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AI-Enabled Digital Transformation and Operational Performance in Nepalese SMEs: The Role of Employee Digital Readiness and IT Support Capability

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ABSTRACT

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The expansion of artificial intelligence (AI) and digital technologies is reshaping the competitive environment of small and medium-sized enterprises (SMEs), while their operational value is closely linked to employees' digital preparedness and the quality of technical support. This study examines the relationship between AI-enabled digital transformation (AIDT) and operational performance (OP) in Nepalese SMEs, with employee digital readiness (EDR) and IT support capability (ITSC) as moderators. Grounded in the resource-based view and dynamic capabilities perspective, the study employs a quantitative, cross-sectional research design and partial least squares structural equation modeling (PLS-SEM). The findings indicate a positive association between AIDT and operational performance. Both employee digital readiness and IT support capability strengthen this association, highlighting the complementary role of human competence and technical support in AI-enabled operations. The study contributes to the SME digital transformation literature by integrating these organizational capabilities in the Nepalese business context and offers practical implications for digital-skills development, technical support, and operational management.

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1.0 Introduction

AI and digital transformation have become important factors determining the manner in which small businesses are managing their information, customer relationships, routine work coordination, and demand changes. Digital transformation is not only about purchasing software but also integrating digital technologies into work processes, decision-making, and organizational routines. The use of digital technologies by SMEs has been found to positively impact business results, while at the same time, there are often resource, skills, and managerial deficiencies in small organizations needed to adopt and use technology properly (Eller et al., 2020; Papadopoulos et al., 2020; Ben Slimane et al., 2022). Recent review papers show that the introduction of AI brings new obstacles connected with knowledge, infrastructure, costs, and organization-fit issues (Oldemeyer et al., 2025; Schwaeke et al., 2025; Zamani, 2022). This situation makes the organizational context, rather than the availability of technology, a key factor for understanding operations results.

In this research, AI-driven digital transformation (AIDT) involves the deliberate adoption of technology that is based on AI and is digitally linked to processes such as demand forecasting, inventory management, customer service, scheduling, reporting, and decision-making by managers. Operational performance (OP) is defined as the effectiveness of the organization in managing time, costs, quality, process dependability, and responsiveness. The employee digital readiness (EDR) is defined as the sum of the capabilities of the employees in terms of knowledge, readiness, and ability to utilize technology. Information technology support capability (ITSC) is the ability of an organization to provide support in maintaining technology, diagnosing issues, safeguarding the use of technology, supporting users, and integrating applications (Mikalef & Gupta, 2021; Zahoor et al., 2023; Barba-Sánchez et al., 2024).

Despite an extensive body of research on digitalization and SMEs' performance, a number of unanswered questions remain regarding when the technological initiative can be considered a measurable operational benefit for the company. The research has established a positive relationship between digitalization and performance, but has identified heterogeneity caused by different organizational orientations, capabilities, implementation, and the essence of business model transformation (Teng et al., 2022; Merín-Rodrigáñez et al., 2024; Kallmuenzer et al., 2025). An SME might subscribe to a forecasting software service, but still use manual record-keeping; another might introduce an AI customer service assistant, but not teach its staff to verify incorrect answers. In both cases, the technology is present, but the process which transforms it into performance advantages is not completed yet. Therefore, the direct-effect model alone explains only partially why certain firms benefit more than others.

Secondly, there is an issue of context and conceptual fit. A majority of the empirical evidence available in relation to AI and digitalization pertains to resource-rich or non-Nepalese environments. The technology adoption by Nepalese SMEs is, however, affected by unique combinations of infrastructure availability, employee competence, firm size, and implementation cost. Several local studies in Nepal have explored the issue of e-commerce readiness and SMEs' use of social media platforms, suggesting that the topic is indeed a relevant and quantifiable subject area for research in Nepal (Bhattarai & Thapa, 2024; Maharjan et al., 2024). Nevertheless, none

of the above studies explains how the dual condition of employee readiness and technological support affects the relationship between AI-based transformation and firm's performance. Instead of arguing that Nepal lacks research in digital enterprises, the current study seeks to fill the gaps in two specific interaction effects.

This research has three major contributions. Firstly, it helps to understand the performance effects of technological investments by distinguishing between AI-driven process innovation and organizational capabilities which facilitate its implementation. Secondly, it contributes to the literature on capabilities of SMEs through its contribution to the knowledge base of Nepal without assuming that results achieved in more developed countries are directly applicable to the Nepalese context. Thirdly, it helps to resolve the real managerial dilemma: should limited budget be invested exclusively in software purchase or in software installation, human resource development, and troubleshooting as well. Recent literature proves that capabilities of people, IT infrastructure, and management processes affect technology success (Scuotto et al., 2021; Kim & Jin, 2024; Fan et al., 2026).

The research project seeks to achieve the following goals: investigating the relationship between AI-driven digital transformation and performance of Nepalese SMEs, moderating effect of digital readiness of employees, and moderating effect of IT capability. These are addressed in the research model and findings outlined in the following sections.

2.0 Literature Review

2.1 Theoretical Support

In terms of research modeling, the concepts are derived from the resource-based view (RBV) and dynamic capabilities approach, viewed from a modern perspective of digital businesses, rather than taking into account the use of AI technologies as a standalone resource. According to RBV, organizational performance is a result of how technological resources are integrated with unique and irreplaceable knowledge. AI technologies can be commercially available for many organizations, but people's capacity to utilize them and their competency to manage the underlying infrastructure cannot easily be copied. For example, Mikalef and Gupta (2021) defined AI capability as a bundle of resources in an organization, linked with creativity and performance; Barba-Sánchez et al. (2024) emphasized the relevance of IT capabilities and digital orientation to capitalize on the digital-transformation potential.

The concept of dynamic capability theory further builds up on this theory through an elaboration of how firms perceive opportunities, adjust their routines, and modify their resources due to changes in markets and technologies. In SMEs, such modifications take an informal form and involve a limited number of managers and staff members. Based on qualitative research, it was found that digital transformation involves learning, coordination, and adaptation of business processes rather than just implementing technologies (Khurana et al., 2022; Saeedikiya et al., 2024). Technology adoption and business models' changes were also shown to be reinforcing each other in literature although all companies may not have organizational context for such integration (Mattos et al., 2024; Marino-Romero et al., 2024). Hence, the proposed model considers AIDT to be the main organizational change while EDR and ITSC are considered its complementary

capabilities.

The choice between moderation and mediation has been made purposefully because the former revolves around the process through which the effect takes place, for example, process integration or innovation. Moderation explores whether there is a change in the strength of the AIDT performance relationship based on employees' readiness or technical support within the organization. Since the two capabilities become a part of technology implementation, they can be considered boundary conditions. This approach is in line with findings showing that organizational capabilities and digital maturity determine the benefits of digitalization (Hassan et al., 2024; Sohu et al., 2026).

2.2 AI-enabled digital transformation and operational performance

Operational performance refers to how well a firm is able to deliver its products or services based on the resources that it has. AI-driven transformation could help through more rapid demand forecasting, fault detection, inventory restocking, transaction categorization, customer inquiry processing, and better information flow. For small firms in food, retailing, tourism, trade, and service sectors, even slight technological advances could impact on the waste, accuracy, speed, and scheduling of their activities. However, these advances depend on the quality of input and integration with the technology. Literature on digitalization in SMEs is supportive of the performance link but warns against adoption alone (Eller et al., 2020; Teng et al., 2022; Prakasa & Jumani, 2024).

Innovative SMEs empirical research suggests that digital transformation is correlated with the performance of firms positively via business model innovation (Merín-Rodrigáñez et al., 2024). Other researchers have found out that digital skills and routines facilitated by technology could lead to better entrepreneurial performance in case an organization recognizes opportunities (Kim & Jin, 2024). Literature on SME digitalization and marketing-related research shows the relationship between digital transformation and enhanced marketing processes (Amin et al., 2025). Literature on applications of artificial intelligence in organizations has revealed efficiency, decision-making, and competitiveness as the potential benefits of applying AIDT, though implementation obstacles are numerous (Landini & Machado, 2026). Thus, it would be appropriate to investigate the connection between AIDT and operational performance of Nepalese enterprises.

The dependent variable used for this study is the actual performance of the technology-enabled integration. Operational performance in terms of process efficiency, quality consistency, fewer avoidable errors, response time, and resource usage is measured based on experiences during a certain operating period. The presence of a positive coefficient means that companies that have higher technology-enabled integration tend to achieve better results in terms of operational performance, ceteris paribus. The existence of a correlation between the two variables does not necessarily mean that AI was the cause of the improvement. Hypothesis:

H1: AI-enabled digital transformation is positively associated with operational performance among Nepalese SMEs.

2.3 The moderating role of employee digital readiness

Digital readiness of the workforce is the ability and readiness to collaborate with

technology. This implies knowledge about digital information, using relevant applications competently, mastering new processes, knowing the limitations of tools being used, and adjusting to changes in software and processes. The reason why these traits are crucial is that an AI-powered system should be interpreted, analyzed, and implemented by employees. In the absence of required skills and calibrated levels of trust, recommendations of AI will either not be implemented, implemented mechanically, or repeated manually. The digital literacy research in SMEs suggests that individual and managerial competences can be used to describe (Scuotto et al., 2021; Zahoor et al., 2023).

Beyond the basic assumption that highly competent employees will do better, the interaction hypothesis implies that AIDT is related to organizational improvement if employees can interpret the output, change work practices, and address problems independently. For example, demand forecasts are valuable in making purchases when employees have the capacity to make use of their estimates. On the other hand, poor readiness may lead to rework if employees do not have confidence in the system or if they are completely dependent on external information. Kim and Jin (2024) established a relationship between digital fluency and performance-related competencies in SMEs, while Fan et al. (2026) investigated technical competence and training.

Moreover, there are some rationales for not making assumptions about the existence of such an interaction. Even digitally competent personnel can achieve high performance levels without sophisticated AI applications. Some automated systems do not require much training from their users. Hence, this moderating effect cannot be treated as something that is taken for granted and needs to be proven on the basis of further investigation. This is why our research model includes positive interaction as a dependent variable due to the fact:

H2: Employee digital readiness positively moderates the association between AI-enabled digital transformation and operational performance, such that the association is stronger at higher levels of employee digital readiness.

2.4 The moderating role of IT support capability

The IT support capability can be described as the ability of the firm to ensure that the systems remain functional, safe, integrated, and responsive to any operational challenges. The elements associated with this capability include access to skilled help, troubleshooting, maintenance, backup and recovery procedures, user support, configuration, and integration of applications. For SMEs, IT support capability may be provided either by an individual internally or by an external technology supplier or even a small support team. The quality of IT support capability cannot be confused with the number of hardware and AI subscriptions. An organization can have advanced technology but still waste time due to connectivity challenges, software conflicts, data challenges, and access issues.

There is some evidence from studies to prove the fact that IT capabilities are multidimensional and have technological as well as organizational aspects. According to Barba-Sánchez et al. (2024), the role of IT capabilities included performance through digital orientation and transformation, while according to Ben Slimane et al. (2022), the dimensions of the SME transformation process were interdependent and included digital infrastructure and managerial

coordination. The recent study conducted about the factors that create barriers for AI implementation in organizations shows that knowledge deficiency, infrastructure and cost are the key barriers for SMEs (Oldemeyer et al., 2025) (Sohu et al., 2026).

In the research model, the ability of the IT support capability enhances the relationship between AIDT and OP by minimizing downtime, integration of the system with business process, and helps employees in case of failure of digital applications and difficulty in understanding the output. The accurate synchronization of AI-enabled inventory management systems and the sales data will be beneficial for dispatch reliability, but lack of good technical support results in data fragmentation, reconciliation, and error resolution issues. The inclusion of ITSC is important to differentiate the interaction effect with the performance relationship of technical support. Thus, the third hypothesis is:

H3: IT support capability positively moderates the association between AI-enabled digital transformation and operational performance, such that the association is stronger at higher levels of IT support capability.

2.5 Conceptual research model

Figure 1 summarizes the research framework. AI-enabled digital transformation is the independent variable, and operational performance is the dependent variable. Employee digital readiness and IT support capability moderate the direct relationship in parallel. Their main effects on operational performance are included in the structural specification, although these paths are not separately numbered as hypotheses. The model does not include a mediating construct.

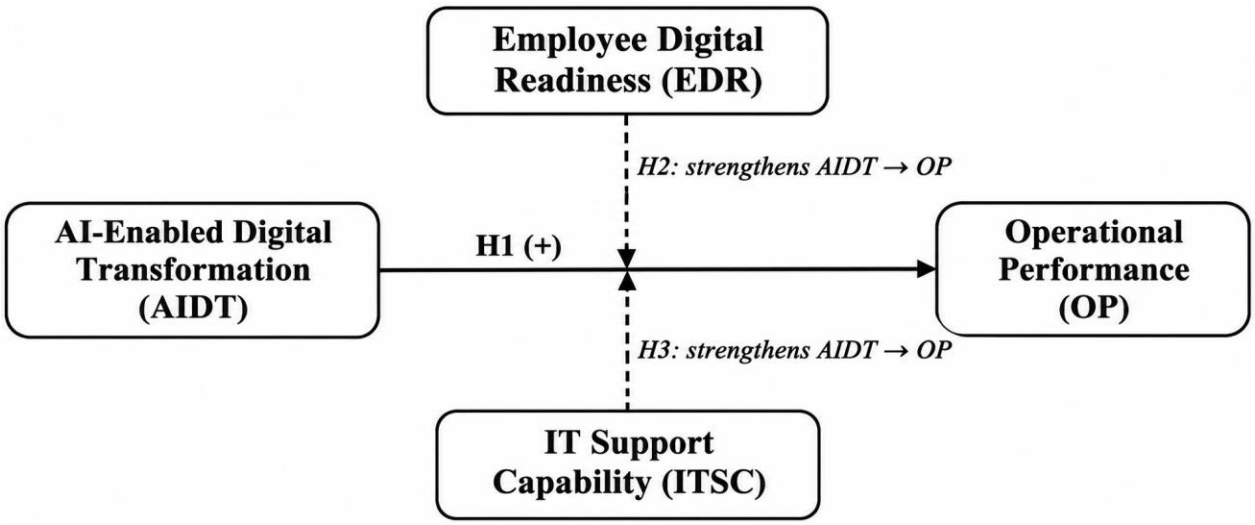


Figure 1. Conceptual research model (H1–H3). Dashed arrows indicate moderating effects.

3.0 Methodology

3.1 Research design and setting

The study uses a quantitative, explanatory cross-sectional research design that is concerned with SMEs in Nepal. The unit of analysis in this study is the organization as the key constructs in this study are concerned with digital practices and operational performance of organizations. The study setting includes various industries such as retailing, food processing, hospitality, professional services, light manufacturing, trading, and technology-enabled services.

The survey methodology will use a firm level design where only one person will respond on behalf of the organization. The target respondents for the study include SME owners, operations managers, IT managers, and other senior employees from organizations who are familiar with digital practices and operational decisions within the organization. Recruitment strategy includes SME associations, chamber of commerce, business networks, and direct contact of enterprises in Nepal.

The notion of AI-enabled digital transformation refers to the significant integration of AI-enhanced capabilities into the functioning of businesses. Thus, AI-powered demand analytics, AI-enhanced demand planning, automated document classification, and AI-driven customer services stand for the application fields that can be considered in the scope of research. Regular digitization through the means of simple usage of emails or spreadsheets differs from the AI-enabled transformation to create a clearer conceptual understanding of AIDT.

The method of surveying stresses the willingness of participants to take part in the process, confidentiality of personal data, and protection of organization's information. The questionnaire is addressed to those individuals who have sufficient knowledge regarding the digital capabilities of their companies.

3.2 Instrument and operationalization

The measurement model encompasses four reflective constructs, namely AIDT, EDR, ITSC, and OP. Each reflective construct comprises of five indicators for a total of 20 indicators that are measured on a five-point scale of agreement from 1 (strongly disagree) to 5 (strongly agree). AIDT represents daily AI integration, cross-functional information usage, automated analysis, AI decision-making, and process redesigning. EDR refers to competence, confidence, learning, adaptability, and critical interpretation of digital output. ITSC encompasses maintenance, troubleshooting, integration, user assistance, and data security. Finally, OP refers to efficiency, process reliability, error avoidance, response time, and resource management. The measurement domains are based on Mikalef and Gupta (2021), Teng et al. (2022), Zahoor et al. (2023), and Barba-Sánchez et al. (2024).

The five-point scale enables a standardized evaluation of organizational practices and perceptions related to firm operations among SME respondents. The survey differentiates AI-enabled practices from overall digitization practices and defines firm size, industry, organizational experience, and firm location as contextual variables. The operational performance construct addresses routine process outcomes, keeping the measurement consistent with the research objective of studying firms.

3.3 Data analysis strategy

The measurement and structural models will be analyzed using partial least squares structural equation modeling (PLS-SEM). For assessing the reflective measurement model, we will consider indicator loadings, Cronbach’s alpha, composite reliability, average variance extracted (AVE), and heterotrait–monotrait ratios (HTMT). The generally accepted standards for reporting suggest having outer loadings of about .708 or more, adequate internal consistency, AVE equal to or greater than .50, and HTMT less than an adequately justified threshold of .85 or .90

(Sarstedt et al., 2022; Ringle et al., 2023). The results of measurement are shown in Tables 1 and 2.

In the structural model, the dependent construct is OP, while the explanatory constructs are AIDT, EDR, ITSC, AIDT × EDR, and AIDT × ITSC. The main effects of the two moderators are considered along with their interaction terms. Hypothesis tests will be conducted based on path coefficients, standard errors, t-statistics, p-values, and 95% confidence intervals (Table 3).

Interpretation of the survey data collected on organizational relationships considers common-method problems and perceptual performance measures. Clarity and neutrality of question phrasing, anonymity, and construct dissociation are key elements of a good survey design. Thus, the interpretation of the results is concentrated on the relationship and moderating effects found.

4.0 Findings and Results

4.1 Reliability and convergent validity

The loadings, Cronbach's alpha, CR, and AVE of the four reflective constructs are shown in Table 1. The loadings are between .776 and .871. CR values are from .911 to .922, and AVE values are from .672 to .704. Cronbach's alpha values are between .877 and .900. These values satisfy the commonly accepted criteria of indicator reliability, internal consistency, and convergent validity of AIDT, EDR, ITSC, and OP.

There are conceptual differences among the four constructs in terms of digital transformation and performance dimensions of SMEs. AIDT is the integration of AI into business practices, EDR is related to employee capabilities, ITSC is the support provided by IT professionals, and OP is operational performance. Such conceptual differences are confirmed by the reliability and convergent validity results in Table 1 and discriminant validity results in Table 2.

Table 4.1. Reliability and convergent validity

Construct	Outer Loadings	A	CR	AVE
AIDT	AIDT1=0.821; AIDT2=0.854; AIDT3=0.796; AIDT4=0.838; AIDT5=0.812	0.884	0.914	0.680
EDR	EDR1=0.811; EDR2=0.835; EDR3=0.867; EDR4=0.787; EDR5=0.822	0.881	0.914	0.680

ITSC	ITSC1=0.824; ITSC2=0.851; ITSC3=0.803; ITSC4=0.776; ITSC5=0.844	0.877	0.911	0.672
OP	OP1=0.836; OP2=0.859; OP3=0.808; OP4=0.819; OP5=0.871	0.900	0.922	0.704

Note. α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted.

4.2 Discriminant validity

The heterotrait-monotrait ratio (HTMT) between the four constructs is shown in Table 2. The values vary from .601 to .744 and are all lower than the benchmark of .85. This is indicative of discriminant validity since the ratios are less than .85. HTMT is more sensitive in assessing construct distinctiveness as compared to using the Fornell-Larcker criterion only (Sarstedt et al., 2022; Ringle et al., 2023).

Table 4.2. HTMT values

Construct	AIDT	EDR	ITSC	OP
AIDT	—			
EDR	0.642	—		
ITSC	0.601	0.713	—	
OP	0.744	0.678	0.692	—

Note. HTMT = heterotrait–monotrait ratio.

4.3 Structural model and hypothesis paths

In the structural model, AIDT, EDR, ITSC, and the two interaction terms predict OP. In Table 3, there exists a positive relationship between AIDT and OP ($\beta = .340$, $t = 5.86$, $p < .001$). This provides empirical evidence for H1. There is a positive and statistically significant interaction between AIDT and EDR ($\beta = .170$, $t = 3.47$, $p = .001$), providing support for H2. Additionally, there is a positive and statistically significant interaction between AIDT and ITSC ($\beta = .140$, $t = 2.75$, $p = .006$), which is supportive of H3. There are also positive and significant main effects of EDR ($\beta = .190$, $p = .002$) and ITSC ($\beta = .160$, $p = .006$).

There are two significant interaction coefficients that indicate that the relationship between AI-driven digital transformation and operational performance will become stronger with higher levels of employee digital readiness and IT support capability. Employee readiness facilitates the use and interpretation of AI-assisted processes while IT support improves continuity and integration of digital operations.

On the whole, the study findings confirm the three hypotheses. The positive direct

relationship underscores the operational significance of AI-integrated process management, whereas the positive moderating effects reflect the connection between the level of employee preparedness and IT support capability with operational performance results.

Table 4.3. Structural paths and moderation tests

Path	β	SE	t	p	95% CI
H1: AIDT → OP	.340	.058	5.86	<.001	[.224, .451]
EDR → OP (control)	.190	.061	3.11	.002	[.071, .306]
ITSC → OP (control)	.160	.058	2.76	.006	[.047, .276]
H2: AIDT × EDR → OP	.170	.049	3.47	.001	[.074, .266]
H3: AIDT × ITSC → OP	.140	.051	2.75	.006	[.041, .241]

5.0 Discussion and Conclusion

The results reveal a positive connection between digital transformation using artificial intelligence and operational performance in Nepal's SMEs. The results are in line with the argument that digital technologies enhance efficiency, coordination, and organizational responsiveness when integrated into business processes. Earlier studies have linked SME digital transformation with innovation and performance-oriented outcomes rather than software acquisition (Eller et al., 2020; Prakasa & Jumani, 2024; Merín-Rodrigáñez et al., 2024). The results suggest the relevance of integrating digital technology and organizational resources for operational purposes.

Digital readiness of employees significantly increases the connection between AIDT and operational performance in support of H2. Employees capable of understanding digital outputs and adopting work processes by using AI-supported systems can easily integrate process integration with operations. The result is in line with earlier research associating digital capabilities with SME growth and digital literacy among managers with digital transformation (Scuotto et al., 2021; Zahoor et al., 2023). Human impact of AI adoption research also suggests the importance of training, support, and digital experience of employees (Fan et al., 2026).

The second moderating variable, IT support capability, concerns sustaining the reliability of the technology and its interface with day-to-day functioning. IT support can help avoid disruptions as well as the frustration experienced when things go wrong. Where an organization is lacking support capacity, frequent interruptions or faulty data can make the functional value of planning, scheduling, and automation of customer response useless. This line of reasoning fits well with new evidence about the importance of organizational IT capability and the challenge that resource-strapped SMEs face when adopting AI technology (Barba-Sánchez et al., 2024; Oldemeyer et al., 2025). It also suggests that IT support should be judged by the quality of the

response, and by business knowledge, not just contract signing.

Nepal serves as an appropriate case to discuss the importance of organizational capabilities for supporting AI-driven digital transformation in SMEs. Local scholars have discussed technology readiness and entrepreneurship capability in relation to e-commerce adoption and also discussed market practices mediated by digital technologies in terms of performance of SMEs (Bhattarai & Thapa, 2024; Maharjan et al., 2024). The current findings further contribute to this discussion by exploring AI-enabled processes along with enhanced role of digital readiness of employees and information technology capability.

The findings are relevant to recent literature on AI capabilities, organizational sustainability and performance of SMEs (Shaikh et al., 2025; Soomro et al., 2025; Landini & Machado, 2026). The two moderator framework provides a specific explanation about the manner in which complementary organizational resources affect performance outcomes related to AI-driven digital transformation. By discussing interaction and direct effect, this study makes a contribution to digital transformation studies based on capability perspectives.

5.1 Conclusion and Implications

This study is unique in separating the implementation of AI-enhanced technology from organizational capabilities needed for the productive implementation of such technology. The positive effect of AIDT on operational efficiency, along with the moderating influence of EDR and ITSC, provides a capability-based perspective of digital transformation. This study further adds to the literature by applying this capability perspective to Nepalese small and medium enterprises and highlights the significance of all three factors - technology, employee skills, and technical support.

Managers can leverage this insight by understanding the need for implementing AI technology along with training their employees about how to utilize such technologies. With proper training, guidelines, maintenance, data quality management, and troubleshooting, the organizations will be able to integrate their AI-driven functions within their regular business practices.

The conclusions will also benefit initiatives for SMEs in Nepal. Various business organizations and policymakers can work to provide practical digital skills programs, cost-effective technical advice, and enhanced digital infrastructure. Helping in both the development of workforce and IT infrastructure will allow firms to be better able to implement processes using AI technologies.

5.2 Future Research Directions

These connections can be explored via longitudinal and multiple respondent research design using both objective measures and managerial perceptions. Comparative research across different industries, firm sizes, and digital maturity levels will add to the clarity of the circumstances where AI-based digital transformation influences performance. Further research can address specific uses of AI technology and development of relevant capabilities of employees and technology.

Contribution

Manoj Kumar Tamang: Problem Identification and Theoretical Framework**,** Data Analysis, Supervision and Drafting

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest in this article's research, authorship,and publication.

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