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The Mediating Role of Technological Innovation Capabilities in the Effect of Information Technology Management and Artificial Intelligence on Organizational Agility and Supply Chain Resilience: A Case Study of Melli Shoe Company

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Abstract

In the era of digital transformation, organizations are inevitably required to adopt emerging technologies to survive and gain competitive advantage. The present study was conducted to examine the effect of information technology management and artificial intelligence on organizational agility and supply chain resilience, with the mediating role of technological innovation capabilities, in Melli Shoe Company. In terms of purpose, this study is applied, and in terms of method, it is descriptive-survey research. The statistical population included all managers and employees of Melli Shoe Company. Using Cochran's formula, a sample size of 200 participants was determined and selected through simple random sampling. The data collection instrument was a standardized questionnaire, and the data were analyzed using SPSS and Smart PLS through a structural equation modeling approach. The results showed that information technology management and artificial intelligence have a positive and significant effect on technological innovation capabilities. Moreover, technological innovation capabilities play a significant mediating role in the relationship between the independent variables, namely information technology management and artificial intelligence, and the dependent variables, namely organizational agility and supply chain resilience. In other words, a substantial part of the effect of these technologies on agility and resilience is realized through the enhancement of technological innovation capabilities. Investment in information technology management and artificial intelligence alone is not sufficient to improve agility and resilience; rather, organizations must strengthen their ability to convert these infrastructures into technological innovation capabilities. These findings can provide practical guidance for managers in the footwear industry to improve organizational performance and flexibility.

Keywords: information technology management, artificial intelligence, technological innovation capabilities, organizational agility, supply chain resilience.

1. Introduction

In the contemporary business environment, digital transformation has become a strategic imperative rather than a discretionary managerial choice. Organizations are increasingly required to redesign their structures, processes, and decision-making mechanisms in response to technological change, environmental turbulence, market volatility, and supply chain disruptions. In such conditions, competitiveness no longer depends solely on physical assets, production capacity, or traditional managerial routines; rather, it increasingly depends on the extent to which organizations can acquire, integrate, and deploy digital technologies to enhance flexibility, responsiveness, innovation, and resilience. Information technology management and artificial intelligence are among the most influential technological drivers of this transformation because they enable firms to collect, process, analyze, and apply data in ways that improve strategic alignment, operational coordination, and adaptive capacity. From the perspective of strategic alignment theory, information technology creates value when it is aligned with organizational strategy and when technological resources are integrated with business processes and managerial priorities (Henderson & Venkatraman, 1993). Similarly, the resource-based view suggests that information technology capability can become a source of superior firm performance when it is valuable, rare, difficult to imitate, and embedded in organizational routines (Bharadwaj, 2000). Therefore, information technology management should be understood not merely as the administration of hardware, software, and networks, but as a strategic capability through which organizations convert technological resources into organizational value.

Information technology management has received increasing attention in management literature because of its direct and indirect contribution to organizational effectiveness. Firms with stronger information technology capabilities are better able to coordinate internal processes, integrate information flows, support managerial decision-making, and improve organizational learning. In digital transformation contexts, information technology capability strengthens the organization's ability to sense environmental change, process complex information, and respond to emerging opportunities and threats (Yi & Kim, 2025). Previous studies have also shown that the strategic alignment between information technology and business objectives is associated with improved organizational and financial performance, because alignment reduces fragmentation between technological investment and managerial priorities (Milani, 2021). In this regard, information technology management includes not only the technical dimension of infrastructure and systems integration, but also the managerial dimension of planning, governance, human expertise, and coordination. When these elements are properly configured, information technology can support rapid decision-making, cross-functional collaboration, supply chain visibility, and the reconfiguration of organizational resources.

Alongside information technology management, artificial intelligence has emerged as one of the most powerful drivers of organizational transformation. Artificial intelligence refers to a set of technologies and systems capable of performing tasks that traditionally require human intelligence, such as learning, prediction, pattern recognition, classification, optimization, and automated decision support. In organizational settings, artificial intelligence can be applied to demand forecasting, customer analytics, inventory management, risk detection, process automation, supplier evaluation, and strategic planning. The practical value of artificial intelligence lies in its capacity to transform large volumes of data into actionable insights, thereby enabling organizations to improve the speed, accuracy, and quality of decisions (Davenport & Ronanki, 2018). Recent reviews indicate that AI-based systems are increasingly used across organizational functions and that their effectiveness depends on data quality, technological infrastructure, managerial readiness, and the organization's ability to integrate intelligent systems into existing processes (Ngoc Cuong, 2025). Consequently, artificial intelligence should not be treated as an isolated technological tool; rather, it should be examined as an organizational capability that interacts with human expertise, managerial systems, and innovation processes.

The relevance of artificial intelligence becomes more evident when organizations operate under uncertainty and competitive pressure. AI-based analytics can enhance predictive accuracy, identify hidden patterns in operational and market data, and support proactive rather than reactive management. In supply chain contexts, artificial intelligence may improve visibility, reduce uncertainty, support early warning systems, and facilitate rapid adjustment to demand fluctuations or disruptions. Moreover, recent studies emphasize that artificial intelligence can support business innovation, particularly when combined with other digital technologies such as blockchain, data networks, and intelligent platforms (Kolayeez, 2024). However, the mere adoption of artificial intelligence does not automatically produce organizational agility or supply chain resilience. AI systems generate value when organizations possess the complementary capabilities required to interpret AI outputs, redesign processes, develop new products or services, and institutionalize innovation. This point highlights the importance of technological innovation capabilities as a potential mechanism through which information technology management and artificial intelligence influence broader organizational outcomes.

Technological innovation capability refers to an organization's ability to develop, adopt, adapt, and commercialize new technologies, processes, products, and services. This capability is multidimensional and includes research and development, process innovation, product and service innovation, technology absorption, and the transformation of knowledge into practical outcomes. Innovation capability has been recognized as a key determinant of firm performance because it enables organizations to convert technological and knowledge resources into marketable and operational advantages (Yam, 2011). In the age of artificial intelligence, digital innovation capability has become even more critical, as organizations must be able to combine data, algorithms, platforms, and managerial knowledge to produce new forms of value (Motamedimoghadam, 2024). Accordingly, technological innovation capability can be regarded as a bridge between technological investment and organizational performance. Without such a bridge, information technology and artificial intelligence may remain underutilized, fragmented, or limited to routine automation rather than contributing to strategic agility and resilience.

The relationship between technology and innovation is also consistent with the dynamic capabilities perspective. Dynamic capabilities refer to the organization's ability to sense opportunities and threats, seize them through resource mobilization, and reconfigure organizational assets in response to environmental change. Organizational agility can be interpreted as a manifestation of dynamic capability, because it reflects the organization's ability to move quickly, respond flexibly, and adapt continuously to changing conditions (Teece, 2018). In this sense, information technology management and artificial intelligence may serve as enabling resources, while technological innovation capability represents the organizational mechanism through which these resources are transformed into adaptive and competitive outcomes. This distinction is crucial because many organizations invest in digital technologies but fail to achieve agility or resilience due to weak innovation routines, insufficient organizational learning, or limited capacity to redesign processes and business models.

Organizational agility has become a central construct in contemporary management research because it captures the organization's ability to respond rapidly and effectively to environmental change. Although the concept has sometimes been defined inconsistently across studies, it generally refers to the capacity to sense change, make timely decisions, reconfigure resources, and deliver products or services with speed and flexibility (Walter, 2021). Earlier research on digital options also emphasizes that digital infrastructures and information technology capabilities can shape organizational agility by creating reach, richness, and flexibility in business processes (Sambamurthy et al., 2003). In a similar vein, information technology capability has been shown to support organizational agility by improving information processing, process integration, and responsiveness to market change (Lu & Ramamurthy, 2011). Nevertheless, agility is not the automatic result of technological adoption. It requires the organizational ability to translate technology-enabled information into innovative processes, flexible structures, and rapid operational responses. Therefore, technological innovation capability may be a critical mediator in the effect of information technology management and artificial intelligence on organizational agility.

Supply chain resilience is another vital outcome in turbulent environments. Supply chain resilience refers to the capability of a supply chain to prepare for disruptions, respond effectively when disruptions occur, and recover to a stable or improved operational state. The importance of resilience has grown due to global disruptions, demand instability, supplier risks, transportation constraints, and increasing interdependence among supply chain actors. Foundational work in this field emphasizes that resilient supply chains require agility, visibility, collaboration, redundancy, and risk management capabilities (Christopher & Peck, 2004). Subsequent frameworks have also highlighted resilience as a multidimensional capability involving preparedness, response, recovery, and adaptation (Ehrenhuber, 2015). In this context, information technology and artificial intelligence can enhance resilience by improving visibility, data sharing, prediction, coordination, and disruption detection. However, the transformation of these technological resources into resilience depends on the organization's ability to innovate in processes, supplier relationships, logistics practices, and risk management systems.

The connection between technological capability and supply chain resilience has been specifically emphasized in recent management and supply chain studies. Technological capabilities can increase resilience by enabling organizations to identify vulnerabilities, monitor supply chain flows, improve communication with suppliers, and redesign processes in response to disruptions (Hosseini Dehshiri & Aghaei, 2021). Big data analytics, organizational culture, swift trust, and collaboration have also been shown to complement one another in enhancing performance in interorganizational and supply chain settings (Dubey & Gunasekaran, 2019). These findings imply that supply chain resilience is not produced by technology alone, but by the interaction between technology, culture, collaboration, innovation, and managerial capability. In industries characterized by complex supplier networks, shifting customer preferences, and pressure for timely delivery, technological innovation capability can help firms convert digital resources into resilient practices such as flexible sourcing, rapid process adjustment, supplier coordination, and risk-based planning.

Despite the growing body of literature on information technology, artificial intelligence, innovation, agility, and resilience, several conceptual and empirical gaps remain. First, many studies examine the direct effect of information technology capability or artificial intelligence on organizational outcomes, while less attention has been paid to the mechanisms through which these technologies produce value. Second, the mediating role of technological innovation capability requires further investigation, particularly in traditional manufacturing industries where digital transformation may face structural, cultural, and operational barriers. Third, much of the literature has been developed in advanced digital sectors or large international firms, while evidence from established industrial companies in developing economies remains limited. Recent research has begun to integrate information technology management, artificial intelligence, organizational agility, supply chain resilience, and technological innovation into a unified model, showing that innovation can function as a critical mediator in technology-performance relationships (Dalain et al., 2025). However, further empirical examination in specific industrial contexts is necessary to clarify how these relationships operate in practice.

The footwear industry provides an appropriate context for examining these relationships because it is exposed to rapid changes in consumer preferences, supply chain uncertainty, cost pressures, production scheduling challenges, and increasing competition from both domestic and international producers. Firms in this industry must respond quickly to changes in demand, improve product variety, manage supplier relationships, control inventory, and maintain operational continuity despite disruptions. In such a context, organizational agility and supply chain resilience are essential for survival and competitive advantage. At the same time, the successful use of information technology management and artificial intelligence depends on whether the organization can convert digital infrastructures and intelligent systems into technological innovation capabilities. Melli Shoe Company, as an established firm in the footwear industry, represents a meaningful case for investigating how information technology management and artificial intelligence contribute to agility and resilience through the mediating role of technological innovation capabilities.

Accordingly, the present study aims to examine the effect of information technology management and artificial intelligence on organizational agility and supply chain resilience, with the mediating role of technological innovation capabilities, in Melli Shoe Company.

2. Methods and Materials

In terms of purpose, the present study is applied research, and in terms of the nature of data collection, it is descriptive-survey research of a correlational type. This study is situated within the positivist paradigm because it is based on the assumption that organizational realities, such as agility and resilience, are objective and measurable. In terms of approach, it is deductive, as the researcher formulated hypotheses by reviewing the theoretical literature and then tested them through the collection of quantitative data. The statistical population of this study included all senior managers, middle managers, and specialized experts of Melli Shoe Company who had sufficient awareness and command of the organization's strategic processes, information technology, and supply chain. According to the official inquiry from the company's human resources department in 2025–2026, the total number of eligible individuals was reported to be 380.

Given that the statistical population was finite and clearly defined, simple random sampling was used so that all members of the population would have an equal chance of being selected. To determine the sample size, the standard Cochran formula for finite populations was applied. Based on the calculations performed at a 95% confidence level and a 5% acceptable error margin, the minimum required sample size was estimated to be 191 participants. To ensure data adequacy and prevent possible attrition, 220 questionnaires were distributed, and ultimately, 200 complete and analyzable questionnaires were collected.

The main data collection instrument in this study was a standardized closed-ended questionnaire. The final questionnaire consisted of two main sections: the first section included five demographic questions, including gender, age, education, and work experience, to identify the demographic characteristics of the respondents, and the second section included 54 specialized items measuring the five main variables of the study. A five-point Likert scale, ranging from strongly disagree with a score of 1 to strongly agree with a score of 5, was used to answer these questions. The information technology management variable was measured using nine questions and three dimensions, namely technical skills and knowledge, hardware and network infrastructures, and information systems integration. The artificial intelligence variable was measured using ten questions and three dimensions, namely intelligent data analytics, prediction and machine learning, and intelligent process automation. The mediating variable of technological innovation capability was measured using 11 questions and three dimensions, namely product and service innovation, process innovation, and research and development. The dependent variable of organizational agility was measured using nine questions and three dimensions, namely customer responsiveness, operational flexibility, and speed in product delivery. Finally, the supply chain resilience variable was measured using 15 questions and three dimensions, namely agility and visibility, collaboration with suppliers, and risk management and redundancy. All dimensions and questionnaire items were adapted from valid previous studies. Table 1 presents the distribution of questionnaire questions by variables and their corresponding dimensions.

Table 1. Distribution of Questionnaire Questions by Variables and Dimensions

Variable	Dimensions	Number of Questions	Question Numbers	Source
Information technology management	Technical skills and knowledge	3	1–3	Yi and Kim (2025)
Information technology management	Hardware and network infrastructures	3	4–6	Yi and Kim (2025)
Information technology management	Information systems integration	3	7–9	Yi and Kim (2025)
Artificial intelligence	Intelligent data analytics	3	10–12	Davenport and Ronanki (2018)
Artificial intelligence	Prediction and machine learning	3	13–15	Davenport and Ronanki (2018)
Artificial intelligence	Intelligent process automation	4	16–19	Davenport and Ronanki (2018)
Technological innovation capability	Product and service innovation	4	20–23	Yam et al. (2011)
Technological innovation capability	Process innovation	3	24–26	Yam et al. (2011)
Technological innovation capability	Research and development	4	27–30	Yam et al. (2011)
Organizational agility	Customer responsiveness	3	31–33	Sambamurthy et al. (2003)
Organizational agility	Operational flexibility	3	34–36	Sambamurthy et al. (2003)
Organizational agility	Speed in product delivery	3	37–39	Sambamurthy et al. (2003)
Supply chain resilience	Agility and visibility	5	40–44	Christopher and Peck (2004)
Supply chain resilience	Collaboration with suppliers	5	45–49	Christopher and Peck (2004)
Supply chain resilience	Risk management and redundancy	5	50–54	Christopher and Peck (2004)

To ensure the accuracy and precision of the measurement instrument, the technical properties of the questionnaire were evaluated using two criteria: validity and reliability. To examine validity, face validity and content validity were used. The initial version of the questionnaire was provided to the supervisor, advisor, and three specialists from the footwear industry and senior experts from the information technology department of Melli Shoe Company. After receiving their feedback, the necessary revisions were made, and the content validity of the questionnaire was confirmed. In addition, Cronbach's alpha was used to assess the reliability and internal consistency of the items. According to statistical principles, if the calculated Cronbach's alpha value is greater than 0.70, the reliability of the questionnaire is considered desirable and acceptable. In the present study, Cronbach's alpha coefficients were calculated as 0.812 for information technology management, 0.845 for artificial intelligence, 0.876 for technological innovation capability, 0.823 for organizational agility, and 0.891 for supply chain resilience. All values were above 0.70, indicating high internal consistency and excellent reliability of the research instrument. Table 2 summarizes the reliability test results.

Table 2. Reliability Test Results Based on Cronbach's Alpha

No.	Research Variables	Number of Items	Cronbach's Alpha Coefficient	Status
1	Information technology management	9	0.812	Confirmed
2	Artificial intelligence	10	0.845	Confirmed
3	Technological innovation capability	11	0.876	Confirmed
4	Organizational agility	9	0.823	Confirmed
5	Supply chain resilience	15	0.891	Confirmed

The analysis of the collected data was conducted at two descriptive and inferential levels. At the descriptive level, using SPSS version 27, frequency distribution and percentage indices were calculated to examine the demographic characteristics of respondents, and central tendency and dispersion indices, including mean and standard deviation, were calculated to examine the current status of the variables within the organization. Furthermore, the Kolmogorov-Smirnov test was used to examine the normality of the data. At the inferential level, structural equation modeling with the partial least squares approach was used to test the conceptual model and research hypotheses, using Smart PLS version 4. The partial least squares method was selected because it is insensitive to normal distribution assumptions, highly efficient in analyzing complex models with mediating variables, and has appropriate statistical power for limited sample sizes.

The data analysis process in Smart PLS was performed in three main stages. In the first stage, the fit of the measurement model was examined, including the evaluation of factor loadings, with an acceptable threshold above 0.40 and preferably above 0.70; reliability using Cronbach's alpha and composite reliability coefficients, with an acceptable threshold above 0.70; convergent validity using the average variance extracted index, with an acceptable threshold above 0.50; and discriminant validity using the Fornell-Larcker criterion and the heterotrait-monotrait ratio. In the second stage, the fit of the structural model was examined, including the calculation of the coefficient of determination (R^2) to assess the extent to which changes in dependent variables were explained, hypothesis testing through the examination of path coefficients (β) and t-statistics using the bootstrapping technique with 5,000 subsamples, effect size (f^2) to assess the intensity of the effect of each independent variable on the dependent variable, and predictive relevance (Q^2) using the blindfolding method. In the third stage, the overall model fit was evaluated using the standardized root mean square residual (SRMR), where values below 0.08 indicate desirable model fit.

3. Findings and Results

Before entering the structural equation modeling stage and testing the hypotheses, examining the distribution of the data is a methodological necessity. To analyze the distributional nature of the main variables, the one-sample Kolmogorov-Smirnov test was used. The results of this test for all research constructs are presented in Table 3.

Table 3. Results of the Kolmogorov-Smirnov Test

Variable	Number (N)	Test Statistic (Z)	Significance Level (Sig.)	Result
Information technology management	200	0.090	0.000	Non-normal distribution
Artificial intelligence capabilities	200	0.084	0.002	Non-normal distribution
Technological innovation capabilities	200	0.094	0.000	Non-normal distribution
Organizational agility	200	0.128	0.000	Non-normal distribution
Supply chain resilience	200	0.095	0.000	Non-normal distribution

Based on the findings reported in Table 3, the significance level, or P-value, for all five research constructs was lower than the assumed error level of 5% ($P < 0.05$). From a statistical perspective, this result indicates the rejection of the null hypothesis (H_0), which assumes that the data follow a normal distribution. This nonparametric nature of the data distribution has decisive methodological implications for selecting the structural equation modeling analysis strategy. Given the uncertainty regarding the normal distribution of the data, the variance-based approach, namely partial least squares structural equation modeling (PLS-SEM), was employed using Smart PLS version 4. This approach has very low sensitivity to data normality and provides robust and unbiased estimates when dealing with skewed or kurtotic distributions.

After confirming the non-normal distribution of the data, the next step was to evaluate the measurement models. In structural equation modeling, before testing the hypotheses, it is necessary to ensure that the latent variables are accurately measured by the questionnaire items. The evaluation of the measurement model includes three critical stages: first, examining factor loadings; second, assessing reliability through Cronbach's alpha and composite reliability (CR); and third, examining convergent validity through the average variance extracted (AVE) index. According to Hair et al. (2019), the threshold for confirming factor loadings is 0.40, the threshold for Cronbach's alpha and composite reliability is 0.70, and the threshold for AVE is 0.50. The final results of the evaluation of the measurement models are presented in Table 4.

Table 4. Results of Measurement Model Evaluation: Factor Loadings, Reliability, and Validity

Variable / Construct	Final Items	Range of Factor Loadings	Cronbach's Alpha	Composite Reliability (CR)	Convergent Validity (AVE)
Artificial intelligence capabilities	AI10, 11, 15, 16, 17, 18, 19	0.69–0.81	0.89	0.91	0.59
Information technology management	IT1, 2, 5, 6, 7	0.54–0.75	0.74	0.82	0.47
Technological innovation capabilities	TIC20, 21, 22, 24, 25, 28, 29	0.68–0.82	0.88	0.90	0.56
Organizational agility	OA31, 33, 34, 35, 39	0.73–0.85	0.89	0.90	0.64
Supply chain resilience	S40, 42, 45, 47, 48, 52, 54	0.63–0.81	0.83	0.85	0.46

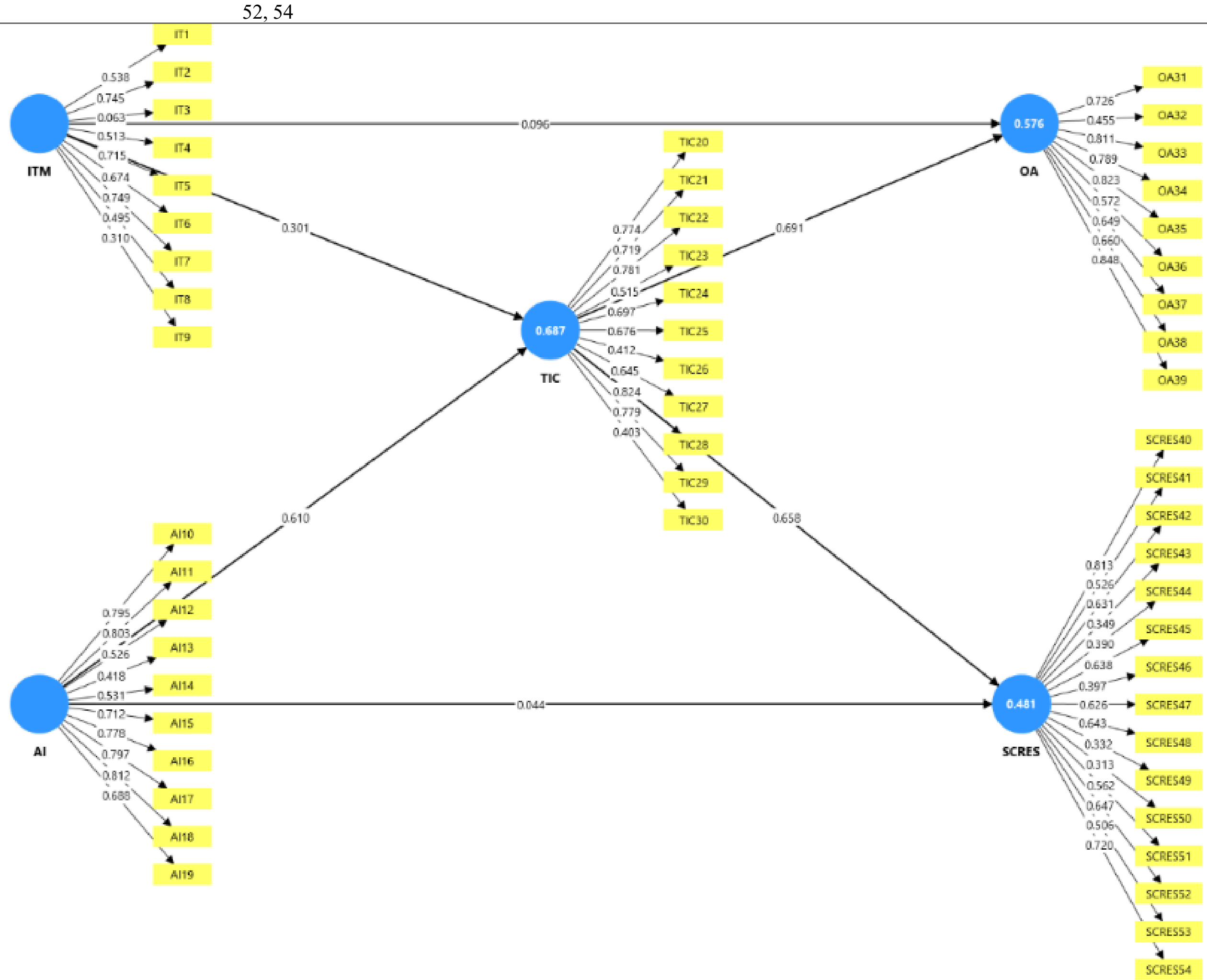

Figure 1. Structural and measurement model of the research in the factor loading mode

The results indicate that all remaining items in the model obtained factor loadings within the desirable range of 0.54 to 0.85, reflecting the high explanatory power of the items. In addition, all Cronbach's alpha and composite reliability values were reported above the standard threshold of 0.70, indicating appropriate internal consistency and reliability of the research instrument. Regarding convergent validity, the constructs of artificial intelligence (0.59), technological innovation (0.56), and organizational agility (0.64) fully exceeded the 0.50 threshold. Regarding the constructs of information technology management (0.47) and supply chain resilience (0.46), although the AVE values were at the borderline of 0.50, based on the logic proposed by Fornell and Larcker (1981), because the composite reliability (CR) values of these constructs were above 0.80, their convergent validity is scientifically confirmed, and the adequacy of the measurement model is established.

Discriminant validity indicates the extent to which a latent variable is distinct from other variables in the model and whether the items of each construct measure only that construct. In this study, to analyze discriminant validity, the classical and valid Fornell and Larcker (1981) criterion and the modern HTMT index were used.

According to the Fornell-Larcker criterion, discriminant validity is established when the square root of the AVE for each construct is greater than the correlation coefficient of that construct with the other constructs in the model. The results of this test are presented in Table 5.

Table 5. Discriminant Validity Matrix Based on the Fornell-Larcker Method

Variables	Artificial Intelligence	Information Technology Management	Innovation Capability	Organizational Agility	Supply Chain Resilience
Artificial intelligence	0.741				
Information technology management	0.516	0.714			
Innovation capability	0.747	0.609	0.748		
Organizational agility	0.518	0.502	0.725	0.787	
Supply chain resilience	0.455	0.351	0.550	0.722	0.735

The values on the diagonal of the matrix represent the square root of AVE, and the off-diagonal values represent the correlation coefficients between the constructs.

Given that, in all cells on the main diagonal, the square root of AVE for each construct is greater than its correlation coefficients with the other constructs in the model, discriminant validity is fully confirmed at the level of the research measurement model. This final confirmation ensures the structural stability of the model and provides assurance that the results obtained from hypothesis testing will not be caused by conceptual overlap.

Since some researchers argue that the Fornell-Larcker criterion may perform weakly in detecting lack of discriminant validity under certain conditions, the modern HTMT index was also used.

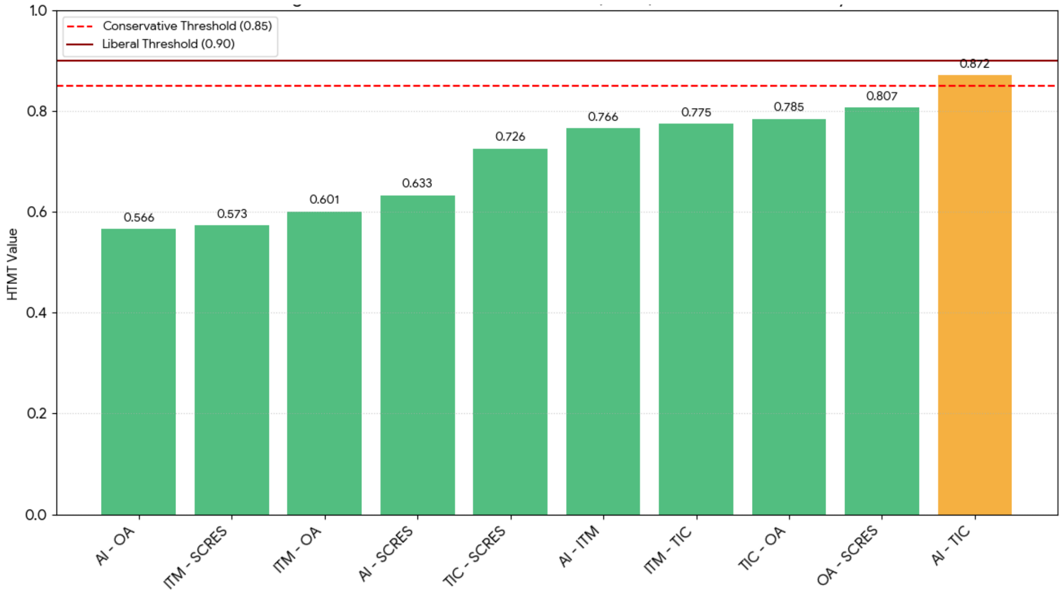

Figure 2. HTMT index diagram of the research constructs

According to Henseler et al. (2015), the thresholds of 0.85 as a strict criterion and 0.90 as a lenient criterion are considered for confirming discriminant validity. The visual analysis of Figure 2 shows that the vast majority of relationships, such as the relationship between information technology management and agility or resilience, fall below the 0.85 threshold, confirming complete structural distinction. The only bar exceeding the 0.85 threshold belongs to the construct pair of artificial intelligence and innovation capability, with a value of 0.87, shown by the orange bar. This numerical closeness does not indicate conceptual overlap; rather, it reflects the substantive interconnectedness of these two variables in the industrial context. However, because this value remains below the 0.90 ceiling, the conceptual independence of these two constructs is scientifically confirmed. The combined confirmation of the Fornell-Larcker criterion and the HTMT index creates additional statistical assurance and indicates that the model possesses the required structural robustness to enter the hypothesis-testing stage.

After establishing the adequacy of the measurement models, the relationships among the latent constructs were tested at this stage based on the seven research hypotheses, including one main hypothesis and six sub-hypotheses.

Testing the Sub-Hypotheses: Direct Relationships

The results obtained from the bootstrapping algorithm with 5,000 subsamples for examining direct relationships are presented in Table 6.

Table 6. Results of Testing the Sub-Hypotheses: Direct Relationships

Hypothesis Code	Relationship Path	Path Coefficient (β)	t-Statistic	P-Value	Result
H1	Information technology management ← technological innovation	0.301	7.52	0.000	Confirmed
H2	Artificial intelligence ← technological innovation	0.610	15.22	0.000	Confirmed
H3	Technological innovation ← organizational agility	0.691	13.77	0.000	Confirmed
H4	Technological innovation ← supply chain resilience	0.658	7.76	0.000	Confirmed
H5	Information technology management ← organizational agility	0.096	1.57	0.116	Rejected
H6	Artificial intelligence ← supply chain resilience	0.044	0.42	0.672	Rejected

The results in Table 6 show that, among the six sub-hypotheses, four hypotheses, namely H1 to H4, were confirmed with positive path coefficients and t-statistics above 1.96. In contrast, two hypotheses, namely H5 and H6, were rejected due to t-statistics lower than 1.96 and significance levels greater than 0.05. The findings related to the rejection of the direct hypotheses indicate the existence of an operational gap between technological infrastructures and performance outcomes, emphasizing the importance of the mediating role in the model.

Testing the Main Hypothesis: The Mediating Role of Technological Innovation Capabilities

To confirm the mediating role, the indirect effects index was used. The results obtained from the bootstrapping algorithm for the indirect paths are presented in Table 7.

Table 7. Results of Testing Indirect Paths: Mediating Role

Code	Indirect Path	Indirect Effect	t-Statistic	P-Value	Result
H_MAIN-1	Information technology management ← innovation ← agility	0.208	6.64	0.000	Confirmed
H_MAIN-2	Information technology management ← innovation ← resilience	0.198	5.84	0.000	Confirmed
H_MAIN-3	Artificial intelligence ← innovation ← agility	0.422	9.95	0.000	Confirmed
H_MAIN-4	Artificial intelligence ← innovation ← resilience	0.402	6.43	0.000	Confirmed

Based on the findings in Table 7, the following key results can be extracted:

The discovery of full mediation: Given that the direct effects of information technology management on agility and artificial intelligence on resilience had been rejected, while their indirect effects were confirmed with high t-statistics of 6.64 and 6.43, respectively, it can be concluded that technological innovation plays the role of an indispensable catalyst in Melli Shoe Company. In other words, without passing through the channel of innovation, investment in technology alone will not lead to agility or resilience.

The strongest mediating path: The path of artificial intelligence ← innovation ← agility, with a coefficient of 0.422, is the strongest mediating path in the model. This finding indicates that artificial intelligence capabilities, when they lead to the creation of process and product innovations, strongly enhance organizational responsiveness, or agility. Therefore, by confirming all indirect paths, the main hypothesis of the study is decisively confirmed.

After confirming the accuracy of the relationships and testing the hypotheses, in the final stage of statistical analyses, the quality and explanatory power of the structural model were evaluated using three indices: the coefficient of determination (R^2), predictive relevance (Q^2), and the overall model fit index (SRMR).

The R^2 index indicates the percentage of variance in the dependent variables explained by the independent and mediating variables. According to Chin (1998), values of 0.19, 0.33, and 0.67 are considered weak, moderate, and strong levels, respectively. The results of this index are presented in Table 8.

Table 8. Coefficient of Determination Values for Endogenous Variables

Dependent Variable	Coefficient of Determination (R^2)	Explanatory Power of the Model
Technological innovation capabilities	0.627	Strong, approaching very strong
Organizational agility	0.528	Moderate to high
Supply chain resilience	0.347	Moderate

The R^2 value for the technological innovation capabilities variable is 0.627, indicating that 63% of the variance in innovation in Melli Shoe Company is explained by the two variables of information technology management and artificial intelligence. In addition, the 53% explanation of agility and the 35% explanation of resilience indicate the appropriate explanatory power of the structural model in predicting organizational outcomes.

This index, obtained through the blindfolding technique, examines the model's ability to predict the values of dependent variables. According to Henseler et al. (2009), values greater than zero for this index indicate the high predictive quality of the model.

Table 9. Results of the Predictive Relevance Index (Q^2)

Dependent Variable	Q^2 Value	Predictive Quality Result
Technological innovation capabilities	0.34	Desirable and strong
Organizational agility	0.31	Desirable and strong
Supply chain resilience	0.18	Desirable and moderate

Given that all Q^2 values are positive and considerably greater than zero, the predictive power of the model is confirmed across all dimensions.

The SRMR index measures the difference between the observed correlations and the correlations predicted by the model. The value of this index in the present study was reported as 0.072. According to PLS-SEM standards, values lower than 0.08 for the SRMR index indicate a highly desirable and acceptable fit for the overall research model.

4. Discussion and Conclusion

The present study examined the effect of information technology management and artificial intelligence on organizational agility and supply chain resilience through the mediating role of technological innovation capabilities in Melli Shoe Company. Overall, the findings confirmed the central logic of the research model and showed that technological resources do not necessarily generate strategic and operational outcomes directly; rather, their effectiveness depends largely on the organization's ability to convert them into technological innovation capabilities. The results indicated that information technology management had a positive and significant effect on technological innovation capabilities. This finding suggests that when an organization develops appropriate information technology infrastructure, technical knowledge, network capacity, and integrated information systems, it becomes better equipped to support product innovation, process innovation, and research and development activities. This result is consistent with the resource-based perspective, according to which information technology capability can create superior organizational outcomes when it is embedded in organizational processes and transformed into a distinctive organizational capability (Bharadwaj, 2000). It is also aligned with the strategic alignment view, which emphasizes that information technology produces value when it is aligned with business strategy and organizational transformation priorities (Henderson & Venkatraman, 1993). In the context of the present study, information technology management appears to provide the technical and informational foundation upon which innovation capabilities can be built.

The significant effect of information technology management on technological innovation capabilities also supports recent arguments that digital transformation is not limited to technology adoption but requires organizational learning, knowledge integration, and capability development. Yi and Kim emphasized that IT capability and organizational learning play a crucial role in digital transformation because they enable organizations to process information, learn from technological change, and translate digital resources into adaptive practices (Yi & Kim, 2025). Similarly, the findings are consistent with Milani's study, which showed that the strategic alignment of information technology and business contributes to improved organizational performance by strengthening the connection between technological resources and managerial objectives (Milani, 2021). In the present study, the positive path from information technology management to technological innovation capabilities indicates that IT infrastructure and systems integration can facilitate innovation-oriented activities, including redesigning processes, developing new products and services, and strengthening organizational knowledge. Therefore, in Melli Shoe Company, information technology management can be interpreted as an enabling capability that prepares the organization for more systematic innovation.

The results also showed that artificial intelligence had a positive and significant effect on technological innovation capabilities, and this effect was stronger than the effect of information technology management. This finding indicates that artificial intelligence capabilities, such as intelligent data analytics, prediction and machine learning, and intelligent process automation, can substantially enhance the organization's capacity for technological innovation. This result is consistent with Davenport and Ronanki, who argued that artificial intelligence creates practical organizational value by improving prediction, automation, decision support, and data-driven problem-solving (Davenport & Ronanki, 2018). It is also supported by Ngoc Cuong's comprehensive review, which emphasized that AI-based systems are increasingly used in organizations to improve decision-making, operational intelligence, and process efficiency (Ngoc Cuong, 2025). In the present research, the strong effect of artificial intelligence on technological innovation capabilities suggests that AI enables the organization to identify patterns in operational and market data, forecast future trends, automate repetitive activities, and create a stronger foundation for innovation in products, services, and processes.

This finding is also aligned with studies emphasizing the role of artificial intelligence in business innovation. Kolayeez argued that artificial intelligence, particularly when combined with digital technologies such as blockchain and data network systems, can support business innovation by improving transparency, automation, and intelligence in organizational processes (Kolayeez, 2024). Motamedimoghadam similarly emphasized that digital innovation capabilities in the age of AI require organizations to integrate technological infrastructure with innovative thinking and adaptive capacity (Motamedimoghadam, 2024). The present findings confirm that artificial intelligence does not merely function as an operational tool but can act as a strategic input for technological innovation capability. In a manufacturing company such as Melli Shoe Company, artificial intelligence can support innovation through demand forecasting, production planning, quality control, inventory optimization, supplier evaluation, and customer preference analysis. However, these advantages become meaningful only when AI outputs are translated into concrete innovations in processes, products, and managerial routines.

Another important finding was the positive and significant effect of technological innovation capabilities on organizational agility. This result indicates that organizations with stronger innovation capabilities are more capable of responding rapidly to customer needs, adapting operational processes, and accelerating product delivery. This finding supports the theoretical view that agility depends on the organization's capacity to sense change and reconfigure resources in response to environmental turbulence (Teece, 2018). It is also consistent with Sambamurthy et al., who argued that digital options shape organizational agility by creating flexibility, reach, and richness in organizational processes (Sambamurthy et al., 2003). Lu and Ramamurthy also demonstrated that information technology capability can enhance organizational agility by improving information processing and enabling rapid response to changing business conditions (Lu & Ramamurthy, 2011). The present study extends these perspectives by showing that technological innovation capabilities represent a key mechanism through which technological inputs can be transformed into agility.

The significant effect of technological innovation capabilities on organizational agility also clarifies why innovation is essential in competitive and unstable environments. Walter noted that although organizational agility has sometimes been defined ambiguously, its central meaning involves the ability to respond quickly and effectively to change (Walter, 2021). The findings of this study show that such responsiveness is strengthened when the organization has the capability to innovate technologically. In the footwear industry, agility requires rapid adjustment to changes in fashion trends, customer preferences, material availability, production constraints, and market competition. Technological innovation capabilities can help the organization redesign production processes, reduce response time, improve customer orientation, and increase flexibility in product development. Therefore, the finding that innovation capability significantly predicts agility is theoretically and practically meaningful.

The results further indicated that technological innovation capabilities had a positive and significant effect on supply chain resilience. This finding suggests that innovation capabilities help organizations strengthen their ability to anticipate, absorb, respond to, and recover from supply chain disruptions. The result is consistent with Christopher and Peck, who emphasized that resilient supply chains depend on agility, visibility, collaboration, risk management, and redundancy (Christopher & Peck, 2004). It also aligns with Ehrenhuber's resilience framework, which conceptualizes supply chain resilience as a multidimensional capability requiring analysis, preparedness, and adaptive response (Ehrenhuber, 2015). In the present study, technological innovation capabilities appear to strengthen resilience by enabling Melli Shoe Company to improve supplier collaboration, enhance visibility, develop alternative processes, and manage risks more effectively. These findings are also supported by Hosseini Dehshiri and Aghaei, who identified technological capabilities as important factors in increasing supply chain resilience (Hosseini Dehshiri & Aghaei, 2021).

The findings are also consistent with Dubey and Gunasekaran, who emphasized that big data analytics, organizational culture, swift trust, and collaborative performance complement one another in production and supply chain contexts (Dubey & Gunasekaran, 2019). In the present study, technological innovation capabilities may serve as the organizational condition that allows data, technology, and collaboration to be converted into resilient supply chain practices. For example, innovation capabilities can help the organization redesign procurement procedures, develop flexible supplier networks, improve inventory planning, and use technological tools to detect disruption risks earlier. Therefore, technological innovation capability is not only a driver of competitiveness but also a protective mechanism that enhances the organization's capacity to survive and recover from environmental and supply chain shocks.

One of the most important findings of the study was that the direct effect of information technology management on organizational agility was not significant. This result indicates that investment in information technology infrastructure and systems integration alone may not be sufficient to produce agile organizational behavior. Although previous studies have shown that information technology capability can support agility (Lu & Ramamurthy, 2011; Sambamurthy et al., 2003), the present finding suggests that this relationship may not always be direct. In Melli Shoe Company, information technology management may provide the necessary infrastructure for agility, but the organization must first convert IT resources into technological innovation capabilities. This finding is theoretically important because it highlights the difference between possessing technological resources and using them innovatively. It also supports the dynamic capability perspective, according to which resources contribute to agility only when organizations can reconfigure and redeploy them in response to change (Teece, 2018).

Similarly, the direct effect of artificial intelligence on supply chain resilience was not significant. This finding suggests that AI-based capabilities do not automatically generate supply chain resilience unless they are integrated with innovation processes and translated into practical supply chain improvements. Although artificial intelligence can improve prediction, automation, and analytical capacity (Davenport & Ronanki, 2018; Ngoc Cuong, 2025), the present study shows that these capabilities must pass through the mechanism of technological innovation to influence resilience. This finding is especially meaningful in traditional manufacturing contexts, where AI adoption may remain limited to isolated tools or analytical functions unless it is accompanied by process redesign, supplier integration, risk management innovation, and organizational learning. Thus, artificial intelligence can be considered a potential source of resilience, but technological innovation capability determines whether this potential becomes an actual organizational outcome.

The mediation results provided the strongest support for the conceptual model. All indirect paths through technological innovation capabilities were positive and significant. Specifically, technological innovation capabilities mediated the relationship between information technology management and organizational agility, information technology management and supply chain resilience, artificial intelligence and organizational agility, and artificial intelligence and supply chain resilience. This finding is highly consistent with Dalain et al., who showed that technological innovation plays a mediating role in the relationship between information technology management, artificial intelligence, organizational agility, and supply chain resilience (Dalain et al., 2025). The present study confirms this model in the context of Melli Shoe Company and demonstrates that technological innovation capabilities function as a strategic catalyst that transforms digital and intelligent resources into operational and supply chain outcomes. The strongest indirect path was from artificial intelligence to organizational agility through technological innovation capabilities, suggesting that AI has the greatest organizational effect when it leads to innovation in processes and products.

Overall, the findings indicate that technological innovation capabilities are the core explanatory mechanism in the model. Information technology management and artificial intelligence provide technological inputs, but innovation capability determines whether these inputs become agility and resilience. This result integrates the resource-based view, strategic alignment theory, dynamic capability theory, and supply chain resilience literature. From the resource-based perspective, IT and AI are valuable resources, but their value depends on organizational capabilities (Bharadwaj, 2000). From the strategic alignment perspective, technology must be connected to business processes and strategic goals (Henderson & Venkatraman, 1993). From the dynamic capabilities perspective, agility and resilience require continuous sensing, seizing, and reconfiguration (Teece, 2018). From the supply chain perspective, resilience requires not only visibility and risk management but also adaptive and innovative responses to disruption (Christopher & Peck, 2004). Therefore, the present study contributes to the literature by showing that technological innovation capabilities connect these theoretical domains in a unified explanatory model.

The present study has several limitations. First, the study was conducted in a single organization, Melli Shoe Company, and therefore the generalizability of the findings to other firms, industries, or national contexts should be approached with caution. Second, the data were collected through self-report questionnaires, which may create the possibility of response bias, common method bias, or social desirability bias. Third, the study used a cross-sectional design, which limits the ability to make strong causal claims about the relationships among information technology management, artificial intelligence, technological innovation capabilities, organizational agility, and supply chain resilience. Fourth, although the model explained a considerable proportion of variance in the endogenous variables, other organizational, cultural, strategic, and environmental factors may also influence agility and resilience. Finally, the study focused on managerial and expert perceptions rather than objective performance indicators, which may limit the precision of operational interpretation.

Future researchers are encouraged to test the proposed model in different industries, such as food production, pharmaceuticals, automotive manufacturing, retail, logistics, and service organizations, to examine whether the mediating role of technological innovation capabilities remains stable across different contexts. Longitudinal studies are also recommended to investigate how digital and AI capabilities gradually influence innovation, agility, and resilience over time. Future studies may combine survey data with objective indicators such as delivery time, inventory turnover, supplier disruption recovery time, product development speed, and financial performance. In addition, researchers can expand the model by adding variables such as organizational learning, digital culture, leadership support, data governance, absorptive capacity, environmental turbulence, supplier integration, and organizational readiness for digital transformation. Comparative studies between traditional and digitally mature firms may also provide deeper insight into the conditions under which information technology and artificial intelligence generate stronger organizational outcomes.

From a practical perspective, the findings suggest that managers should not view investment in information technology and artificial intelligence as sufficient by itself. Instead, they should develop organizational mechanisms that transform technological infrastructure and AI-based analytics into technological innovation capabilities. Managers should strengthen employee digital skills, support cross-functional collaboration, encourage process redesign, invest in research and development, and create systems for converting data-driven insights into new products, services, and operational improvements. In supply chain management, organizations should use digital tools and AI not only for monitoring and reporting but also for supplier collaboration, disruption forecasting, risk prevention, and flexible sourcing strategies. For Melli Shoe Company and similar manufacturing firms, the key managerial implication is that agility and resilience are achieved when technology is embedded in innovation-oriented routines, supported by skilled human resources, and aligned with strategic priorities.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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References

Bharadwaj, S. (2000). A resource-based perspective on information technology capability and firm performance. *MIS quarterly*, *24*(1), 169-196. https://doi.org/10.2307/3250983
Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *International Journal of Logistics Management*, *15*(2), 1-13. https://doi.org/10.1108/09574090410700275
Dalain, M., Alnadi, M., Allahham, M. I., & Yamin, M. A. (2025). Investigating the impact of information technology management and artificial intelligence on organizational agility and supply chain resilience: The mediating role of technological innovation. *Logistics*, *9*(4), 138. https://doi.org/10.3390/logistics9040138
Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard business review*, *96*(1), 108-116.
Dubey, R., & Gunasekaran, A. (2019). Big data analytics and organizational culture as complements to swift trust and collaborative performance. *International Journal of Production Economics*, *210*, 120-136.
Ehrenhuber. (2015). *Supply chain resilience: A framework for analysis*.
Henderson, C., & Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal*, *32*(1), 4-16. https://doi.org/10.1147/sj.382.0472
Hosseini Dehshiri, S. Z., & Aghaei, M. (2021). Identifying technological capabilities for increasing supply chain resilience. *Scientific Quarterly of New Approaches in Business Management*, *4*(13), 96-107.
Kolayeez, E. K. (2024). Business innovation based on artificial intelligence and blockchain technology. *International Journal of Data and Network Science*, *8*(1), 47-58.
Lu, Y., & Ramamurthy, K. (2011). Understanding the link between information technology capability and organizational agility. *MIS quarterly*, *35*(4), 931-954. https://doi.org/10.2307/41409967
Milani, S. (2021). Investigating the effect of strategic alignment of information technology and business on corporate financial performance. *Journal of Information Technology Management*, *13*(2), 345-368.
Motamedimoghadam, S. (2024). Digital innovation capabilities in the age of AI. *Journal of Innovation Management*, *12*(2), 45-67.
Ngoc Cuong, P. (2025). AI-based systems used in organizations: A comprehensive review. *International Journal of Information Management Data Insights*, *5*(1), 100251.
Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options. *MIS quarterly*, *27*(2), 237-263. https://doi.org/10.2307/30036530
Teece, J. (2018). Dynamic capabilities and organizational agility. *California Management Review*, *58*(4), 13-35. https://doi.org/10.1525/cmr.2016.58.4.13
Walter. (2021). Organizational agility: Ill-defined and somewhat confusing? *Management Review Quarterly*, *71*, 343-391. https://doi.org/10.1007/s11301-020-00186-6
Yam, R. C. (2011). Analysis of sources of innovation, technological innovation capabilities, and performance. *Research Policy*, *40*(3), 391-402. https://doi.org/10.1016/j.respol.2010.10.013
Yi, S., & Kim, J. (2025). The role of IT capability and organizational learning in digital transformation. *Journal of Strategic Information Systems*, *34*(1), 101-120.