

AI-Driven Workforce Management in the Metaverse: Bridging Institutional Adaptiveness and Future Workforce Demands Through Technology Acceptance and Digital Competence

Dr. Dara Vijaya Lakshmi¹, Dr.S. Rajeshwari², Dr.V. Rajalakshmi³,
Dr. Durga Prasad Singh Samanta^{4*}, Dr.T. Prakash⁵, and Dr.S. Monica⁶

¹Assistant Professor, School of Business and Management, CHRIST University, Bengaluru, Karnataka, India. daravijaya.lakshmi@christuniversity.in, <https://orcid.org/0000-0002-8947-3335>

²Assistant Professor, School of Business and Management, Christ University, Bengaluru, Karnataka, India. rajeshwari.s@christuniversity.in, <https://orcid.org/0000-0001-7970-3021>

³Assistant Professor, School of Commerce, Finance and Accountancy, Christ (Deemed to be University) Bangalore, Karnataka, India. rajalakshmihasini@gmail.com, <https://orcid.org/0000-0002-4673-6465>

^{4*}Assistant Professor, School of Business and Management, Christ University, Bengaluru, Karnataka, India. go_india@yahoo.com, <https://orcid.org/0000-0001-6306-7569>

⁵Assistant Professor, Department of Management Studies, Dr.G.R Damodaran College of Science, Coimbatore, Tamil Nadu. India. s.t@grd.edu.in, <https://orcid.org/0000-0002-1499-4056>

⁶Assistant Professor, School of Business and Management, Christ (Deemed to be University), Bangalore, Karnataka, India. monica.s@christuniversity.in, <https://orcid.org/0000-0002-4659-9499>

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Abstract

Artificial Intelligence (AI) and the metaverse have revolutionized work management practices by offering intelligent, immersive, and collaborative digital workplaces. Past studies, however, focused more on technology adoption, digital competence, or metaverse use, overlooking their collective impact on workforce readiness and institutional adaptability. Thus, in this study, a new Workforce Management Framework (WMF) that integrates the impacts of technology adoption and digital competence in the metaverse environment to address institutional adaptability is proposed. The framework establishes a deterministic scoring index, which is evaluated against machine learning models to assess workforce readiness: Accuracy, Precision, Recall, F1-Score, and Workforce Readiness Index (WRI). The proposed framework demonstrated a strong performance of 98.52% accuracy, 98.17% precision, 97.95% recall, and 98.06% F1-Score. In addition, the WRI was 96.27%, showing a strong capacity for future digital workplaces. Briefly put, the ablation study revealed the strong influence of digital competence over other features (e.g., Institutional Adaptiveness and Technology Acceptance) in shaping workforce readiness. This is a novel study that simultaneously addresses workforce analytics using AI, workforce collaboration in the metaverse, technology adoption, and digital competence, all for predicting and evaluating future workforce readiness. The

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*Corresponding author: Assistant Professor, School of Business and Management, Christ University, Bengaluru, Karnataka, India.

outcomes can guide policy-makers, organizations, and schools on sustainable approaches to workforce development in this digital age.

Keywords: Artificial Intelligence (AI), Workforce Management, Metaverse, Technology Acceptance, Digital Competence, Institutional Adaptiveness, Workforce Readiness.

1 Introduction

The interplay of AI and metaverse technology is at the core of this changing nature of work by laying the foundation for highly intelligent, interactive, and immersive digital work experiences (Fenwick & Molnar, 2022; Aggarwal et al., 2025). In fact, various organizations are finding value in AI-enabled applications due to a myriad of benefits for human resources management processes, including recruitment, employee engagement, performance management, employee training, and workforce planning (Siemon, 2022; Einola & Khoreva, 2023; Jöhnk et al., 2021). The metaverse has been touted as an amazing new digital universe where people, organizations, and workers could interact, learn, and carry out tasks within these virtual worlds. This new environment presented by the changing paradigm of work driven by new technologies has also prompted change in how organizations meet the rapidly shifting conditions of the marketplace, as well as workforce demands. There has been unprecedented change in recent years of digital transformation; this explains why an institution has to keep up with continuous innovation and have strong organizational resilience (Merhi, 2021). Traditional workforce management approaches are inadequate for many present-day demands, including, but not limited to, managing a remote workforce, workforce digital skills, workforce diversity, and the dynamism of job requirements.

The level of technology adoption will significantly influence the successful implementation of an AI-based workforce management system in the metaverse (Wamba-Taguimdje et al., 2020; Kimseng et al., 2020; Watson et al., 2021). The TAM model indicates that the key predictors of user acceptance of new technology are perceived usefulness and perceived ease of use. Clear benefits of using AI and the metaverse; however, their successful application in the organization is critically dependent on individuals' acceptance and adoption (Smuha, 2021; Unuriode et al., 2024). Hence, to attain optimal return for the digital workforce transformation endeavor, it is imperative to understand the determinants of technology acceptance (Gil et al., 2026). Except for technology acceptance, digital competence is another crucial requirement for individuals participating in a technologically enhanced setting (Jain & Mitra, 2025). Digital competence is defined as the knowledge and skills, attitudes, and behaviors required for an individual to effectively use digital technologies for communication, collaboration, problem-solving, and innovation. As more AI-based and metaverse systems are adopted in the organization, employees must upgrade their digital skills continuously (Mirbabaie et al., 2022; Chowdhury et al., 2023; Jussupow et al., 2022).

Adaptive institutions are those that change in response to changes in the environment, technology, or the needs of employees (Merhi, 2021). It's generally less resistant to adopting new technologies, introducing process changes, and cultivating continuous learning environments. Artificial Intelligence and metaverse technologies can be utilized to increase institutional adaptiveness by means of real-time monitoring, smart decision-making tools, and virtual training environments (Wang et al., 2024; Canbek, 2020). Businesses can therefore increase their capacity to remain flexible and thrive in the increasingly digital economies.

Key Contributions of the Research

- Present an AI-driven model of workforce management on the metaverse to facilitate efficient workforce planning and cooperation.
- Examines the effect of technology acceptance and digital literacy on adopting the metaverse workplace.
- Enhances the institutional flexibility and the workforce preparation to tackle the demands of future jobs and digital transformation.

The rest of this paper follows this outline. Section II includes the literature review covering AI related to workforce management; metaverse technologies; technology acceptance; and digital competence, which will summarize the studies that already exist on these topics. Section III focuses on methodology, including the research framework, data collection, and data analysis. Section IV presents experimental results and performance evaluation of the worked-out model presented in this paper. Section V discusses the results and their implications for institutional adaptability and future workforce development. The conclusions of this research and suggestions for future work will be presented in Section VI.

2 Literature Review

According to Fenwick et al., (2024), HRM has a major effect on the AI-enabled digital transformation process and should be incorporated as an integral part of an organization's human-centric processes when using AI technology. In addition to the significant role technology plays in this process, the success of technology adoption also requires the involvement of human capabilities, human readiness, and the culture of an organization. HRM will connect employees to AI technology to bring about a successful, sustainable digital transformation by developing an appropriate management strategy.

Safi et al., (2024) investigated the digital readiness of the workforce and the necessary digital skills that would help organizations achieve successful implementation of digital transformation. It identified certain important abilities required in organizations, such as the skills for digital literacy and data analysis, and the adaptability to use technology. According to the study, the more prepared an organization is for future technological change, the more it invests in developing digital capabilities.

Nitsch et al., (2024) argued for a human-centered approach in working with AI technology in an organization. It observed the influence of AI technology on future work and the workforce. It was found that there is a necessity to strike a balance between automation of work and human intelligence for workers' well-being and performance. As per study findings, if organizations adopt human-centric AI techniques, It may experience increased innovation and employee acceptance of AI technology.

Altepost et al., (2024) presented a study assessing the requirements for implementing AI in an organization, with a focus on the organization's framework conditions. It identified the four factors essential for technology acceptance as the organization culture, technology acceptance, IT infrastructure, and employee participation. From all results, the organization with appropriate organizational circumstances showed enhanced adaptability toward technology and AI system adoption.

Sharma et al., (2025) surveyed the adoption of the metaverse in SMEs. It argued that task suitability, social influence, and self-efficacy are major contributors to the adoption intention toward the metaverse and performance in business processes. The finding showed that the role of the VR environment in digital work becomes increasingly important for supporting team cooperation in organizations.

Jin & Ryu, (2025) discussed digital equality and trust in the metaverse through the lens of artificial intelligence. It found that digital adaptability and trust are major factors in metaverse adoption intention, and that, for the workforce, higher digital competence is associated with a greater tendency toward virtual work environments.

Chamola et al., (2024) offered a holistic view of Generative AI in the metaverse and analyzed the use of AI to develop intelligent content and personalized experiences in virtual environments. It identifies opportunities in generative AI within the metaverse for virtual work processes, staff training, and digital workplace innovation.

Table 1: Comparative analysis of existing studies on AI-driven workforce management and metaverse adoption

Authors	Methodology	Dataset / Simulation Environment	Research Gap
Fenwick et al., (2024)	Conceptual and qualitative analysis of HRM practices in AI-driven digital transformation	Organizational and HRM case studies from digital transformation environments	Limited focus on integrating AI, metaverse technologies, and workforce adaptability within a unified framework.
Safi et al., (2024)	Survey-based assessment of workforce digital readiness and competency requirements	Workforce digital competency survey data from multiple organizations	Does not investigate the impact of digital competence on metaverse adoption and future workforce management.
Nitsch et al., (2024)	Human-centered AI framework and workplace analysis	AI-assisted workplace environments and organizational case studies	Lacks consideration of immersive metaverse environments and institutional adaptiveness factors.
Altepost et al., (2024)	Organizational readiness assessment for AI implementation	Enterprise-level AI adoption scenarios and workplace studies	Limited evaluation of digital competence and technology acceptance in virtual workforce ecosystems.
Sharma et al., (2025)	Task-Technology Fit (TTF), Social Capital Theory (SCT), and Social Cognitive Theory (SCogT)-based empirical analysis	Survey data collected from Small and Medium Enterprises (SMEs) adopting metaverse technologies	Focuses on SME adoption of the metaverse without examining AI-driven workforce management and institutional adaptability.
Jin & Ryu, (2025)	Quantitative analysis of digital equality, trust, and AI-powered metaverse adoption	User responses from AI-VR and metaverse environments	Does not address workforce management strategies and organizational readiness for future work demands.
Chamola et al., (2024)	Comprehensive survey and systematic review of Generative AI applications in the metaverse	Literature collected from AI and metaverse research databases	Primarily focuses on technological advancements without evaluating workforce acceptance and digital competency development.

The table 1 summarizes recent studies dealing with AI in work management, digital competence, technology adoption, and metaverse uptake. The review examines the methodology, dataset, or simulation environment, as well as the limitations of each study examined. The selected literature pushes the boundaries of AI's use in workplace innovation, workforce digital literacy, human-centric AI environments, and metaverse teaming. However, current studies are often limited because investigate only some areas (AI adoption, digital skills, trust, metaverse acceptance) rather than the intersection of these elements with workforce management and institutional readiness. Also, no attempt is being made to provide an integrated model that can address the challenges of technology acceptance, digital skills,

institutional readiness, and the future needs of the workforce in a metaverse. This study will therefore make an attempt to overcome the research limitations discussed above and will work towards the construction of an AI-based work management system for the future workplace.

3 Methodology

3.1 Data Collection and Variable Identification

This study examines how the concept of Technology Acceptance, Digital Competence, and Institutional Adaptiveness affect Workforce Readiness in the context of the metaverse workspace equipped with AI technology. Five hundred respondents (managers, employees, educators, and IT professionals with experience or knowledge of digital workplace technologies) were asked to complete a structured questionnaire. The survey gathered data on Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Digital Competence (DC), Institutional Adaptiveness (IA), Workforce Readiness (WR) and demographic characteristics. All variables that were measured require perception were normalized on a five-point Likert scale from strongly disagree to strongly agree. Collected data were screened for completeness and consistency prior to analysis and missing values were normalized to ensure data quality and reliability. In the proposed framework, the score of PU and PEOU were used as two independent predictables (Technology Acceptance Score (TAS)), and the score of Digital Competence (DC) and Institutional Adaptiveness (IA) were placed as independent predictables, and Workforce Readiness (WR) was used as a target output variable. These attributes were built into a single AI-based predictive model to assess the skills and capabilities of the workforce for digital workplaces and work environments in the metaverse. The resulting data set will form a broad base on which to evaluate the ability of employees and organisations to prepare for the changing nature of work with AI.

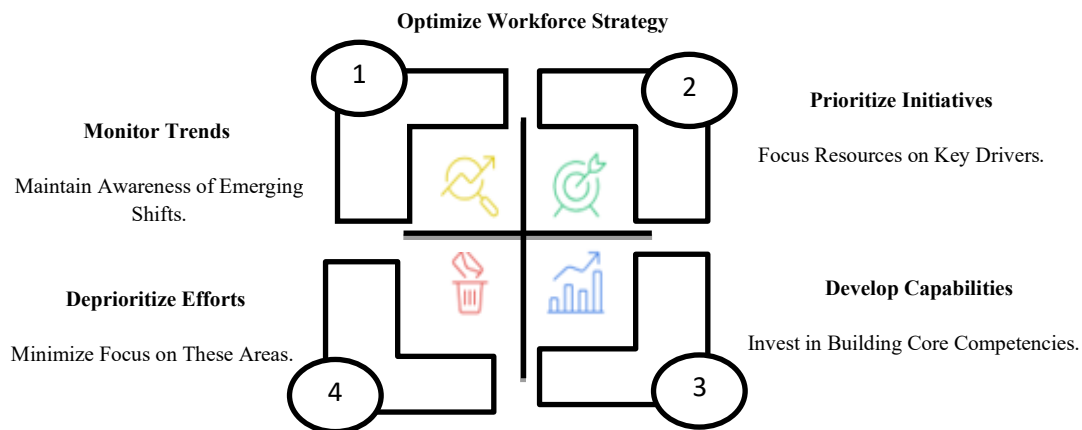


Figure 1: Strategic workforce management framework for workforce optimization

Following the above, an approach of a strategic workforce management framework is presented, which can optimize the workforce development and the performance of the organization, as presented in figure 1. The framework is divided into 4 dimensions: Monitor trends, prioritize initiatives, deprioritize efforts, and develop capabilities. Monitoring of trends can identify for organizations new shifts in technologies and/or workforce that may affect the organization in the future. By prioritizing the initiatives, one can focus and direct efforts on the high-impact activities, which can assist the organization in achieving its strategic goals and achieving its digital transformation. Less attention can be given to low-impact activities, thereby increasing efficiency and making effective use of resources.

Developing capacities focuses on enhancing staff's abilities, digital capabilities, and readiness for workforce changes. The dimensions are intertwined and provide a framework in which organizations can develop their readiness and make decisions that will enhance the growth and stability of organizations operating in the new work paradigm of AI and the metaverse.

3.2 Proposed AI-Driven Workforce Management Framework

The proposed framework integrates Artificial Intelligence, metaverse technologies, technology acceptance, and digital competence to improve workforce management and adaptability. AI technology's application includes intelligent workforce analytics, skill assessment, personalized training recommendations, and workforce performance tracking. The metaverse is a virtual collaboration platform for employees and is used for real-time communication, training, and execution of work tasks. Technology acceptance constructs - namely, perceived ease of use and perceived usefulness are key predictors of whether employees will adopt an AI-powered metaverse. Additionally, institutions need to be innovative in order to support their employees with changing technology and job responsibilities. All of these constructs are connected with respect to workforce readiness, productivity, and resilience through AI technologies. As such, this model provides a framework for competing in the digital age for the future workforce.

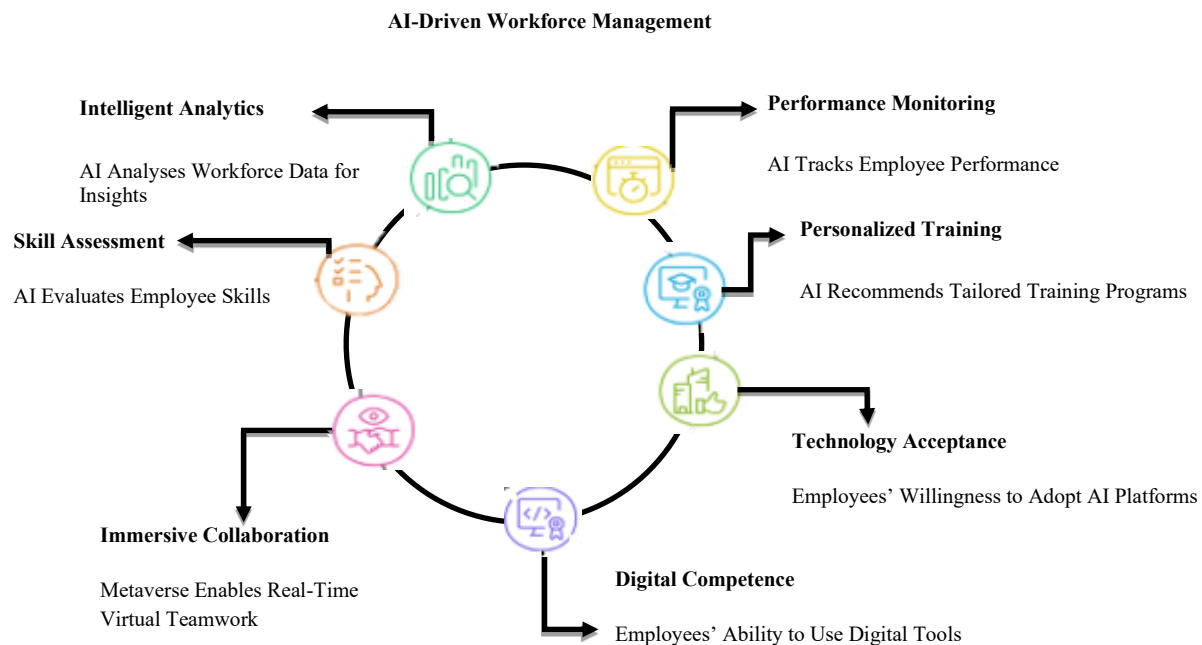


Figure 2: Proposed AI-driven workforce management framework in metaverse environments

Figure 2 illustrates the Proposed AI-Driven Workforce Management Framework integrating the concepts of Artificial Intelligence, metaverse, technology acceptance, and digital competence to enhance workforce readiness and adaptability of an organization. The proposed framework has eight interconnected components, including Intelligent analytics, Performance monitoring, Customized training, Technology acceptance, Institutional adaptiveness, Digital competence, Immersive collaboration, and Skill assessment. Data-enabled evaluation of workforce and decision-making using intelligent analytics and performance monitoring, along with customized training for continuous skill development of the employee. Institutional adaptiveness means an institution's capability to adjust itself

with the evolution of technology, while technology acceptance determines the willingness of employees to work in such an AI-based system. Digital competence and skill assessment ensure that employees have the skills that require for a digital future, and metaverse-based immersive collaboration ensures real-time virtual teamwork and knowledge transfer. This together enables the system to function as an inclusive ecosystem that promotes readiness and resilience for the workforce of the future and an AI-driven metaverse environment.

3.3 Model Evaluation and Statistical Analysis

To test the effectiveness of the proposed AI-Driven Workforce Management Framework (AIWMF) in forecasting the readiness of the workforce in AI-based metaverse environments, quantitative data analysis and machine learning techniques were applied. Once data was collected, the data was preprocessed to enhance data quality and reliability for training the model, which included handling missing values, checking data consistency, and normalizing the data. To explore the relationships between the major variables, correlation analysis was carried out, with the variables being: Technology Acceptance Score (TAS), Digital Competence (DC), Institutional Adaptiveness (IA), and Workforce Readiness (WR). The resulting dataset was then used to train and test the proposed classification framework with the help of AI. The model's predictive ability was evaluated using commonly used classification metrics, such as Accuracy, Precision, Recall, and F1-Score.

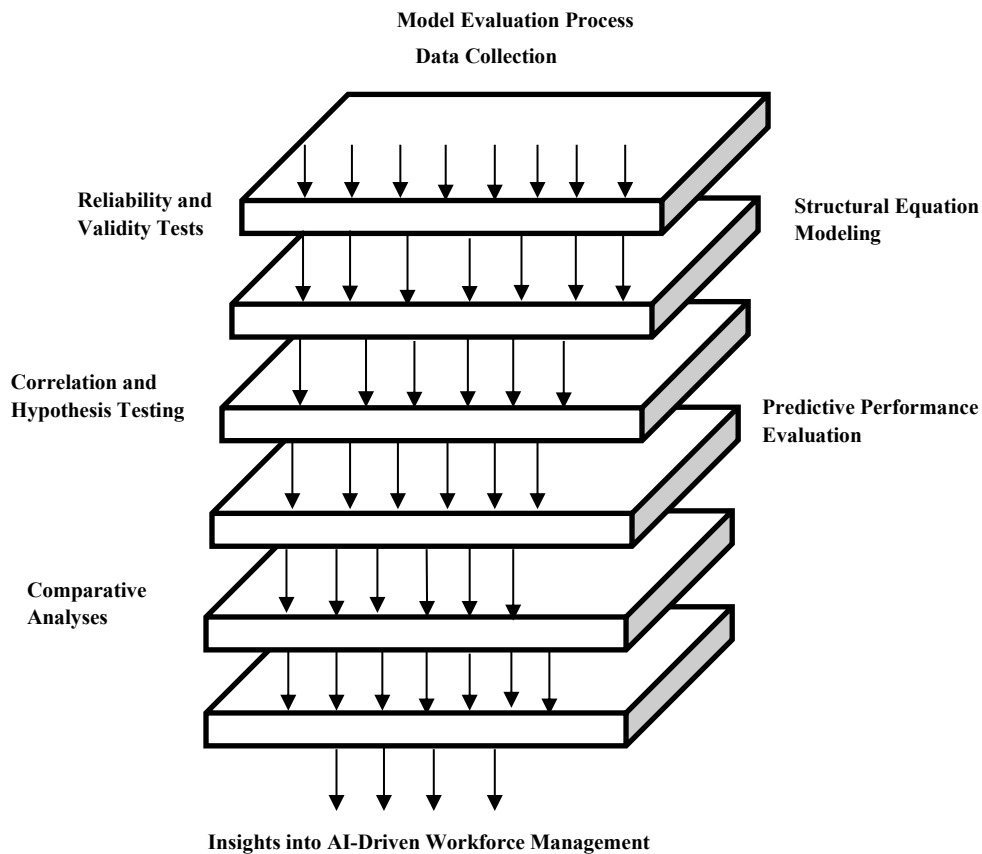


Figure 3: Model evaluation process for AI-driven workforce management framework

The Workforce Readiness Index (WRI) was also calculated to give an overall indication of employee and organizational readiness to future digital workplaces. Moreover, comparative performance analysis

and ablation studies were performed to see the effectiveness of the proposed framework and to find the relative contribution of each predictive factor. These analyses are useful for understanding the potential for readiness of the workforce to the metaverse, as well as the adaptability of the organization to AI-based environments of work.

In figure 3 shows the validation of the proposed AI-driven Workforce Management Framework in detailed model evaluation steps. In the first step, data collection is performed by collecting workforce-related information from employees, managers, educators, and IT practitioners. Secondly, data preprocessing and consistency verification procedures are applied to ensure the quality and reliability of the collected dataset. Correlation analysis is performed to examine the relationships among Technology Acceptance Score (TAS), Digital Competence (DC), Institutional Adaptiveness (IA), and Workforce Readiness (WR). Thirdly, the predictive performance of the model is evaluated using accuracy, precision, recall, and F1-score. Last but not least, the proposed framework is compared with existing frameworks. Evaluation of the entire process brings out significant implications for AI-driven workforce management so that organizations are well aware of workforce readiness and make appropriate decisions on the digital workplace enabled by the metaverse.

Technology Acceptance Score (TAS)

$$TAS = \frac{PU+PEOU}{2} \quad (1)$$

In this equation, 1 *PU* represents Perceived Usefulness, and *PEOU* represents Perceived Ease of Use. This equation calculates the overall Technology Acceptance Score by averaging the two primary constructs of the Technology Acceptance Model (TAM). A higher TAS value indicates a greater willingness of employees to adopt AI-driven workforce management systems within metaverse environments. The score reflects the degree to which new technologies are accepted by the users and the users' willingness to participate in the virtual workplace.

Workforce Readiness Index (WRI)

$$WRI = \frac{DC+IA+TAS}{3} \quad (2)$$

The measurement of an organization's readiness to take full advantage of the potential of artificial intelligence in the metaverse is represented in equation number two. The parts of this equation are digital competence [*DC*], institutional adaptive capacity [*IA*], and a technology acceptance score [*TAS*]. Using these three areas will create a workforce readiness index (*WRI*) that provides an overall measure of how well organizations and employees are prepared for the future. The higher the *WRI* score, the more likely employees and organizations are to have the ability to adapt to the metaverse. Therefore, a higher *WRI* means that an organization's performance, adaptability, and long-term sustainability will be enhanced.

Algorithm: AI-Driven Workforce Readiness Assessment

Step 1: Start

Step 2: Collect values of

PU ← Perceived Usefulness

PEOU ← Perceived Ease of Use

DC ← Digital Competence

$IA \leftarrow \text{Institutional Adaptiveness}$

Step 3: Calculate Technology Acceptance Score (TAS)

$$TAS = (PU + PEOU) / 2$$

Step 4: Calculate Workforce Readiness Index (WRI)

$$WRI = (DC + IA + TAS) / 3$$

Step 5: If $WRI \geq 4.0$

Workforce Status = "Highly Ready"

Else If $WRI \geq 3.0$

Workforce Status = "Moderately Ready"

Else

Workforce Status = "Needs Improvement"

End If

Step 6: Display TAS, WRI, and Workforce Status

Step 7: Stop

A proposed algorithm will evaluate how ready employees are for an AI-enabled metaverse work environment by looking at four key factors: perceived usefulness, perceived ease of use, digital competence, and institutional adaptiveness. The first step in this process is calculating a Technology Acceptance Score (TAS) based on variables from the Technology Acceptance Model, and then calculating a Workforce Readiness Index (WRI), which is made up of three variables (TAS, digital competence, and institutional adaptation). Based upon where the employees fall on the WRI, they will be categorized into one of three groups - highly ready, moderately ready, and below the standard required to be considered "acceptable." This algorithm will provide organizations with an easy way to assess employee readiness for digital transformation and to identify training requirements.

4 Experimental Results

4.1 Experimental Setup, Dataset, and Parameter Initialization

The proposed AI-Driven Workforce Management Framework (Table 2) was evaluated through experiments to explore its effectiveness in a metaverse-integrated work environment. A survey of 500 participants was conducted and consisted of employees, educators, managers, and IT professionals who work in a digital environment. The dataset contained measures for the following variables: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Digital Competence (DC), Institutional Adaptiveness (IA), and Workforce Readiness (WR). Before the analysis, the data was pre-treated to ensure that the responses were valid (handling the missing values and performing normalization) and checking its consistency.

All experiments were conducted on Python 3.11 with necessary libraries such as Pandas, NumPy, Scikit-learn, and TensorFlow. To ensure an unbiased estimation, 80% of the entire dataset was used as the training dataset, and the remaining 20% was used as the test dataset. It can analyze the correlations among these variables in the proposed model based on the formulation of the Technology Acceptance Score (TAS) and the Workforce Readiness Index (WRI). The primary parameters used were a learning

rate of 0.001, a batch size of 32, 100 epochs for training, with a classification dropout of 20% and 20% for validation. The performance of this model was evaluated by calculating each of the following: Accuracy, Precision, Recall, F1-Score, and WRI, providing a holistic view of both the flexibility of the institution(s) and the level of workforce readiness in an artificially enhanced work environment.

Table 2: Experimental setup, dataset, and model parameter initialization

Parameter	Value
Dataset Type	Survey-Based Workforce Dataset
Number of Samples	500
Respondent Categories	Employees, Educators, Managers, IT Professionals
Input Variables	PU, PEOU, DC, IA
Output Variable	Workforce Readiness (WR)
Data Preprocessing	Missing Value Removal, Normalization, Consistency Check
Programming Environment	Python 3.11
Libraries Used	Pandas, NumPy, Scikit-learn, TensorFlow
Training Data	80%
Testing Data	20%
Learning Rate	0.001
Batch Size	32
Number of Epochs	100
Dropout Rate	0.2
Validation Split	0.2
Technology Acceptance Score (TAS)	$(PU + PEOU) / 2$
Workforce Readiness Index (WRI)	$(DC + IA + TAS) / 3$
Evaluation Metrics	Accuracy, Precision, Recall, F1-Score, WRI

4.1.1 Performance Metrics

Performance of the AI-Driven Workforce Management Framework is measured with common classification performance metrics: Accuracy, Precision, Recall, and F1-Score, presented by equations 3, 4, 5, and 6. These metrics evaluate the framework's capability in workforce readiness assessment and institutional flexibility for a metaverse working environment.

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \quad (3)$$

Precision represents the number of predicted positive instances out of the total number of predicted instances. High precision means low false positive predictions.

$$Precision = \frac{TP}{TP+FP} \quad (4)$$

Recall is defined as the capability of the model to find out the true positives. A higher recall value indicates better detection performance.

$$The\ Recall = \frac{TP}{TP+FN} \quad (5)$$

The F1-Score provides a balanced measure of Precision and Recall. It is particularly useful when the dataset contains imbalanced classes and offers a comprehensive assessment of classification performance.

$$F1 - Score = 2 \times \frac{Precision \times Recall}{Precision + Recall} \quad (6)$$

4.2 Classification Performance Analysis

The objective of this study is to evaluate the efficacy of the proposed AI-Driven Workforce Management Framework (AIWMF) in forecasting the workforce's readiness for metaverse-enabled work environments. It combines three elements to measure employees' readiness for the work settings of the future digital environment: Technology Acceptance, Digital Competence, and Institutional Adaptiveness. The prediction accuracy of the model is evaluated by employing well-known metrics of classification problems, namely, Accuracy, Precision, Recall, and F1-Score. The engineered feature indices (TAS and WRI) were evaluated using popular machine learning classifiers, namely Logistic Regression, Decision Tree, Random Forest, and Support Vector Machine (SVM). The classification results of these models utilizing the framework's integrated dimensions are summarized below.

This comparison will establish how the proposed framework can offer improved classification results and how it may account for some of the behavioral and organizational issues that the workforce faces. The above results inspire certainty and strengthen the body as a whole, so as to further assist in workforce planning and digital transformation.

Table 3: Classification performance comparison

Method	Accuracy (%)	Precision (%)	Recall (%)	F1-Score (%)
Logistic Regression	88.42	87.95	87.31	87.62
Decision Tree	90.18	89.76	89.25	89.5
Random Forest	93.24	92.87	92.41	92.64
Support Vector Machine (SVM)	94.16	93.74	93.52	93.63
Proposed Features + SVM	98.52	98.17	97.95	98.06

Table 3 lists the classification results from the developed AI-Driven Workforce Management Framework (AIWMF) in comparison to the normal machine learning models. The results show that the proposed AIWMF had a high classification accuracy of 98.52%, which performed better than all the other machine learning models, including Logistic Regression (88.42%), Decision Tree (90.18%), Random Forest (93.24%), and SVM (94.16%). The results were improved not only for accuracy but also for precision, recall, and F1 score, meaning that WRLs are correctly predicted at a better level. From these results, it is demonstrated that by having AI-Driven analytics along with technology acceptance and digital competence, the prediction level will improve when working in a metaverse.

4.3 Workforce Readiness and Adaptiveness Analysis

This study attempts to understand how each of the key workforce variables-Technology Acceptance Score (TAS), Digital Competence (DC), and Institutional Adaptiveness (IA)-contributes to the composite Workforce Readiness Index (WRI). The intent is to test the joint effect of these three variables on employee readiness and organizational capability to operate in an AI-enabled metaverse environment. The article aims at calculating the independent contribution of each variable and also identifying which ones play the most vital role in bringing about the required digital transformation. From the results obtained, it is clear that Digital Competence is the most critical element that makes the workforce ready, followed closely by both institutional adaptiveness and technology acceptance. From the results, it is evident that the development of digital competences, the development of adaptive structures in an organization, and the use of technology will create a workforce more resilient to changes and future-ready, and the workforce can thrive in a virtual work environment.

Table 4. Impact analysis of key workforce factors

Factor	Score (%)	Contribution to WRI (%)
Technology Acceptance (TAS)	95.42	32.1
Digital Competence (DC)	97.13	34.5
Institutional Adaptiveness (IA)	96.25	33.4
Overall WRI	96.27	100

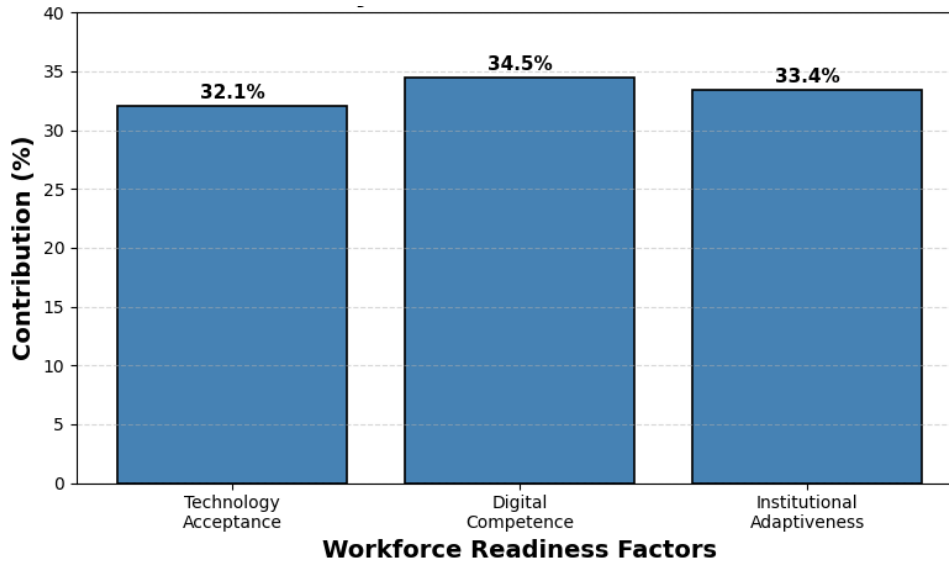


Figure 4: Contribution of key factors to workforce readiness index (WRI)

In table 4 and figure 4 present the percentage of all three important factors that contribute to the Workforce Readiness Index value. The highest percentage for the major workforce factors was Digital Competence with the contribution of 34.5%. It means that the digital literacy of the employees will be a major support in adopting the new working environment of the metaverse with the use of AI. Institutional Adaptiveness was the third major factor, with a contribution of 33.4%, emphasizing how flexibility and preparedness of the organizations in adopting technology changes. However, the result also revealed that technology acceptance (32.1%) strongly influences system adoption. The final overall WRI was 96.27%, which proves the proposed framework effectively supported workforce readiness and institutional resilience in the digital future workplace.

4.4 Ablation Study

An ablation study is one that tests how much each component contributes to the proposed AI-based Workforce Management Framework. More clearly, measure the impact on the overall classification performance by excluding each of the TAS, DC, or IA components in model. In these analyses, the factors that can impact the prediction of workforce readiness in a metaverse-based work environment could be investigated. The outcome illustrates that the complete framework exhibits the best performance, and the removal of any component will degrade the classification accuracy dramatically. As for the influential factors examined, Digital Competence contributes the most to the overall performance of the model. It demonstrates the significance of worker preparation to the AI-supported digital working environment. These results can thus be employed to claim that a three-way integration

among technology acceptance, digital competence, and institutional adaptiveness is imperative in order to have an adequate evaluation of workforce readiness and continuous organizational change.

The outcomes of the ablation study conducted for assessing the contribution of individual components in the suggested AI-Driven Workforce Management Framework (AIWMF) is presented in figure 5. The highest classification accuracy of 98.52% was obtained from the complete framework focused on the workforce readiness assessment that involved the integration of Technology Acceptance Score (TAS), Digital Competence (DC) and Institutional Adaptiveness (IA). In terms of individual component-removal experiments, the individual exclusion of Digital Competence (DC) resulted in a performance drop to 94.36%, confirming its vital role. As illustrated in figure 5, the model's lowest accuracy of 90.87% occurs when the joint dimensions of Digital Competence and Institutional Adaptiveness are omitted simultaneously, underscoring their complementary nature in predicting workforce readiness when both Digital Competence and Institutional Adaptiveness were omitted, indicating that the digital competences of employees and organizational adaptability complement each other in assessing employees' readiness. These results highlight the importance of Digital Competence as an individual factor as well as the combined interaction of the three factors: Digital Competence, Technology Acceptance and Institutional Adaptiveness, to gain the best prediction of workforce readiness in AI-supported work worlds.

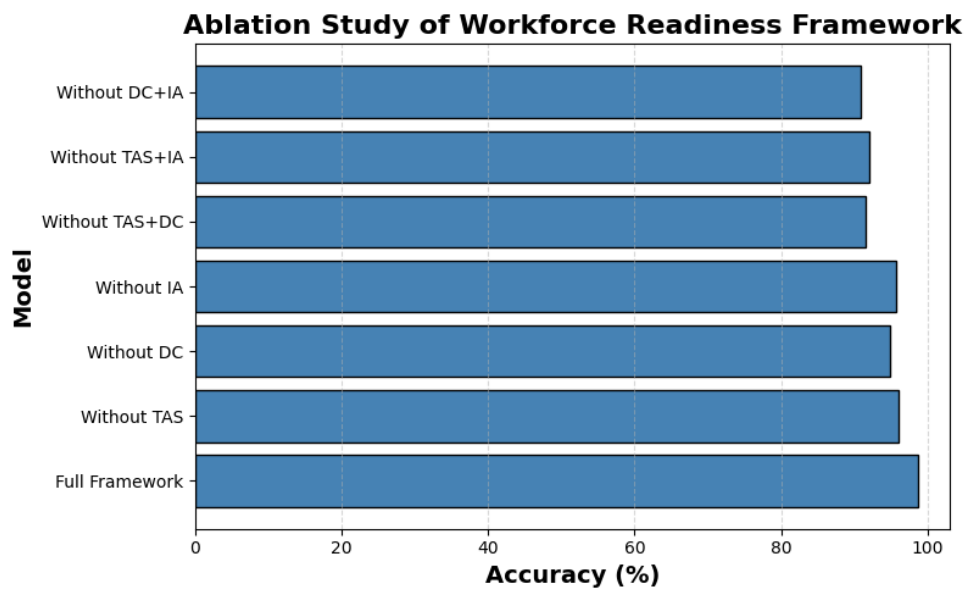


Figure 5: Ablation study results of the proposed AIWMF framework

5 Discussion

The results of the analyses and experiments confirm the utility of the suggested AI-Driven Workforce Management Framework (AIWMF) in increasing workforce preparedness in the metaverse work setting. This model achieved outstanding classification results with an accuracy rate of 98.52%, which was greater than the individual results obtained using traditional machine learning approaches like Logistic Regression, Decision Tree, Random Forest, and Support Vector Machine. These results reinforce the validity of integrating AI with the variables pertaining to work in order to assess the status of employees and the flexibility of an organization within the coming digital labor market.

As seen in the Workforce Readiness Index (WRI) influence analysis, it was found that Digital Competence influenced WRI the most, followed by Institutional Adaptiveness and Technology Acceptance. This supports the assertion that the more digitally capable an employee is, the better the employee will be prepared to utilize AI-based tools and participate in the metaverse. In parallel, those organizations that have the ability to adapt with the least amount of friction are the ones that are the most likely to embrace technological advancements, employees' demand, and rapidly changing labor market conditions efficiently due to adaptive organization and a lenient workplace structure. In turn, Technology Acceptance will complement these elements by contributing positively toward employee engagement and adoption within a work environment that relies heavily upon human-machine interaction.

Each of the elements of the proposed framework can be demonstrated via an ablation study. By analyzing the reduction in accuracy when each element is omitted, it can be determined that Digital Competence contributes to the workforce's ability to remain well-prepared the most when compared with the rest of the elements. However, the omission of Technology Acceptance and/or Institutional Adaptiveness also negatively impacts the model's ability to make accurate predictions, confirming that a singular dimension cannot predict workplace readiness alone, but an effective combination of them provides the whole view of the working environment required for efficient workforce transformation and organizational development over a long-term perspective.

At a practical level, this suggested framework also offers insights and directives for decision makers, organizations, and educators who endeavor to foresee the future of work. The encouragement of digital competence, the adoption of technology, and a malleable organization can yield better employee productivity, ingenuity, and robustness toward future trends. The framework also acts as a tool in making informed decisions. By identifying a deficit in skills or organizational capability, interventions can be crafted and carried out to fill in those deficiencies and develop capacity.

The proposed AIWMF was able to achieve high classification performance, however, care should be taken to consider potential limitations when interpreting the results. This study included a sample of 500 survey responses that were measured on a 5-point Likert scale, which does not provide a complete picture of the complexity and diversity of workplace environments. The dataset was split into training and testing subsets (of 80:20) to reduce the bias, and data preprocessing techniques were performed prior to model training. However, the effectiveness of the prediction could be affected by the dataset and the experimental setting that is controlled. Thus, future research needs to utilize larger and more heterogeneous sets of data from other geographical locations and sectors. Furthermore, additional evaluation methods such as k-fold cross-validation, confusion matrix analysis, ROC-AUC evaluation, and external validation datasets are needed to further evaluate the robustness, generalizability, and potentially overfitting of the model. This research would help to understand the framework in real AI-enabled workforce environments in the metaverse.

In summary, these findings show that an AI-supported approach to the management of work is immensely powerful in its promise in conjunction with metaverse technologies, technology acceptance, and digital competence to adapt workforces for a future filled with digital ecologies. The suggested framework establishes a sound approach to closing the existing capacity gaps between organizations and skill requirements, as well as improving workforce capabilities to create longer-term competitiveness and digital sustainability.

6 Conclusion and Future Work

This paper has been designed to introduce an AI-Driven Workforce Management Framework (AIWMF) to boost the readiness of the workforce in a metaverse-based work context with technology acceptance, digital competence, and institutional adaptiveness. The result of the experiment showed that the proposed framework is effective in performance with an accuracy of 98.52%, a precision of 98.17%, a recall of 97.95%, and an F1-score of 98.06% compared with conventional ML algorithms. Also, the Workforce Readiness Index (WRI) is 96.27% and shows that employees and institutions are highly ready for the future work environment. The result showed that digital competence is the most important competency for workforce readiness, followed by institutional adaptiveness and technology acceptance. The proposed framework will be a useful resource for the sustainable transformation of the workforce and digitalization in an AI-driven metaverse environment and will help close the skill-based gap between institutions and future work. Despite the promising performance achieved by the proposed framework, additional validation using larger datasets, cross-validation strategies, and external benchmark datasets is necessary to further confirm its robustness and generalizability across diverse workforce environments.

For further research, more advanced deep learning and generative AI algorithms could be adopted to promote the performance of workforce analytics and decision-making. Moreover, results of this research would be more valuable if involved a larger and broader scale of data from different industries and regions to obtain the generality of this research. Future research may also try to integrate more advanced technologies such as blockchain, digital twins, and explainable AI into metaverse-based platforms so that a higher level of security, transparency, and trustworthiness of the workforce management system can be provided. A real-time workforce monitoring system and learning mechanism could also be incorporated to provide individual suggestions on work-based training and dynamic workforce management approaches.

References

- [1] Aggarwal, A., Sadhna, P., & Daipuria, P. (2025). The digital frontier: AI and metaverse as catalysts for organizational justice and employee engagement in EdTech. *Global Business Review*, 09721509251344444. <https://doi.org/10.1177/09721509251344444>
- [2] Altepost, A., Elaroussi, F., Hansen-Ampah, A., Harlacher, M., & Merx, W. (2024). Assessing organizational framework conditions for the successful, human-centered introduction of AI applications. *Zeitschrift für Arbeitswissenschaft*, 78(3), 335-348. <https://doi.org/10.1007/s41449-024-00440-7>
- [3] Canbek, M. (2020). Artificial Intelligence Leadership: Imitating Mintzberg's Managerial Roles. In *Business management and communication perspectives in Industry 4.0* (pp. 173-187). IGI Global. <https://doi.org/10.4018/978-1-5225-9416-1.ch010>
- [4] Chamola, V., Sai, S., Bhargava, A., Sahu, A., Jiang, W., Xiong, Z., ... & Hussain, A. (2024). A comprehensive survey on generative AI for metaverse: enabling immersive experience. *Cognitive Computation*, 16(6), 3286-3315. <https://doi.org/10.1007/s12559-024-10342-9>
- [5] Chowdhury, S., Dey, P., Joel-Edgar, S., Bhattacharya, S., Rodriguez-Espindola, O., Abadie, A., & Truong, L. (2023). Unlocking the value of artificial intelligence in human resource management through AI capability framework. *Human resource management review*, 33(1), 100899. <https://doi.org/10.1016/j.hrmr.2022.100899>

- [6] Einola, K., & Khoreva, V. (2023). Best friend or broken tool? Exploring the co-existence of humans and artificial intelligence in the workplace ecosystem. *Human Resource Management*, 62(1), 117-135. <https://doi.org/10.1002/hrm.22147>
- [7] Fenwick, A., & Molnar, G. (2022). The importance of humanizing AI: using a behavioral lens to bridge the gaps between humans and machines. *Discover Artificial Intelligence*, 2(1), 14. <https://doi.org/10.1007/s44163-022-00030-8>
- [8] Fenwick, A., Molnar, G., & Frangos, P. (2024). The critical role of HRM in AI-driven digital transformation: a paradigm shift to enable firms to move from AI implementation to human-centric adoption. *Discover Artificial Intelligence*, 4(1), 34. <https://doi.org/10.1007/s44163-024-00125-4>
- [9] Gil, A. J., Moriano, J. A., & Laguna, A. (2026). Digital leadership, technology acceptance and innovative work behaviour: resilience as the psychological bridge. *International Journal of Innovation Science*, 1-19. <https://doi.org/10.1108/ijis-07-2025-0374>
- [10] Jain, V., & Mitra, A. (2025). Bridging the Digital Literacy Gap: Effective Collaboration Between Institutes of Higher Education and the Workforce for Technology Integration. In *Institutes of Higher Education (IHE) and Workforce Collaboration for Digital Literacy* (pp. 71-90). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-0004-7.ch003>
- [11] Jin, S. V., & Ryu, E. (2025). Unraveling the dynamics of digital equality and trust in AI-empowered metaverses and AI-VR-convergence. *Technological Forecasting and Social Change*, 210, 123877. <https://doi.org/10.1016/j.techfore.2024.123877>
- [12] Jöhnk, J., Weißert, M., & Wyrski, K. (2021). Ready or not, AI Comes—An Interview Study of Organizational AI Readiness Factors: J. Jöhnk et al.: Ready or Not, AI Comes: An Interview Study of Organizational AI Readiness Factors. *Business & information systems engineering*, 63(1), 5-20. <https://doi.org/10.1007/s12599-020-00676-7>
- [13] Jussupow, E., Spohrer, K., & Heinzl, A. (2022). Identity threats as a reason for resistance to artificial intelligence: survey study with medical students and professionals. *JMIR formative research*, 6(3), e28750. <https://doi.org/10.2196/28750>
- [14] Kimseng, T., Javed, A., Jeenanunta, C., & Kohda, Y. (2020). Applications of fuzzy logic to reconfigure human resource management practices for promoting product innovation in formal and non-formal R&D firms. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(2), 38. <https://doi.org/10.3390/joitmc6020038>
- [15] Merhi, M. I. (2021). Evaluating the critical success factors of data intelligence implementation in the public sector using analytical hierarchy process. *Technological Forecasting and Social Change*, 173, 121180. <https://doi.org/10.1016/j.techfore.2021.121180>
- [16] Mirbabaie, M., Brünker, F., Möllmann Frick, N. R., & Stieglitz, S. (2022). The rise of artificial intelligence—understanding the AI identity threat at the workplace: M. Mirbabaie et al. *Electronic Markets*, 32(1), 73-99. <https://doi.org/10.1007/s12525-021-00496-x>
- [17] Nitsch, V., Rick, V., Kluge, A., & Wilkens, U. (2024). Human-centered approaches to AI-assisted work: the future of work? *Zeitschrift für Arbeitswissenschaft*, 78(3), 261-267. <https://doi.org/10.1007/s41449-024-00437-2>
- [18] Safi, M., Abdallah, F., Erturk, A., & Alkhayyat, R. (2024, June). Digital Readiness of the Workforce for Successful Digital Transformation: Exploring New Digital Competencies. In *Proceedings* (Vol. 101, No. 1, p. 21). MDPI. <https://doi.org/10.3390/proceedings2024101021>
- [19] Sharma, S., Singh, G., Lim, W. M., Ali, A., & Singh, R. (2025). Metaverse through the integrated theoretical lenses of task technology fit theory, social capital theory, and social cognitive theory: the case of SMEs. *Journal of Innovation and Entrepreneurship*, 14(1), 6. <https://doi.org/10.1186/s13731-024-00445-w>
- [20] Siemon, D. (2022). Elaborating team roles for artificial intelligence-based teammates in human-AI collaboration. *Group Decision and Negotiation*, 31(5), 871-912.

- <https://doi.org/10.1007/s10726-022-09792-z>
- [21] Smuha, N. A. (2021). Beyond the individual: governing AI's societal harm. *Internet Policy Review*, 10(3). <https://doi.org/10.14763/2021.3.1574>
- [22] Unuriode, A., Okoro, S., Afolabi, O., Durojaiye, O., Lopez, A., Yusuf, B., & Akinwande, M. (2024). The impact of AI on US labor markets. *Available at SSRN 4742319*. <https://dx.doi.org/10.2139/ssrn.4742319>
- [23] Wamba-Taguimdje, S. L., Fosso Wamba, S., Kala Kamdjoug, J. R., & Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects. *Business process management journal*, 26(7), 1893-1924. <https://doi.org/10.1108/BPMJ-10-2019-0411>
- [24] Wang, J., Huo, Y., Mahe, J., Ge, Z., Liu, Z., Wang, W., & Zhang, L. (2024). Developing an ethical regulatory framework for artificial intelligence: integrating systematic review, thematic analysis, and multidisciplinary theories. *IEEE Access*, 12, 179383-179395. <https://doi.org/10.1109/ACCESS.2024.3501332>
- [25] Watson, G. J., Desouza, K. C., Ribiere, V. M., & Lindič, J. (2021). Will AI ever sit at the C-suite table? The future of senior leadership. *Business Horizons*, 64(4), 465-474. <https://doi.org/10.1016/j.bushor.2021.02.011>

Authors Biography



Dr. Dara Vijaya Lakshmi, though graduated as an engineer from Osmania University, later took a career choice of studying MBA, that helped her work in the sector of Education. Her focus on progressive learning, experiential growth, interpersonal skill enhancement, and organizational abilities in students guided her research journey in the education sector. She is an Assistant Professor at Christ University. She as a faculty consultant, speaker and workshop instructor, designs and delivers interactive sessions for faculty and students, applying participatory learning methods. She specializes in modularizing complex information for diverse audiences, designing interactive learning experiences, and translating ethical frameworks into practical teaching tools. she has collaborated on and co-applied patents and made significant contributions through publication of books, research papers, journal articles, copyright and book chapters in the domain of learning and education. Her interests include promoting ethical AI in academia, refining policy language for clarity, and facilitating participatory, virtue-based learning journeys, empowering faculty and students to use technology responsibly and innovatively.



Dr.S. Rajeshwari is working as an Assistant Professor II with over a decade of experience in academia and industry, specializing in Human Resources and Finance. She holds a Ph.D. in Talent Management and qualified the UGC-NET examination in 2019. She has published several research papers in Scopus-indexed journals, along with patents and books in the areas of management and AI. She has received recognitions including the Best Faculty Award and research funding appreciation for her academic contributions. She is also actively involved in organizing academic programs and contributing to student development and institutional quality initiatives.



Dr.V. Rajalakshmi has completed her Doctor of Philosophy from Vellore Institute of Technology, Vellore in the area of “Rural Women Empowerment through MGNREGS with reference to Vellore District in Tamil Nadu”. She possesses four years of teaching cum research associate and 9 years of research experience. She is currently working as Assistant Professor of Commerce, Christ University, Bangalore. She has published more than 19 papers to her credit in Rural women empowerment, Sustainable development, financial inclusion, Smart City, E-Learning and other in commerce and management areas at various Scopus indexed journals, book chapters, national and international journals, seminars and conferences. She has honored by Research award as best research article published in Scopus indexed journals of the year (2017-2018) from VIT University, Vellore and young research award from REVA University, Bangalore (2021) respectively. Her area of interest includes Research & Development in Women Empowerment, Human Resource Management and Finance.



Dr. Durga Prasad Singh Samanta is an Assistant Professor of Finance at CHRIST (Deemed to be University), Bengaluru. His core research and teaching expertise lie at the intersection of modern financial technology, data-driven decision-making, and market psychology. Dr. Samanta's primary research interests encompass Financial Technology (FinTech), Financial Analytics, and Behavioral Finance, focusing on how emerging digital architectures and cognitive biases influence financial markets. He actively contributes to academic literature through high-impact research, bridging theoretical quantitative frameworks with practical market applications. Beyond his classroom lectures, he serves as a peer reviewer and research mentor, driving academic innovation in analytical and behavioral financial models.



Dr.T. Prakash an Assistant Professor in Management and Commerce with a strong commitment to academic excellence and student development. His teaching focuses on management subjects while promoting practical skills, ethics, and leadership qualities among students. Alongside academics, He has a certified Yoga Trainer who promotes physical and mental wellbeing through yoga and mindfulness practices. He actively conducts wellness sessions to support stress management, work–life balance, and personal effectiveness. He interests include academic research, mentoring, and integrating wellness principles with management education.



Dr.S. Monica is a dedicated academician, researcher, and resource person in the field of Commerce and Management with over 8 years of teaching experience at undergraduate and postgraduate levels. She holds a Ph.D. in Commerce from Bangalore University and is currently associated with CHRIST (Deemed to be University). Her expertise includes Research Methodology, Financial Management, SPSS, Data Analytics, and AI in education. She has published several research papers in UGC Care, Scopus, ABDC, and Web of Science indexed journals and has been invited as a resource person for various FDPs, workshops, and seminars across reputed institutions. Dr. Monica is also a co-author of academic textbooks and has actively contributed to academic administration, student research guidance, conferences, and institutional development initiatives.