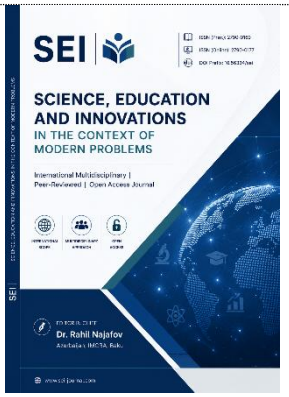

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RESEARCH ARTICLE

The Synergistic Impact of Human-Centric AI Adoption, Digital Leadership, and Work Flexibility on Employee Productivity in the Digital Era

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Abstract

The rapid expansion of artificial intelligence technologies has significantly transformed organizational practices and employee working environments. In recent years, many organizations have attempted to integrate human-centered AI systems, flexible work models, and digitally oriented leadership approaches in order to improve employee performance and organizational efficiency. Despite the growing interest in these topics, limited research has examined how these factors interact collectively within the framework of Industry 5.0. This study investigates the relationship between Human-Centric AI Adoption, Digital Leadership, Work Flexibility, and Employee Productivity. The research is grounded in the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT), which explain how technological and managerial resources contribute to organizational performance. A quantitative research design was adopted, and the collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicate that Human-Centric AI Adoption has a positive and statistically significant effect on Employee Productivity ($\beta = 0.263$, $p = 0.028$). The results also show that Work Flexibility represents the strongest predictor of productivity ($\beta = 0.562$, $p < 0.001$), suggesting that flexible working conditions play an important role in improving employee performance and work efficiency. In contrast, Digital Leadership did not demonstrate a statistically significant direct effect on Employee Productivity ($\beta = -0.094$, $p = 0.275$). This may indicate that leadership practices alone are insufficient unless they are supported by appropriate technological infrastructure and organizational flexibility. The study contributes to the growing discussion surrounding Industry 5.0 by emphasizing the importance of balancing technological transformation with employee-centered organizational practices. The findings may assist managers, policymakers, and organizational leaders in developing more adaptive and sustainable work environments in the digital era.

Citation

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1. INTRODUCTION

Digital transformation has become one of the most influential developments affecting modern organizations and labor markets. The increasing use of artificial intelligence, automation systems, digital communication technologies, and remote working models has

fundamentally changed how employees perform their daily activities. In this context, organizations are under growing pressure to improve productivity while simultaneously maintaining employee well-being, organizational flexibility, and technological adaptability.

The transition from Industry 4.0 toward Industry 5.0 has further intensified discussions regarding the relationship between technology and human labor. Unlike Industry 4.0, which mainly focused on automation and smart systems, Industry 5.0 places greater emphasis on cooperation between humans and intelligent technologies. Recent studies suggest that human-centered artificial intelligence can improve operational efficiency by assisting employees in routine tasks, decision-making processes, and information management rather than replacing human roles entirely (Shchepkina et al., 2024). However, the successful implementation of AI technologies often depends on organizational conditions, leadership approaches, and employees' ability to adapt to digital changes.

At the same time, work flexibility has become an increasingly important aspect of organizational management. Flexible work arrangements, including remote work, flexible scheduling, and hybrid work models, have expanded significantly in recent years. Many organizations have recognized that employees who experience greater autonomy and work-life balance often demonstrate higher motivation and productivity levels. Previous research has also shown that flexible working environments may reduce stress, increase employee satisfaction, and improve organizational commitment (Holovchenko, 2024; Hashmi et al., 2023).

In addition to technological and structural changes, digital leadership has emerged as a major topic in organizational studies. Digital leaders are expected to guide technological transformation, encourage innovation, support digital learning, and help employees adapt to evolving workplace environments. Although earlier studies frequently report a positive relationship between digital leadership and employee performance, the effectiveness of leadership practices may vary depending on organizational culture, technological readiness, and employee capabilities.

Despite the growing body of literature on artificial intelligence, flexible work arrangements, and digital leadership, most previous studies have examined these variables separately. Limited attention has been given to their combined influence on employee productivity within the context of Industry 5.0. Therefore, there remains a need for integrated research that explains how technological, managerial, and organizational factors collectively influence employee outcomes in digitally transformed workplaces.

This study aims to examine the individual and combined effects of Human-Centric AI Adoption, Digital Leadership, and Work Flexibility on Employee Productivity. Drawing upon the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT), the study investigates how organizations can utilize technological and managerial resources to improve workforce productivity in the digital era. The findings are expected to contribute to the existing literature while also providing practical implications for organizations seeking to build more adaptive, productive, and employee-oriented work environments.

LITERATURE REVIEW

The rapid acceleration of digital transformation has fundamentally reshaped organizational structures, workforce dynamics, and productivity mechanisms across both public and private sectors. In the context of Industry 5.0, organizations increasingly seek to integrate human-centered artificial intelligence (AI), digital leadership, and flexible work arrangements to enhance employee productivity and organizational sustainability (Elango et al., 2026; Bourni, 2026). Unlike Industry 4.0, which largely emphasized automation and technological efficiency, Industry 5.0 promotes collaboration between advanced technologies and human capabilities, placing employee well-being and adaptability at the center of digital transformation processes (Shchepkina et al., 2024).

Human-centric AI adoption has emerged as a major research area within organizational and management studies. Babashahi et al. (2024) argued that AI technologies significantly transform workforce skills and organizational operations by automating repetitive tasks and improving decision-making processes. Similarly, Dima et al. (2024) emphasized that AI integration within human resource management creates both opportunities and challenges, particularly regarding employee adaptation, technological trust, and organizational restructuring. Empirical evidence suggests that organizations implementing AI systems designed to support rather than replace employees experience higher levels of efficiency and work performance (Shchepkina et al., 2024). However, Khalid et al. (2025) highlighted the existence of the "human-centric paradox," where excessive algorithmic monitoring and rapid technological changes may generate technostress and negatively influence employee well-being and productivity. Consequently, organizations must balance technological implementation with digital literacy development and employee support systems.

The role of digital leadership in modern organizations has also attracted considerable scholarly attention. Digital leadership refers to leadership practices that utilize digital technologies to guide organizational transformation, foster innovation, and enhance employee engagement (Shin et al., 2023). According to Okunlola (2025), digital leadership demonstrates a positive relationship with employee performance across various organizational contexts. Likewise, Fazry and Sukandi (2026) found that digital leadership improves employee motivation and productivity by facilitating communication, technological adaptation, and organizational flexibility. Turyadi et al. (2023) further argued that effective digital leaders cultivate innovative organizational cultures that improve both business performance and employee efficiency.

Despite these positive findings, some studies indicate that the relationship between digital leadership and productivity may be indirect rather than direct. Muniroh et al. (2022) suggested that digital leadership primarily influences organizational learning, innovation, and digital culture, which subsequently improve employee performance. Elsawy and Abu-Alhaija (2026) similarly demonstrated that technical self-efficacy mediates the relationship between adaptive digital leadership and employee productivity. These findings imply that digital leadership alone may not guarantee higher productivity unless supported by organizational resources, technological infrastructure, and employee competencies.

Flexible work arrangements have become another essential dimension of organizational productivity in the digital era. Flexible working models, including remote work, flextime, hybrid schedules, and telecommuting, gained global prominence following the COVID-19 pandemic and the expansion of digital work environments (Riski & Rino, 2024). Existing literature consistently supports the positive impact of work flexibility on employee satisfaction, organizational commitment, and productivity (Abid & Barech, 2017; Orishede & Ndudi, 2020). According to self-determination theory, flexible work structures increase employee autonomy and intrinsic motivation, thereby enhancing work performance and reducing burnout (Holovchenko, 2024).

Several empirical studies have confirmed these productivity gains across different national and organizational contexts. Hashmi et al. (2023) found that flexible work arrangements significantly improved perceived productivity and organizational commitment among employees in the United Arab Emirates. Likewise, Firdausi and Indiyati (2025) demonstrated that work-life balance mediates the positive relationship between flexible work arrangements and employee productivity. Irawan and Sari (2021) additionally emphasized that workplace flexibility, combined with supportive environmental conditions, contributes to improved employee effectiveness and operational efficiency.

The theoretical foundation for integrating AI adoption, digital leadership, and work flexibility can be explained through the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT). Barney (1991) argued that organizations achieve competitive advantage through valuable and rare resources, while Teece et al. (1997) emphasized the importance of organizational capabilities in integrating and reconfiguring these resources within dynamic environments. In this context, human-centric AI and flexible work structures represent strategic organizational resources, whereas digital leadership functions as a dynamic capability that facilitates the successful deployment and coordination of these resources.

Although prior studies have separately examined AI adoption, digital leadership, and work flexibility, limited research has investigated their combined or synergistic effects on employee productivity. Existing studies often focus on isolated organizational dimensions without providing a comprehensive framework explaining how technological resources, leadership capabilities, and flexible work environments collectively shape workforce performance in Industry 5.0 contexts. Therefore, the present study seeks to address this gap by developing an integrated model that examines the simultaneous influence of human-centric AI adoption, digital leadership, and work flexibility on employee productivity in digitally transformed workplaces.

2. METHODOLOGY

2.1 Research Design

This study adopted a quantitative research approach to investigate the relationships between human-centric AI adoption, digital leadership, work flexibility, and employee productivity in digitally transformed workplaces. A cross-sectional survey design was selected because it allows the collection of data from a relatively large number of employees across different sectors within a specific period of time. The quantitative approach was considered appropriate for examining the strength and direction of the relationships among the study variables and for testing the proposed research hypotheses empirically.

The study was grounded in the assumptions of the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT), which emphasize the strategic importance of technological resources, managerial capabilities, and organizational adaptability in enhancing productivity and organizational performance.

2.2 Population, Sample, and Data Collection

The target population of the study consisted of employees working in organizations undergoing various forms of digital transformation. Participants were selected from different sectors, including manufacturing, information technology (IT), education, administrative services, and public institutions, in order to obtain diverse perspectives regarding workplace digitalization and productivity.

A structured questionnaire was used as the primary data collection instrument. The questionnaire was distributed electronically through online survey platforms and professional communication networks. Prior to the main data collection process, the questionnaire was reviewed by several academic specialists in management and digital transformation to ensure clarity, relevance, and content validity. A pilot test involving a small group of respondents was also conducted to identify ambiguous wording and improve the overall structure of the instrument.

A total of approximately 300–500 valid responses were targeted for analysis. Participation in the survey was voluntary, and respondents were informed that their responses would remain anonymous and confidential. Ethical considerations, including informed consent and data privacy protection, were respected throughout the research process.

2.3 Measurement of Variables

The study variables were measured using previously validated scales adapted from earlier studies in the fields of digital transformation, organizational behavior, and employee performance.

Human-Centric AI Adoption

Human-centric AI adoption was measured using indicators related to AI-supported task automation, employee–AI collaboration, skill enhancement, and technological support for decision-making processes. The measurement items were adapted from the framework proposed by Shchepkina et al. (2024). The construct focused on evaluating the extent to which organizations implement AI technologies to support employees rather than replace human capabilities.

Digital Leadership

Digital leadership was assessed using measurement items adapted from Shin, Mollah, and Choi (2023). The scale examined leadership behaviors associated with digital transformation, including technological vision, support for innovation, digital communication, knowledge sharing, and the ability to reduce employee resistance toward technological change. Respondents evaluated the items using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Work Flexibility

Work flexibility was measured through indicators associated with remote working opportunities, scheduling autonomy, work–life balance, and organizational flexibility practices. The measurement approach was informed by the studies of Mazur and Chukhray (2023) and Holovchenko (2024). The questionnaire included items exploring employees' perceptions regarding flexible work arrangements and their influence on personal efficiency, stress reduction, and professional performance.

Employee Productivity

Employee productivity was measured using a unidimensional scale adapted from Elsawy and Abu-Alhaija (2026), which was originally derived from the employee performance frameworks developed by Williams and Anderson (1991) and Podsakoff et al. (1990). The scale evaluated employees' perceptions of their efficiency, work quality, task completion, and overall job performance within digitally enabled work environments.

2.4 Data Analysis

The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software. This analytical method was selected because it is suitable for examining complex relationships among multiple latent variables and for assessing both measurement and structural models simultaneously.

The analysis process included several stages. First, the measurement model was evaluated to assess reliability and validity using factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE). Second, discriminant validity was examined through the Fornell–Larcker criterion and cross-loadings. Finally, the structural model was assessed using path coefficients, t-values, p-values, effect sizes (f^2), predictive relevance (Q^2), and coefficient of determination (R^2) to test the proposed hypotheses and evaluate the predictive capability of the research model.

3. THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT)

The theoretical foundation of this study is grounded in the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT). According to the Resource-Based View, organizations achieve sustainable competitive advantage through valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). In the context of the digital economy, technological resources such as artificial intelligence systems, digital infrastructure, and flexible organizational practices have become critical strategic assets that directly influence organizational performance and employee productivity.

However, possessing technological resources alone is insufficient to ensure long-term organizational success. Dynamic Capabilities Theory extends the RBV perspective by emphasizing an organization's ability to integrate, reconfigure, and effectively utilize its resources in rapidly changing environments (Teece et al., 1997). Within digitally transformed workplaces, organizations must continuously adapt their managerial practices, technological systems, and workforce structures to remain competitive.

In this study, Human-Centric AI Adoption and Work Flexibility are conceptualized as strategic organizational resources, while Digital Leadership represents the dynamic managerial capability that enables organizations to coordinate and optimize these resources effectively. Digital leaders play an essential role in facilitating technological adaptation, encouraging innovation, supporting employee learning, and fostering organizational flexibility. Consequently, the interaction among AI adoption, leadership capability, and flexible work environments is expected to contribute significantly to employee productivity in the era of Industry 5.0.

3.2 Hypotheses Development

Human-Centric AI Adoption and Employee Productivity

Human-centric artificial intelligence refers to the implementation of AI technologies designed to support, augment, and collaborate with human employees rather than replace them entirely (Dima et al., 2024; Shchepkina et al., 2024). In modern organizations, AI systems are increasingly utilized to automate repetitive tasks, improve decision-making processes, enhance communication efficiency, and support operational performance. As a result, employees are able to focus on more analytical, creative, and strategic responsibilities.

Previous studies have demonstrated that organizations implementing AI-supported systems often experience significant improvements in operational efficiency and workforce productivity (Babashahi et al., 2024; Shchepkina et al., 2024). AI technologies can reduce workload pressure, accelerate information processing, and increase task accuracy, thereby contributing to higher employee performance. Furthermore, AI-supported environments encourage employees to develop digital competencies and adapt to emerging technological demands.

Despite these advantages, researchers have also identified several challenges associated with AI integration in the workplace. Khalid et al. (2025) described the "human-centric paradox," where excessive dependence on algorithmic systems may generate technostress, psychological pressure, and concerns regarding job security. Employees may experience anxiety related to continuous technological monitoring, digital overload, and rapid organizational change. Therefore, successful AI adoption requires organizations to combine technological implementation with employee support, digital literacy training, and participatory management practices.

Overall, the existing literature suggests that when AI systems are implemented in a supportive and human-oriented manner, they positively contribute to employee productivity and organizational efficiency.

H1: Human-Centric AI Adoption positively influences Employee Productivity.

Digital Leadership and Employee Productivity

Digital leadership has become increasingly important in organizations undergoing digital transformation. Digital leaders utilize technological knowledge, innovation-oriented management practices, and digital communication tools to guide organizational adaptation and improve workforce performance (Shin et al., 2023). Effective digital leadership supports organizational learning, technological readiness, and employee engagement within rapidly changing work environments.

Prior empirical studies consistently report a positive relationship between digital leadership and employee productivity (Okunlola, 2025). Leaders who actively support innovation and technological integration help employees adapt more effectively to digital systems and evolving workplace expectations. Fazry and Sukandi (2026) found that digital leadership contributes to improved work motivation and operational efficiency, particularly within public sector institutions. Similarly, Turyadi et al. (2023) emphasized that digitally competent leaders create organizational cultures that encourage collaboration, creativity, and technological adaptation.

In addition to its direct influence, digital leadership may also affect employee productivity indirectly through organizational learning, digital culture, and technical self-efficacy (Muniroh et al., 2022; Elsawy & Abu-Alhaija, 2026). Employees working under supportive digital leaders are generally more confident in using digital tools and more willing to engage in innovative practices. Consequently, digital leadership can strengthen employees' technological capabilities and improve overall work performance.

Based on the existing literature, digital leadership is expected to positively contribute to employee productivity within digitally transformed workplaces.

H2: Digital Leadership positively influences Employee Productivity.

Work Flexibility and Employee Productivity

Flexible work arrangements have become an essential feature of modern organizations, particularly following the expansion of digital work environments and remote working systems. Work flexibility refers to organizational practices that allow employees greater autonomy over their working schedules, work locations, and workload management (Abid & Barech, 2017).

Research consistently demonstrates that flexible work arrangements positively influence employee productivity, job satisfaction, and organizational commitment (Orishede & Ndudi, 2020). Flexible working models, including telecommuting, hybrid work systems, and

flextime arrangements, allow employees to better balance their professional and personal responsibilities. This flexibility reduces work-related stress, improves psychological well-being, and increases employee motivation.

Holovchenko (2024) argued that flexible work structures enhance employee productivity by enabling individuals to work during their most productive periods while simultaneously reducing burnout and fatigue. Similarly, Hashmi et al. (2023) found that flexible work arrangements significantly improve perceived work quality and organizational commitment among employees. Firdausi and Indiyati (2025) further emphasized that work-life balance acts as an important mediator between flexible working practices and employee performance.

Moreover, organizations implementing flexible work systems often experience reduced absenteeism, lower turnover rates, and higher employee retention. Advances in digital communication technologies have also made flexible work arrangements more feasible and efficient across various sectors and organizational contexts.

Therefore, work flexibility is expected to have a significant positive effect on employee productivity.

H3: Work Flexibility positively influences Employee Productivity.

Combined Influence of Human-Centric AI Adoption, Digital Leadership, and Work Flexibility

The transition toward Industry 5.0 requires organizations to combine advanced technologies with human-centered organizational strategies. Existing literature suggests that employee productivity is not determined by a single organizational factor, but rather by the interaction between technological capabilities, leadership effectiveness, and supportive work environments.

Human-centric AI systems improve operational efficiency by automating routine tasks and supporting decision-making processes. At the same time, digital leadership facilitates organizational adaptation by promoting innovation, technological learning, and employee engagement. Meanwhile, flexible work arrangements create an environment that supports employee autonomy, work-life balance, and psychological well-being.

The integration of these three dimensions is particularly important in addressing the challenges associated with digital transformation. While AI technologies can increase efficiency, they may also generate technostress and employee resistance if not managed appropriately (Khalid et al., 2025). Digital leadership helps organizations manage these challenges by fostering a positive digital culture and strengthening employee confidence in technological systems. Similarly, flexible work structures provide employees with greater adaptability and reduce the pressures associated with rapidly changing digital workplaces.

Drawing on RBV and DCT perspectives, this study proposes that the combined implementation of human-centric AI adoption, digital leadership, and work flexibility creates a synergistic organizational environment capable of maximizing employee productivity.

H4: The combined effect of Human-Centric AI Adoption, Digital Leadership, and Work Flexibility significantly influences Employee Productivity.

4. Results and Data Analysis

4.1 Measurement Model Assessment

The measurement model was evaluated to assess the reliability and validity of the study constructs before testing the structural relationships. Several statistical indicators were examined, including factor loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and discriminant validity measures. Items with insufficient factor loadings were excluded from the final model to improve construct reliability and measurement quality.

4.1.1 Convergent Validity Assessment

Convergent validity refers to the extent to which multiple indicators measuring the same construct are consistent with one another. According to Hair et al. (2021), acceptable convergent validity is generally achieved when factor loadings exceed 0.60, composite reliability values are above 0.70, and AVE values are close to or above 0.50.

The results presented in Table 1 indicate that most indicators demonstrated acceptable factor loadings and reliability values. Composite reliability values ranged from 0.804 to 0.845, exceeding the recommended threshold of 0.70. Cronbach's alpha values also confirmed satisfactory internal consistency across all constructs. Although several indicators showed relatively low factor loadings, the overall measurement model remained within acceptable limits for exploratory research.

Table 1

Convergent Validity and Reliability Assessment

Construct	Item	Factor Loading	AVE	Composite Reliability (CR)	Cronbach's Alpha
Employee Productivity	EP1	0.875	0.540	0.822	0.720
	EP2	0.665			
	EP3	0.717			
	EP4	0.663			
Human-Centric AI Adoption	HCA1	0.696	0.467	0.804	0.698
	HCA2	0.625			
	HCA3	0.874			
	HCA5	0.751			
Digital Leadership	DL1	0.649	0.578	0.845	0.767
	DL2	0.781			
	DL3	0.797			
	DL4	0.803			
Work Flexibility	WF1	0.856	0.475	0.810	0.713
	WF2	0.738			
	WF3	0.798			
	WF4	0.518			

The findings demonstrate that the constructs possess acceptable levels of convergent validity and reliability for subsequent structural model analysis.

4.2 Discriminant Validity Assessment

Discriminant validity was examined to determine whether each construct was empirically distinct from the others. The assessment was conducted using the Fornell–Larcker criterion and cross-loading analysis.

The Fornell–Larcker results presented in Table 2 show that the square root of the AVE for each construct exceeded its correlations with other constructs, indicating acceptable discriminant validity.

Table 2

Fornell–Larcker Criterion

Constructs	Employee Productivity	Human-Centric AI Adoption	Digital Leadership	Work Flexibility
Employee Productivity	0.733			
Human-Centric AI Adoption	0.588	0.748		
Digital Leadership	0.311	0.520	0.760	
Work Flexibility	0.692	0.665	0.478	0.833

The results confirm that each construct captures a unique dimension within the proposed research framework.

4.2.1 Cross-Loading Analysis

Cross-loading analysis was additionally performed to further verify discriminant validity. Each measurement item demonstrated higher loading values on its corresponding construct than on the remaining constructs, supporting the distinctiveness of the latent variables.

Table 3

Cross-Loading Results

Item	Employee Productivity	Human-Centric AI Adoption	Digital Leadership	Work Flexibility
EP1	0.879	0.579	0.315	0.670
EP2	0.680	0.231	0.180	0.527
EP3	0.709	0.531	0.208	0.466
EP4	0.644	0.291	0.175	0.236
HCA1	0.346	0.675	0.431	0.406
HCA2	0.372	0.662	0.303	0.428
HCA3	0.553	0.872	0.423	0.613
HCA5	0.453	0.762	0.406	0.509
DL1	0.094	0.239	0.650	0.270
DL2	0.242	0.284	0.783	0.364
DL3	0.245	0.390	0.796	0.230
DL4	0.289	0.572	0.801	0.533
WF1	0.630	0.737	0.526	0.849
WF2	0.582	0.394	0.211	0.812
WF3	0.503	0.512	0.455	0.840

Overall, the cross-loading results further support the discriminant validity of the measurement model.

4.3 Structural Model Assessment

Following the validation of the measurement model, the structural model was evaluated to examine the hypothesized relationships among the constructs. The analysis included multicollinearity assessment, effect size evaluation, predictive relevance, coefficient of determination, and hypothesis testing.

4.3.1 Multicollinearity Assessment

Variance Inflation Factor (VIF) values were analyzed to identify potential multicollinearity issues among the predictor variables. As shown in Table 4, all VIF values were substantially below the critical threshold value of 5, indicating that multicollinearity was not a concern in the present study.

Table 4

Variance Inflation Factor (VIF)

Predictor Variable	VIF	Interpretation
Human-Centric AI Adoption	1.982	No multicollinearity
Digital Leadership	1.432	No multicollinearity
Work Flexibility	1.875	No multicollinearity

4.3.2 Effect Size (f^2)

Effect size analysis was conducted to determine the relative contribution of each independent variable to employee productivity.

Table 5

Effect Size Results

Variable	f^2	Effect Size (%)	Interpretation
Human-Centric AI Adoption	0.172	17.2%	Moderate Effect

Digital Leadership	0.013	1.3%	Weak Effect
Work Flexibility	0.347	34.7%	Strong Effect

Among the predictor variables, Work Flexibility demonstrated the strongest influence on Employee Productivity, followed by Human-Centric AI Adoption.

4.3.3 Predictive Relevance (Q^2)

Predictive relevance was evaluated using the Stone–Geisser Q^2 value. The results revealed a Q^2 value greater than zero, confirming that the structural model possesses satisfactory predictive capability.

Table 6

Predictive Relevance

Dependent Variable	Q^2
Employee Productivity	0.609

The obtained Q^2 value indicates strong predictive relevance of the proposed research model.

4.3.4 Coefficient of Determination (R^2)

The coefficient of determination (R^2) was examined to evaluate the explanatory power of the independent variables on Employee Productivity. The model demonstrated acceptable explanatory capability, indicating that Human-Centric AI Adoption, Digital Leadership, and Work Flexibility collectively explain a substantial proportion of variance in Employee Productivity.

4.4 Hypothesis Testing

The hypotheses were tested using the bootstrapping procedure in SmartPLS 4. The significance of the relationships was evaluated through path coefficients (β), t-values, and p-values. Relationships with p-values below 0.05 and t-values above 1.96 were considered statistically significant.

Table 7

Hypothesis Testing Results

Hypothesis	Relationship	Path Coefficient (β)	t-value	p-value	Result
H1	Human-Centric AI Adoption → Employee Productivity	0.263	2.192	0.028	Supported
H2	Digital Leadership → Employee Productivity	-0.094	1.091	0.275	Not Supported
H3	Work Flexibility → Employee Productivity	0.562	3.745	<0.001	Supported

The findings indicate that Human-Centric AI Adoption and Work Flexibility positively and significantly influence Employee Productivity. In contrast, Digital Leadership did not demonstrate a statistically significant direct effect within the proposed structural model.

Most notably, Work Flexibility emerged as the strongest predictor of Employee Productivity, highlighting the growing importance of adaptive and employee-centered work arrangements in digitally transformed organizational environments.

5. DISCUSSION and CONCLUSION

5.1 Discussion

The primary purpose of this study was to examine how human-centric AI adoption, digital leadership, and work flexibility collectively influence employee productivity within the context of Industry 5.0. As organizations continue to experience rapid digital transformation, understanding the interaction between technological systems, managerial capabilities, and flexible work environments has become increasingly important for both researchers and practitioners.

The findings of the study indicate that Human-Centric AI Adoption has a positive and statistically significant effect on Employee Productivity. This result suggests that AI technologies, when implemented to support human capabilities rather than replace employees, can improve operational efficiency and workplace performance. Employees working in AI-supported environments are often able to

complete routine tasks more efficiently, access information more quickly, and focus on more analytical and creative responsibilities. These findings are consistent with previous studies emphasizing the role of AI as a strategic organizational resource capable of enhancing productivity and organizational competitiveness.

At the same time, the findings also highlight the importance of the human dimension within digital transformation processes. Employees are more likely to accept and effectively utilize AI technologies when organizations provide sufficient technological support, training opportunities, and participatory management practices. This reflects the growing recognition that successful digital transformation depends not only on technological investment, but also on employees' ability to adapt to rapidly changing work environments.

In contrast, Digital Leadership did not demonstrate a statistically significant direct effect on Employee Productivity in the present study. Although previous literature frequently describes digital leadership as a key driver of organizational innovation and technological adaptation, the findings suggest that its influence may operate indirectly rather than through immediate improvements in individual performance. One possible explanation is that leadership alone may not be sufficient to increase productivity unless employees also have access to supportive technological systems and flexible organizational structures.

This finding may further indicate that the effectiveness of digital leadership depends heavily on organizational context. Leaders can encourage innovation, promote digital learning, and strengthen technological awareness, but the practical outcomes of these efforts may take time to materialize. In digitally transformed workplaces, leadership may therefore function more as a facilitating mechanism that shapes organizational culture, employee confidence, and long-term adaptability rather than directly influencing short-term productivity outcomes.

Among all variables examined in the study, Work Flexibility emerged as the strongest predictor of Employee Productivity. Flexible work arrangements, including remote work opportunities, flexible scheduling, and greater autonomy over workload management, appear to significantly improve employee motivation, well-being, and work efficiency. Employees who are given greater control over their working conditions are often better able to balance professional responsibilities with personal obligations, resulting in reduced stress levels and higher overall performance.

The findings also reinforce the argument that modern employees increasingly value organizational environments that prioritize flexibility, trust, and autonomy. In digitally connected workplaces, rigid organizational structures may reduce employee engagement and adaptability, whereas flexible work systems create conditions that support creativity, psychological comfort, and sustainable productivity. Consequently, work flexibility has become not only an operational strategy but also a critical organizational resource in the digital economy.

Overall, the results of this study suggest that employee productivity within Industry 5.0 environments is shaped by the interaction between technology, organizational practices, and human-centered management approaches. Organizations that successfully integrate AI technologies with flexible work structures and supportive leadership practices are more likely to achieve sustainable improvements in workforce performance and organizational effectiveness.

5.2 Conclusion

This study contributes to the growing literature on Industry 5.0 by examining the combined influence of Human-Centric AI Adoption, Digital Leadership, and Work Flexibility on Employee Productivity. The findings demonstrate that modern organizational productivity cannot be explained solely through technological advancement or managerial practices in isolation. Instead, productivity increasingly depends on how organizations integrate technological innovation with employee-centered organizational environments.

The results confirm that Human-Centric AI Adoption and Work Flexibility positively contribute to Employee Productivity, while Digital Leadership does not exert a significant direct influence within the proposed model. Among the examined factors, Work Flexibility was identified as the strongest determinant of productivity, emphasizing the importance of autonomy, adaptability, and work-life balance in contemporary workplaces.

From a practical perspective, the findings suggest that organizations should move beyond traditional management structures and adopt more adaptive workplace strategies. Investments in AI technologies should be accompanied by employee training initiatives, digital literacy development, and supportive organizational policies that encourage collaboration between humans and technology. Similarly, organizations should prioritize flexible work arrangements that improve employee well-being and foster long-term organizational commitment.

The transition toward Industry 5.0 requires organizations to develop environments where technological systems enhance human potential rather than diminish it. By combining advanced digital technologies with flexible and employee-oriented organizational

practices, companies can strengthen productivity, improve employee satisfaction, and enhance organizational resilience in increasingly competitive digital economies.

5.3 Limitations and Future Research

Despite its contributions, this study has several limitations that should be acknowledged. First, the study employed a cross-sectional research design, meaning that the data were collected at a single point in time. As a result, the findings reflect only a snapshot of organizational dynamics during a specific stage of digital transformation. Future studies could benefit from longitudinal research designs that examine how relationships between AI adoption, leadership, work flexibility, and productivity evolve over time.

Second, the study relied primarily on self-reported survey data, which may introduce subjective bias or common method variance. Future research may strengthen the validity of findings by incorporating objective organizational performance indicators, qualitative interviews, or mixed-method approaches.

Third, although the study included participants from multiple sectors, organizational and cultural differences may still influence employee perceptions regarding technology adoption and workplace flexibility. Future studies could conduct comparative analyses across industries or countries to better understand contextual variations in digital transformation practices.

Finally, the insignificant direct relationship between Digital Leadership and Employee Productivity suggests the possibility of indirect or mediating relationships that were not fully explored in the present study. Future research should therefore investigate the mediating roles of digital culture, employee resilience, technological self-efficacy, and organizational learning in order to provide a more comprehensive understanding of leadership effectiveness in digitally transformed workplaces.

DECLARATIONS

Ethics Approval and Consent to Participate

The study was conducted in accordance with accepted ethical standards for social science research. Participation in the survey was voluntary, and all respondents were informed about the purpose of the research prior to data collection. Participants provided informed consent before completing the questionnaire, and anonymity and confidentiality were fully maintained throughout the study. No personally identifiable information was collected from the participants.

Availability of Data and Materials

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The author declares that there are no competing interests related to this study.

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Authors' Contributions

Amine Azri was solely responsible for the conceptualization of the study, literature review, research design, data collection, statistical analysis, interpretation of findings, and preparation of the manuscript.

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Declaration of Generative AI

During the preparation of this manuscript, the author used AI-assisted language tools solely for improving language clarity, grammar correction, and academic formatting. All interpretations, analyses, conclusions, and intellectual contributions presented in the manuscript remain the full responsibility of the author. The author carefully reviewed and edited the final manuscript prior to submission.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable academic request.

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