
3. Advanced technologies are required investments. UR Cobot is not coming cheap. Training the human workers for new jobs is bringing extra costs. The companies are found it difficult to upgrade the production lines for industry 5.0. Adopting Industry 5.0 is expensive as it requires smart machines and highly skilled employees to increase productivity and efficiency.
4. Security is a challenge for Industry 5.0 as it is critical to establish trust in ecosystems. The authentication is used in the industry is the scale to interact with various devices, to stand against the future quantum computing applications to deploy nodes of IoT. Usage of artificial intelligence and automation in industry 5.0 are threats for the business, and therefore it is required to have trusted security for it. The applications of Industry 5.0 are focused on the ICT systems, and therefore it leads to strict security requirements to prevent the security challenges.

### **Applications of industry 5.0**

Industry 5.0 provides benefits for the industry for both the workers and society. There is also an increase in the competitiveness of the business and help attract the best talents]. Adoption of this industry supports technologies that make natural usage of the resources properly. Human robotics, such as Sophia, personifies dreams of the future of artificial intelligence It helps in the decision making of humans and is supported by enabling technologies that help in revolutionize various sectors. Even various challenges are mentioned in this paper, like handling quantity of data, managing resources, and others.

### **Enabling technologies**

The enabling technologies of industry 5.0 are set for complex systems that can combine the technologies such as smart materials, human-machine interaction, big data analytics, cloud computing, and others. Smart manufacturing and intelligence help reduce network traffic, facilitate transactions, and privacy, which helps the business use software resources to exchange data about the industrial sectors . Blockchain technology is automated agreement processes among various stakeholders, while smart contracts manage security, authentication, and automated service-related actions 6G network is expected to meet with the intelligent information standard that provides high energy efficiency, high reliability, plus capacity of traffic. Big data analytics is the enabling technology that helps manage a large amount of data Even the internet of things is an opportunity for industry 5.0 that can reduce operating costs by eliminating issues on the communication network, waste management, supply chain, production process optimization, and others.

### **Future directions**

**Cognitive computing:** This application aims to stimulate the thoughts of the human in processes into a computerized model Using the self-learning algorithms uses data mining, recognition of patterns, natural language, and others that the computer can read that the human brain will work.

**Human and machine interaction** refers to communication with interaction among humans and machines via the user interface. Natural user interfaces like gestures are used to gain attention as they allow humans to control the machines through intuitive and natural behaviours It is the future direction for industry 5.0 as it helps to keep the humans at the centre of the system and technologies to build in. Even the user interface helps people understand people's behaviour and motivations. Quantum computing is a type of computation that can harness collective properties of the quantum states, like interference entanglement, to do the calculations. The devices are performed quantum computations which are defined as quantum computers It is performing calculations focused on the probability of the object's state before it is measured.

## **Conclusion**

From the study, it is concluded that the author started the work with definitions of industry 5.0 from the perspective of the industrial as well as academic communities. Even the applications have also been discussed that help better understand the features of industry 5.0, followed by a discussion of enabling technologies. Industry 5.0 concept is designed to make the efficiency of humans and machines correctly. Challenges are also presented in this paper that help manage the issues caused in industry 5.0. Future directions are discussed in this paper that should be handled better to use this industry shortly.

## **COMMERCIAL BANKS: CATALYSTS FOR INNOVATION AND SUSTAINABILITY IN THE LIGHT OF INDUSTRY 5.0**

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### **Abstract**

*As per the Industry 5.0 policy, industrial houses are expected to direct their business operations towards multi-faceted goals to facilitate employee satisfaction in a progressive working environment, better living conditions for the people, and ensure environmental sustainability. The Financial sector, especially the Banking industry has subject to significant transformations in its operations during the last two decades due to the adaptation of technological innovations and environmental concern. The Practice of responsible finance, technological adaptation, and sustainable economic growth are the mantra of commercial banks today. In the light of light of Industry5.0, the role of Commercial banks are not just financial intermediaries but also catalysts for innovation and sustainability. In the current phase of transformation, Industry 5.0 is characterized by the integration of human creativity and advanced technologies like Artificial Intelligence (AI), Robotics, and Internet of Things (IoT), and sustainability. In the present scenario, most of the public sector and private sector banks in India are very much concerned about aligning their business models with the sustainable development Goals (SDGs) of the United Nations, keeping in view the industry 5.0 principles. This paper is an enquiry about how commercial banks can support and accelerate SDGs in light of Industry 5.0. through their functional areas of project financing, technological adoption, risk management, and partnership facilitation. The study is based on secondary data with reference to selected Commercial banks in India.*

**Key words:** Commercial banks, Environment, Industry 5.0, Technology, Sustainability

### **Introduction**

All over the world the industrial landscape has undergone significant transformations over the centuries as a result of industrial revolutions. The first industrial revolution



introduced mechanization powered by steam engines, revolutionizing manufacturing processes. The second industrial revolution brought about mass production through assembly lines and electrification. The third industrial revolution saw the rise of automation, computers, and electronics in manufacturing. The fourth industrial revolution integrated cyber-physical systems, IoT, and cloud computing to create smart factories.

The current phase of transformation-Industry 5.0, is characterized by the integration of human creativity and advanced technologies like Artificial Intelligence (AI), Robotics, and Internet of Things (IoT), and sustainability. Commercial banks, traditionally seen as financial intermediaries, also play a significant role in this new scenario. They provide the necessary capital, manage risks, and foster collaborations that drive innovation and growth. So, in the light of Industry5.0, the role of Commercial banks are not just financial intermediaries but also catalysts for innovation and sustainability.

According to the [European Union](#), Industry 5.0 provides a new vision to the industrial sector, which redefines the role and the contribution of industry to society. In other words, Industry 5.0 reflects a shift from the focus of industry from economic value to societal value, and welfare to wellbeing. Industry 5.0 emphasizes the relationship between humans and machines, aiming for a collaborative approach that combines human creativity and critical thinking with advanced technologies like AI, robotics, and big data analytics. This human-centric approach seeks not only to enhance efficiency and productivity but also to prioritize sustainability, resilience, and social well-being.

The Sustainable development goals (SDGs) introduced by the United Nations in the year 2015 considers both Social and environmental issues to make the world a better place of living for all creatures. Further, the SDGs put forward a great responsibility to the business world to have responsible production, and consumption to promote economic growth and to create a better world for everyone. Considering the need of the hour financial institutions especially commercial banks have aligned their business strategies and policies with SDGs as part of business promotion in order to remain viable and strong in the market. A few SDGs, namely Climate action (SDG13), Women empowerment (SDG5), Quality education (SDG4) and Sustainable agriculture (SDG1) considered in the present study. The ICICI Bank Ltd from private sector and State Bank of India from public sector are the banks selected for the present study. This paper is an enquiry about how commercial banks can support and accelerate SDGs in light of Industry 5.0. with reference to their functional areas of project financing, technological adoption, risk management, and partnership facilitation.

### **Literature review**

The report of the European Commission (2021) says that industry 5.0 focus from shareholders to stake holders value, considering benefit for all concerned by recognising the power of industry as a resilient provider of prosperity to the society rather than mere

facilitators of employment and growth. Nicoletti (2021) is of the opinion that industry 5.0 will impact banking industry in such a way to combine information technology and automation based on artificial intelligence, individuals- robot collaboration and sustainability. The social actors are radically advocates the promotion of industry5.0 due to the fact that socially disruptive digital transformation under industry 4.0 has been severely felt globally, especially within Europe and Western countries. Ghobakhloo et al, (2023). In the new paradigm of industry 5.0, human- robots collaboration will play an important role in providing banking services (Mehdi Abadi et al,2020). In the protection of the environment and the creation of a sustainable world, the role of banking industry is very significant (Ajaz and Aijaz 2022). Green banking is the order of the day and a source for sustainable development which will benefit banks and the environment at large. In the process of sanctioning credit to customers and making investment decisions, the data related to environment is to be considered by banks. Funding to business projects which having large amount of carbon output may be viewed as risky and be in a restricted manner keeping in view the prevention of global warming for a sustainable world.

Athanasia et.al (2023) are pointed out that now a days commercial banks have focused on sustainable management in order to improve the overall image and business opportunities. When customers get information regarding the sustainable development goals followed by banks, they will show positive attitude towards such banks and which in turn may influence the business to be more sustainable with increased market share and revenue. Jivan and Mahesh (2018) have pointed out that since agriculture development is part of the SDGs, commercial banks play a cardinal role in financing the agricultural sector. However, there is regional imbalance and inequality in the supply of agricultural credit by commercial banks in India. It is mentioned in the Discussion paper on Climate Risk and Sustainable Finance published by the Reserve bank of India (2022) that climate change is increasingly being recognized globally as a source of financial risk for banks. The uncertainty about the timing and severity of climate-related and environmental risk certainly threatens the stability of the overall financial system.

The first, most essential step is to divest from fossil fuel extraction. When projects and companies that extract fossil fuels cannot access financing, those fossil fuels stay in the ground, minimizing emissions. However, divesting from fossil fuels is not enough if a bank is funding other projects with a high impact on the environment. Monique Johnson (2023) has rightly pointed out that banks of the 20<sup>th</sup> century have exhibited their institutional values and strength by physical buildings in a classical style. But the banks of 21<sup>st</sup> century are working in ecofriendly physical infrastructure more sustainable and climate proof that reflect the values of the institutions within them.

Coleman and LaPlante (2021) are upholding the opinion that global warming adds to the risk of banks and other financial institutions. So, they must adopt climate change strategies and risk management procedures in order to remain viable in the field. Jivan and Mahesh (2018) has pointed out that commercial banks have a major share in the supply of credit to agricultural sector, but there is regional variations and irregularities in the supply of bank credit to agricultural sector to a great extent.

Caby, Ziane, and Lamarque (2021) have found that the overall quality of climate change management and disclosure positively influence the profitability of commercial banks and enhance their CDP (Carbon Disclosure Project) score, and managerial credibility. In the light of the SDGs and business practices, the implementation of a sound climate related policies and practices are very significant for the success of banking industry. Joseba and others are of the opinion that Climate change put forward opportunities and challenges before the banking industry. Banks should measure climate exposures at different levels of their business operations and formulate policies and practices to manage climate related risk. As intermediaries and providers of capital banks play a significant role in economic development that now includes managing the physical and transition risks of climate change towards a more sustainable global economy. Shivangi and Seema (2019) have pointed out that G-20 nations consider financial inclusion as a facilitator for women empowerment and other SDGs. Women with good access and usage of financial services have higher social, political and economic empowerment. Meenakshi Sharma and Akansha Choubey (2022) have identified that if green banking initiatives are implemented effectively, the environmental reputation and sustainability will no longer be a difficult task to achieve. Through efficient resource planning of green activities, new and interesting opportunities can be created by banks which can boost their prominence and trust among the current and prospective customers.

#### **ICICI BANK and SDGs**

For environment protection ICICI bank initiated a tree plantation drive and have planted more than 2.6 million trees across India. Further, the bank planted fruit trees in villages facing the problem of malnutrition and horticulture plants and timber trees to help farmers. The bank believes that plantation in alignment with the needs of local people will contribute better towards sustainable environment and future. In the Jahanabad district in Bihar State, the bank planted one lakh Moringa trees to help the localities to get a sustainable living by production and production and sale of Moringa powder.

The rising level of carbon footprints is an alarming issue in India. At global level many of the top polluted cities are in India. To support and aid the vision of carbon neutral India, ICICI bank is focusing on replacing traditional energy with green renewable solar energy in possible areas. The bank has facilitated more than 2000 solar units in rural schools and hospitals with capacity of 5MW which helps to do the daily tasks without power

disruption while reducing carbon footprints. In Cities the bank trains energy Auditors to support business firms to reduce carbon footprints while increasing productivity and profit. Accumulation of waste is considered as an environmental hazard because it emits carbon dioxide, methane and other gases in addition to several health issues. On the other hand, proper management of waste is an opportunity for creating a sustainable environment and livelihood for many. The initiatives of ICICI bank helps Village and City Bodies to manage waste in a sustainable manner which helps environment and people.

Scarcity of clean water exacerbated by climate change is a threat to the survival of living creatures, and economies of nations. In the area of Watershed management also the contribution of ICICI bank is highly appreciable. Rejuvenation of lakes, Drought -proofing of villages, construction of artificial glacier, rain water conservation etc are some of the initiatives of the bank towards water conservation in rural and urban India. So far, the bank established more than 3500 rain water harvesting plants in schools across 21 states in India. The Quality Education Program named Baran is an initiative of ICICI bank in the area of providing quality education in Baran district of Rajasthan State. The program includes capacity building of teachers, improving students' attendance, and the teaching learning practices in class rooms. Approximately 250 teachers and 6000 students were beneficiaries of the program.

As regards, women empowerment, the bank is focused on imparting financial education and creating awareness of banking services in the unbanked areas of the country. Under the women Self-help group- bank Linkage program, the bank is financial assistance to women entrepreneurs in the rural areas and help them to earn sustainable livelihood. Overall, 8 million women were beneficiaries of the program who recognize their dream of financial independence.

ICICI Bank follows responsible financing practices by laying emphasis on Environmental, and Social, and Governance (ESG) management. The ESG Framework of the bank will conduct the overall assessment of environmental impact of projects as part of credit appraisal before sanctioning of loans. Reducing the use of paper in day today business activities by adopting modern technologies is one of the focus areas of ICICI bank in connection with SDGs. At present most of the day today transactions are conducting through digital platforms. It is highly appreciable and worth noted that the Bank's conscious and continuing efforts led to savings of over 9 million sheets of A4 size paper, equivalent to substitute the cutting down of nearly 1,100 trees and saving of 4.5 million litres of water.

### **State Bank of India (SBI) and Sustainable Development Goals**

The State Bank of India, the first and largest public sector bank in India is committed to create values to stakeholders and move towards a sustainable society and future. Towards the objective of helping India to achieve the 2030 agenda for SDGs laid down by the UN, the

bank has introduced several products and services. The bank's sustainability frame work is focusing to leverage the synergy and interconnection between social environmental and economic aspects of business with its mission, vision, and core values. The SBI has several frame work and policies to support SDGs such as Climate Change Risk Management Policy, Renewable Energy Policy, Sustainability and Business Responsibility policy, Corporate Social Responsibility policy etc. The Sustainability and Business Responsibility policy designs the bank's approach towards economic, social, and environmental performance in an integrated manner.

Finance for Bio-fuel projects scheme of SBI provides corporate loans for replacing the existing Coal and Fossil fuel business with biomass. In partnership with World bank and UN Women, SBI has introduced Stree Shakthi Entrepreneur Loan at moderate interest rates to women who are engaged in manufacturing, trading, and service sector and agricultural activities. Green car loan is another initiative of SBI to promote cleaner energy and climate action. Longer repayment period up to 8 years with lower interest rate are the features of this car loan scheme.

As regards the promotion of agricultural sector, SBI is rendering commendable services by offering different types of loan facilities to farmers. Further, the bank provides loan and for facilitating agricultural infrastructure, and other ancillary activities to farmers. The new deposit scheme *SBI Green Term Deposit* to mobilise funds to support green projects and *Green Car loan* scheme with longer repayment to period encourage electric car purchase are some of the initiatives of SBI in the area of green finance.

### **Industry 5.0 and banks**

Startups and small to medium-sized enterprises (SMEs) are often the pioneers of technological innovation. Commercial banks can help Startups and small and medium enterprises with the necessary financial resources to develop and scale their innovations and invest in cutting-edge technologies. Further, banks can finance R&D activities of companies in line with SDGs and industry 5 .0 principles. Beyond providing finance, commercial banks can help businesses adopt new technologies through advisory services and partnerships with technology providers. Commercial Banks can facilitate consultancy services to the business houses to assess the viability of adopting new technologies in production process and developing implementation strategies in collaboration with technology firms. Industry 5.0 thrives on collaboration between various stakeholders, including businesses, technology providers, and financial institutions. Commercial banks can act as intermediaries to foster these partnerships. The adoption of new technologies comes with inherent risks, including cybersecurity threats, operational disruptions, and financial uncertainties. Commercial banks play a crucial role in identifying, managing, and mitigating these risks.

### **Challenges and opportunities to commercial banks in the light of industry 5.0**

The advanced technologies associated with Industry 5.0 can be complex and costly to implement, posing a challenge for businesses and banks. Navigating the regulatory landscape can be challenging, especially with the rapid pace of technological advancements. The increased connectivity and digitization bring about new risks, particularly in cybersecurity.

Banks have the opportunity to expand their market by offering new financial products and services tailored to Industry 5.0. By supporting technological innovation, banks can position themselves as leaders in driving economic and industrial growth and play a crucial role in promoting sustainability by financing green projects and encouraging environmentally friendly practices.

### **Findings and Conclusion**

In India the commercial banks are very much proactive towards the agenda of Sustainable Development Goals 2030 as laid down by the United Nations. As regards the SDGs considered in the present study, the contributions of both ICICI bank and State Bank of India are highly commendable and appreciable. The transition to Industry 5.0 presents both challenges and opportunities for commercial banks. By providing financial assistance, facilitating technological adoption, managing risks, and fostering partnerships, banks can significantly contribute to the advancement of Industry 5.0. As catalysts for innovation and sustainability, commercial banks are well-positioned to support the creation of a more efficient, personalized, and sustainable industrial landscape. By adopting Industry 5.0 principles in their operations, both ICICI Bank and State Bank of India aims to create a more responsive, efficient, and customer-centric banking environment, ultimately driving growth and fostering a sustainable future in the financial sector. So, it can be concluded that both private sector and public sector commercial banks in India have redefined their business policies and practices in accordance with the Sustainable development Goals and the new vision of Industry5.0.

## **INSIGHTS FROM MASLOW'S EXPANDED THEORY ON MOTIVATIONAL FACTORS OF WOMEN HOMEPRENEURS**

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### **Abstract**

*The purpose of this paper is to examine the motivational factors that may encourage women to become homepreneurs. This study was conducted with 385 women homepreneurs in Tirunelveli District. Exploratory Factor analysis and Confirmatory Factor Analysis Model (CFA) was used to achieve the objective of the study. Previous experience among the four variables under Career Transition, Ambition to be an entrepreneur among the four variables under Career Aspiration, High demand for the products/services among three variables under Career Competency, Generation of Income among three variables under Career Expansion, A desire to gain social status among three variables under Career Patronage and A desire to bring the family to a better state among three variables under Career Advancement were found to be the highest significant motivational factors. Confirmatory Factor Analysis model shows that Career Transition, Career Aspiration, Career Competency, Career Expansion, Career Patronage and Career Advancement have a significant influence on each other. The findings of the research reveal that the absolute fit indices match the model data and the proposed model has an acceptable fit by satisfying the prescribed values.*

**Keywords:** Career Advancement, Career Aspiration, Career Competency, Career Expansion, Career Patronage and Career Transition

### **Introduction**

In recent years, there has been a notable surge in the number of women opting to embark on the journey of home-based entrepreneurship. The desire for greater work-life balance, the pursuit of financial independence, and the imperative to navigate the demands of familial responsibilities are among the key drivers behind this phenomenon. As delve into the motivational dynamics of women in home-based entrepreneurship, it becomes evident that their endeavors are fueled by a potent blend of determination, resilience, and a fervent commitment to crafting their own narrative in the world of business.

Motivation develops from a perceived need and drives individual behaviour to take action towards a certain purpose or goal that must be met, as well as to continue and expand until the level of satisfaction or decrease of need condition is reached (**Sunil Kumar &**

**Patrick, 2018**). As home-based enterprises are viewed as one of the most important strategies to address the problem of female unemployment while giving flexibility and maintaining family institutional norms, identifying the key success factors and problems in this sector is critical (**Mahmud, 2003**). Motivation is defined as inner and outside forces that stimulate aspiration and dynamism in people in order for them to remain consistently interested and dedicated to a job, a role, or a topic, or to make an attempt to achieve a goal (**Ingle, 2014**).

#### **Review of Literature**

**Sufian et al. (2022)** conducted a study on motivational factors faced by women entrepreneurs while growing their Home Based Business (HBB). They conducted the study through interviews with female entrepreneurs involved in home-based businesses in the Klang Valley region of Malaysia. Their results show that women who own and manage a home-based business are motivated to grow their business through intrinsic motivations such as the need for independence and need for achievement, while extrinsic motivations such as financial problems, fame and positive feedback from others. **Khan et al. (2021)** conducted a study with the main objective of determining the impact of various factors on the success of women entrepreneurs. Data for the research was collected through structured questionnaires from a total of 181 registered SMEs with 79 responses from Rawalpindi, 54 from Islamabad and 48 from Lahore in Pakistan. The results of the research found that internal factors including self-confidence, risk-taking and need for achievement and external factors including economic and socio-cultural factors have a positive and significant impact on the success of women entrepreneurs in Pakistan. **Kumalasari et al. (2021)** researched external factors affecting rural women entrepreneurs. They conducted a qualitative research using phenomenological approach. 10 women from "Pelangi Nusantara" community were the main participants of their research. Based on the analysis results, they found that family support, environmental factors and the presence of supervisory institutions lead to the success of rural women entrepreneurs in Indonesia. **Solesvik et al. (2019)** qualitative study found a stronger willingness to contribute to the needs of society among female founders in Norway compared to their counterparts in Russia and Ukraine. Increasing a family's income was the motivation of most Russian entrepreneurs. Most Ukrainian entrepreneurs are motivated by the desire to earn a decent income from work, which is significantly higher than the previous wages. It was found that the need for self-realization motivated most Norwegian female entrepreneurs compared to Russia and Ukraine. **Kavitha and Uthra Devi (2017)** study is attempted to know the various factors that motivated women to become homepreneurs and also the problems faced by the women homepreneurs in Coimbatore city. Their findings revealed that the major motivational factor for the women homepreneurs is that business is easy to setup. In addition to that they classified the problems faced by women home entrepreneurs into three categories such as business problems, socio-personal problems and technical problems.



Management of business in business problems, family support in socio-personal problems, and access of technology in technology problems were found to be the main problems.

### **Research Gap**

Previous studies have shown that motivational factors are based on intrinsic factors such as self-esteem, need for risk and achievement, and extrinsic factors such as economic and sociocultural factors. But the present research shows that the motivational factors of women homepreneurs in six factors from 20 variables. Those six factors are career change, career desire, career ability, career expansion, career support, and career advancement. These six factors are consistent with Maslow's extended theory.

### **Research Methodology**

The main objective of the study is to examine the motivational factors that may encourage women to become homepreneurs. The study was conducted in Tirunelveli district of Tamil Nadu. Primary data were collected from 385 women homepreneurs with the help of structured interview schedule. The interview schedule was prepared in both Tamil and English languages for the purpose of understanding of the respondents. The motivational factors are rated by the respondents on a five point Likert Scale. The collected data has been processed and entered into SPSS data sheet and then analyzed by applying suitable statistical tools. Reliability Analysis is used to check the reliability of the question. Exploratory Factor Analysis and Confirmatory Factor Analysis Model are used to achieve the objective of the study.

### **Motivating Factors of Women Homepreneurs**

Motivating factors for women entrepreneurs stem from a diverse range of sources. These include a strong passion for their business ideas, a desire for greater autonomy and independence, and the pursuit of financial empowerment. **Kavtiha and Uthra devi (2017)** pointed out in their research that easy to setup is the most motivating factor for women homepreneurs. Because majority of the respondents are strongly agree with that statement. **(Sufian et al. 2022)** Their study focused on both intrinsic motivations and extrinsic motivations. At the conclusion of the study it is clear that women who own and manage HBBs are motivated by intrinsic motivations including the need for independence and need for achievement and extrinsic motivations such as financial problems, fame and positive feedback from others. **(Bin Dahari et al. 2019)** Their study also focused on intrinsic and extrinsic motivational factors of female home entrepreneurs. Their findings reveal that HBB contributing factors include access to financing, adequacy of savings, and the influence of intrinsic and extrinsic motivation on starting a business. In addition to that their findings also revealed that home-based business venture development is related to cultural control, family/work conflicts, and time flexibility. The present research categorizes factors motivating women homepreneurs into six perspectives based on rotated factor loading. These

six factors are compared and explained with Maslow's extended theory. The six factors are career change, career desire, career ability, career expansion, career support and career advancement. Confirmatory Factor Analysis model is drawn. With the help of that model Construct Reliability and Convergent Validity are calculated and verified. In addition, Confirmatory Factor Analysis model demonstrates discriminant validity.

**Table 1 Reliability Statistics for Motivating Factors of Women Homepreneurs**

Cronbach's Alpha	N of Items
0.835	20

Source: Primary data

The Cronbach's Alpha value for the motivating factors of women homepreneurs is 0.835. The Cronbach's Alpha value lies between 0.8 and 0.9. So, the internal consistency is good. Hence the reliability of the question is proved.

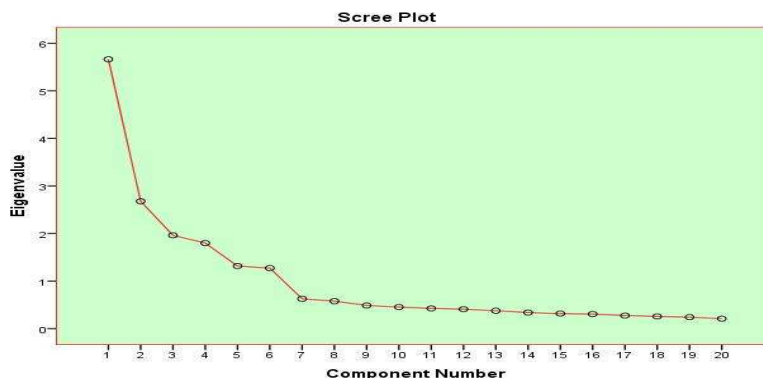
**Table 2 KMO and Bartlett's Test for Motivating Factors of Women Homepreneurs**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.843
Bartlett's Test of Sphericity	Approx. Chi-Square	3684.407
	df	190
	Sig.	<0.001

Source: Primary data

Kaiser-Meyer-Olkin measure is an index which define of Sampling Adequacy. The KMO test value is 0.843 which is more than 0.5, can be considered great and valid to conduct data reduction technique. The Bartlett's test of Sphericity helps to decide, whether the results of factor analysis are worth considering and whether should continue analyzing the research work. Bartlett's test of Sphericity significant to a level of significance is <0.001 which shows that there is a high level of correlation between variables, which makes it adequate to apply factor analysis.

**Figure 1 Scree Plot for Motivating Factors of Women Homepreneurs**



The Scree plots shows the components as the X axis and the corresponding Eigen values as the Y axis. Six components are considered whose Eigen values are 5.664, 2.678, 1.961, 1.800, 1.316 and 1.274. Since all these six factors are having Eigen value greater than 1 and sharing maximum variance hence they are essential in the present study.

**Table 3 Motivating Factors of Women Homepreneurs**

Components	Motivating Factors	Rotated Loading	% of Variance	Eigen Value
Career Transition	Previous Experience	0.850	28.319	5.664
	Dissatisfied with previous employment	0.825		
	Retirement from Job	0.815		
	Unemployment	0.798		
Career Aspiration	Ambition to be an entrepreneur	0.868	13.389	2.678
	Passion on work	0.864		
	Desire to do something new	0.850		
	Desire to be an Independent	0.845		
Career Competency	High demand for the products/services	0.858	9.805	1.961
	Desire to compete with others	0.845		
	Market Potential	0.812		
Career Expansion	Generation of Income	0.845	9.001	1.800
	Financial Potential	0.818		
	Economic Compulsion	0.789		
Career Patronage	A desire to gain social status	0.843	6.582	1.316
	Education	0.743		
	Government assistance and support	0.737		
Career Advancement	A desire to bring the family to a better state	0.832	6.368	1.274
	Family members encouragement	0.794		
	Traditional/Hereditary	0.789		

Source: Primary data

The first factor consists of four variables and all these four variables are related to Career Transition, so it is termed as Career Transition. The Eigen value of Career Transition is 5.664 with 28.319 % of variance. Career Transition has very high significant loading on the variable Previous Experience (0.850), followed by Dissatisfied with previous employment (0.825), Retirement from Job (0.815) and Unemployment (0.798).

The second factor consists of four variables and all these four variables are related to Career Aspiration, so it is termed as Career Aspiration. The Eigen value of Career Aspiration is 2.678 with 13.389 % of variance. Career Aspiration has very high significant loading on the variable Ambition to be an entrepreneur (0.868), followed by Passion on work (0.864), Desire to do something new (0.850) and Desire to be an Independent (0.845).

The third factor consists of three variables and all these three variables are related to Career Competency, so it is termed as Career Competency. The Eigen value of Career Competency is 1.961 with 9.805 % of variance. Career Competency has very high significant loading on the variable High demand for the products/services (0.858), followed by Desire to compete with others (0.845) and Market Potential (0.812).

The fourth factor consists of three variables and all these three variables are related to Career Expansion, so it is termed as Career Expansion. The Eigen value of Career Expansion is 1.800 with 9.001 % of variance. Career Expansion has very high significant loading on the variable Generation of Income (0.845), followed by Financial Potential (0.818) and Economic Compulsion (0.789).

The fifth factor consists of three variables and all these three variables are related to Career Patronage, so it is termed as Career Patronage. The Eigen value of Career Patronage is 1.316 with 6.582 % of variance. Career Patronage has very high significant loading on the variable A desire to gain social status (0.843), followed by Education (0.743) and Government assistance and support (0.737).

The sixth factor consists of three variables and all these three variables are related to Career Advancement, so it is termed as Career Advancement. The Eigen value of Career Advancement is 1.274 with 6.368 % of variance. Career Advancement has very high significant loading on the variable A desire to bring the family to a better state (0.832), followed by Family members encouragement (0.794) and Traditional/Hereditary (0.789).

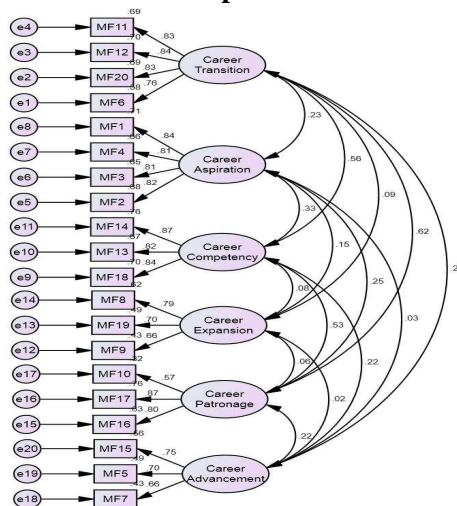
**Table 4 Model Fit Summary of Confirmatory Factor Analysis**

Indices	Estimate	Suggested Value	Interpretation
Chi-square value	178.685		
DF	155		
P value	0.093	> 0.05 (Hair et al., 1998)	Excellent
CMIN/DF	1.153	< 5.00 (Hair et al., 1998)	Excellent
GFI	0.957	> 0.90 (Hu and Bentler, 1999)	Excellent
AGFI	0.942	> 0.90 (Hair et al. 2006)	Excellent
NFI	0.952	> 0.90 (Hu and Bentler, 1999)	Excellent
CFI	0.993	> 0.90 (Daire et al., 2008)	Excellent
RMR	0.044	< 0.08 (Hair et al. 2006)	Excellent
RMSEA	0.020	<0.08 (Hu and Bentler, 1999)	Excellent

Source: Primary data

The above table displays the information regarding the way in which the numerous indices fits the model. From the above table it is found that the calculated P value is 0.093 which is greater than 0.05 which indicates perfectly fit. Here Goodness of Fit Index (GFI) value (0.957), Adjusted Goodness of Fit Index (AGFI) value (0.942), Normed Fit Index (NFI) value (0.952) and Comparative Fit Index (CFI) value (0.993) are greater than 0.9 which indicates it is a good fit and also it is found that Root Mean square Residuals (RMR) value (0.044) and Root Mean Square Error of Approximation (RMSEA) value (0.020) are less than 0.08 which indicates it is perfectly fit.

**Figure 2 Confirmatory Factor Analysis Model for Motivating Factors of Women Homepreneurs**



Based on the CFA model, it is possible to conclude that Career Transition, Career Aspiration, Career Competency, Career Expansion, Career Patronage and Career Advancement are statistically significant. This means that Career Transition, Career Aspiration, Career Competency, Career Expansion, Career Patronage and Career Advancement have a significant influence on each other. Factor loading values of all indicators in the measurement model is above 0.5 which is in acceptable range.

**Table 5 Average Variance Extracted (AVE) and Construct Reliability (CR) for Motivating Factors of Women Homepreneurs**

Items		Constructs	Factor Loading (FL)	Item Reliability (IR)	Delta	AVE	Sum of FL	Sum of Delta	CR
MF6	<---	Career Transition	0.764	0.584	0.416	0.666	3.262	1.336	0.888
MF20	<---		0.831	0.691	0.309				
MF12	<---		0.836	0.699	0.301				
MF11	<---		0.831	0.691	0.309				
MF2	<---	Career Aspiration	0.823	0.677	0.323	0.675	3.285	1.301	0.892
MF3	<---		0.806	0.650	0.350				
MF4	<---		0.813	0.661	0.339				
MF1	<---		0.843	0.711	0.289				
MF18	<---	Career Competency	0.837	0.701	0.299	0.711	2.529	0.867	0.881
MF13	<---		0.821	0.674	0.326				
MF14	<---		0.871	0.759	0.241				
MF9	<---	Career Expansion	0.658	0.433	0.567	0.515	2.146	1.456	0.760
MF19	<---		0.698	0.487	0.513				
MF8	<---		0.790	0.624	0.376				
MF16	<---	Career Patronage	0.795	0.632	0.368	0.573	2.237	1.281	0.796
MF17	<---		0.874	0.764	0.236				
MF10	<---		0.568	0.323	0.677				
MF7	<---	Career Advancement	0.657	0.432	0.568	0.492	2.101	1.524	0.743
MF5	<---		0.696	0.484	0.516				
MF15	<---		0.748	0.560	0.440				

Source: Calculated

The Construct Reliability (CR) is the method for assessing the contribution or significance of an item by examining the factors loading. The Construct Reliability (CR) value of all the six latent constructs are greater than 0.70 which indicate good reliability. A high construct reliability indicates that internal consistency exists. Average Variance Extracted (AVE) is the amount of variance captured by a construct relative to the amount of variance due to measurement error. All the Average Variance Extracted (AVE) values are greater than 0.5 except career advancement which indicates adequate Convergent Validity. For career advancement also, the Average Variance Extracted value is 0.492 which is almost 0.5. The data has good Construct Reliability and Convergent Validity.

**Table 6 Discriminant Validity for Motivating Factors of Women Homepreneurs**

Factors	AVE	Squared Interconstruct Correlation (SIC)					
		Career Transition	Career Aspiration	Career Competency	Career Expansion	Career Patronage	Career Advancement
Career Transition	<b>0.666</b>	-	0.055	0.312	0.009	0.381	0.054
Career Aspiration	<b>0.675</b>	0.055	-	0.112	0.022	0.064	0.001
Career Competency	<b>0.711</b>	0.312	0.112	-	0.006	0.282	0.047
Career Expansion	<b>0.515</b>	0.009	0.022	0.006	-	0.004	0.000
Career Patronage	<b>0.573</b>	0.381	0.064	0.282	0.004	-	0.049
Career Advancement	<b>0.492</b>	0.054	0.001	0.047	0.000	0.049	-

Source: Calculated

Average Variance Extracted (AVE) estimates are larger than the corresponding Squared Interconstruct Correlation (SIC) estimates. This means the indicators have more in common with the construct they are associated with than they do with other constructs. The above stated aspects meet the reliability thereby making the model fit. Therefore CFA model demonstrates Discriminant Validity.

### **Maslow's Expanded Theory on Factors Motivating Women Homepreneurs**

**Stawasz (2019)** conducted research on Employment Satisfaction and Maslow's Hierarchy of Needs Expansion Theory by the Pastoral Care Department. With the help of Maslow's Hierarchy of Needs theory, he analyzed that according to the perspective of pastoral care in the hospital, employees and leaders need to be constantly nurtured and supported to succeed at the highest level of their "commitment". (**Kenrick et al. 2010**) In light of developments at the interface of evolutionary biology, anthropology, and psychology, some have suggested structural changes to Maslow's classic hierarchy of human motives. A key aspect of this revised perspective focuses on the ongoing dynamic interactions between internal motives and their functional links.

This study explains the stages of Maslow's expanded theory in the following manner. Abraham Maslow (1943), a psychologist, created a hypothesis that suggests humans are motivated to meet five basic needs. These requirements are structured in a hierarchy, and humans, according to Maslow, attempt to satisfy the lowest level of wants first. After that, they endeavour to meet each higher degree of need until all five needs are met. His notion can also be articulated from the perspective of an entrepreneur. Physiological requirements are the most basic and lowest level of human wants. To survive, an entrepreneur must meet his or her physiological needs. As a result, he or she is motivated to work in an organization to receive monetary benefits to meet his or her basic needs. Also he/she gets work experience through it. Maslow's hierarchy of requirements includes safety and security demands at the second level. Meeting these demands costs more money, therefore an entrepreneur is compelled to work harder in his or her entrepreneurial endeavour. The third level comprises social demands such as belongingness and affiliation. Individuals desire to be noticed and recognised by others, and entrepreneurs want to communicate with other entrepreneurs, employees, and others. The following level is about self-esteem. These include needs that refer to self-esteem, achievement, competence, and knowledge. Entrepreneurs' value needs are met by ownership and self-control over their business, which gives them respect, social status and reputation. The next stage represents self-actualization. It means realizing personal potential, seeking self-fulfillment, personal growth, and peak experiences. An entrepreneur gains self-fulfillment, personal growth and peak experiences by earning good financial standing and high income. The final stage represents transcendence. An entrepreneur is motivated to a great extent by the motivation of his/her family members beyond himself/herself and by the desire to bring the family to a better position. Through this, his/her family is also progressing well beyond being an entrepreneur. (Maslow, 1943).

It is clearly that 22 percent of women homepreneurs are motivated by Career Transition, 21 percent are motivated by Career Aspiration, 16 percent are motivated by Career



Competency and 14 percent are motivated by Career Patronage, Career Expansion and Career Advancement. Hence majority of the women homepreneurs are motived by Career Transition.

### **Conclusion**

As result of Exploratory Factor Analysis, Previous experience among the four variables under Career Transition, Ambition to become homepreneur among the four variables under Career Aspiration, High demand for the products/services among three variables under Career Competency, Generation of Income among three variables under Career Expansion, A desire to gain social status among three variables under Career Patronage and A desire to bring the family to a better state among three variables under Career Advancement were found to be the highest significant motivational factors. Confirmatory Factor Analysis model shows that Career Transition, Career Aspiration, Career Competency, Career Expansion, Career Patronage and Career Advancement have a significant influence on each other. Women home entrepreneurs will be further encouraged by popularizing the success stories of women entrepreneurs from various backgrounds through school and college textbooks. All possible media should be used to promote these ideals. Housewives should be targeted as a potential source of entrepreneurship by government and other agencies. Efforts should be made to identify entrepreneurial potential among housewives and provide opportunities to them. By this way they are also encouraged. Let me conclude by quoting Pandit Jawaharlal Nehru's words "When woman moves forward, the family moves, the village moves and the nation moves".

## **CHALLENGES AND RISKS INVOLVED IN DIGITAL PAYMENT SYSTEM**

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### **ABSTRACT**

*As the popularity of e-commerce has risen greatly in recent years, reaching 46% user penetration rate for digital commerce in 2020, the advantages of digital payments have never been so appealing to merchants. With more and more users preferring digital payments, the chances of getting exposed cyber security risks such as online fraud, information theft and malware or virus attacks are also increasing. With the rapid development of science, computer and network technology, electronic commerce (e-commerce) has become a routine part of human life. The research study is carried out with the sample size of 100 respondents and the statistical tools used were correlation analysis and regression analysis. The concluding observation is that there is significant relationship between gender and card data security and technical issues.*

**Keywords:** Technical issues, Charge backs, Security, Processing fees.

## **INTRODUCTION**

A digital payment, sometimes called an electronic payment, is the transfer of value from one payment account to another using a digital device such as a mobile phone, POS (Point of Sales) or computer, a digital channel communications such as mobile wireless data or SWIFT (Society for the Worldwide Interbank Financial Transactions). With more and more users preferring digital payments, the chances of getting exposed to cyber security risks such as online fraud, information theft and malware or virus attacks are also increasing. Tech maintenance operations performed on online payment gateways or in the card network system are usually limited in time, announced in advance, and scheduled for periods when e-Shops don't have a lot of traffic, often during the night. It is good practice to check a future supplier's SLA (Standard Level Agreement) before signing a new contract, to know in advance how much uptime is guaranteed for the merchant. Luckily, as hackers have diversified their arsenal so have payment solution providers. Card purchases, for example, are tightly regulated by security protocols and directives, which include top-of-the-line identity verification services such as a biometrics or secure 3D protocols. All-in-one payment providers also include additional security features in the face of fraud, such as secure web protocols, Address Verification Systems or order monitoring options. The risk of fraud, even when it takes the form of friendly fraud, such as chargebacks, is greatly mediated by payment providers who offer comprehensive fraud mitigation options. Cross-border transactions: The cross-border payment processing industry is growing. There is no denying that these are now exposed to fraud risks and more vulnerable. These transactions are the ones where a payee and the transaction recipient are based in different locations. These transactions can happen at retail, wholesale, or in a recurring nature.

## **LITERATURE REVIEW**

**Amar Jain (2021)** in his work "Challenges Online Payments Are Facing and How to solve them" has clearly explained about the online payments which enables the customers to pay their transactions through mobile phone and cards. The major challenges that are quoted are technical issues, increased costs and security problems.

**Nasr (2020)** in their work "E-payment systems risks, opportunities and challenges for improved results in e-business" Like any other field, e-payment field faces several risks. These risks need to be faced and limit their impact some of the key challenges are fraud, tax evasion, payment conflicts, impulse buying and fake providers and merchants.

**Rachna, Priyanka Singh (2013)** in their work "Issues and challenges of electronic payment system has given their insights on the challenges such as lack of security, lack of usability, issues with e-cash, lack of trust, lack of awareness, highly expensive and time consuming.

**Stefan Cenusă (2020)** in his work "Advantages and challenges of accepting online payments". There are no outstanding disadvantages when it comes to online transactions, but there are several challenges that you will need to take into consideration before starting your online shop. Some of the key challenges are technical problem and cost of fraud.

#### **RESEARCH GAP**

As the emergence of online payments and demonetization, there was a huge increase in the digital payment system. As everyone are moving towards the digital payments from a small petty shop to multinational companies. This huge increase has paved the way for many risks and fraudulent activities. There were many research studies undergone regarding the need for payment system and the payment modes in various sectors. But there was very few studies relating to the risks involved in the payment system. The researcher has identified the risks and challenges that are faced by the consumers.

#### **OBJECTIVES OF THE STUDY**

To find out the challenges and risks faced by the consumers while making the online payments and also the technical issues that are undergone by them while making transactions.

#### **RESEARCH METHODOLOGY**

The methodology adopted is descriptive based on the statistics from the primary data questionnaire from the sample size which consist of 100 respondents through simple random sampling. This type of sample method is considered as the economical method for collecting data from a large geographical area. Secondary data was collected from various sources like journals, reviews, and websites. After the data had been collected, it was processed & tabulated directly in to SPSS 20 Software. SPSS version 20 statistical software was used and the results obtained thereby have been analysed using correlation analysis and interpreted. The questionnaire consists of five-point Likert scales in the research study.

#### **HYPOTHESES FOR THE STUDY**

- H0<sup>1</sup> - There is no significant relationship between gender and card data security.
- H0<sup>2</sup> - There is no significant relationship between gender and security problems.
- H0<sup>3</sup> - There is no significant relationship between gender and technical issues.
- H0<sup>4</sup> - There is no significant relationship between gender and Multi-Currency transactions.
- H0<sup>5</sup> - There is no significant relationship between gender and charge backs.
- H0<sup>6</sup> - There is no significant relationship between gender and data hacking.

## DATA ANALYSIS AND INTERPRETATION

### Demographic Profile

Variable	Frequency	Percent
21-25 years	24	24.0
26-30 years	27	27.0
31-35 years	11	11.0
36-40 years	17	17.0
Above 40 years	21	21.0
Total	100	100.0
<b>Source:</b> Primary Data		

**Interpretation:** Table 1 shows that out of 100 respondents in which 24% fall under the age group of 20-25 years where as 27% fall under the age group of 26-30 years, 11% of the respondents belong to 31-35 years, 17% of the respondents belong to the age group of 36-40 years and the remaining respondents are from the age group of above 40years.

Variable	Frequency	Percent
Female	63	63.0
Male	37	37.0
Total	100	100.0
<b>Source:</b> Primary Data		

**Interpretation:** Table 2 shows that there are 37% male respondents taken for the study and 63% of the study was done with female respondents.

Variable	Frequency	Percent
UG	31	31.0
PG	24	24.0
Diploma	23	23.0
Doctorate	22	22.0
Total	100	100.0
<b>Source:</b> Primary Data		

**Interpretation:** Table 3 shows that Out of 100 respondents, 31% belong to under graduation, 24% from post-graduation and 23% belong to Diploma and the remaining respondents are Doctorates.

Table -4 Occupational of the Respondents		
Variable	Frequency	Percent
Research scholar	11	11.0
House wife	8	8.0
Own business	15	15.0
Public sector	19	19.0
Private sector	47	47.0
Total	100	100.0

**Source:** Primary Data

**Interpretation:** Table 4 shows that majority of the respondents were working in the private sector. 11% of the respondents were research scholar, 8% of the respondents were house wife, 15% of the respondents were having own business, 19% of the respondents were working in the public sector.

Table -5 Family Monthly Income of the Respondents		
Variable	Frequency	Percent
25000-30000	31	31.0
31000-35000	26	26.0
36000-40000	17	17.0
Above 40000	26	26.0
Total	100	100.0

**Source:** Primary Data

**Interpretation:** Table 5 shows that Out of 100 respondents, 31% of the respondents have monthly income of Rs. 25000-Rs.30000, 26% of the respondents have Rs.31000-Rs.35000, 17% of the respondents have Rs. 36000-Rs. 40000 and 26% of the respondents have a monthly income of above Rs. 40000.

**Correlation Analysis:**

Table-6 Correlations								
		Gender	Card data	Security problems	Technical issues	Multi-currency transaction	Charge backs	Data hacking
Gender	r	1	.481	-.190	.273*	-.099	.074	.019
	Sig		.000	.058	.006	.931	.463	.851
	N	100	100	100	100	100	100	100
Card data	r	.481**	1	.039	.431**	-.056	.124	.132
	Sig	.000		.698	.000	.578	.220	.190
	N	100	100	100	100	100	100	100

Security problems	r	-.190	.039	1	.089	.229*	.158	.504**
	Sig	.058	.698		.378	.022	.116	.000
	N	100	100	100	100	100	100	100
Technical issues	r	.273**	.431**	.089	1	.130	.208*	.073
	Sig	.006	.000	.378		.196	.038	.472
	N	100	100	100	100	100	100	100
Multi-currency transaction	r	-.009	-.056	.229*	.130	1	.317**	.132
	Sig	.931	.578	.022	.196		.001	.189
	N	100	100	100	100	100	100	100
Charge backs	r	.074	.124	.158	.208*	.317**	1	.266**
	Sig	.463	.220	.116	.038	.001		.008
	N	100	100	100	100	100	100	100
Data hacking	r	.019	.132	.504*	.073	.132	.266**	1
	Sig	.851	.190	.000	.472	.189	.008	
	N	100	100	100	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								
Source: Primary Data Analysis								

**Interpretation:**

**H01- There is no significant relationship between gender and card data security**

The correlation table reveals that Pearson's coefficient of correlation value for the relationship between gender and card data security is 0.481, which shows a moderate positive correlation. Since the p value is 0.000 which is less than 0.05, the null hypothesis is rejected. Hence, there is a significant relationship between gender and card data security.

**H02- There is no significant relationship between gender and security problems**

The correlation table reveals that Pearson's coefficient of correlation value for the relationship between gender and security problems is -0.190, which shows a low negative correlation, Since, the p value is 0.058 which is greater than 0.05, the null hypothesis is accepted. Hence, there is no significant relationship between gender and security problems.

**H03- There is no significant between gender and technical issues**

The correlation table reveals that Pearson's coefficient of correlation value for the relationship between gender and technical issues is 0.273, which shows a low positive correlation. Since, the p value is 0.006 which is less than 0.05, the null hypothesis is rejected. Hence, there is a significant relationship between gender and technical issues.

**H04- There is no significant relationship between gender and Multi-Currency transactions**

The correlation table reveals that Pearson's coefficient of correlation value for the relationship between gender and Multi Currency transactions is -0.009, which shows a low negative correlation. Since, the p value is 0.931 which is greater than 0.05, the null hypothesis is accepted. Hence, there is no significant relationship between gender and Multi-currency transactions.

**H05- There is no significant relationship between gender and charge backs**

The correlation table reveals that Pearson's coefficient of correlation value for the relationship between gender and charge backs is 0.074, which shows a very low positive correlation. Since the p value is 0.463 which is greater than 0.05, the null hypothesis is accepted. Hence, there is no significant relationship between gender and charge backs.

**H06- There is no significant relationship between gender and data hacking**

The correlation table reveals that Pearson's coefficient of correlation value for the relationship between gender and technical issues is 0.019, which shows a very low positive correlation. Since p value is 0.851 which is greater than 0.05, the null hypothesis is accepted. Hence, there is no significant relationship between gender and data hacking.

**FINDINGS**

**Demographic profile:** The majority respondents for the study were female from the age group of 26-30 years have completed their under-Graduation and working in the private sector with monthly earnings of Rs.25000-Rs30000.

**Correlation Analysis:** There is significant relationship between gender and card data security and technical issues. There is no significant relationship between gender and security problems, multi currency transactions, chargebacks and data hacking.

**CONCLUSION AND SUGGESTIONS**

The security of mobile payments relies heavily on the robustness of authentication and registration controls configured within the design of individual mobile payment services. Strong customer authentication is a procedure based on the use of two or more of the following elements categorised as knowledge, ownership and inherence: (i) something that only the user knows (ii) something that only the user possesses. These two must be kept in a careful way in order to prevent from the risks and challenges pertaining to the online payments.

### **SCOPE FOR FURTHER RESEARCH**

The researcher has highlighted some of the key points relating to risks and challenges pertaining the online payment system. The future researchers can focus on many other factors like the reasons behind these challenges and the rectification from the part of the concern or from the banks.

## **INDUSTRY 5.0: OPPORTUNITIES AND CHALLENGES OF INDIAN CAPITAL MARKET**

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### **ABSTRACT**

*This paper explores the opportunities and challenges in capital markets and related services within the Indian context. Capital creation is a vital force of economic development, and capital market intermediaries play key roles for corporates and governments to raise capital and savers to allocate their funds. The study examines the past trends using technology, regulatory structures, and the future course of markets after embracing the ingredients of industry 5.0. Moreover, the paper investigates the opportunities for Indian start-up companies and investors, and it provides insights into prospective future implications in the context of the management while adopting these changes.*

**Keywords:** Industry 5.0, Capital Markets, Technology Adoption, IoT, Big Data, Artificial Intelligence, Machine Learning, Sustainability, Robotics)

### **Introduction**

The financial markets, especially the capital market is frequently developing and becoming progressively multifaceted, guided by technological developments and international economic movements. The capital and stock market sector play a crucial part in the global economy, giving the funds required for governments, corporates, and persons. Technology in capital markets includes several technologies and facilities to face the industry's technical needs. It targets to provide innovative, digital and cloud-based solutions which improve productivity, restructure methods, and give exceptional client service. The intermediaries in capital market has an important objective to ensure compliance with altering regulations but increasing effectiveness and providing world class service to clients. Technology, traditionally, has been both the exile and the champion in the world of business. In the yester decades, companies have had to either embrace a digital transformation, or resentfully stand by when opponents become stronger, quicker, and more capable – and more commercially prospering.



Technology Adoption is with a purpose for both people and the environment. Industry 5.0 was designed to build on the foundations set by Industry 4.0 by promoting human-machine symbiosis and making sure that the effects of digital transformation on society, the environment, and the economy are given equal weight with advancements in technology. Industry 5.0 is thought to being the fifth industrial revolution, where customers can customize products to suit their preferences and needs. While Industry 4.0, which is at the mass customisation level, uses robots to complete monotonous jobs, Industry 5.0 uses artificial intelligence to perform mass personalization.

Industry 5.0 is expected to revolutionize the production process with higher autonomy for collaborative robots. Industry 5.0 is the futuristic industrial revolution which is expected to bring in more creativity and innovation in the products by allowing robots to perform repetitive tasks. It is expected to utilize the creative intellectual capability of humans optimally.

Industry 5.0 is anticipated to transform manufacturing through increased autonomy for cooperative robots. By enabling robots to carry out monotonous activities, Industry 5.0, a potential industrial revolution, is anticipated to foster greater creativity and innovation in products. It is anticipated to make the best possible use of human creativity and intelligence.

### **Objectives**

Examine how Industry 5.0 technologies (including block-chain, IoT, and AI) are now being adopted in the Indian capital market, paying particular attention to adoption trends, obstacles, and possible advantages.

Determine the main regulatory obstacles and chances to promote innovation while maintaining investor protection and market integrity.

Examine the real-world uses of Industry 5.0 technology in Indian markets and financial institutions.

Provide recommendations and guidance on how investors, institutions, and regulators can best utilize Industry 5.0 technologies

### **Key Motivators**

AI and ML have aided businesses in using past patterns to forecast future events, make wiser investment decisions, and steer clear of dangers. Putting people at the center of processes is one of the main principles of Industry 5.0. Reducing the apprehension and opposition to automation from politicians and labor unions that fear that Industry 4.0 may theoretically lead to a crisis of technological unemployment is one of the driving forces. Practically speaking, highly automated processes can produce very consistent and repeatable results; nevertheless, this does not solve the need to supply products that are more and more tailored or individualized.

In the past, automation and robotics on the factory floor have frequently been kept apart from people. In order to allow people to collaborate with cobots, a new breed of collaborative robots, has improved vision and sensing technologies. The latest generation of cobots is easier to program and set up, and they are safer by nature. They may be reprogrammed to carry out a greater variety of jobs as needed, and they can be "trained" to operate alongside humans on the production floor. The goal of Industry 5.0 is to provide a more dynamic spectrum of produced goods by utilizing human creativity inside a framework that is significantly more expandable. Organizations may now operate at lower costs thanks to cloud computing, which also makes highly scalable and available solutions possible.

When it comes to tasks like welding, painting, loading, and unloading, robots are quite helpful. An autonomous robot can work in areas where human workers are not allowed to go and can do manufacturing tasks more accurately on their own. Cooperative robots, or "COBOTs," are a popular trend that are designed to work alongside human employees to help them with a variety of tasks (Fukuda, 2019). Robo advisors are becoming the new trend in the financial services industry. Devices in Industry 5.0 are networked to maximize efficiency and human performance.

### **Benefits**

Makes ensuring that industry has a framework that balances sustainability and competitiveness, enabling it to reach its full potential as one of the pillars of transformation.  
Highlights how alternative forms of (technological) governance affect resilience and sustainability

Gives employees more control over digital gadgets and supports a human-centered approach to technology.

Creates a path for the shift of technology use toward ecologically sustainable practices  
Broadens the scope of a company's accountability to include all value chains  
Presents metrics that demonstrate the advancements made in each industrial environment toward resilience, well-being, and overall sustainability.

Capital Market Leaders priorities for spending on next –gen technologies

### **Opportunities**

New Product Offers: Industry 5.0 creates opportunities for cutting-edge financial services and solutions that make use of block-chain and artificial intelligence. Tokenized assets, DeFi products, and algorithmic trading techniques that improve market accessibility and liquidity are examples of this.

Enhanced capacity for data management: Industry 5.0 makes it possible to aggregate, analyze, and understand data more effectively thanks to advanced technologies like machine learning and big data analytics. As a result, financial organizations are able to manage risk better, make more accurate market projections, and make better decisions.

Improved demand for alternative assets classes: Interest in alternative assets including tokenized real estate, digital securities, and cryptocurrency is encouraged by Industry 5.0. Investors looking for decreased correlation with traditional markets, higher returns, and diversification options will find these assets appealing.

Rise in the need for outsourcing: The intricacy involved in integrating and overseeing Industry 5.0 technology forces financial institutions to contract out specialist services. This includes AI-driven customer care, data analytics, and cybersecurity, which is driving the fin-tech outsourcing industry. For capital markets firms, outsourcing offers a critical chance to strike a balance between cutting expenses and meeting the need to adopt the new skills that come with digitization.

Profound connection to international markets: The integration of India's capital markets with those of other countries is made easier by Industry 5.0, which makes use of AI-powered trading algorithms, cross-border payment systems, and interconnected block-chain networks. This integration increases liquidity, opens up new investment opportunities, and boosts market efficiency.

Process Automation: Through the automation of repetitive processes like data input, reconciliation, and compliance reporting, process automation improves operational efficiency. As a result, financial organizations can increase overall efficiency, cut down on errors, and reallocate resources to more strategic projects.

Improved Analytics and Data Visualization: Advanced data analytics methods including sentiment analysis, predictive modeling, and real-time market monitoring are made possible by Industry 5.0. Visualization technologies such as AI-driven insights and interactive dashboards assist stakeholders in quickly identifying trends, making well-informed decisions, and taking advantage of market opportunities.

### **Challenges**

Consolidation of Industry: Industry 5.0 might hasten capital market consolidation as smaller businesses find it difficult to keep up with the technical expenditures necessary to remain competitive. Bigger companies with more resources might buy out smaller competitors or outbid them, which would limit market diversity and possibly lead to monopolistic tendencies.

Unable to satisfy the needs of the clients: Client demands for real-time data access and quicker, more individualized services are rising due to the rapid improvements in technology. Businesses who don't use Industry 5.0 technologies run the risk of losing customers to rivals who can offer better digital experiences and cutting-edge financial solutions.

Unable to fulfill fiduciary obligations: Financial institutions must contend with difficulties in guaranteeing fiduciary responsibility compliance as Industry 5.0 brings sophisticated

algorithms and automated procedures. It becomes necessary but difficult to maintain accountability, openness, and ethical standards in automated decision-making systems.

**Risks associated with the market:** When new technologies are used, there are additional dangers that come with them, like disruptions to operations, data breaches, and cybersecurity threats. Strong risk management frameworks, ongoing monitoring, and adaptation to changing threats are all necessary for managing these risks, which call for significant investments in cybersecurity solutions.

**Margin Calls:** The implementation of Industry 5.0 technologies necessitates large initial investments in talent acquisition, infrastructure, and continuing maintenance. Cost challenges may result from this, particularly for smaller businesses with tighter budgets. Moreover, as businesses adapt to new operating methods, the transition phase may have a brief negative influence on profitability.

**Impact of Regulations:** Businesses implementing Industry 5.0 may face difficulties since regulatory frameworks frequently lag behind technical developments. Adherence to dynamic legislation, particularly those pertaining to block-chain applications, algorithmic trading, and data protection, necessitates proactive adjustments and could incur supplementary expenses for compliance.

#### Technology Adoption and Transformation of Capital Markets

The industry has seen significant change due to technology in the capital markets, where companies are aggressively implementing cutting-edge and novel solutions to improve consumer satisfaction. Block-chain, machine learning (ML), and artificial intelligence (AI) are three new technologies that are gradually making their way into the market. These technologies are employed in many processes such as instruction updates, reconciliation, off-boarding client analysis, settlements, and static data updates. Additionally, manual intervention and operational hazards are being decreased through intelligent automation, which is crucial in a sector where continuous service is required.

The financial markets industry's embrace of digital-first initiatives has been expedited by the COVID-19 pandemic. Among the many advantages of digitalization are greater cost savings and better productivity, which enable a flexible value delivery environment that can adjust to changing conditions in the future.

All things considered, the digital revolution has completely changed the capital markets sector. Organizations have been able to increase efficiency, improve responsiveness, and rejuvenate antiquated systems because to it. Institutions may maintain aggressive change management and become the industry's digital leaders by utilizing in-house IT personnel and forming partnerships with reputable technology vendors. It might be difficult for capital markets to adopt new technologies. Organizations may gain a lot from introducing new technology, though, if they plan ahead, are prepared, and are prepared to face any obstacles head-on.

Organizations in the banking and financial services sector of today must deal with the problems of delivering an omni-channel client experience, adjusting to digital banking, and complying with ever-tightening laws. It is necessary to accomplish this while cutting expenses, such as high run-the-bank (RTB) costs brought on by full-time equivalent (FTE)-based pricing models.

To thrive in this climate, industry participants need to strike a balance between digital transformation and operational optimization. Banks must use analytics to better optimize data management even while big data, cloud, mobile, internet of things (IoT), and AI/ML technologies continue to revolutionize business practices. By doing this, the sector may improve customer value, expand cross-selling opportunities, strengthen company resilience, and optimize revenues.

### **Regulatory Interventions**

For the financial services sector, the 2008 financial crisis marked a sea change. It brought with it stronger restrictions, increased regulatory scrutiny, and noticeably larger fines and penalties. Due to the industry's need to commit additional resources, declining profit margins were under extreme pressure. Many firms struggled to modify their legacy systems in order to meet the constantly evolving requirements. By providing better customer experiences with streamlined digital procedures, fin-tech startups took advantage of this and forced established businesses to embrace digital transformation.

### **For Investors in India**

An Indian investor can research a variety of sectors, primarily in the fields of health care, pharmaceuticals, and artificial intelligence. Many structural changes will occur in these areas as sustainability is no longer an optional or desirable inclusion in your annual report. In the end, this will introduce the nation to the Bio-economy. New participants and investment in the bio economy and clean and green energy will be drawn by the Indian government's new ethanol mix policy, which will be the first of many new regulations for more sustainable and clean energy.

Reliance Industries has already declared its intention to invest a significant amount of capital in hydrogen energy capabilities in order to take part in the bio economy. There aren't many businesses in India involved in the green hydrogen value chain. Businesses such as Praj Industries, which is now regarded as the second hottest firm in the global bio-economy for 2021, are already present in the bio economy sector. The bio-economy in India is predicted to be valued between \$100 and \$150 billion by 2025, and the impact of biotechnology is likely to span multiple sectors and decades. Among the many applications of biotechnology that would be greatly impacted are agro-biotechnology and raised meat. To take advantage of this revolutionary technology, biotechnology and healthcare organizations working on genomics and diagnostics should include these into their long-term core portfolio.

Businesses that are currently engaged in CRO and CDMO activities ought to be researched before making an investment. For the same or typical investor, a basket strategy is always preferable. Mutual funds or ETFs focused on biotechnology are low risk options. The bio economy as a whole is a burgeoning industry in India that will provide enormous riches over the next many decades.

### **For Start-Ups**

Industry 5.0 companies are finding that Indian PSUs, who are willing to implement digital solutions, present a prospective customer base that presents considerable opportunities. India's emergence as a major manufacturing base presents a fantastic opportunity for entrepreneurs to collaborate with big businesses on innovative projects. For Indian start-ups, this is the perfect time to take use of their advantages on the international scene. An Industry 5.0 revolution is about to occur in India, thanks to the need for robust and diverse supply networks around the world.

In a nutshell, Industry 5.0 is the next term for automation and industrialization, where people work with technology and AI to create extremely efficient workplace results. Indian startups, especially in the manufacturing and industrial sectors, are poised to seize "significant opportunities" in the field of enterprise software. These companies, in contrast to their Western counterparts, operate in an environment that is comparatively free of legacy systems. Their lack of it simplifies their go-to-market approach and encourages flexibility, which helps new ideas take off quickly. Notably, given their increasing receptiveness to embracing digital solutions and the high average contract values indicated by established companies, Indian public sector organizations are developing as a prospective consumer base. Making use of local opportunities can assist Industry 5.0 businesses in breaking into foreign markets.

Indian average contract values (ACVs) are one-third to one-fourth of those in the West, which is still a significant difference from those of US/EU and Indian clients. However, companies can exploit this success to expand into areas like the Middle East, EU, and Southeast Asia where contract values are significantly greater by concentrating on developing strong connections and proving value to Indian enterprises first. Compared to entering completely new markets and acquiring clients, expanding internationally in the second or third year is possible more quickly, especially through Indian customers who have a global presence. Startups need to understand that founder-led sales work well for up to \$5–10 million in revenue, and that building a strong team is necessary to continue growing after this point.

### **Broad Implications**

Operating leverage will rise with the introduction of cloud, distributed computing, and mobile technologies. By digitizing current corporate procedures, operational models will be streamlined, fraud management and regulatory processes will be less risky, and automated decision making will be possible. Opportunities will present themselves in the areas of data

mining, packaging, and distribution of useful information gleaned from the vast volume of information gathered via digital channels. Capital markets would not need data standardization, internal system reconciliation, or agreements on exposures and obligations if distributed ledger technology is used. Asset holdings would be clear across the system, simplifying regulatory oversight and lowering the likelihood of fraud.

#### Managerial Strategies for digital adoption

Throughout the program execution process, use an agile mindset to make sure IT and business are continually collaborating. This can be accomplished by providing extensive training on the agile mindset and its application in the workplace. Take guesswork and fear out of the organization. This can be accomplished using a use-case-based methodology and well-defined success and failure criteria. Utilize human-centered service design and design thinking to create innovative product-service experiences. Shift from a model centered on projects and budgets to one centered on products and platforms, with priorities determined by business results. Create a T-shaped organization by allocating resources to cross-skilled personnel in all the areas required to meet user experience and efficacy goals.

#### **Conclusion**

The implications of Industry 5.0 for the Indian capital markets are expected to be both revolutionary and difficult. Adoption of cutting edge technologies like IoT, block-chain, and AI offers substantial potential for growing product offerings, improving market efficiency, and integrating with international markets. These technologies have the potential to completely transform data management, provide sophisticated analytics for well-informed decision-making, and automate procedures through robotic process automation and smart contracts. But these opportunities also bring with them significant obstacles, such as the need for significant investments, cybersecurity threats, regulatory compliance, and competitive pressures. In order to fully utilize Industry 5.0 and maintain investor protection, market integrity, and sustainable growth in India's developing capital markets, financial institutions and regulators must successfully navigate these obstacles.

## **HARNESSING INDUSTRY 5.0 FOR SOCIAL GOOD CHALLENGES AND OPPORTUNITIES**

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### **HARNESSING INDUSTRY 5.0 FOR SOCIAL GOOD CHALLENGES AND OPPORTUNITIES**

#### **ABSTRACT**

*We live in an environment of increasing disruption, where the world presents complexity and uncertainty, uncertainty and fragility. Therefore, people are increasingly faced with global challenges at all levels and in all areas, whether it is technology, business, social, higher education or higher education, which causes problems in terms of people's security and well being. The new era 5.0, where people are at the center of innovation and technological change, can and should make itself useful to improve the quality of life, solve social technical problems and improve human health with the support of science and technology.*

**KEY WORDS: Industry 5.0, Technology, Quality of Life, Challenges and Opportunities.  
HARNESSING INDUSTRY 5.0 FOR SOCIAL GOOD CHALLENGES AND  
OPPORTUNITIES**

**INTRODUCTION:** In the last few decades of human history, technology has achieved great success and growth, especially with the emergence of the Internet. The world is in a new era, with the rapid development of globalization and digital technologies such as the Internet of Things (IoT), big data (BD), artificial intelligence (AI), robots, 3D printing, cloud computing (CC) and mobile devices (MD). era. It is seen that the development of human civilization is associated with the transformation of the economy and that the social and economic situation is now determined by ideas such as Society 5.0, the fourth and fifth industrial revolutions. To this end, technology and innovation should be used not to replace human roles, but to help people in their daily lives and promote progress. Therefore, Era 5.0 focuses not only on how tools, methods and strategies can lead to better business results, but also on how this affects everything around organizations, institutions and communities, as well as the visibility and security of their processes.

Since we entered the 21st century, people have experienced new changes that have given them the opportunity to adapt to new business processes. It is seen that the development of human civilization is associated with the transformation of the economy, and that the social



and economic situation is now determined by ideas such as Society 5.0, the fourth and fifth industrial revolutions. To this end, technology and innovation should not be used to replace human roles, but to help people in their daily lives and promote progress. Therefore, Era 5.0 focuses not only on how tools, methods and strategies can lead to better results for business, but also on how these events affect everything around organizations, institutions and communities, as well as people's thoughts and views about their own processes and communities.

Mihardjo et al. Conducted a survey among senior executives of Indonesian ICT companies to evaluate the concept of the agile innovation model and to promote change in the context of digitalization for Industry 5.0, with the aim of demonstrating the focus on customer usage and change patterns, and the concept of organizational agility. This can be a competitive advantage in Industry 5.0. The following perspectives: Society 5.0 and Business 5.0.

Technology is promising in promoting economic growth as well as personal and social development. As Rantada points out, without technology, our world faces relevant problems and specific threats such as the 2030 Agenda and the Sustainable Development Goals (SDGs); especially since we are now in the transition period from Industry 4.0 to Life . 5.0. This change brings with it new challenges from the beginning to Industry 5.0, which brings the environment of collaboration and technology, creating a new concept for companies in the use and innovation of social and educational business models.

**METHODOLOGY:** Since we entered the 21st century, people have experienced new changes that have given them the opportunity to adapt to new business processes. It is seen that the development of human civilization is associated with the transformation of the economy, and that the social and economic situation is now determined by ideas such as Society 5.0, the fourth and fifth industrial revolutions. To this end, technology and innovation should not be used to replace human roles, but to help people in their daily lives and promote progress. Therefore, Era 5.0 focuses not only on how tools, methods and strategies can lead to better results for business, but also on how these events affect everything around organizations, institutions and communities, as well as people's thoughts and views about their own processes and communities.

#### **FROM INDUSTRY 4.0 TO INDUSTRY 5.0**

The history of the Industrial Revolution has had a significant impact on the development of the world economy. In addition, people live in a time when industrial revolutions (Industry 3.0, Industry 4.0 and Industry 5.0) occur simultaneously. Each of them has solved its own problems, but together they have brought about an unprecedented change in the socio-economic system. The Industrial Revolution 4.0, the result of the entire digital industrial era, has become the culmination of meetings, discussions, studies and work of scientists and professionals in business, business and social fields since 2018. The concept of

the fourth revolution (Business 4.0) is the integration of the physical and virtual worlds through CPS and the disruption of people, machines and devices through IoT. It is also called the hyperconnectivity revolution because it provides instant interaction between the virtual and physical worlds. This changes the company's strategy, organization, business model, value and supply chain, processes, products, capabilities and stakeholder relationships. and the Internet of Things. The essence of the Industry 4.0 framework is the CPS, which includes the integration of hardware and software into electronic or electronic systems designed for a specific purpose.

Industry 4.0 involves the creation of technologies that use cyber-physical integration in production, delivery and connected devices. Rüämänn et al. I believe that the fourth wave of success, with the advancement of the new business technology called Industry 4.0, is a change from nine technological reforms: information dimension and analysis, robot control, simulation, horizontal and vertical integration, industrial IoT, cybersecurity, cloud, Additive manufacturing and augmented reality. While these are disruptive technologies that are causing change, the Industry 4.0 revolution goes far beyond these technologies and requires a whole new generation to solve the new problems caused by Industry 4.0. In Society 4.0, creating knowledge from knowledge is done by people. It is believed that the next stage of human life will be created by machines through intelligence (or digital processes), but in the service of humans. Technology and innovation should be used and integrated to help and support society rather than replace human responsibility. Social, cultural and economic, it is the basis and human base of the connection of new technologies that use information and communication technologies to ensure fast and accurate information everywhere in the world. Building a knowledge community allows community members to improve their people and lifestyles by transforming knowledge into more valuable resources or factual knowledge. Now the idea of social cooperation is a good description of the world we live in.

In the conditions of Industry 4.0, while a person is working less and less physically, the use of machines (CPS) in production continues to increase. People should be the only end users of products and services. The worker is considered the most variable of the CPS and its results. As an important part of Industry 4.0, its diverse content will play an important role in future work. and real-time data interspersed. The fourth industrial revolution brings many challenges to the manufacturing industry in terms of work, collaboration and management. With the use of new IT and changes in process, work and production will have to change significantly in the future, requiring employees to have new skills. This Industrial Revolution 4.0 is focused on technology; This means that all schools should focus on technology and use technology as the basis, because companies investing in these new technologies hire qualified employees. Lack of digital ideas and limited resources are the most important obstacles to the implementation of Industry 4.0 in design and business. Although Industry 4.0 has not yet

matured, the world is eagerly awaiting the next industrial revolution (Industry 5.0), which is the production of human intelligence and will lead to the emergence of intelligent society (Society 5.0). Through the combination and continuation of Industrial Revolution 4.0 and Society 5.0, a good cultural model can be established and people's quality of life can be improved. However, it is necessary to discuss the change and evolution of human civilization from the perspective of biological abilities, work and the ability to correspond to important business information. . It is necessary to add value to the concept of Industry 4.0 that promotes success. Industry 4.0 opens the door to new opportunities, creates more value for customers, and increases competition by promoting technology and process innovation. Including public administration, design, work and personal privacy. This change will result in the transition of the society from version 4.0 to version 5.0.

### **INDUSTRY 5.0 CHALLENGES**

The term Business 5.0 was first coined in 2015 by Michael Rada, citing an article published by the LINKEDIN social network. Industry 4.0 is still in its infancy, but can be seen as the new meaning of Industry 5.0, which includes the introduction of artificial intelligence into people's lives, the development of human potential and cooperation, and the return of man to the "center of the world".

"Industry 5.0 is a visionary concept that will deeply affect people, management, individuals and businesses. It is considered as a transition from an information society to a society consisting of highly intelligent people. The vision of an economy that is innovative, dynamic, social, competitive, respectful of global boundaries and minimizes its impact on the environment is called Industry 5.0. This situation brings with it many new challenges related to technology, business economics, management and control.

Industry 5.0 is based on the concept of "Industry 4.0" and will have a more transformative development vision based on welfare and human health, such as reducing consumption and changing consumption to create new growth paths. Cyclical, regenerative and balanced progress. Industry 5.0 products/services, human-machine collaboration and personalization are called humanization, that is, the personalization of human needs. Such things can only be created through human collaboration. Industry 5.0 is a return to pre-industrial production, but it has been made possible by the most advanced technology available, bionic technology and smart data, real-time digital twins and analogs, network security data transmission, storage and analysis technology, intelligence and power, electricity and reliable autonomous technology.

This is a future that also means that the process of change will move towards the relationship between humans and machines. The goal of Industry 5.0 is to enable people to spend more time on planning and efficiency. Industry 5.0 will increase productivity, create more humans and machines, and take responsibility for continuous monitoring of interactions

and activities. Industry 5.0 is a future revolution that aims to use the concept of human expertise working with efficient, intelligent and accurate machines.

Although Industry 5.0 has been adopted, international standards and regulations are still being updated to become a global standard. The fifth industrial revolution is also better for people, the environment, the economy and the world. The concept of Business 5.0 aims to reverse the dehumanization of business, take into account the important role and needs of people in society, and move closer to sustainable development.

### **PARADIGM IN SOCIETY 5.0**

The transition to Society 5.0 is taking place during the fourth industrial revolution (Industry 4.0) based on disruptive technologies. This change in social culture creates a challenge for businesses to survive and sustain their business in the face of Society 5.0. Therefore, Society 5.0 brings about the transformation of the economy with the development of the Internet of Things (ICT) obtained by measurement; In the future, people will use IoT/AI/ICT to do new jobs that do not yet exist.

However, Mihajo et al. Especially in anticipation of New Life 5.0, consider that there is little evidence that companies are developing new business models and putting people first as a culture that drives companies to innovate. A concept with interesting and eclectic elements that follows the previous four explanations. It is based on the information society (Society 4.0), supports the development of information to create value, and aims to promote technology and digital transformation in human life. This digital revolution will change many aspects of society: private life, public administration, design and work, the use of cyberspace and its integration with the physical world.

The Internet of Things, robots, artificial intelligence and augmented reality (AR) are frequently used in business, people's daily lives, medical care and other activities, not only for success, but also for everyone to benefit and easily find body and support. body. integration of virtual space to solve social problems. The concept of Society 5.0 is not limited to production; it solves social problems through the integration of physical space and cyber (virtual) space, and makes dependency an open and environmentally friendly society. The concepts of 5.0 and Industry 5.0 are not a simple continuation or adaptation of the Industry 4.0 paradigm. The principle of the Society 5.0 era is to solve the problems caused by the Industrial Revolution 4.0 era by reducing social relations, work and other internalization effects. Society 5.0 is a "thinking society" where business will be a key factor in change and technological advancement.

Driven by Industry 4.0, Organization 5.0 offers a unique opportunity to place people at the center of innovation, technological change, and job automation. This new concept of Society 5.0 will play a significant role in creating a happier, more successful, and therefore more productive society. The use of technology to benefit society has ignited a new economic

revolution called Society 5.0. The slogan of Society 5.0 is "a society-centered society." and matching skills are useful in solving problems related to human-computer interaction. The main goal of the development of modern human civilization is to transform into a new economic form that includes the urgent need to regenerate resources and use waste products.

### **THE CHANGES RESULTING FROM EDUCATION 5.0**

Education is affected by the new technologies of Society 5.0, leading to significant changes. Modern life 5.0 technology supports digital teaching through video conferencing and virtual tools, so students can achieve more at the same time, of course without physical limitations. From books to knowledge work, employees benefit from freelancers who provide additional benefits to their work, as well as collaborative robots (cobots), for example, that have emotions and understand people's wants and desires. However, the effect of collaboration between employees regarding the Industry 5.0 concept has not been investigated. Industry 5.0 mainly focuses on major reforms in which humans will lead robots. Creating the conditions for social success in business 5.0, which aims to solve this problem, achieve the "personality" of production and consumption, meet the needs of the individual and achieve personal development (SDG) is a difficult task.

The need for skills evolves with technology. There is a need for engineering professionals and new courses, including programming courses. Industry 5.0 requires measures to promote education and skills training to help workers adapt to changing market conditions, as well as social innovation to drive success and promote quality work. One of the biggest changes is the spread of the internet, which is also used for educational purposes. Digital transformation and the proliferation of digital technologies increase social interaction, causing negative effects such as security risks (cyber risks) and affecting personal privacy, so control is required.

Education Organization 5.0 supports the creation of educational systems that support not only the development of work, but also leadership, environmental change, information processing, interaction with the environment and others, personal and social development. Education and training play an important role in the development of new skills and knowledge. Only in this way can the so-called 5.0 society be developed, a human organization in which all citizens strongly want to participate and the introduction of technology to improve the quality of life. In the future, skills will become more important and personal skills (soft skills) will become more important. Skills that include technical, digital and information intelligence, as well as the art of communication and creative and critical thinking skills will be greatly needed. This is a real challenge, especially for employees who do not have technical knowledge and do not see the importance of investing in content technology production. We are experiencing the integration of cyberspace, information and physical space (the real world) created by Society 5.0, which is the basis of humans and

humans. This new type of intelligent humans will be characterized by being more efficient and successful in different tasks. Humans will not be replaced, but they will be equipped with cooperative, collaborative intelligent robots to perform their tasks. These new capabilities will be supported by personalized products with a human touch.

Education 5.0 will help people have the skills to learn, unlearn and relearn to adapt and accept the changing technological environment of the world. Education 5.0 will be personalized, which will improve the learning process and prepare students to use their rich skills (communication, leadership, patience, curiosity, understanding, good thinking and creativity) to endure and face the uncertainty of the future. Some of the needs of the fifth education revolution (Education 5.0) are 21st century skills: academic skills, literacy and life skills. In addition to the six basic knowledge skills (such as technical knowledge, information knowledge, financial knowledge, cultural knowledge and action public opinion), students must also have other skills such as thinking, reasoning, reasoning, communication, cooperation, problem solving and most importantly, curiosity. Initiative, patience, adaptability, leadership and cultural awareness.

## **CONCLUSION**

The 5.0 era is a real social and human revolution focused on quality of life, people, relationships, environment and health. After the impact of pandemics, climate change, war, social division and cyber risk, these issues have become important issues and deserve more attention from politicians, organizations and communities. It is an evolution of the Industry 4.0 concept, which uses new technologies and applications to harmonize the virtual and physical worlds, providing benefits to people in the middle of work. Thus, we will have a society (Society 5.0) where technology and infrastructure are centered on people, solving social and environmental problems, that is, based on sustainability, human value and resilience. However, although technology has not stopped changing the economy, society and education, it is still not enough to support human progress. In the context of rapid development, change and technological change, education requires new learning and skills. Therefore, Education 5.0 emerged, which should develop/develop other skills and abilities and educate students in humane ways to be successful, focusing on the collaboration between peers and communities in relation to the development of people's lives, health and people. Real contribution to the future of humanity, social responsibility and sustainable development and to examine how, according to the sustainable development goals, especially the world of work and education are moving towards better participation in terms of quality of life and work to achieve social and environmental benefits.