EXPLORING THE IMPACT OF INDUSTRY 5.0 TECHNOLOGIES ON WORKFORCE PLANNING AND SKILL DEVELOPMENT IN THE IT SECTOR

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ABSTRACT

Industry 5.0 is a shift in how IT firms use technology to create creative, sustainable, and people-focused workforces. From the standpoint of skill development and forecasting, this study looks at the key technologies of industry 5.0, such as artificial intelligence and predictive analytics. In the context of skill gap analysis, succession planning, demand forecasting, learning personalization, and upskilling and reskilling initiatives, the study investigates potential applications of these technologies. This study examines the impact of them on IT training and career development. The organizational challenges to incorporating these technologies into HR systems are also discussed. Insights for policy makers and HR managers. This study is giving insights to policy makers and HR directors, how they can combine strategic personnel development with technology in order to create versatile IT workforces of the future.

KEY WORDS: *Career Progression, Industry 5.0, Skill Development, Technology Adoption, Workforce Planning.*

Introduction

Industry 5.0 accelerates digital transformation and creates ever more creative, customized, and environmentally friendly workspaces by fusing human creativity with intelligent technologies. In an IT sector that has seen decades of rapid technological advancement, this paradigm marks a substantial shift from the company-based learning and talent strategy. In immersive learning systems, artificial intelligence (AI), predictive analytics, cognitive computing, and robots are increasing the efficiency of data-driven decision-making and traditional HR procedures. I have always joked that there are a lot of marketers working in the marketing industry, and AI insights have a lot to do with workforce planning. IT companies can use predictive models to track mobility, map future skill requirements, anticipate talent shortages, and enhance succession planning in order to adapt to market changes and preserve a strong, competitive talent pool. Employees now have more opportunities to acquire job skills thanks to personalized learning platforms, AI-driven training recommendations, virtual simulations, and continuous learning tools. These programs have several advantages, including accelerating career advancement, increasing organizational productivity and adapting to the evolving needs of employees, argues Palermo.

Review of literature

1. **Asma Bano and Ayesha Khatun's (2025)** thorough literature assessment demonstrates a strong correlation between employee potential, employee engagement, and organizational performance. A review of the study defines a sequence: tapping into employees' untapped potential in an appropriate way improves employee engagement to some extent, which in turn improves organizational production.

2. **Arti Awasthi (2025)** The bibliometric study of 2013-2023, analyzed using VOS viewer, demonstrates that engagement studies gradually rose and peaked in 2020 with 238 Scopus-indexed articles. The United States leads the rankings, followed by India, the United Kingdom, China, Australia, and Malaysia. The findings highlight the expanding global trend of engagement studies, as well as the critical need for more complete and diverse data in order to better understand the notion of engagement and achieve improved organizational engagement practices.

3. **Seda Gugercin (2024)** examined the anticipated impact of Industry 5.0 on the competencies of the future workforce. It is anticipated that this new pattern will alter the skills needed and possibly lead to the creation of new skill gaps. In its Future of Jobs—Studies (2016 and 2020), the World Monetary Forum identified critical future characteristics, including technical skills, self-management, leadership, social impact awareness, and problem-solving abilities. In this new Industry 5.0 era, this study shows how important early training is for adapting to shifting skill needs and offers very useful guidance for managers, staff, researchers, and HR professionals

4. **S. Yuvaraj and M. S. Suganthiya (2021)** applying knowledge in human resource management can enhance speed, reduce costs, improve data precision, transparency, consistency, and data availability, and lead to a paradigm shift in HR's role. The application of technology in human resource management can increase efficiency, cost-effectiveness, accuracy, transparency, and efficiency, reducing administrative time. Technology can help an enterprise stay competitive by delivering effective human resource management services.

5. **Y. Long (2019)** investigates the connections between HR, HRIT, and processes while analysing HRIT and the shift in the HR role. The study uses 43 peer-reviewed articles for both a theoretical analysis and a meta-analysis of empirical findings. According to the empirical findings, there is a role conflict between HR professionals and line managers as a result of their continued focus on operational issues. However, because it can help with the shift from traditional HR roles to technology-based roles, HRIT is regarded as an essential tool for HR change.

6. **According to Karesek (2019)** the growth of IT has led to a greater use of IT in HRM, which has reduced the time and expense of services offered to employees and job seekers. Investigating how IT supports HR functions like hiring, training, development, motivation, capacity management, and employee management across various organizational departments is the goal of this study. Document analysis, interviews, and observation were all part of the case study research design. Three Silicon Valley-based US tech companies are the subject of the case study. The majority of big businesses have HR software integrated to manage the workforce in a single application, and Silicon Valley technical schools use a variety of IT applications for people management.

Research Gap

There is little empirical data on how Industry 5.0 technologies are actually used in workforce planning and skill development within the IT sector, despite the fact that these technologies have drawn more attention due to their potential to revolutionize work environments. The majority of the literature currently in publication concentrates on theoretical discussions of Industry 5.0 with little attention paid to practical applications of technologies like automation, artificial intelligence (AI) and predictive analytics in predicting demand for the workers and matching skill sets to future employment. Furthermore, there is a dearth of research regarding how employees view and experience the adoption of these new technologies. This Discrepancy highlights how important is to conduct empirical research that assesses the potential advantages of manufacturing 5.0 technologies for IT workforce planning and skill development.

Conceptual Framework

Industry 5.0 Technologies in IT: Impact on Workforce
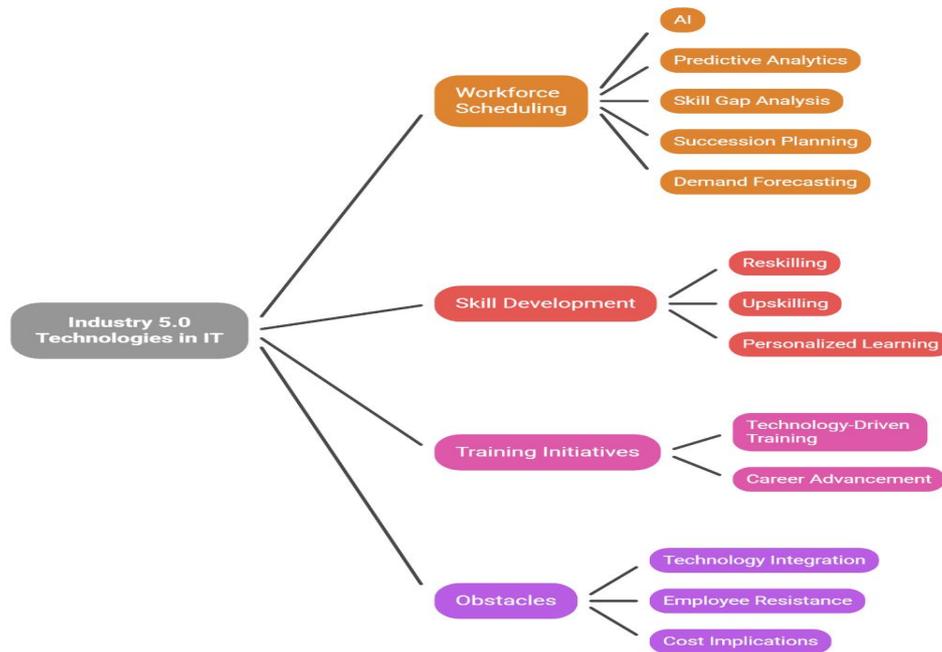
Objective of The Study
- To assess the most important industry 5.0 technologies used by IT companies and how they relate to skill development and workforce planning.
- To investigate how workforce scheduling uses AI, predictive analytics, and other tools (skill gap analysis, succession planning, and demand forecasting).
- To evaluate the way industry 5.0 technologies, improve employee skills through reskilling, upskilling, and personalized learning.
- To analyse technology-driven perspectives on training initiatives and career advancement in the IT industry.
- To examine the obstacles and difficulties in incorporating industry 5.0 skills into employee development and workforce planning.

Statement of The Problem
As we move from industry 4.0 to industry 5.0, the nature of work in the IT sectors has changed significantly due to the rapid development of digital technology. The new commerce prioritizes people and technological optimization in addition to sustainability and resilience. IT companies are changing how they pan for talent and develop skills via technologies like artificial intelligence (AI), big data analytics, intelligent automation, and collaborative schemes, but they also bring with them new difficulties. New job titles, skill obsolescence, and the need to combine higher-order human skills with strong technical expertise are some of the challenges facing the industry. The rate of change is too rapid for traditional workforce planning and development methods that rely on historical data and structural models. Despite industry 5.0's focus on human-centered innovation, the IT sector lacks the strategic frameworks required to plan and develop with these technologies in an efficient manner. By examining its effects on workforce planning and skill development in the IT sector, this study seeks to close the empirical data gap on industry 5.0's implications for human resources that currently exists in the literature.

Scope of The Study
The study looks into how IT workforce planning and development are affected planning and development are affected by industry 5.0 technology. Predictive analytics, intelligent automation, artificial intelligence, and human collaboration are the study's main industry 5.0 technologies. The application of industry 5.0 technology to workforce planning and expansion in the IT sector provides additional support for this research. This sector-specific analysis focuses on the software and IT service providers that make up the study area's IT industry. Managers, team leaders, workers, and human resources staff make up the learners. The analysis's primary focus is on how industry 5.0 technology affects workforce planning performance, skill development performance in general, and future job readiness. The parameters of this study and their relevance to the current stage of industry 5.0 technology development. This does not include industry 5.0 technology's financial performance and technical design.

Research Methodology

The impact of industry 5.0 technologies on workforce planning and IT competency development is examined in this research. It uses a descriptive and analytical research design to evaluate how emerging technologies affect human resource outcomes and provide an overview of modern workforce practices. This study uses both primary and secondary data. To collect primary data, structured questionnaires were used to survey 167 individuals, including managers, team leaders, HR specialists, and IT personnel, about their direct or indirect roles in workforce planning and skill development. Purposive sampling was used to select respondents in order to make sure they had relevant experience with Industry 5.0 concepts and associated workforce practices.

This approach proved to be very helpful since it produced data that was both instructive and pertinent to the goal of the study. The secondary data came from industry reports, peer-reviewed journals, conference proceedings, and academic databases like EBSCO and Google Scholar. In addition to identifying research gaps in Industry 5.0, workforce planning and skill development, this literature review attempted to offer theoretical support for the study.

Data Analysis

The data gathered to evaluate the impact of Industry 5.0 technologies on IT workforce planning and skill development is analysed in this section. The study employed frequency analysis of demographic information, Likert-scale analysis to assess respondents' perceptions, and the Chi-square test to examine relations between key variables.

<table>
<tr><th colspan="5">Table 1: Frequency Analysis</th></tr>
<tr><th>SI. NO</th><th>Variable</th><th>Classification</th><th>Frequency</th><th>Percentage</th></tr>
<tr><td>1</td><td>Gender</td><td>Male
Female</td><td>92
75</td><td>55
44</td></tr>
<tr><td>2</td><td>Age Group</td><td>Up to 25
26 to 35
36 to 45
Above 45</td><td>46
71
34
16</td><td>27
42
20
9</td></tr>
<tr><td>3</td><td>Marital Status</td><td>Single
Married
Widowed</td><td>
89
68
10</td><td>
53
40
5</td></tr>
<tr><td>4</td><td>Level of Education</td><td>Diploma
Bachelor's Degree
Master's Degree
Doctorate</td><td>
21
74
56
16</td><td>
12
44
33
9</td></tr>
<tr><td>5</td><td>Years of Experience</td><td>Less than 1 year
1 – 2years
2 – 4years
5 – 6years</td><td>38
45
44
40</td><td>22
26
26
23</td></tr>
</table>

Source: Primary data

Interpretation:

Table demonstrations the Individual variances like Gender, Age, Marital Status, Level of education, then Occupational status of the respondents, these factors directly stimulus the Impact of Industry 5.0 Technologies on Workforce Planning and Skill Growth in the IT Sector. Table 1, shows that 55% of the respondents are male and 44% are female, 42% of the respondents are in the age group of 26 to 35, 53% of the respondents are Single, 44% of the respondents have completed their Bachelor's Degree and 26% of the respondents were having a working experience with 1 – 2 years & 2 – 4 years.

<table>
<tr><th colspan="9">Table 2: The Role of Predictive Analytics, Ai and Other Tools in Workforce Plannings.</th></tr>
<tr><th>Particulars</th><th>Strongly Agree (5)</th><th>Agree (4)</th><th>Neutral (3)</th><th>Disagree (2)</th><th>Strongly Disagree (1)</th><th>Total</th><th>Likert value</th><th>Rank</th></tr>
<tr><td>Predictive analytics improves workforce demand forecasting accuracy.</td><td>68
(340)</td><td>57
(228)</td><td>25
(75)</td><td>12
(24)</td><td>5
(5)</td><td>672</td><td>1</td><td>I</td></tr>
<tr><td>AI-Based systems enhance succession planning processes.</td><td>62
(310)</td><td>55
(220)</td><td>28
(84)</td><td>15
(30)</td><td>7
(7)</td><td>651</td><td>0.96</td><td>II</td></tr>
<tr><td>Skill gap analysis is</td><td>59</td><td>52</td><td>32</td><td>17</td><td>7</td><td></td><td></td><td></td></tr>
</table>

Particulars						Total	Likert value	Rank
more effective with data-driven tools.	(295)	(208)	(96)	(34)	(7)	640	0.95	III
Workforce planning decision rely on real-time analytics.	49 (245)	48 (192)	38 (114)	20 (40)	12 (12)	603	0.89	V
AI tools reduce workforce shortages and excess staffing.	54 (270)	50 (200)	36 (108)	18 (36)	9 (9)	623	0.927	IV

Source: Primary data

Interpretation:
Table 2 shows the agreement level of respondents to examine the role of predictive analytics, AI and other tools in workforce planning using Likert scale. The First rank is predictive analytics improves workforce demand forecasting accuracy. The Second rank is AI-Based systems enhance succession planning processes. The Third rank is skill gap analysis is more effective with data-driven tools. The Fourth rank is AI tools reduce workforce shortages and excess staffing. The Fifth rank is Workforce planning decision rely on real-time analytics.

Table 3: Barriers And Challenges in Integrating Industry 5.0 Technologies into Workforce Planning and Employee Development.								
Particulars	HS	S	N	D	HDS	Total	Likert value	Rank
Availability of technical expertise for industry 5.0 adoption.	(190) 38	(208) 52	(123) 41	(44) 22	(14) 14	579	0.991	II
Management of employee resistance to technology.	(170) 34	(196) 49	(132) 44	(50) 25	(15) 15	563	0.964	IV
Addressing data privacy and security concerns.	(180) 36	(220) 55	(105) 35	(48) 24	(17) 17	570	0.976	III
Adequacy of infrastructure for industry 5.0 tools.	(165) 33	(200) 50	(129) 43	(52) 26	(15) 15	561	0.960	V
Organizational support for technology-driven HR practices.	(200) 40	(212) 53	(114) 38	(44) 22	(14) 14	584	1	I

Source: Primary data

Interpretation:
Table 3 shows the satisfactory level of respondents to barriers and encounters in participating industry 5.0 technologies into workforce planning and employee development using Likert scale. The first rank is organizational support for technology-driven HR practices. The second rank is Availability of technical expertise for industry 5.0 adoption. The Third rank is Addressing data privacy and security concerns. The Fourth rank is Management of employee resistance to technology. The fifth rank is Adequacy of infrastructure for industry 5.0 tools.

Table 4: Industry 5.0 Technologies Used by It Firms and Their Relevance to Workforce Planning and Skill Development								
Particulars	Always	Often	Sometimes	Rarely	Never	Total	Likert value	Rank
AI and automation technologies are used for workforce planning activities.	46 (230)	52 (208)	38 (114)	21 (42)	10 (10)	604	1	I
Advanced Analytics tools are applied in HR-decision making.	42 (210)	49 (196)	41 (123)	23 (46)	12 (12)	587	0.971	III
Human-Machine collaboration systems are implemented in daily HR operations,	39 (195)	47 (188)	45 (135)	24 (48)	12 (12)	578	0.956	V
Digital tools are used to Identify current workforce capabilities.	44 (220)	51 (204)	40 (120)	22 (44)	10 (10)	598	0.990	II
Industry 5.0 technologies are used to monitor employee skill requirement.	41 (205)	48 (192)	44 (132)	23 (46)	11 (11)	586	0.970	IV

Source: Primary data

Interpretation:

Table 4 shows the agreement level of respondents towards key industry 5.0 technologies used by it firms and their relevance to workforce planning and skill development using Likert scale. The First rank is AI and automation technologies are used for workforce planning activities. The Second rank is Digital tools are used to Identify current workforce capabilities. The Third rank is Advanced Analytics tools are applied in HR-decision making. The Fourth rank is Industry 5.0 technologies are used to monitor employee skill requirement. The Fifth rank is Human-Machine collaboration systems are implemented in daily HR operations.

Table 5: Industry 5.0 Technologies Enhances Employee Skills Through Personalised Learning, Upskilling, And Reskilling.								
Particulars	**Very likely (%)**	**Likely (%)**	**Neutral (%)**	**Unlikely (%)**	**Very Unlikely (%)**	**Total**	**Likert value**	**Rank**
Digital platforms are likely to provide personalised learning experiences.	47 (235)	60 (240)	32 (96)	18 (36)	10 (10)	617	0.991	IV
Industry 5.0 Tools are likely to support continuous upskilling.	52 (260)	57 (228)	30 (90)	16 (32)	12 (12)	622	1	I
Technology-enabled training is likely to improve employee skills.	49 (245)	58 (232)	34 (102)	15 (30)	11 (11)	620	0.996	II
Employee are likely to engage in reskilling through AI tools.	44 (220)	55 (220)	37 (111)	18 (36)	13 (13)	600	0.964	V
Learning Technologies are likely to align skills with future job roles.	50 (250)	56 (224)	33 (99)	17 (34)	11 (11)	618	0.993	III

Source: Primary data

Interpretation:

Table 5 shows the agreement level of respondents to industry 5.0 technologies enhance employee skills through personalised learning, upskilling, and reskilling using Likert scale. The First is Industry 5.0 Tools are likely to support continuous upskilling. The Second rank is Technology-enabled training is likely to improve employee skills. The Third rank is Learning Technologies are likely to align skills with future job roles. The Fourth rank is Digital platforms are likely to provide personalised learning experiences. The Fifth rank is Employee are likely to engage in reskilling through AI tools.

Table 6: Technology-Driven Insights on Career Progression and Training Programmes in The IT Sector.								
Particulars	**Very High (%)**	**High (%)**	**Moderate (%)**	**low (%)**	**Very low (%)**	**Total**	**Likert value**	**Rank**
Effectiveness of analytics in career progression decision.	54 (270)	56 (224)	33 (99)	15 (30)	9 (9)	632	0.998	II
Accuracy of technology – driven employee potential assessment.	52 (260)	58 (232)	34 (102)	14 (28)	9 (9)	631	0.996	III
Effectives of AI-based training programme design.	49 (245)	57 (228)	37 (111)	19 (38)	5 (5)	627	0.990	IV
Alignment between career paths and skills analytics.	51 (255)	55 (220)	36 (108)	15 (30)	10 (10)	593	0.93	V
Impact of Industry 5.0 tools on employee career growth.	56 (280)	54 (216)	33 (99)	14 (28)	10 (10)	633	1	I

Source: Primary data

Interpretation:

Table 6 illustrations the agreement level of respondents to evaluate technology-driven insights on career progression and training programmes in the it sector using Likert scale. The First rank is Impact of Industry 5.0 tools on employee career growth. The Second rank is Effectiveness of analytics in career progression decision. The Third rank is Accuracy of technology – driven employee potential assessment. The Fourth rank is Effectives of AI-based training programme design. The Fifth rank is Alignment between career paths and skills analytics.

Statistical Tool - Table 1

Post Hoc Tests - Multiple Comparisons						
(I) Experience	(J) Experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
LESS THAN 1 YEAR	1-2 YEARS	.11930	.23473	.957	-.4900	.7286
	2-4 YEARS	.16627	.23595	.895	-.4462	.7787
	5-6 YEARS	.00263	.24135	1.000	-.6239	.6291
1-2 YEARS	LESS THAN 1 YEAR	-.11930	.23473	.957	-.7286	.4900
	2-4 YEARS	.04697	.22588	.997	-.5394	.6333
	5-6 YEARS	-.11667	.23152	.958	-.7176	.4843
2-4 YEARS	LESS THAN 1 YEAR	-.16627	.23595	.895	-.7787	.4462
	1-2 YEARS	-.04697	.22588	.997	-.6333	.5394
	5-6 YEARS	-.16364	.23276	.896	-.7678	.4405
5-6 YEARS	LESS THAN 1 YEAR	-.00263	.24135	1.000	-.6291	.6239
	1-2 YEARS	.11667	.23152	.958	-.4843	.7176
	2-4 YEARS	.16364	.23276	.896	-.4405	.7678

Homogeneous Subsets

Experience		Subset for alpha = 0.05
	N	1
2-4 YEARS	44	1.8864
1-2 YEARS	45	1.9333
5-6 YEARS	40	2.0500
LESS THAN 1 YEAR	38	2.0526
Sig.		.892

Means for groups in homogeneous subsets are displayed.
a. Uses Harmonic Mean Sample Size = 41.552.
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Interpretation:

A one-way ANOVA was directed to examine whether experience influences perceptions of predictive analytics in improving workforce demand forecasting accuracy. The results show there is no statistically significant difference among experience collections, as the significance value (0.856) is greater than 0.05. This indicates that employees, regardless of their experience level, have similar perceptions regarding the effectiveness of predictive analytics in enhancing workforce demand forecasting accuracy. Hence, the null hypothesis is accepted.

Interpretation (Tukey HSD – Post Hoc Test):

The post-hoc Tukey HSD test has also supported there are no significant mean differences among each pair of the experience groups, as the values are greater than 0.05.

Homogeneous Subset Analysis

As a result of the previous test, a homogeneous subset test has been performed, which states that a single subset contains all experience groups, referring to similar levels in mean score values between groups; hence, perceptions regarding the efficiency of predictive analytics in workforce demand forecasts are similar, regardless of experience levels.

H_0: There is no significant relationship between AI & automatic technologies are used for workforce planning activities and predictive analytics improve workforce demand forecasting accuracy.
H_1: There is no significant relationship between AI & automatic technologies are used for workforce planning activities and predictive analytics improve workforce demand forecasting accuracy.

Table 2: Analysis of the Relationship between AI Usage in Workforce Planning and Workforce Demand Forecasting Accuracy using Correlation Coefficient.

Descriptive Statistics			
	Mean	Std. Deviation	N
Ai And Automatic Technologies Are Used For Workforce Planning Activities	2.3832	1.18594	167
Predictive Analytics Improve Workforce Demand Forecasting Accuracy	1.9760	1.05826	167

Correlations		Ai And Automatic Technologies Are Used for Workforce Planning Activities	Predictive Analytics Improve Workforce Demand Forecasting Accuracy
Ai And Automatic Technologies Are Used for Workforce Planning Activities	Pearson Correlation	1	-.204**
	Sig. (2-tailed)		.008
	N	167	167
Predictive Analytics Improve Workforce Demand Forecasting Accuracy	Pearson Correlation	-.204**	1
	Sig. (2-tailed)	.008	
	N	167	167
**. Correlation is significant at the 0.01 level (2-tailed).			

Interpretation:

The correlation investigation was conducted to observe the relationship between the use of AI and automation technologies for workforce planning activities and the effectiveness of predictive analytics in improving workforce demand forecasting accuracy. The two variables have a negative and statistically significant correlation, according to the results (r=-0.204, p=0.008). At the 1% level, the relationship is significant when the p-value is less than 0.01. This suggests a weak inverse relationship, meaning that perceptions of the accuracy of predictive analytics in workforce demand forecasting change in parallel with increased use of AI and automation technologies. As a result, the null hypothesis is disproved, demonstrating the variables are significantly correlated. The two variables have a negative and statistically significantly correlation, according to the results (r=-0.204, p=0.008). At the 1% level, the relationship is significant when the p-value is less than 0.01.

Findings

The purpose of this study is to demonstrate how employing industry 5.0 technology improves workforce planning and development in the IT industry. Today's IT companies can now predict their skill needs with human-centric technologies like advanced analytics, smart automation, and collaborative AI, based on the research findings. The guidelines promote ongoing retraining and professional development, combining technologies know-how with human values like creativity, empathy, and problem-solving. In addition, using AI analytics helps to bridge the skills gap and maximize career prospects through personalized learning and performance-based programs. The incorporation of Industry 2.0 technology into the mix helps to enhance employee engagement, flexibility, and longevity. Thus, creating a more challenging workforce in today's dynamic technological world.

Suggestion

It implies that IT companies should incorporate industry 5.0 technologies into workforce planning using "human-focused AI, smart analytics, and the intelligent decision tools" to better forecast the skills that the workforce would require in the future. IT companies should develop programs aimed at continuous upskilling and reshuffling the workforce by combining expertise in cutting-edge technology with basic human capabilities such as creativity, critical thinking, or emotions. "Building a culture of lifelong learning through personalized learning paths and AI – led career tools is advisable to increase employee versatility". Address the issue of resistance using awareness campaigns, leadership support, and effective change management strategies. It is imperative that policymakers and training institutions collaborate with IT companies to develop Industry 5.0 skills that would prepare the workforce for future endeavours.

Conclusion

The focus of this research will be on the influence that Industry 5.0 technology will have on IT changers workforce planning and skills training, with a focus on enhancing forecasting and planning. Many people find them very useful in enhancing their skills to fit with what is to come in their respective organizations. It is interesting to note that the predictive analytics role in forecasting workforce needs remain the same, regardless of years of employment. All employers, at different level are supportive of these technologies. Moreover, it can be noted that there is a correlation between AI-based planning and predictive analytics, which means that more informed decisions can be made by HR professionals with the integration of handles workforce planning and skills training. Those who join can refine forecasts, enhance their skills and be bold in making strategic decision.

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