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Digital Business Ecosystem Strategy and Innovation Capability: The Mediating Effect of Knowledge Integration on Organizational Agility

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Abstract

The rapid evolution of digital technologies has intensified competition in software development, requiring firms to strengthen strategic capabilities to adapt and remain competitive over the long term. This study investigates the influence of digital business ecosystem strategy and innovation capability on organizational agility, with knowledge integration serving as a mediating variable. This study employed a quantitative explanatory cross-sectional survey of 300 employees in Indonesian software development companies selected through purposive sampling. Respondents included software engineers, developers, system analysts, DevOps engineers, quality assurance engineers, and product managers. Data were analyzed using PLS-SEM with SmartPLS 4. The findings reveal that digital business ecosystem strategy significantly enhances knowledge integration and organizational agility, while innovation capability positively affects both constructs. Knowledge integration also strengthens organizational agility and partially mediates the relationships between digital business ecosystem strategy, innovation capability, and organizational agility. These findings indicate that effective ecosystem collaboration, continuous innovation, and knowledge integration enhance organizational adaptability and responsiveness in dynamic digital environments. The study contributes an integrated model explaining how ecosystem strategy and innovation capability strengthen organizational agility through knowledge integration, while providing practical insights for software development managers to improve ecosystem collaboration, innovation, and knowledge management.

Keywords

Digital Business Ecosystem Strategy, Innovation Capability, Knowledge Integration, Organizational Agility, Software Development Companies.

1. Introduction

The rapid acceleration of digital transformation has fundamentally reshaped how organizations create, deliver, and sustain competitive value in increasingly interconnected business environments (Verhoef et al., 2021; Ramadhani et al., 2024). Rather than relying solely on internal resources, organizations increasingly must collaborate through digital business ecosystems that integrate technology platforms, strategic partners, customers, and complementary resources to achieve continuous innovation and long-term competitiveness (Subramaniam, 2020). Software development companies represent one of the industries most significantly affected by this transformation because they operate in environments characterized by rapid technological evolution, shortened product life cycles, and continuously changing customer requirements (Ciampi et al., 2022). The widespread adoption of cloud computing, artificial intelligence, DevOps, and agile software development has increased organizational complexity while simultaneously creating new opportunities for collaborative innovation and digital value creation (Priyono & Hidayat, 2024). Consequently, software firms must continuously adapt their strategic capabilities to remain competitive in highly dynamic digital markets.

Within this context, digital business ecosystem strategy has emerged as an important strategic capability that enables organizations to coordinate digital infrastructures, collaborative networks, and ecosystem partners in creating sustainable competitive advantage (Priyono & Hidayat, 2024). A well-developed ecosystem strategy allows organizations to access complementary knowledge, leverage external technological resources, and strengthen collaborative innovation across organizational boundaries, thereby improving their ability to respond rapidly to market changes. Besides ecosystem strategy, innovation capability has become another critical organizational capability that determines long-term organizational success in digital industries (Alyasein et al., 2025). Innovation capability reflects an organization's ability to continuously generate, develop, and implement new products, services, business processes, and technological solutions that respond effectively to changing market demands (Liu et al., 2025). Organizations possessing stronger innovation capability are generally better prepared to exploit emerging technologies and maintain sustainable organizational growth despite environmental uncertainty.

However, organizations cannot fully realize the strategic benefits of digital business ecosystems and innovation capability without an effective mechanism for integrating organizational knowledge. Knowledge integration refers to an organization's ability to combine, disseminate, and use knowledge from diverse internal and external sources to support strategic decision-making and innovation activities (Acharya et al., 2022). In software development companies, knowledge integration facilitates collaboration among software engineers, product managers, business analysts, quality assurance specialists, and external technology partners, enabling organizations to transform distributed expertise into collective organizational intelligence that accelerates innovation and improves operational responsiveness (Caccamo et al., 2023).

An increasingly important outcome of these strategic capabilities is organizational agility, which reflects an organization's ability to sense environmental changes, rapidly reconfigure organizational resources, and respond effectively to emerging business opportunities (Ciampi et al., 2022). Organizations with higher agility are more capable of adapting to technological disruptions, responding to changing customer expectations, and maintaining competitive performance in volatile digital environments. Organizational agility has therefore become an essential determinant of organizational resilience and sustainable competitiveness in knowledge-intensive industries.

Despite the growing body of research on digital transformation and organizational agility, several important research gaps remain. First, many previous studies have investigated digital ecosystems, innovation capability, and organizational agility independently, with limited attention given to their integrated relationships within software development organizations (Priyono & Hidayat, 2024). Second, empirical evidence explaining the mediating role of Knowledge Integration in linking digital business ecosystem strategy and innovation capability to organizational agility remains limited, particularly in the context of digital-intensive firms operating in emerging economies (Alyasein et al., 2025). Third, existing studies have largely emphasized technology adoption and infrastructure development while paying less attention to the organizational knowledge processes that translate technological investments into adaptive organizational capabilities.

To address these gaps, this study proposes an integrated research framework that examines of digital business ecosystem strategy and innovation capability influence organizational agility through the mediating role of knowledge integration in software development companies in Indonesia. The study is expected to contribute to the literature on strategic management, digital innovation, and organizational capability development by providing empirical evidence regarding how ecosystem-oriented strategies and innovation capability collectively strengthen organizational agility through effective knowledge integration. Furthermore, the findings are expected to provide practical guidance for managers in designing collaborative digital ecosystems, enhancing innovation capability, and strengthening organizational knowledge processes to improve organizational adaptability and long-term business performance.

2. Literature Review and Hypothesis Development

2.1. The Effect on Knowledge Integration

Digital business ecosystem strategy refers to an organization's ability to coordinate digital platforms, technological resources, business partners, customers, and other stakeholders to create value through interconnected networks (Verhoef et al., 2021). Unlike strategies focused primarily on internal resources, digital business ecosystem strategy emphasizes the orchestration of external actors to facilitate innovation, knowledge exchange, and competitive advantage. Through complementary capabilities, real-time information sharing, and collaborative value creation, ecosystem-oriented strategies can strengthen digital innovation, strategic flexibility, and organizational responsiveness (Zou et al., 2022; Samsuden et al., 2024). In software development companies, Volz et al. (2025) note that such strategies facilitate collaboration among developers, cloud providers, customers, platform vendors, and innovation partners, enabling firms to access external expertise and respond to changing customer needs.

This ecosystem connectivity also supports knowledge integration by enabling organizations to access, exchange, combine, and utilize knowledge across organizational boundaries. Massa et al. (2023) explain that digital technologies reshape knowledge processes by strengthening connectivity and facilitating knowledge exchange, while Zhang et al. (2021) demonstrate that knowledge search and integration within innovation ecosystems help firms combine heterogeneous knowledge and transform it into organizational value. Thus, ecosystem collaboration, platform integration, strategic partnerships, and digital resource orchestration can strengthen knowledge integration. Similarly, innovation capability relies on the ability to generate, exchange, combine, and apply diverse knowledge. David et al. (2022) highlight that openness to innovation facilitates knowledge integration by connecting firms with external knowledge sources, while Fu et al. (2024) emphasize the role of knowledge integration in developing

continuous innovation capability. Accordingly, stronger innovation capability can encourage collaborative learning, cross-functional knowledge combination, and knowledge utilization in developing new products, technologies, and processes. Based on these arguments, digital business ecosystem strategy and innovation capability are expected to positively influence knowledge integration.

H1: Digital business ecosystem strategy has a positive and significant effect on knowledge integration.
H2: Innovation capability has a positive and significant effect on knowledge integration.

2.2. The Effect on Organizational Agility

Organizational agility refers to an organization's capability to rapidly sense environmental changes, reconfigure organizational resources, and respond effectively to emerging opportunities under conditions of uncertainty (Ciampi et al., 2022). It has become increasingly important as digital transformation continues to reshape competitive dynamics, customer expectations, and technological trajectories. Asghar et al. (2025) conceptualize organizational agility as a multidimensional capability encompassing strategic responsiveness, operational flexibility, decision-making speed, and continuous adaptation. In software development companies, Samsuden et al. (2024) found that organizational agility enables faster software delivery, greater customer responsiveness, continuous innovation, and effective management of technological uncertainty. Thus, organizational agility represents an important organizational capability for maintaining resilience and competitiveness in the digital economy.

Digital business ecosystem strategy can strengthen organizational agility by facilitating access to external resources, knowledge, and digitally connected partners. Tisyani and Sushandoyo (2023) found that digital business ecosystems improved organizational, operational, marketing, and product-development activities, thereby strengthening business agility. Similarly, Priyono and Hidayat (2024) demonstrated that participation in digital business ecosystems facilitates learning, access to external knowledge and resources, capability development, and adaptation to market changes. Innovation capability also contributes to organizational agility. Wanasida et al. (2021) found that innovation capability enhances firms' ability to respond to environmental changes, while Alyasein et al. (2025) demonstrated its contribution to organizational agility within digitally enabled supply chains. Furthermore, knowledge integration supports organizational agility by facilitating knowledge flows and coordination across organizational units (Nazir & Pinsonneault, 2021). Consistent with this perspective, Rehman et al. (2025) found a positive and significant relationship between knowledge management practices and organizational agility, with inter-organizational learning further supporting agility. These findings support the proposition that digital business ecosystem strategy, innovation capability, and knowledge integration enhance organizational agility.

H3: Digital business ecosystem strategy has a positive and significant effect on organizational agility.
H4: Innovation capability has a positive and significant effect on organizational agility.
H5: Knowledge integration has a positive and significant effect on organizational agility.

2.3. Knowledge Integration as a Mediating Variable

Knowledge integration refers to an organization's capability to acquire, combine, disseminate, and apply knowledge from multiple internal and external sources to support decision-making and innovation (Samsuden et al., 2024). Rather than treating knowledge as isolated assets, knowledge integration transforms dispersed expertise into organizational capabilities through collaborative learning. This capability is particularly important in software development, where multidisciplinary teams continuously combine technical expertise, customer insights, market intelligence, and organizational experience to improve software quality, development speed, and organizational learning (Ciampi et al., 2022). Volz et al. (2025) found that effective knowledge integration also supports innovation, collaborative problem-solving, and strategic responsiveness in rapidly changing digital ecosystems.

Knowledge integration can mediate the relationship between digital business ecosystem strategy and organizational agility. Wicaksana and Isfania (2022) found that knowledge sharing significantly contributes to organizational agility, indicating that knowledge exchange strengthens organizational responsiveness. Similarly, Waseel et al. (2024) emphasized that knowledge creation and integration support organizational capabilities associated with innovation and agility. Fildansyah and Nailul (2025) further found that knowledge sharing significantly mediates the relationship between digital competence and organizational agility. These findings indicate that digital business ecosystem strategies can enhance agility by facilitating access to interconnected resources while strengthening knowledge integration.

Knowledge integration may also mediate the relationship between innovation capability and organizational agility. AlTaweel and Al-Hawary (2021) highlighted the importance of innovation capability in translating adaptive capabilities into organizational outcomes, while Salimi and Nazarian (2022) identified significant relationships among knowledge management, innovation, and organizational agility. Thus, innovation capability can facilitate knowledge integration, enabling organizations to transform dispersed knowledge into adaptive responses. Accordingly, knowledge integration is expected to mediate both relationships.

H6: Knowledge integration mediates the relationship between digital business ecosystem strategy and organizational agility.
H7: Knowledge integration mediates the relationship between innovation capability and organizational agility.

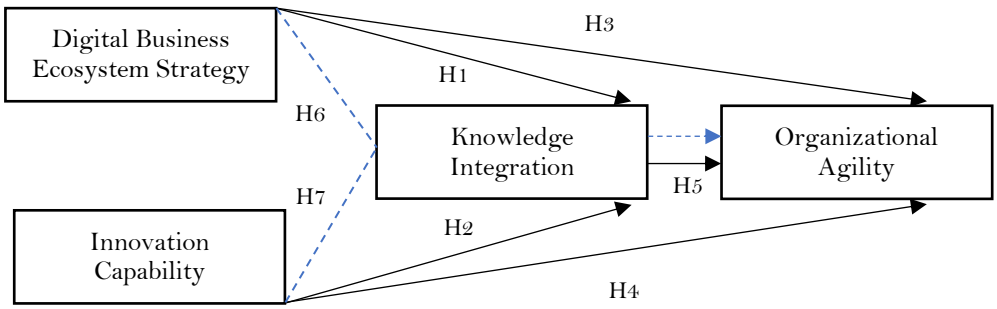


Figure 1. Research Framework

Figure 1 illustrates the relationships among digital business ecosystem strategy, innovation capability, knowledge integration, and organizational agility. Digital business ecosystem strategy is proposed to directly influence knowledge integration (H1) and organizational agility (H3), while innovation capability is proposed to affect

knowledge integration (H2) and organizational agility (H4). Knowledge integration is further expected to enhance organizational agility (H5). In addition, knowledge integration mediates the relationships between digital business ecosystem strategy and innovation capability (H6) and between innovation capability and organizational agility (H7).

3. Methods

This study used a quantitative approach and an explanatory research design to examine the causal relationships among digital business ecosystem strategy, innovation capability, knowledge integration, and organizational agility in software development companies in Indonesia. A cross-sectional survey collected empirical data from employees actively involved in software development activities. The quantitative approach was selected because it enables statistical testing of theoretical relationships among latent constructs and provides objective evidence for hypothesis testing (Hair et al., 2022). The target population consisted of employees working in software development companies in Indonesia. Respondents included software engineers, software developers, system analysts, DevOps engineers, quality assurance engineers, project managers, product managers, UI/UX designers, and IT consultants with at least one year of professional experience in software development projects.

A purposive sampling technique was employed to ensure that respondents possessed relevant knowledge and practical experience related to digital business ecosystem strategies and innovation activities. A total of 300 questionnaires were distributed to employees across software development companies in Indonesia. After screening, 300 valid responses were retained and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. Primary data were collected through an online questionnaire distributed using professional networks, software engineering communities, LinkedIn professional groups, and corporate partnerships between January and March 2026. Before large-scale distribution, the questionnaire was evaluated through a pilot study involving 30 respondents to assess item clarity, content validity, and questionnaire reliability. Feedback obtained during the pilot testing was incorporated to improve wording and measurement accuracy. Participation in the survey was voluntary. Respondents were informed that all responses would remain anonymous and confidential and would be used exclusively for academic research purposes. Incomplete questionnaires and responses showing inconsistent answer patterns were excluded during the data cleaning process.

All constructs were measured using validated scales adapted from recent studies published between 2021 and 2025. Items were assessed using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Digital business ecosystem strategy was measured through ecosystem collaboration, platform integration, strategic partnership, digital resource orchestration, and ecosystem governance. Innovation capability was measured through idea generation, product innovation, process innovation, technology innovation, and continuous improvement. Knowledge integration was measured through knowledge acquisition, knowledge sharing, knowledge combination, cross-functional collaboration, and knowledge utilization. Organizational agility was measured through strategic responsiveness, operational flexibility, decision speed, adaptability, and customer responsiveness.

Data were analyzed using SmartPLS 4 with the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, which suits complex models with multiple latent variables and mediation effects (Hair et al., 2022). The analysis comprised two stages. First, the measurement model was assessed for indicator reliability, internal consistency, convergent validity, and discriminant validity using Cronbach's Alpha

and Composite Reliability (>0.70), Average Variance Extracted (AVE) (>0.50), and Heterotrait–Monotrait Ratio (HTMT). Second, the structural model was evaluated through collinearity, R^2, Q^2, and path coefficients. Before hypothesis testing, multicollinearity was assessed using the Variance Inflation Factor (VIF). Hypotheses were tested using 5,000 bootstrap resamples based on t-values, p-values, and confidence intervals, while mediation was assessed through indirect effects.

4. Results

A total of 300 valid responses were collected from employees working in software development companies across Indonesia. The respondents represented various professional roles, including software engineers, software developers, system analysts, DevOps engineers, quality assurance engineers, product managers, UI/UX designers, project managers, and IT consultants. All respondents had at least one year of professional experience in software development projects, ensuring adequate familiarity with organizational digital strategies and innovation practices.

Table 1. Demographic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	198	66.0
	Female	102	34.0
Age	21–30 years	128	42.7
	31–40 years	112	37.3
	41–50 years	46	15.3
	>50 years	14	4.7
Education	Bachelor	196	65.3
	Master	96	32.0
	Doctorate	8	2.7
Working Experience	1–5 years	134	44.7
	6–10 years	103	34.3
	>10 years	63	21.0

Table 1 presents the demographic profile of the 300 respondents. The sample was predominantly male, accounting for 66.0%, while female respondents represented 34.0%. In terms of age, the largest group was respondents aged 21–30 years (42.7%), followed by those aged 31–40 years (37.3%), 41–50 years (15.3%), and those above 50 years (4.7%). Regarding educational attainment, most respondents held a bachelor's degree (65.3%), followed by a master's degree (32.0%) and a doctorate (2.7%). The distribution of work experience shows that 44.7% had 1–5 years of experience, 34.3% had 6–10 years, and 21.0% had more than 10 years. The respondent profile reflects a relatively young and well-educated workforce with varied levels of professional experience, providing a relevant basis for examining digital ecosystem strategy, innovation capability, knowledge integration, and organizational agility.

The measurement model was evaluated by examining indicator reliability, internal consistency reliability, convergent validity, and discriminant validity using SmartPLS 4. All constructs met the recommended thresholds, indicating that the measurement model was statistically acceptable.

Table 2. Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
Digital Business Ecosystem Strategy	0.914	0.931	0.731
Innovation Capability	0.903	0.924	0.708
Knowledge Integration	0.918	0.936	0.745
Organizational Agility	0.927	0.943	0.768

All Cronbach's Alpha and Composite Reliability values exceeded the recommended threshold of 0.70, confirming satisfactory internal consistency. Likewise, all AVE values exceeded 0.50, demonstrating adequate convergent validity. Table 2 shows that all constructs demonstrate satisfactory reliability and convergent validity. Cronbach's Alpha values range from 0.903 to 0.927, while Composite Reliability values range from 0.924 to 0.943, exceeding the 0.70 threshold and indicating strong internal consistency. The AVE values, ranging from 0.708 to 0.768, are also above the recommended minimum of 0.50, confirming that the indicators adequately represent their respective constructs. The measurement model meets the required criteria for reliability and convergent validity.

Table 3. Discriminant Validity (HTMT)

Constructs	DBES	IC	KI
Innovation Capability (IC)	0.731	-	
Knowledge Integration (KI)	0.756	0.709	-
Organizational Agility (OA)	0.694	0.742	0.781

Table 3 presents the results of discriminant validity assessment using the Heterotrait-Monotrait Ratio (HTMT). The HTMT values among the constructs range from 0.694 to 0.781, with the highest value observed between knowledge integration and organizational agility (0.781). All values remain below the recommended threshold of 0.90, indicating that the relationships among the constructs are sufficiently distinct and do not indicate excessive conceptual overlap. Specifically, the HTMT values between digital business ecosystem strategy and innovation capability, knowledge integration, and organizational agility are 0.731, 0.756, and 0.694, respectively. Meanwhile, innovation capability shows HTMT values of 0.709 with knowledge integration and 0.742 with organizational agility, while the relationship between knowledge integration and organizational agility has an HTMT value of 0.781. These findings confirm that each construct represents a distinct dimension within the research model and provide adequate evidence that the measurement model achieves satisfactory discriminant validity.

Before hypothesis testing, multicollinearity was assessed using the Variance Inflation Factor (VIF). The VIF values ranged from 1.42 to 2.61, indicating that the predictor constructs did not exhibit problematic multicollinearity. The coefficient of determination (R^2) was subsequently examined to evaluate the model's explanatory power.

Table 4. Coefficient of Determination

Endogenous Variable	R^2	Interpretation
Knowledge Integration	0.647	Moderate
Organizational Agility	0.721	Strong

Table 4 shows that the model provides meaningful explanatory power for both endogenous constructs. The R^2 value of 0.647 indicates that 64.7% of the variance in knowledge integration can be explained by the predictor variables in the model, while the remaining 35.3% is attributable to factors outside the model. Meanwhile, the R^2 value of 0.721 indicates that the proposed predictors explain 72.1% of the variance in organizational agility, with the remaining 27.9% attributable to factors not included in the study. These results indicate that the structural model adequately explains both knowledge integration and organizational agility.

Table 5. Direct and Indirect Effect Results

Relationship	β	t-value	p-value	Decision
Digital Business Ecosystem Strategy → Knowledge Integration	0.418	8.764	<0.001	H1 Supported
Innovation Capability → Knowledge Integration	0.396	8.121	<0.001	H2 Supported
Digital Business Ecosystem Strategy → Organizational Agility	0.244	4.856	<0.001	H3 Supported
Innovation Capability → Organizational Agility	0.287	5.432	<0.001	H4 Supported
Knowledge Integration → Organizational Agility	0.381	7.518	<0.001	H5 Supported
Digital Business Ecosystem Strategy → Knowledge Integration → Organizational Agility	0.159	5.634	<0.001	H6 Supported
Innovation Capability → Knowledge Integration → Organizational Agility	0.151	5.271	<0.001	H7 Supported

Table 5 presents the results of the direct and indirect effect analysis. All proposed relationships are statistically significant, as indicated by t-values above 1.96 and p-values below 0.05. Digital business ecosystem strategy has a positive and significant effect on knowledge integration ($\beta = 0.418$; $t = 8.764$; $p < 0.001$), indicating that stronger ecosystem collaboration and digital integration are associated with greater organizational capacity to acquire, share, combine, and utilize knowledge. Innovation capability also positively affects knowledge integration ($\beta = 0.396$; $t = 8.121$; $p < 0.001$), suggesting that organizations with stronger innovation practices tend to develop more effective knowledge integration processes. Furthermore, digital business ecosystem strategy has a positive and significant effect on organizational agility ($\beta = 0.244$; $t = 4.856$; $p < 0.001$), while innovation capability also demonstrates a positive effect on organizational agility ($\beta = 0.287$; $t = 5.432$; $p < 0.001$). Among the direct effects on organizational agility, knowledge integration shows the strongest relationship ($\beta = 0.381$; $t = 7.518$; $p < 0.001$), indicating that the ability to effectively integrate organizational knowledge is closely associated with greater responsiveness, flexibility, and adaptability.

The results of the indirect effect analysis examine the mediating role of knowledge integration in the relationships between the predictor variables and organizational agility. The results show that digital business ecosystem strategy has a positive and significant indirect effect on organizational agility through knowledge integration ($\beta = 0.159$; $t = 5.634$; $p < 0.001$). This finding indicates that ecosystem-oriented strategies contribute to organizational agility not only directly but also by strengthening the organization's ability to integrate and use knowledge. Similarly, innovation capability demonstrates a positive and significant indirect effect on organizational agility through knowledge integration ($\beta = 0.151$; $t = 5.271$; $p < 0.001$). This suggests that innovation-oriented capabilities can enhance organizational agility by enabling more effective knowledge integration.

Table 6. Predictive Relevance

Construct	Q^2
Knowledge Integration	0.432
Organizational Agility	0.517

Table 6 presents the predictive relevance of the structural model. The Q^2 values for knowledge integration (0.432) and organizational agility (0.517) are both greater

than zero, indicating that the model has adequate predictive relevance for the endogenous constructs. The higher Q^2 value for organizational agility suggests stronger predictive capability compared with knowledge integration.

5. Discussion

The findings demonstrate that digital business ecosystem strategy, innovation capability, and knowledge integration significantly contribute to organizational agility in software development companies in Indonesia. All proposed hypotheses are supported, while knowledge integration partially mediates the relationships between digital business ecosystem strategy and organizational agility and between innovation capability and organizational agility. These results indicate that organizational agility is strengthened not only through digital ecosystem participation and innovation activities but also through the organization's ability to integrate knowledge generated from these processes. This finding is consistent with Verhoef et al. (2021) and Zou et al. (2022), who view digital competitiveness as increasingly dependent on orchestrating technological resources, ecosystem relationships, and organizational knowledge.

The significant positive effect of digital business ecosystem strategy on knowledge integration indicates that ecosystem-oriented strategies provide broader opportunities to acquire and combine knowledge from internal and external stakeholders. In software development companies, collaboration with customers, technology vendors, cloud providers, developer communities, and strategic partners provides access to diverse technical and market knowledge. This finding supports Thomas et al. (2022), who emphasize the role of ecosystems in connecting complementary resources and capabilities, and Volz et al. (2025), who highlight knowledge processes in developing organizational capabilities within dynamic digital environments.

Innovation capability also has a significant positive effect on knowledge integration, suggesting that organizations with stronger innovation capabilities are more likely to encourage experimentation, collaboration, and knowledge exchange. Software development innovation requires coordination among multidisciplinary teams, enabling the combination of technical expertise, customer insights, and organizational experience. This finding is consistent with Wang et al. (2018) and Ciampi et al. (2022), who highlight the relationship between knowledge processes, innovation, and organizational capability development. The significant positive effect of digital business ecosystem strategy on organizational agility indicates that ecosystem-oriented strategies strengthen firms' ability to respond to environmental changes. Access to external information, technological resources, and strategic partners enables software development companies to coordinate activities and adapt to changing customer and technological requirements. This result is consistent with Verhoef et al. (2021) and Akhtar et al. (2022), who emphasize the role of digital transformation and ecosystem collaboration in organizational adaptability.

Similarly, innovation capability significantly enhances organizational agility. Organizations capable of continuously developing and implementing new ideas can more effectively adjust their resources, processes, and products to changing market conditions. In software development, continuous innovation facilitates technological adaptation and responsiveness to customer requirements. This finding supports Ciampi et al. (2022) and Dubey et al. (2023), who identify innovation capability as an important contributor to organizational adaptability. Furthermore, knowledge integration significantly enhances organizational agility, demonstrating that the ability to acquire, combine, disseminate, and apply knowledge improves organizational responsiveness. Integrated knowledge facilitates faster problem-solving, cross-functional coordination, and informed decision-making when organizations face technological and market changes. This finding supports Wang

et al. (2018) and Zou et al. (2022), who associate knowledge capabilities with innovation and organizational adaptability.

The mediation results show that knowledge integration partially mediates the relationships between digital business ecosystem strategy and organizational agility and between innovation capability and organizational agility. The partial mediation indicates that both variables influence organizational agility directly while also strengthening it through knowledge integration. Thus, ecosystem collaboration and innovation generate greater adaptive value when organizations effectively integrate and use the resulting knowledge. Consistent with Thomas et al. (2022) and Volz et al. (2025), these findings position knowledge integration as an important mechanism for transforming ecosystem resources and innovation activities into organizational agility. Software development companies should strengthen ecosystem collaboration, innovation capability, and systematic knowledge integration simultaneously to improve agility and sustain competitiveness in dynamic digital environments.

6. Conclusion

This study concludes that digital business ecosystem strategy, innovation capability, and knowledge integration are important determinants of organizational agility in Indonesian software development companies. The findings confirm that digital business ecosystem strategy and innovation capability significantly strengthen knowledge integration and organizational agility, while knowledge integration also has a significant positive effect on organizational agility. Furthermore, knowledge integration partially mediates the relationships between digital business ecosystem strategy and innovation capability and organizational agility. These findings indicate that organizational agility is strengthened not only through ecosystem collaboration and innovation but also through the effective integration and utilization of organizational knowledge.

The study has several practical implications. Managers should strengthen collaboration with customers, technology partners, developer communities, and other ecosystem actors while fostering innovation-oriented organizational cultures. Establishing systematic knowledge-sharing mechanisms can further help firms transform ecosystem and innovation activities into greater organizational agility. Several limitations should be acknowledged. The study focuses on 300 employees in software development companies in Indonesia and uses a cross-sectional survey with purposive sampling, which may limit the generalizability of the findings to other industries, countries, or organizational contexts. In addition, the cross-sectional design provides limited insight into how these relationships develop over time.

Future research could employ longitudinal designs to examine changes in organizational agility as digital ecosystems and innovation practices evolve. Comparative studies across industries or countries could also provide broader insights. Future researchers may further incorporate factors such as digital leadership, organizational learning, dynamic capabilities, or technological turbulence to develop a more comprehensive understanding of the mechanisms underlying organizational agility.

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