Emerging Industry 5.0 Opportunities and Industry readiness of MBA graduates - How to bridge the gap?

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ABSTRACT: Technological breakthroughs keep ascending day by day in today's fast paced, ever evolving world. To keep ourselves ever ready is the challenging milestone in the world driven by technology. There is a sea of opportunities that these disruptive changes like Artificial Intelligence, Internet of Things, Big data analytics brings forth to the student community. industry 5.0, the emerging, human centric industrial revolution is not an exception to this. How far the educational institutions are successful in bridging the gap between industrial expectations and actual student preparedness is always a focus area of interest to the academia. The current study focused upon the factors affecting industrial readiness of MBA graduates with regard to the emerging opportunities that the paradigm shifts from industry 4.0 to industry 5.0 has opened up. The researcher focused on narrowing down the challenging factors that hinders the industrial readiness of MBA graduates for the emerging industry 5. 0 opportunities. The study used stratified sampling technique to collect data from different strata catering to different specialization groups among MBA graduates. The study also focused on the impact of NEP curriculum in creating an attitude fostering sustainability and circularity among MBA student fraternity moulding them to be environmentally responsible Industry ready MBA graduates.

KEYWORDS: Disruptive technologies, Industry readiness, Industry 5.0.

INTRODUCTION

India has to make strides in preparing its workforce for industry 5.0 as it demands a very skilled workforce with more talents in communication and problem solving. If the skill gap occurs in the in- demand skills and existing skills, we will not be able to tap the full benefits of industry 5.0. Latest technologies like internet of things, big data analytics, machine learning all play a pivotal role in creating industry, ready prospect workforce suitable to the demands in industry 5.0 scenario. Developing industry ready workforce is the need of the hour to march ahead in the journey of wholistic sustainable development

The skill gap exists between industry 5.0 expectations and the prospect workforce that are being moulded at different universities. The present study focuses on the industry readiness of MBA graduates regarding the emerging industry 5.0 opportunities.

Industry 5.0 is an emerging and dynamic automation revolution focusing more on the technology with a human touch. Here, the focus is on more integration of humans with machines so that more harmonious synergy happens between the two for better productivity and efficiency at the workplace. According to industry 5.0 concept, the role of humans at the workplace is enhanced with better value without any turbulence as the concept aims at automation with a soul.

Empowered humans can perform better in industry 5.0 as compared to industry 4.0. The emerging concept of industry 5.0 is envisaging a production environment with a human touch since its focus is upon human impact, all latest technology technologies like internet of things, big data analytics, all in a supporting and complementing role to assist human capabilities. Human capital becomes a core value in industry 5.0. works along with collaborative robots, namely cobots for better productivity, focusing on more human centered design approaches.

OBJECTIVES OF THE STUDY
- To understand the industry readiness of MBA graduates towards emerging industry 5.0 opportunities
- To find out various factors that need to be addressed to meet the challenges in creating industry 5.0 ready MBA graduates.
- To find out the relationship between new education policy and its contribution towards industry 5.0 readiness

REVIEW OF LITERATURE

According to G. A. Yunusova (2003), the education system encompasses the prevailing policies, structures, practices, and institutions that govern education within a specific region or country. It includes a broad array of components, such as early childhood education, primary and secondary education, higher education, vocational training, curriculum development, examination methods, and educational governance. The current education system primarily focuses on developing the Intelligence Quotient (IQ), which measures aspects like knowledge, problem-solving skills, visual-spatial abilities, memory, and logical reasoning (A. Oommen, 2014)

However, with the advent of Artificial Intelligence (AI) and augmented intelligence, these human skills are losing their dominant role. Possessing a high IQ alone is no longer sufficient to meet the demands of contemporary society and workplaces. Therefore, to fully develop students' potential, it is essential to cultivate not only IQ but also emotional intelligence and resilience (K.Maj-Wasniowska etal.2023) Professionals will need to be more proactive and adaptable in response to the rapid evolution of technology, necessitating more frequent and ongoing learning. This shift may increase their financial and time commitments.

Industry 5.0 focuses on investing in human competence, behavior, and creative efficiency, supporting and empowering people amidst technological advancements rather than leaving them behind. Humans must learn new skills, adapt to new situations, and be motivated and satisfied in their work (Pacher, Woschank, and Zunk 2023). Human factors professionals can assist by providing training, mentorship, and continuous learning opportunities, as well as designing systems that offer feedback, guidance, and recognition. In summary, human-centricity in Industry 5.0 acknowledges the value of humans in the workplace and fosters an environment that supports their well-being and growth.

Leng, Jiewu, et al. (2022) in explored the evolutionary trajectory of Industry 5.0, highlighting three key characteristics: human-centricity, sustainability, and resiliency.

In the study conducted by Setia Hermawati etal . (2024), they provide a comprehensive overview of the current state of readiness in Ergonomics/Human Factors (E/HF) for Industry 5.0, as well as the desired future state. The study also highlights the gaps and challenges that need to be addressed. This information is valuable for researchers, educators, and practitioners to understand the current trends and future directions in industrial innovation. Furthermore, it can help them develop and implement effective strategies to enhance E/HF readiness. Secondly, the study underscores the pivotal role of human factors professionals in realizing the human-centered vision of Industry 5.0. Achieving this vision requires a holistic approach that prioritizes human well-being, empowerment, and growth. Professionals can contribute to human factors by designing and evaluating human-machine systems and interactions that are collaborative, respectful, and mutually beneficial. Developing these skills will enhance their professional development and career prospects, enabling them to contribute to the advancement of human-centric technology. The gaps identified suggest that current curricula in E/HF-accredited courses and professional activities require adjustments to better equip professionals for supporting the realization of human-centricity in Industry 5.0.

According to Broo etal (2022) Engineering education requires a curriculum revamping to prepare prospect engineers to meet the advancing expectations of the industry. The study also focuses on the key challenges and opportunities for aligning engineering education in line with industry 5.0 principles. This study suggests lifelong learning opportunities and industry collaborations to fine tune the students to meet the industry requirements.

The National Education Policy (NEP) 2020 in India includes provisions for integrating emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and other advancements into the curriculum. The NEP 2020 emphasizes equipping students with 21st-century skills, including technological literacy and problem-solving abilities. New Education Policies (NEP) in various countries aim to reform and modernize educational systems to better prepare students for future challenges, including those posed by Industry 5.0. NEP prioritizes Science, Technology, Engineering, and Mathematics (STEM) education, along with emerging technologies like AI, Robotics, and Data Science. This prepares students with the necessary skills for the advanced technological landscape of Industry 5.0.

The NEP stresses the importance of skill development and vocational training, ensuring students acquire practical skills that are directly applicable in the workplace. This includes hands-on experience with new technologies and machinery, essential for Industry 5.0. The policy promotes critical thinking, problem-solving, and analytical skills, crucial for adapting to the dynamic changes in Industry 5.0. It encourages students to be innovative and to approach problems with creative solutions.

NEP incorporates elements that develop these skills, preparing students to work effectively in diverse and interdisciplinary teams. It supports the incorporation of digital tools and online learning, which are vital for staying updated with the latest technological advancements. This prepares students for a future where digital fluency and continuous learning are key to career success.NEP aims to provide inclusive and equitable access to education, ensuring that all students, regardless of background, have the opportunity to acquire the skills needed for Industry 5.0. In nutshell, the NEP's focus is on modernizing education, promoting a multidisciplinary approach, and emphasizing both technical and soft skills aligns well with the demands of Industry 5.0, preparing students to thrive in a rapidly evolving technological environment (Rupesh G Sawant, Umesh B Sankpal, 2021)

RESEARCH METHODOLOGY

The research design followed is descriptive in nature. Researchers used stratified sampling, and the sample consisted of Mba General, MBA supply chain and logistics, MBA business analytics, MBA digital marketing and the category "others" which included MBA in healthcare, tourism and media. Each strata consisted of 50 students. Primary data collected from these students as their views towards various statements provided in the questionnaire forms the basis of the analysis carried out. Structured questionnaire was used to collect the responses from the different strata. Collected data were analyzed using SPSS software.

Demographic Profile of respondents

Researchers selected students learning various specialisations of MBA as different strata of respondents to get a uniform picture of responses from all different viewpoints. Majority of the respondents were in the age group of 21 to 23. Researchers also included diversified university student categories including State, Deemed, Affiliated as well as Central universities for a more elaborate and diverse population for the representative sample selection. Table 1. Describes the demographic profile of the respondents in detail.

Table 1

Variables	Category	Frequency
Age	Above 25	29
	24-25	42
	22-23	128
	20-21	101
Gender	Male	182
	Female	118
University of Study	State University	66
	Deemed University	118
	Affiliated To University	69
	Central University	47
Specialisation in MBA	Business Analytics	50
	Digital Marketing	50
	Conventional Specialisation (HR, Finance, Marketing, System, Operation)	50
	Logistics & SCM	50
	Health care	50
	Travel & Tourism	50

The responses are collected from all these strata and compiled together for analysis.

DATA ANALYSIS AND INTERPRETATION

The reliability analysis is conducted by using Cronbach's Alpha test. The test gave a number 0.907, which is a good measure of reliability of the questionnaire and all the 25 questions are considered to be reliable for conducting further tests.

Table 2

KMO and Bartlett's Test		
Kaiser Meyer Olkin Measure of Sample Adequacy		0.804
Bartlett's Test of Sphericity	Approx. chi-Square	1073.81
	Df	200
	Sig	0.000

Test results show that there is a significant degree of shared variance among the variables, which make it adequate to conduct factor analysis.

The researchers have selected factor analysis as the method to group together the associated variables. Principal component analysis is conducted to reduce the many factors into identifiable groups. Table 3 shows the extraction value of various responses indicating industry readiness of MBA graduates from various streams of MBA.

Table 3. Industrial readiness of MBA graduate- Principal Component Analysis

S. No	Components	Initial	Extraction
1.	Do you agree that the current MBA curriculum prepare you for industry 5.0	1.000	.632
2.	Give your response on specific training related to industry 5.0 being offered in MBA curriculum.	1.000	.721
3.	I have learnt about the challenging requirements of man machine integration in industry 5.0	1.000	.539
4.	Continuous learning & upskilling are necessary to stay relevant in the era of industry 5.0	1.000	.641
5.	My MBA Program include latest and emerging technologies like AI, IoT and Machine learning	1.000	.782
6.	I feel there exists a gap between skills taught in my MBA program and the skills sets required for industry 5.0	1.000	.798
7.	My MBA program cover the integration of Augmented Reality (AR) and Virtual Reality (VR) in business	1.000	.865
8.	My MBA program help me to take leverage of IoT in business context	1.000	.724
9.	We have competent systems to enhance personalised learning and to provide predictive insights	1.000	.681
10.	My program trained me on cyber security necessary for industry 5.0	1.000	.752
11.	My program taught me about ethical implication of industry 5.0	1.000	.657
12.	I have got sufficient leadership training and communication skills training for the requirement of industry 5.o	1.000	.842
13.	My MBA program places more emphasis on sustainable business practices	1.000	.743
14.	Our college provides high speed internet access to students and faculty	1.000	.609
15.	We are equipped with IoT devices, smart classrooms and campus automation	1.000	.652
16.	We are ready to adapt to advanced technologies like AI, robotics, and smart automation in the workplace	1.000	.745
17.	I am prepared to manage a work force that includes both human and robots	1.000	.573

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18.	I have been equipped for conflict resolution strategies in teams that involve diverse skills, backgrounds, and human-machine interactions	1.000	.769
19.	We are provided with advanced hardware devices like VR/AR devices that can support advanced application and simulations	1.000	.553
20.	Our IT infrastructure has got scalability and flexibility to accommodate increasing students	1.000	.734
21.	We are prepared to be in multidisciplinary teams and adapt to combine skills from technology, design, and social sciences, as Industry 5.0 requires.	1.000	.593
22.	I have got sufficient leadership training and communication skills training for the requirement of industry 5.0	1.000	.682
23.	I can inspire and motivate teams in an environment that merges cutting-edge technology with human skills	1.000	.789
24.	I am prepared to take on leadership roles that prioritise human-centric values and employee wellbeing in an Industry 5.0 setting	1.000	.563
25.	I can handle cross-cultural communication in globalised, digitally connected teams that are integral to Industry 5.0	1.000	.785

The variance of 25 variables ranges from 0.539 to 0.865, which shows that there is a significant variance between 50 and 80% for the 25 variables used in the questionnaire.

Table 4. Industrial readiness factors- Total variance

	Total Variance Explained								
S.No	**Initial Eigen values**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.152	20.608	20.608	3.064	20.576	20.586	3.873	12.652	16.679
2	3.942	15.768	36.363	2.631	15.787	36.373	4.842	12.942	29.621
3	3.013	12.052	48.415	1.698	12.096	48.469	1.763	11.647	41.268
4	2.512	10.048	58.463	1.634	10.034	58.503	2.734	12.523	53.791
5	1.891	7.564	66.027	1.252	7.132	65.635	3.942	13.784	67.575
6	.934	5.841	71.466						
7	.723	4.856	76.322						
8	.604	4.131	80.453						
9	.615	4.263	84.716						
10	.593	3.732	88.448						
11	.504	3.073	91.521						
12	.523	3.100	94.621						
13	.511	3.092	97.106						
14	.371	2.010	91.031						
15	.427	2.983	94.014						
16	.432	2.23	96.914						
17	.332	1.923	91.775						
18	.373	1.321	93.698						
19	.273	.832	95.019						
20	.194	.737	95.756						

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21	.245	.817	96.573					
22	.263	.823	97.396					
23	.283	.851	98.247					
24	.272	.832	99.079					
25	.213	.921	100.00					
Extraction Method: Principal Component Analysis								

Table 5. Factors influencing Industry readiness of MBA graduates (Rotated Component Matrix)

Variables	1	2	3	4	5
Do you agree that the current MBA curriculum prepare you for industry 5.0	.823				
Give your response on specific training related to industry 5.0 being offered in MBA curriculum	.742				
My MBA Program include latest and emerging technologies like AI, IoT and Machine learning	.794				
I feel there exists a gap between skills taught in my MBA program and the skills sets required for industry 5.0	.854				
My MBA program cover the integration of Augmented Reality (AR) and Virtual Reality (VR) in business	.736				
My MBA program help me to take leverage of IoT technologies in business context	.637				
My program trained me on cyber security measures necessary for industry 5.0	.755				
My program taught me about ethical implication of industry 5.0	.782				
My MBA program places more emphasis on sustainable business practices	.815				
I believe that continuous learning & upskilling are necessary to stay relevant in the era of industry 5.0		.783			
I have learnt about the challenging requirements of man machine integration in industry 5.0		.837			
I have got sufficient training and willing to adapt to new skills requirement of industry 5.0		.756			
I am prepared to manage a work force that includes both human and robots		.638			
Our college provides high speed internet access to students as well as facility			.736		
We are provided with advanced hardware devices like VR/AR devices that can support advanced application and simulations			.648		
We are equipped with IoT devices and smart classrooms and campus automation			.792		
We have competent systems to enhance personalised learning and to provide predictive insights			.841		
Our IT infrastructure has got scalability and flexibility to accommodate increasing students			.672		
I have got sufficient leadership training and communication skills training for the requirement of industry 5.0				.873	

I can inspire and motivate teams in an environment that merges cutting-edge technology with human skills				.736	
I am prepared to take on leadership roles that prioritize human-centric values and employee wellbeing in an Industry 5.0 setting				.821	
I can handle cross-cultural communication in globalized, digitally connected teams that are integral to Industry 5.0				.648	
I have been equipped for conflict resolution strategies in teams that involve diverse skills, backgrounds, and human-machine interactions				.794	
We are prepared to work in multidisciplinary teams and adapt ourselves combining skills from technology, design, and social sciences, as Industry 5.0 requires.					.754
We are ready to adapt to advanced technologies like AI, robotics, and smart automation in the workplace					.852

1. Revamp in existing curriculum

This first factor has 9 variables each of them having different component scores in the rotated component matrix. All these 9 variables are considered to be belonging to the same category named *Need for revamp in existing curriculum*. Among these nine, the variable belonging to students feeling of a lack of match between industry 5.0 requirements and their current curriculum content is the most relevant factor with a factor loading value of 0.854. Existing curriculum should be revived by incorporating industry 5.0 requirements like integration of latest technologies like artificial intelligence (AI), Internet of things (IoT) and machine learning to the academic curriculum. Curriculum should be able to prepare students for the emerging needs of Industry 5.0. Student should get to know about cyber security measures necessary for industry 5.0, and also about various ethical challenges and implications in the context of industry 5.0. Sustainability should be reinforced as the best practice of any organisation or industry.

2. Smart leadership to face the challenges of disruptive changes.

This second factor has 4 variables each of them having different component scores in the rotated component matrix. All these 4 variables are considered to be belonging to the same category named *Smart leadership to face challenges of disruptive changes*. Industry 5.0 brings forth various challenging requirements like managing a diverse workforce consisting of men- machine interfaces. Human factors should be given prior importance to balance the disruptive changes brought about by advanced technologies. Continuous learning and upskilling are the need of the hour to stay relevant in the industry 5.0 era.

3. Need for latest IT infrastructure.

This third factor has 5 variables each of them having different component scores in the rotated component matrix. All these 5 variables are considered to be belonging to the same category named *Need for latest IT infrastructure*. Facilities like high-speed internet connection, campus automation, advanced hardware devices like AR/VR devices that can support simulation, etc. are the requirements to take advantage of the disruptive change in a positive way. Competent IT infrastructure can promote enhanced personalised learning experience to the students. The requirement of a sound IT infrastructure facility with sufficient scalability and flexibility is the main challenge to meet the industry expectation regarding industry 5.0.

4. Inclusive culture.

This fourth factor has 5 variables each of them having different component scores in the rotated component matrix. All these 5variables are considered to be belonging to the same category named *Inclusive culture*. Industry 5.0 has opened up the doors of diverse workmanship, including global workforce and cobots working together under a single roof. This new industrial revolution in the form of industrial 5.0, thrust upon the need of a more sustainable and inclusive industrial environment that focuses on human values.

5. Student mindset to adapt to new challenging requirements of industry 5.0

This fifth factor has 2 variables each of them having different component scores in the rotated component matrix. These variables are considered to be belonging to the same category named *Student mindset to adapt to new challenging requirements of industry 5.0*. Students should have an adaptable mindset to learn new technologies and assimilate the concept of lifelong learning. Flexibility and adaptability will be the key factor determining the industry readiness of students regarding emerging industry 5.0 opportunities.

Table 6. Correlation analysis

		Industry Readiness for 5.O opportunity	Incorporation of modern technologies like AI, IoT in NEP curriculum	Incorporation of Sustainability in NEP curriculum	Incorporation of communication skill development in NEP curriculum
Industry Readiness for 5.O opportunities	Pearson Correlation	1	.862**	.641*	.632**
	Sig. (2-tailed)		.000	.017	.011
	N	250	250	250	250
Incorporation of modern technologies like AI, IoT in NEP curriculum	Pearson Correlation	.862**	1	.585	.694
	Sig. (2-tailed)	.000		.141	.110
	N	250	250	250	250
Incorporation of Sustainability in NEP curriculum	Pearson Correlation	.641*	.585	1	.693**
	Sig. (2-tailed)	.017	.141		.000
	N	250	250	250	250
Incorporation of communication skill development in NEP curriculum	Pearson Correlation	.632*	.694	.693**	1
	Sig. (2-tailed)	.011	.110	.000	
	N	250	250	250	250

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The independent factor, Industry readiness for 5.0 opportunities, was correlated with various dependent factors like incorporation of technology in curriculum, Incorporation of sustainability principles in curriculum, Focus on communication skill development.

Incorporation of modern technologies like AI, IoT in NEP curriculum had a strong correlation (0.862) with industry readiness of the students. Incorporation of sustainability concepts contributed positively to industry readiness, correlation value being 0.641. Incorporating communication skill development programs also has a valuable effect on with industry readiness, correlation value being 0.632.

SUGGESTIONS

Based on the analysis conducted and the corresponding findings, following suggestions are put forward by the researcher to reduce the challenges faced by the students to equip themselves for industry ready for the emerging industry 5.0 opportunities.

1.The study identified five major factors influencing the industrial readiness of MBA graduates namely Need for revamp in existing curriculum, Smart leadership to face the challenges of disruptive changes, Need for latest IT infrastructure, Inclusive culture, Student mindset to adapt to new challenging requirements of industry 5.0 So the researchers suggest careful interventions on the five major factors to create an industry ready student fraternity.

2. The study found out that Industry readiness for 5.0 opportunities, was correlated with various dependent factors like incorporation of technology in curriculum, Incorporation of sustainability principles in curriculum and focus on communication skill development. So, there should be upgradation in the existing systems of curriculum by incorporating more of these elements to make the students industry ready.

3. NEP curriculum is able to contribute to more of industry readiness among students because of its inherent nature of creating more of practical aspects related to sustainability, inclusiveness, as well as blended learning opportunities.

CONCLUSION

The study found out five major factors contributing to industry readiness of MBA graduates towards industry 5.0 opportunities viz.Revamp in existing curriculum, Smart leadership to face the challenges of disruptive changes, Availability of latest IT infrastructure, Inclusive culture, Student mindset to adapt to new challenging requirements of industry 5.0. Careful interventions to maximise the industrial readiness of students will of course need focus on these five factors and necessitate a learning environment fostering the same. Incorporation of modern technologies like AI, IoT in NEP curriculum had a strong correlation with industry readiness of the students, hence universities can assimilate the positive sides of the disruptive changes that these technologies bring along with them.

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