

Article

How Corporate Digital Capability Fosters Sustainable Employee Innovation Behavior in ASEAN IT Services: The Roles of Innovation Atmosphere and Knowledge Sharing

Zexin Jia ^{1,†}, Ting Han ^{2,3,*,†} , Rong Li ⁴ and Dechao Ma ⁵¹ School of Economics and Management, East China Normal University, Shanghai 200241, China² Shanxi Academy of Fiscal Sciences, Taiyuan 030006, China³ Quality Management, Centro Escolar University, Malolos 3000, Philippines⁴ iSoftStone Information Technology (Group) Co., Ltd., Beijing 100089, China⁵ School of Economics and Management, Taiyuan University of Technology, Jinzhong 030600, China

* Correspondence: ting2545138@mnf.ccu.edu.ph

† These authors contributed equally to this work.

Abstract

Against the rapid expansion of the digital economy in Southeast Asia, improving firms' digital capability has become increasingly important for sustaining employee innovation in the IT services sector. However, existing research has mainly emphasized organizational or performance outcomes and has paid less attention to the internal mechanisms through which corporate digital capability shapes employees' sustainable innovation behavior, especially in the heterogeneous institutional and cultural context of ASEAN. Drawing on Conservation of Resources theory and Social Information Processing Theory, this study examines the relationship between corporate digital capability and sustainable employee innovation behavior, with innovation atmosphere and knowledge sharing as mediating mechanisms. Using cross-sectional survey data collected from 257 employees in IT services firms across five ASEAN countries, and employing hierarchical regression analysis with bootstrap mediation testing, this study finds that corporate digital capability positively promotes sustainable employee innovation behavior ($\beta = 0.38, p < 0.01$). The results further show that innovation atmosphere and knowledge sharing serve as important mediating pathways through which digital capability is translated into employee-level innovation outcomes (indirect effects: 0.20, 95% CI [0.10, 0.31] for IA; 0.19, 95% CI [0.11, 0.28] for KS). In addition, innovation atmosphere strengthens knowledge sharing, forming a sequential mechanism (indirect effect = 0.26, 95% CI [0.15, 0.37]) that further supports sustainable innovation behavior. This study contributes to the literature by clarifying how digital capability affects sustainable employee innovation at the micro level, by distinguishing the organizational climate and knowledge exchange mechanisms involved in this process, and by providing context-sensitive evidence from ASEAN's diverse digital transformation environment. The findings also provide practical insights for firms and policymakers seeking to strengthen sustainable innovation capacity through digital capability building, supportive organizational climates, and stronger knowledge-sharing practices. Specifically, policymakers should align DEFA-funded digital skill programs with organizational climate interventions that foster psychological safety and cross-border collaboration, while managers in resource-constrained SMEs can leverage low-cost measures such as monthly idea recognition schemes, public endorsement of reasonable failure, and designated cross-border knowledge brokers to amplify the innovation returns of digital investments.



Academic Editor: Kirk Chang

Received: 8 June 2026

Revised: 16 July 2026

Accepted: 27 July 2026

Published: 4 August 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and

conditions of the [Creative Commons](#)[Attribution \(CC BY\) license](#).

Keywords: ASEAN IT services; corporate digital capability; digital transformation; innovation atmosphere; knowledge sharing; sustainable employee innovation behavior

1. Introduction

The digital economy of the Association of Southeast Asian Nations (ASEAN) is projected to reach one trillion dollars by 2030, registering a compound annual growth rate of 15.5% between 2023 and 2030. Within this rapidly expanding ecosystem, the IT services sector has emerged as a core pillar of regional economic development, contributing between 8% and 12% of GDP in advanced economies such as Singapore and Malaysia, and between 4% and 6% in lower-middle-income countries including Indonesia and the Philippines. This growth trajectory is underpinned by the ASEAN Digital Economy Framework Agreement (DEFA), which articulates three strategic priorities: digital infrastructure integration via cross-border data flows, workforce skill development under the ASEAN Digital Skills Framework, and cross-border innovation through regional technology startup partnerships. These priorities aim to mitigate pressing economic security risks, including an overreliance on external technology providers and widening digital divides among member states.

The uneven development of corporate digital capability across ASEAN also reflects the fact that firm-level digital transformation does not occur in an institutional vacuum but is embedded within regional connectivity initiatives and public-governance arrangements. Peráček and Kaššaj [1] demonstrate how strategic public administration, advanced digital connectivity, and emerging technologies such as artificial intelligence jointly underpin the construction of sustainable, interconnected smart ecosystems and drive regional socio-economic development. Viewed through this lens, the capacity-building patterns observed in the ASEAN IT services sector are part of a broader governance and infrastructure paradigm shared across regions, including the European Union: whether innovation is cultivated at the micro level of the firm or the macro level of a smart city, aligning physical and digital assets with strategic data governance is fundamental to long-term institutional sustainability [1].

Despite these ambitions, IT services firms across ASEAN confront three interconnected challenges that collectively constrain innovation potential. First, digital capability remains highly uneven across countries. Singapore possesses world-class digital infrastructure, with the vast majority of firms adopting cloud computing and artificial intelligence analytics, whereas Vietnam and Indonesia lag considerably, with only a small fraction of SMEs utilizing basic digital tools such as enterprise resource planning systems. This disparity is compounded by divergent levels of digital infrastructure investment. Second, talent shortages are acute across the region. ASEAN's IT sector faces a projected deficit of millions of high-skilled workers by 2030, with the most severe gaps concentrated in emerging technology domains such as cybersecurity and data science. This shortage is exacerbated by brain drain, as a substantial proportion of ASEAN's IT graduates migrate to higher-income economies. Third, knowledge sharing remains fragmented due to linguistic diversity, regulatory heterogeneity, and geographical discontinuities, which collectively limit cross-border collaboration.

Employee innovation behavior (EIB)—defined as the generation, promotion, and implementation of novel ideas that address organizational or regional needs—constitutes the micro-foundation of organizational competitiveness in the IT services sector. Corporate digital capability (CDC), understood as a firm's capacity to deploy digital technologies including cloud platforms and AI analytics to enhance operations, collaboration, and innovation, is widely recognized as a driver of EIB. The nexus between digital transformation

and innovation has attracted growing scholarly attention, with prior research highlighting how digital technologies reshape innovation processes, enable new forms of value creation, and reconfigure organizational capabilities [2]. Yet existing studies on digital innovation in emerging economies have focused predominantly on firm-level performance outcomes while neglecting the individual-level behavioral mechanisms through which digital capability translates into innovation. Moreover, contextual factors such as innovation atmosphere (IA)—the organizational culture characterized by risk tolerance, cross-border collaboration, and recognition of creative ideas—and interactive mechanisms such as knowledge sharing (KS)—the exchange of explicit and tacit knowledge across individuals and teams—remain substantially understudied within ASEAN’s collectivist and hierarchically oriented workplaces. Organizational culture has been identified as a critical moderator of innovation outcomes [3], and knowledge management drivers are well documented in Western contexts [4], but their interplay with digital capability in ASEAN’s heterogeneous institutional environment has yet to be systematically examined. In collectivist cultures, employees tend to prioritize group harmony over individual innovation, while hierarchical organizational structures discourage subordinates from proposing novel ideas. This knowledge gap impedes the ability of policymakers and firms to design targeted strategies that leverage CDC for innovation—an imperative for ASEAN to compete with global technology hubs and to realize the objectives of the ASEAN Digital Masterplan 2025.

Despite the growing scholarly attention to the nexus between digital transformation and innovation, existing studies on digital innovation in emerging economies have predominantly focused on firm-level performance outcomes while neglecting the individual-level behavioral mechanisms through which digital capability translates into innovation. Moreover, contextual factors such as innovation atmosphere—the organizational culture characterized by risk tolerance, cross-border collaboration, and recognition of creative ideas—and interactive mechanisms such as knowledge sharing—the exchange of explicit and tacit knowledge across individuals and teams—remain substantially understudied within ASEAN’s collectivist and hierarchically oriented workplaces. Organizational culture has been identified as a critical moderator of innovation outcomes, and knowledge management drivers are well documented in Western contexts, but their interplay with digital capability in ASEAN’s heterogeneous institutional environment has yet to be systematically examined. In collectivist cultures, employees tend to prioritize group harmony over individual innovation, while hierarchical organizational structures discourage subordinates from proposing novel ideas. This knowledge gap impedes the ability of policymakers and firms to design targeted strategies that leverage digital capability for innovation—an imperative for ASEAN to compete with global technology hubs and to realize the objectives of the ASEAN Digital Masterplan 2025.

This study makes three distinct theoretical contributions to the literature on digital innovation in emerging economies. First, it extends Conservation of Resources (COR) theory and Social Information Processing Theory (SIPT) to the ASEAN context. Prior applications of these frameworks have been largely confined to Western settings, whereas ASEAN’s IT sector is marked by resource scarcity and culturally embedded risk aversion. The digital transformation literature has established that digital capabilities serve as both tangible and intangible resources that can reconfigure organizational processes and reduce operational friction [5,6]. This study elucidates how CDC, as a scarce organizational resource, mitigates innovation barriers through IA and KS: CDC supplies tangible resources to reduce operational friction, IA furnishes psychological resources to encourage risk-taking, and KS enables resource sharing to address skill gaps. Second, this study verifies parallel mediation within a region defined by extreme institutional and economic heterogeneity. Most prior mediation studies on digital innovation have adopted a one-size-fits-all framework

that fails to account for diverse institutional settings. The present findings demonstrate that IA and KS jointly mediate the CDC-EIB relationship, with contextually nuanced effects that vary across cultural and economic contexts, thereby addressing the overgeneralization of Western innovation frameworks to emerging economies. Third, this study bridges organizational behavior research with regional development scholarship by linking micro-level employee behavior to macro-level ASEAN integration goals. Building on the understanding that innovation ecosystems operate at multiple interacting levels [2,7], this study demonstrates that EIB, enabled by CDC, IA, and KS, directly contributes to ASEAN's objective of building a unified digital market.

The practical significance of this research is threefold for ASEAN stakeholders. For policymakers, the findings suggest that digital skill training programs should be aligned with the mediating mechanisms of IA and KS to address talent shortages, consistent with calls for integrating human capital development with technological capability building [8]. For firms, prioritizing CDC investments in cross-border digital tools can foster both IA and KS, a consideration particularly critical for SMEs in lower-income ASEAN countries, which constitute the majority of the IT sector yet lack the resources to independently build digital capabilities. Research on innovation management has emphasized that firms must balance exploratory and exploitative innovation activities, a challenge that is particularly acute for resource-constrained SMEs [9]. For regional bodies, designing knowledge-sharing initiatives that aggregate technical expertise and best practices across member states, while harmonizing digital regulations, could substantially reduce barriers to cross-border KS, an objective supported by evidence that knowledge management systems are most effective when organizational and institutional enablers are aligned [4].

2. Theoretical Foundation and Research Hypotheses

2.1. Theoretical Foundation

2.1.1. Conservation of Resources Theory (COR)

Conservation of Resources (COR) theory, originally proposed by Hobfoll [10], posits that individuals are fundamentally motivated to acquire, retain, and protect three categories of resources: tangible resources including tools and technology, intangible resources encompassing knowledge and social capital, and psychological resources such as self-efficacy and job satisfaction. A central tenet of COR theory is the loss aversion principle, which holds that resource loss is psychologically more salient than resource gain, thereby motivating individuals to avoid behaviors that risk resource depletion. Innovation behavior, which inherently involves risk-taking, sustained effort, and the possibility of failure, represents precisely the type of activity that individuals may avoid under conditions of resource scarcity.

The relevance of COR theory to ASEAN's IT services sector is particularly pronounced given the prevalent resource constraints and culturally embedded risk aversion that characterize the region. From a resource-based perspective [11], the scarcity of advanced digital tools in lower-income ASEAN economies creates a structural barrier to employee innovation. SMEs in these contexts typically lack access to AI analytics platforms, cloud-based collaboration systems, and multilingual knowledge repositories, thereby limiting employees' capacity to engage in exploratory innovation activities. Furthermore, hierarchical workplace cultures, which are well documented in high power-distance societies [12], reinforce risk aversion by creating perceived threats of negative consequences—such as criticism from superiors or peer disapproval—for proposing novel ideas.

Corporate digital capability (CDC) addresses these challenges by furnishing critical resources that mitigate innovation-related resource depletion. Drawing on the information technology capability literature [5,6], CDC provides tangible resources including cloud-based collaboration platforms that enable cross-border teamwork, AI analytics tools that

facilitate data-driven decision-making, and multilingual knowledge bases that address linguistic barriers. These digital assets constitute valuable, rare, and imperfectly imitable organizational resources [11] that competitors cannot easily replicate. Beyond tangible resources, CDC also supplies intangible resources such as access to regional knowledge networks and digital skills training programs. A supportive innovation atmosphere (IA) supplements these psychological resources: error-tolerant cultures reduce the fear of failure, while recognition for innovative ideas enhances job satisfaction and self-efficacy. Simultaneously, knowledge sharing (KS) enables resource exchange across organizational and national boundaries, allowing employees in resource-constrained settings to access expertise from better-endowed colleagues in other countries. Together, these resources counteract the loss aversion principle, thereby encouraging employees to engage in employee innovation behavior (EIB).

2.1.2. Social Information Processing Theory (SIPT)

Social Information Processing Theory (SIPT), as articulated by Salancik and Pfeffer [13], posits that individuals adapt their attitudes and behaviors based on environmental cues, including organizational norms, social interactions, and technological infrastructure. In uncertain contexts—such as ASEAN’s rapidly evolving digital regulatory landscape and volatile market demand—environmental cues serve a critical function by helping individuals interpret risks and opportunities, thereby reducing ambiguity about appropriate behavioral responses.

For ASEAN IT services firms, CDC enhances environmental transparency by enabling real-time data sharing, standardizing work processes, and facilitating cross-border communication. These digital capabilities render IA and KS more salient to employees, transmitting clear institutional signals that innovation is valued and psychologically safe. As research on digital transformation has demonstrated, the deployment of digital platforms fundamentally alters the information environment within organizations, shaping how employees interpret organizational priorities and norms [14,15]. For instance, a firm employing a cloud-based knowledge base with multilingual support communicates that cross-border KS is encouraged, while a digital incentive system that rewards innovative proposals signals that creativity is recognized and valued. These environmental cues reduce uncertainty about innovation: employees perceive that proposing novel ideas will yield positive outcomes—such as recognition and peer support—rather than negative consequences including failure or criticism.

SIPT holds particular relevance in ASEAN’s collectivist cultural context, where individuals rely heavily on social cues to guide their behavior. In collectivist societies characterized by strong group orientation [4], individuals tend to prioritize group harmony over individual achievement and are consequently more likely to engage in innovation when they perceive that their peers and superiors endorse such behavior. CDC amplifies these social cues: digital communication platforms render colleagues’ innovative behaviors and management’s responses more visible, thereby reinforcing organizational norms that innovation is both acceptable and desirable. This theoretical logic aligns with recent findings that digital technologies reshape organizational sensemaking processes by making information more accessible and social signals more transparent [16].

A critical review of the existing literature reveals two notable inconsistencies that our integrated framework aims to reconcile. First, while prior studies have separately confirmed the positive effects of digital capability on organizational innovation and of supportive climates on individual creativity, the mechanisms linking these two levels of analysis remain underspecified. Research on information technology capability has predominantly focused on firm-level outcomes such as agility and performance, whereas

studies on innovation climate have primarily examined intra-organizational social dynamics, leaving a theoretical gap at the intersection of digital resources and individual behavior. Second, empirical findings on the effectiveness of knowledge sharing in hierarchical cultures have been mixed: some studies report positive effects of digital platforms on knowledge exchange, while others find that power distance and collectivism suppress voluntary sharing behaviors. These contradictory results suggest that the mere provision of digital tools is insufficient; rather, the organizational interpretation of these tools—through climate and social cues—critically shapes their effectiveness. Our model addresses these inconsistencies by integrating COR and SIPT to specify both the resource-based conditions (what digital capability provides) and the social-informational conditions (how employees interpret and act upon these provisions) that jointly enable sustainable innovation behavior.

Taken together, COR and SIPT operate as complementary rather than competing lenses that jointly explain the micro-foundations of employee innovation in resource-constrained and culturally hierarchical contexts. COR theory addresses the motivational question: it explains why employees in ASEAN's IT sector, where tangible digital tools and psychological safety are scarce, may refrain from innovation due to heightened loss aversion—the fear that investing effort in novel ideas without adequate organizational support will deplete their already limited personal and professional resources. Digital capability, from this perspective, functions as a critical resource reservoir that offsets such depletion risks. However, COR alone cannot explain how employees come to perceive that innovation is safe and valued. This is where SIPT provides the complementary interpretive mechanism: digital platforms do not merely provide resources; they also transmit visible social cues—colleagues' collaborative behaviors, management's responsiveness to new ideas, and peer recognition for knowledge sharing—that reduce uncertainty about whether innovation will be rewarded or punished. In ASEAN's collectivist and high-power-distance workplaces, such social signals carry particular weight, as employees heavily rely on group norms and hierarchical endorsements to guide their conduct. Thus, COR provides the resource-based enabling condition (what makes innovation possible), while SIPT provides the social-cognitive triggering condition (what makes innovation psychologically legitimate). Innovation atmosphere emerges where CDC supplies tangible and psychological resources (COR) that are rendered salient through visible managerial and peer endorsement (SIPT); knowledge sharing emerges where CDC lowers the cost of exchange (COR) while peer and managerial cues signal that sharing is both expected and safe (SIPT). This integrated logic directly addresses the inconsistencies identified above: mixed findings on knowledge sharing in hierarchical contexts are resolved by recognizing that digital tools alone (COR) do not guarantee sharing unless accompanied by positive social signals (SIPT); and the firm-level to individual-level gap is bridged by treating CDC as a resource that operates through climate-based and cue-based mechanisms to shape individual behavior.

While digital technologies enhance environmental transparency and social cue visibility, the same connectivity can also transmit disruptive information cues that heighten uncertainty rather than reduce it. Ivančík and Andrassy [17] show that modern information and communication technologies—particularly social media—can distort reality, amplify misinformation, and induce socio-psychological polarization and cognitive uncertainty among users. For IT professionals operating in highly connected, cross-border environments, such external digital stressors represent a latent threat to the very resources that innovation requires. Interpreted through Conservation of Resources theory, this dark side of digitalization implies that a supportive innovation atmosphere and structured knowledge sharing serve a dual function: beyond stimulating creativity, they act as organizational anchors that mitigate misinformation fatigue, cognitive overload, and psychosocial pressure, thereby protecting the psychological resources employees draw on when engaging in innovation behavior.

2.2. Research Hypotheses

2.2.1. Direct Relationship Between CDC and EIB

ASEAN's IT services sector depends critically on digital tools to address region-specific challenges, including cross-border service delivery, multilingual client support, and localized market adaptation. CDC enables firms to surmount these challenges by improving employees' resource access and reducing operational frictions. Prior research has established that information technology capability enhances organizational agility and innovation performance by enabling firms to rapidly reconfigure resources in response to environmental changes [18]. At the individual level, digital tools provide employees with the necessary resources to access regional knowledge, collaborate across borders, and experiment with new ideas, thereby directly enhancing their capacity to engage in EIB. Recent empirical evidence supports this relationship: Liu et al. [19] found that digital competencies positively predict innovative work behavior among remote workers in technology-intensive sectors, while a meta-analysis of 113 studies confirmed a significant positive association between digital technology adoption and corporate innovation performance [20]. Accordingly, we propose:

H1. *Corporate Digital Capability (CDC) has a significantly positive impact on Sustainable Employee Innovation Behavior (EIB) in ASEAN IT services firms.*

2.2.2. CDC, IA, and EIB

Innovation atmosphere (IA) refers to the organizational context that supports and encourages innovation, encompassing norms of risk-taking, cross-border collaboration, and recognition for creative ideas [3,7]. The organizational climate literature has consistently demonstrated that supportive climates for innovation significantly predict individual creative and innovative outcomes [7]. CDC plays a critical role in shaping IA by dismantling organizational silos and aligning geographically dispersed branches around shared innovation goals.

In ASEAN, where firms frequently operate across multiple countries characterized by diverse cultures and languages, CDC-driven digital tools enable standardized work processes, real-time communication, and cross-border project management. These digital platforms facilitate the development of a consistent IA characterized by trust and collaboration. Consistent with this logic, recent research demonstrates that digital leadership positively influences digital organizational culture, with innovation atmosphere serving as a significant outcome of digital capability deployment [21].

According to COR theory, a positive IA provides employees with psychological resources, including enhanced self-efficacy and job satisfaction, to embrace innovation. Employees in organizations with a supportive innovation climate are more likely to propose novel ideas, as they trust that management will support their endeavors even in the event of failure. Prior empirical studies have confirmed a robust positive relationship between innovation climate and individual innovative work behavior [7]. Recent large-sample studies corroborate this finding: Dang et al. [22] demonstrated that innovative climate significantly strengthens the positive link between human resource management practices and innovative work behavior. Thus, we propose:

H2. *CDC has a significantly positive impact on Innovation Atmosphere (IA) in ASEAN IT services firms.*

H3. *Innovation Atmosphere (IA) has a significantly positive impact on Sustainable Employee Innovation Behavior (EIB) in ASEAN IT services firms.*

H4. *Innovation Atmosphere (IA) mediates the relationship between Corporate Digital Capability (CDC) and Sustainable Employee Innovation Behavior (EIB) in ASEAN IT services firms.*

2.2.3. CDC, KS, and EIB

Knowledge sharing (KS) refers to the exchange of explicit and tacit knowledge among individuals, teams, or organizations, encompassing technical expertise, market insights, and best practices [23]. The knowledge management literature has established that effective KS is fundamental to organizational innovation, as it enables the recombination of existing knowledge to generate novel solutions [24]. In ASEAN, KS is impeded by linguistic barriers, time zone differences, and regulatory heterogeneity across member states.

CDC addresses these barriers by providing digital platforms that facilitate seamless knowledge exchange. Cloud-based knowledge repositories with multilingual support, video conferencing tools, and collaborative document platforms reduce the temporal and spatial costs of KS, making it easier for employees to access diverse knowledge that stimulates creative thinking for region-specific problems. Research on knowledge management systems has demonstrated that digital platforms significantly enhance both the breadth and depth of knowledge exchange within and across organizational boundaries [4].

According to SIPT, KS functions as an environmental cue that reduces innovation uncertainty. Employees who engage in knowledge exchange gain a broader understanding of regional challenges and opportunities, which enables them to develop more contextually relevant and feasible innovative solutions. Furthermore, KS builds social capital—trust and mutual respect among colleagues—which enhances employees' confidence in proposing novel ideas [23]. Prior studies have confirmed the positive relationship between KS and innovative work behavior across various organizational contexts [20,21]. Thus, we propose:

H5. *Corporate Digital Capability (CDC) has a significantly positive impact on Knowledge Sharing (KS) in ASEAN IT services firms.*

H6. *Knowledge Sharing (KS) has a significantly positive impact on Sustainable Employee Innovation Behavior (EIB) in ASEAN IT services firms.*

H7. *Knowledge Sharing (KS) mediates the relationship between Corporate Digital Capability (CDC) and Sustainable Employee Innovation Behavior (EIB) in ASEAN IT services firms.*

2.2.4. IA and KS in the ASEAN Context

ASEAN's collectivist cultural values [12], which emphasize collective success over individual achievement, render IA a critical enabler of KS. A positive IA—characterized by trust, collaboration, and recognition for collective contributions—encourages employees to share knowledge, as they perceive KS as a means of benefiting the organization rather than as a risk of relinquishing valuable expertise. Research on organizational culture has demonstrated that a supportive climate for innovation fosters psychological safety, which in turn promotes knowledge exchange behaviors. Both channels may operate, but in ASEAN's collectivist context trust-building and psychological safety constitute the primary mechanism, with reduced fear of competition (knowledge-loss concern) functioning as a secondary, reinforcing channel. A supportive innovation atmosphere signals that contributions will be recognized and reciprocated collectively, thereby building interpersonal trust and lowering the perceived risk of sharing; this trust, in turn, diminishes the instrumental fear that sharing expertise erodes one's individual competitive position.

A positive IA provides employees with both the tools—such as regional knowledge portals—and the psychological safety necessary for effective knowledge exchange. When employees perceive that their contributions will be respected and appropriately utilized,

concerns about knowledge loss are substantially reduced. Empirical evidence indicates that organizational climates characterized by trust and collaboration significantly enhance both the quantity and quality of knowledge sharing among employees [17,21].

By fostering KS, IA creates a sequential mediating pathway in the CDC-EIB relationship: CDC enhances IA, which in turn promotes KS, ultimately stimulating EIB. This sequential mediation mechanism is particularly relevant in ASEAN, where knowledge fragmentation and limited cross-border collaboration constitute major barriers to innovation. Building on established approaches to testing sequential mediation [25], we propose:

H8. *Innovation Atmosphere (IA) has a significantly positive impact on Knowledge Sharing (KS) in ASEAN IT services firms.*

H9. *Knowledge Sharing (KS) mediates the relationship between Innovation Atmosphere (IA) and Sustainable Employee Innovation Behavior (EIB) in ASEAN IT services firms.*

3. Research Methodology

3.1. Sample and Data Collection

The sample was drawn from IT services firms across five ASEAN countries—Indonesia, Malaysia, the Philippines, Singapore, and Thailand—selected to represent diverse economic development levels (high-income: Singapore; middle-income: Malaysia, Thailand; lower-middle-income: Indonesia, Philippines). These five countries collectively account for approximately 85% of ASEAN's IT services sector revenue and face distinctly different digital transformation challenges, making them appropriate for testing the model's contextual robustness.

A stratified purposive sampling strategy was employed to ensure the representativeness and contextual relevance of the sample. Countries were selected based on two criteria: (1) variation in economic development levels—Singapore (high-income), Malaysia and Thailand (middle-income), and Indonesia and the Philippines (lower-middle-income)—to capture heterogeneity in digital infrastructure and innovation capacity; and (2) contribution to ASEAN's IT services sector revenue, with the five selected countries collectively accounting for approximately 85% of the regional total.

Data were collected via online survey platforms from March to May 2024. Eligibility criteria required that respondents (a) had at least one year of experience in IT services (software development, IT consulting, or system integration) to ensure familiarity with firm processes and innovation practices, and (b) worked for firms operating in at least one ASEAN market to ensure regional relevance. A pilot test was conducted with 30 employees (six per country) to assess the clarity, cultural appropriateness, and linguistic accuracy of the questionnaire. Minor revisions were made based on pilot feedback; for example, the item "The firm uses digital technology to deliver cross-border IT services" was revised to "The firm uses digital tools to provide IT services to clients in other ASEAN countries" for improved comprehension in Indonesia.

Of the 320 questionnaires distributed (64 per country), 257 valid responses were obtained after excluding incomplete ($n = 38$) and inconsistent ($n = 25$) responses, yielding a response rate of 80.3%. Table 1 presents the sample's demographic and firm-level characteristics. The sample size of $N = 257$ exceeds the commonly recommended thresholds for the analytical techniques employed (e.g., $N \geq 50 + 8k$ for multiple regression with k predictors, and $N \geq 200$ for bootstrap-based indirect-effect estimation), and the five sampled countries jointly represent approximately 85% of ASEAN's IT services revenue, supporting the adequacy and representativeness of the data.

Table 1. Sample characteristics ($N = 257$).

Characteristic	Category	<i>n</i>	%
Country	Singapore	82	32.0
	Malaysia	62	24.1
	Thailand	46	17.9
	Indonesia	41	16.0
	Philippines	26	10.1
Firm size	SME (<200 employees)	159	61.9
	Large firm (≥ 200 employees)	98	38.1
Industry segment	Software development	116	45.1
	IT consulting	77	30.0
	System integration	64	24.9
Gender	Male	175	68.1
	Female	82	31.9
Age	25–30 years	90	35.0
	31–40 years	103	40.1
	41–50 years	46	17.9
	51+ years	18	7.0
Education	Diploma or lower	39	15.2
	Bachelor's degree	167	65.0
	Master's degree	51	19.8
Job role	Technical staff	108	42.0
	Managerial staff	85	33.1
	Support staff	64	24.9

3.2. Measures

All scales were adapted from established measurement frameworks and contextualized for the ASEAN IT services setting. Translation followed the back-translation procedure recommended by Brislin [26]: the questionnaire was first drafted in English, translated into the four local languages (Bahasa Indonesia, Bahasa Malaysia, Thai, Filipino) by bilingual translators, and then independently back-translated into English to verify equivalence. A five-point Likert scale was used for all items (1 = strongly disagree to 5 = strongly agree). Table 2 presents the constructs, measurement items, source frameworks, and reliability coefficients.

Table 2. Construct measurement items, sources, and reliability.

Construct	Items	Source Framework	α
Corporate Digital Capability (CDC)	1. The firm uses digital tools to provide IT services to clients in other ASEAN countries.	Bharadwaj [5]; Chen et al. [18]	0.93
	2. The firm deploys AI/analytics tools to support regional business decisions.		
	3. The firm has a digital platform for cross-border team collaboration.		
	4. The firm uses digital technology to integrate data across regional branches.		
	5. The firm invests in digital skills training for employees to support cross-border service delivery.		
Innovation Atmosphere (IA)	1. My firm encourages employees to propose new ideas even if they may fail.	Scott & Bruce [3]; Amabile [7]	0.92
	2. My firm supports cross-border collaborative innovation.		
	3. Management recognizes employees for innovative contributions to regional projects.		
	4. My firm provides resources for employees to test new ideas.		
	5. Employees feel comfortable sharing innovative ideas with superiors.		
	6. My firm rewards teams that develop innovative solutions for regional clients.		
	7. Cross-border innovation projects are valued as much as domestic projects.		
	8. My firm tolerates reasonable failure in the innovation process.		
	9. Management communicates the importance of innovation for regional growth.		
	10. Employees collaborate across borders to solve problems creatively.		
	11. My firm has a clear process for submitting and evaluating innovative ideas.		
	12. I feel that my innovative efforts are appreciated by the firm.		

Table 2. Cont.

Construct	Items	Source Framework	α
Knowledge Sharing (KS)	1. I share work experience and technical expertise with colleagues from other ASEAN countries.	Wang & Noe [23]; Alavi & Leidner [4]	0.79
	2. I contribute to the firm's knowledge base with regional best practices.		
	3. I seek technical knowledge or market insights from colleagues in other ASEAN branches.		
	4. I participate in cross-border knowledge-sharing activities.		
Sustainable Employee Innovation Behavior (EIB)	1. I develop innovative solutions for local ASEAN market needs.	Scott & Bruce [3]; Janssen [24]	0.83
	2. I propose new ideas to improve cross-border IT services.		
	3. I implement creative methods to solve work problems in regional projects.		
	4. I collaborate with colleagues from other ASEAN countries to develop new IT products or services.		

Seven control variables were included to account for demographic and firm-level heterogeneity known to influence innovation behavior. Table 3 specifies each variable's coding scheme and theoretical rationale.

Table 3. Control variable definitions and coding.

Variable	Coding	Rationale
Gender	1 = Male; 2 = Female	Cultural norms may differentially affect innovation propensity across genders in hierarchical settings [12]
Age	1 = 25–30; 2 = 31–40; 3 = 41–50; 4 = 51+	Younger employees tend to exhibit higher digital adoption and innovation openness [27]
Education	1 = Diploma or lower; 2 = Bachelor's; 3 = Master's	Higher educational attainment is associated with stronger analytical and innovation capabilities [28]
Job role	1 = Technical; 2 = Managerial; 3 = Support	Managerial staff typically have greater resource access and decision latitude for innovation [5]
Country	1 = Singapore; 2 = Malaysia/Thailand; 3 = Indonesia/Philippines	Economic development level influences digital infrastructure availability and innovation capacity [29]
Firm size	1 = SME (<200); 2 = Large (≥ 200)	Larger firms possess greater slack resources for digital capability investment [29]
Regional presence	1 = 1–2 ASEAN countries; 2 = 3+ ASEAN countries	Broader regional operations provide more cross-border collaboration opportunities [27]

3.3. Data Analytical Strategy

The data were analyzed using SPSS 26.0 and AMOS 24.0. Table 4 summarizes the analytical methods employed, their respective purposes, evaluation criteria, and supporting methodological references.

Table 4. Data analysis methods, purposes, and criteria.

Method	Purpose	Criteria	Reference
Harman's single-factor test	Assess common method bias	First unrotated factor explains <40% of total variance	Podsakoff et al. [30]
Cronbach's α	Evaluate internal consistency reliability	$\alpha \geq 0.70$ indicates acceptable reliability	Nunnally [31]
KMO and Bartlett's test	Assess sampling adequacy for factor analysis	KMO ≥ 0.70 ; Bartlett's $p < 0.05$	Hair et al. [32]
Descriptive statistics and Pearson correlations	Examine variable distributions and bivariate relationships	Mean, SD; correlation coefficients between -1 and $+1$	Hair et al. [32]
Hierarchical regression	Test direct (H1, H2, H5) and mediating (H3, H4, H6, H7) effects	Sequential entry of controls $\rightarrow$ IV $\rightarrow$ mediator $\rightarrow$ DV; β change significance	Baron & Kenny [33]
Bootstrap mediation (1000 resamples)	Verify indirect effect significance	95% bias-corrected CI excludes zero	Preacher & Hayes [25]
Multigroup analysis	Compare effects across income groups and firm sizes	$\Delta\chi^2$ test; critical ratio differences	Hair et al. [32]

Following the mediation testing procedure established by Baron and Kenny [33], the analysis proceeded in four steps: Model 1 introduced control variables only; Model 2 added CDC (the independent variable); Model 3 added the mediators (IA and KS); and Model 4 tested the full model including all paths. Bootstrap resampling with

1000 iterations was used to generate bias-corrected 95% confidence intervals for indirect effects, an approach that does not require the assumption of normality in the sampling distribution of the indirect effect [31]. Multigroup analyses were subsequently conducted to compare path coefficients between high-income (Singapore) and middle/lower-middle-income (Malaysia, Thailand, Indonesia, Philippines) clusters, as well as between SME and large-firm subsamples, thereby testing the contextual robustness of the proposed model across ASEAN's diverse institutional landscape.

4. Results

4.1. Common Method Bias Test

Before proceeding to hypothesis testing, a Harman's single-factor test was conducted by loading all 25 measurement items (five for CDC, twelve for IA, four for KS, and four for EIB) into an unrotated exploratory factor analysis. The results showed that the first unrotated factor accounted for 37.8% of the total variance, which falls comfortably below the 40% threshold commonly adopted to indicate substantial common method variance. This finding confirms that common method bias does not pose a significant threat to the validity of subsequent analyses in this study.

4.2. Reliability and Validity Analysis

The reliability and validity of the measurement instruments were evaluated through Cronbach's alpha coefficients, Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy, and Bartlett's tests of sphericity, as summarized in Table 5. All Cronbach's α values exceeded the widely accepted threshold of 0.70, with CDC demonstrating the highest reliability ($\alpha = 0.93$), followed by IA ($\alpha = 0.92$), EIB ($\alpha = 0.83$), and KS ($\alpha = 0.79$). The KMO values ranged from 0.76 for KS to 0.91 for IA, all exceeding the recommended minimum of 0.70, indicating that the data were well-suited for factor analysis. Bartlett's spherical test reached statistical significance ($p < 0.001$) for all constructs, confirming satisfactory inter-item correlations for dimensional reduction. Taken together, these results provide strong evidence for both the internal consistency and construct validity of the measurement scales employed in this research.

Table 5. Reliability and validity analysis results.

Variable	Items	Cronbach's α	KMO	Bartlett's Test (p)
CDC	5	0.93	0.81	<0.001
IA	12	0.92	0.91	<0.001
KS	4	0.79	0.76	<0.001
EIB	4	0.83	0.78	<0.001

4.3. Descriptive Statistics and Correlation Analysis

Table 6 presents the means, standard deviations, and Pearson correlation coefficients for all study variables. The mean values for CDC ($M = 3.75$, $SD = 0.78$), IA ($M = 3.68$, $SD = 0.71$), KS ($M = 3.61$, $SD = 0.73$), and EIB ($M = 3.52$, $SD = 0.75$) all exceeded the midpoint of the five-point Likert scale (3.0), indicating that ASEAN IT services firms in this sample, on average, exhibit moderate to high levels of digital capability, innovation-supportive organizational climates, cross-border knowledge exchange, and employee innovative behavior. The relatively modest standard deviations (ranging from 0.71 to 0.78) suggest reasonable consistency across countries and firm sizes within the sample, lending confidence to the aggregate analyses that follow.

Table 6. Descriptive statistics and correlation matrix.

Variable	M	SD	1	2	3	4
1. CDC	3.75	0.78	1			
2. IA	3.68	0.71	0.66 **	1		
3. KS	3.61	0.73	0.55 **	0.70 **	1	
4. EIB	3.52	0.75	0.57 **	0.63 **	0.61 **	1

Note: ** $p < 0.01$.

The correlation matrix reveals several noteworthy patterns consistent with the theoretical framework. CDC was positively and significantly correlated with IA ($r = 0.66$, $p < 0.01$), KS ($r = 0.55$, $p < 0.01$), and EIB ($r = 0.57$, $p < 0.01$), providing preliminary support for Hypotheses 1, 2, and 5, respectively. IA was positively associated with both KS ($r = 0.70$, $p < 0.01$) and EIB ($r = 0.63$, $p < 0.01$), offering initial evidence for Hypotheses 3 and 8. KS was positively correlated with EIB ($r = 0.61$, $p < 0.01$), consistent with Hypothesis 6. Importantly, all inter-construct correlations fell below the conventional 0.80 threshold, indicating that multicollinearity does not pose a concern for the regression analyses reported in the following sections.

4.4. Hypothesis Testing

4.4.1. Direct Effects (H1, H2, H5)

Hierarchical regression analysis was employed to test the direct effects proposed in the theoretical model. Following the entry of the seven control variables—gender, age, education, job role, country, firm size, and regional presence—in Model 1, CDC was introduced as the independent variable in Model 2. As shown in Table 7, the inclusion of CDC produced a significant improvement in model fit across all three dependent variables. For EIB, the addition of CDC raised the explained variance from 12% (Model 1) to 30% (Model 2), yielding a significant R^2 change of 0.18 ($p < 0.01$); CDC positively predicted EIB ($\beta = 0.38$, $p < 0.01$), confirming Hypothesis 1. For IA, the R^2 increased substantially from 0.09 to 0.44 ($\Delta R^2 = 0.35$, $p < 0.01$), with CDC exerting a strong positive effect ($\beta = 0.58$, $p < 0.01$), thereby supporting Hypothesis 2. For KS, the R^2 rose from 0.10 to 0.27 ($\Delta R^2 = 0.17$, $p < 0.01$), and CDC demonstrated a significant positive influence ($\beta = 0.37$, $p < 0.01$), providing support for Hypothesis 5. These results confirm that corporate digital capability serves as a robust predictor of innovation atmosphere, knowledge sharing, and employee innovation behavior within ASEAN IT services firms, with its effect being most pronounced on innovation atmosphere.

Table 7. Hierarchical regression results for direct effects.

DV	Model	Predictor	β	t	R^2	ΔR^2	F-Change
EIB	1	Controls	—	—	0.12	—	—
	2	CDC	0.38 **	5.23	0.30	0.18 **	27.35 **
IA	1	Controls	—	—	0.09	—	—
	2	CDC	0.58 **	7.81	0.44	0.35 **	60.99 **
KS	1	Controls	—	—	0.10	—	—
	2	CDC	0.37 **	4.92	0.27	0.17 **	24.21 **

Note: ** $p < 0.01$; control variables include gender, age, education, job role, country, firm size, and regional presence.

4.4.2. Mediating Effects of Innovation Atmosphere (H3, H4)

To examine whether innovation atmosphere mediates the relationship between CDC and EIB, IA was entered as an additional predictor in Model 3, following the causal steps approach established by Baron and Kenny [23]. As detailed in Table 8, IA positively and

significantly predicted EIB ($\beta = 0.34, p < 0.01$), confirming Hypothesis 3. Importantly, the direct effect of CDC on EIB diminished from $\beta = 0.38$ ($p < 0.01$) in Model 2 to $\beta = 0.18$ ($p < 0.05$) in Model 3, while the model's overall explanatory power improved ($R^2 = 0.39$, $\Delta R^2 = 0.09, p < 0.01$). Bootstrap analysis with 1000 resamples [23] further revealed that the indirect effect of CDC on EIB through IA was 0.20, with a 95% bias-corrected confidence interval of [0.10, 0.31] excluding zero, confirming a statistically significant partial mediation. These findings provide robust support for Hypothesis 4, indicating that innovation atmosphere serves as a key mechanism through which digital capability translates into innovative employee behavior: CDC fosters a climate that tolerates reasoned risk-taking and rewards creative contributions, which in turn encourages employees to generate and implement novel ideas.

Table 8. Hierarchical regression results for mediating effects of IA.

DV	Model	Predictor	β	t	R^2	ΔR^2	F-Change
EIB	1	Controls	—	—	0.12	—	—
	2	CDC	0.38 **	5.23	0.30	0.18 **	27.35 **
	3	CDC	0.18 *	2.31	0.39	0.09 **	21.81 **
		IA	0.34 **	4.67			

Note: * $p < 0.05$, ** $p < 0.01$; bootstrap indirect effect = 0.20, 95% CI [0.10, 0.31].

4.4.3. Mediating Effects of Knowledge Sharing (H6, H7)

A parallel analytical procedure was followed to test the mediating role of knowledge sharing. When KS was introduced into the regression model predicting EIB (Table 9), it positively predicted EIB ($\beta = 0.50, p < 0.01$), confirming Hypothesis 6. The coefficient of CDC on EIB decreased from $\beta = 0.38$ ($p < 0.01$) in Model 2 to $\beta = 0.19$ ($p < 0.01$) in Model 3, and model fit improved substantially ($R^2 = 0.42$, $\Delta R^2 = 0.12, p < 0.01$). The bootstrap indirect effect of KS was 0.19 (95% CI [0.11, 0.28]), with the confidence interval excluding zero, thereby confirming a partial mediation effect. Accordingly, Hypothesis 7 is supported: knowledge sharing constitutes a second independent pathway through which corporate digital capability enhances employee innovation behavior. By providing digital platforms that lower the cost of cross-border knowledge exchange, CDC enables employees to access diverse technical expertise and market insights, which in turn stimulates creative problem-solving and the development of regionally relevant innovations.

Table 9. Hierarchical regression results for mediating effects of KS.

DV	Model	Predictor	β	t	R^2	ΔR^2	F-Change
EIB	1	Controls	—	—	0.12	—	—
	2	CDC	0.38 **	5.23	0.30	0.18 **	27.35 **
	3	CDC	0.19 **	2.65	0.42	0.12 **	47.47 **
		KS	0.50 **	6.89			

Note: ** $p < 0.01$; bootstrap indirect effect = 0.19, 95% CI [0.11, 0.28].

4.4.4. Relationship Between Innovation Atmosphere and Knowledge Sharing (H8, H9)

The final set of hypotheses concerned the sequential relationship between innovation atmosphere and knowledge sharing. As presented in Table 10, IA positively predicted KS ($\beta = 0.54, p < 0.01$), supporting Hypothesis 8. This finding indicates that an organizational climate characterized by trust, collaboration, and recognition for collective contributions creates the psychological safety necessary for employees to share knowledge without fear of losing proprietary expertise—a dynamic particularly relevant in ASEAN's collectivist cultural context. When KS was added to the regression model predicting EIB (Model 3), the direct effect of IA on EIB decreased from $\beta = 0.41$ ($p < 0.01$) to $\beta = 0.24$ ($p < 0.01$), while the

model's explanatory power increased ($R^2 = 0.45$, $\Delta R^2 = 0.15$, $p < 0.01$). Bootstrap analysis revealed an indirect effect of KS in the IA-EIB relationship of 0.26 (95% CI [0.15, 0.37]), confirming a partial mediation. Thus, Hypothesis 9 is supported: knowledge sharing serves as a mediating mechanism through which innovation atmosphere influences employee innovation behavior. Collectively, these results underscore the sequential pathway in which digital capability cultivates an innovation-supportive climate, which in turn promotes knowledge exchange, ultimately driving individual-level innovation outcomes.

Table 10. Hierarchical regression results for IA-KS relationship and mediating effects.

DV	Model	Predictor	β	t	R^2	ΔR^2	F-Change
KS	1	Controls	—	—	0.10	—	—
	2	IA	0.54 **	7.32	0.39	0.29 **	53.58 **
EIB	1	Controls	—	—	0.12	—	—
	2	IA	0.41 **	5.87	0.30	0.18 **	34.46 **
	3	IA	0.24 **	3.21	0.45	0.15 **	28.52 **
		KS	0.39 **	5.34			

Note: ** $p < 0.01$; bootstrap indirect effect of KS (IA $\rightarrow$ KS $\rightarrow$ EIB) = 0.26, 95% CI [0.15, 0.37].

4.4.5. Robustness Checks Through Multigroup Analysis

To rule out that our findings merely reflect cross-country economic disparities, national income level was first entered as a control variable (Table 3, coded 1 = Singapore; 2 = Malaysia/Thailand; 3 = Indonesia/Philippines) and then examined directly through the following multigroup analysis. To assess the stability of the proposed theoretical model across ASEAN's heterogeneous institutional landscape, multigroup analyses were conducted comparing high-income (Singapore) versus middle/lower-middle-income clusters (Malaysia, Thailand, Indonesia, Philippines), as well as SME versus large-firm subsamples. The direct effect of CDC on EIB was marginally stronger in Singapore ($\beta = 0.42$, $p < 0.01$) than in the combined middle/lower-middle-income group ($\beta = 0.35$, $p < 0.01$). Notably, the mediating role of IA proved more pronounced in resource-constrained countries ($\beta = 0.36$, $p < 0.01$) compared to Singapore ($\beta = 0.28$, $p < 0.01$), suggesting that an innovation-supportive organizational climate plays a particularly critical compensatory role where digital infrastructure is less developed and hierarchical cultural norms are more prevalent. The mediating effect of KS, by contrast, was largely consistent across income groups (high-income: $\beta = 0.18$, $p < 0.01$; middle/lower-middle-income: $\beta = 0.20$, $p < 0.01$), indicating that knowledge sharing functions as a comparatively universal mechanism that operates effectively regardless of national income level. When comparing firm sizes, both mediating pathways were slightly stronger among SMEs (IA: $\beta = 0.36$, $p < 0.01$; KS: $\beta = 0.33$, $p < 0.01$) than among large firms (IA: $\beta = 0.30$, $p < 0.01$; KS: $\beta = 0.28$, $p < 0.01$), reflecting the greater reliance of smaller organizations on contextual and interactive resources to compensate for limited digital endowments. Overall, the pattern of results remained consistent across all subgroups, confirming the general robustness and contextual adaptability of the proposed theoretical framework.

5. Discussion

5.1. Key Findings and Theoretical Implications

This study offers several theoretical contributions to the literature on digital transformation, employee innovation, and sustainability-oriented organizational development.

First, the study advances existing research by shifting the analytical focus from firm-level outcomes of digital transformation to the employee-level behavioral mechanisms through which corporate digital capability generates sustainable innovation outcomes. Prior studies have widely documented the importance of digital capability for organiza-

tional agility, performance, and innovation. However, less attention has been given to how such capability is converted into employees' sustained innovation behavior in everyday work settings. By showing that corporate digital capability has a positive relationship with sustainable employee innovation behavior, this study helps open the micro-level "black box" linking organizational digital resources to employee innovation. Crucially, this study extends COR and SIPT in a way prior ASEAN research has not. Whereas earlier ASEAN applications employ these theories in isolation—COR for individual stress-coping and SIPT for general attitude formation—and typically in Western-calibrated settings, we reposition them at the intersection of resource scarcity and culturally embedded risk aversion that jointly define the region's IT sector. We extend COR by treating corporate digital capability as a scarce, firm-level resource pool that offsets employees' loss aversion in low-resource economies, and we extend SIPT by showing that digital platforms operate as culturally amplified social cues within collectivist, high-power-distance workplaces. Integrating these two logics into a single sequential mechanism (CDC → IA → KS → EIB) is the study's distinctive theoretical advance.

Second, the study develops a more differentiated explanatory framework by showing that innovation atmosphere and knowledge sharing represent two distinct but complementary mechanisms through which corporate digital capability influences sustainable employee innovation behavior. This is an important theoretical refinement because prior discussions of digital capability often emphasize either technological resources or generalized innovation outcomes without clearly distinguishing the internal organizational processes that connect the two. The present findings suggest that digital capability does not operate only through improving access to tools and information; it also reshapes the organizational climate in which employees interpret innovation as supported and worthwhile, while simultaneously improving the exchange of knowledge needed to act on new ideas. In this sense, the study contributes a dual-path explanation that integrates climate-based and interaction-based mechanisms into the digital innovation literature. This defensive interpretation also complements the resource-protection logic of COR, suggesting that IA and KS help offset the information-security and psychosocial risks inherent in digitally intensive workplaces.

Third, the finding that innovation atmosphere positively promotes knowledge sharing adds a further theoretical insight by identifying a sequential relationship among the mediators. This result suggests that a supportive innovation climate is not only an outcome of digital capability, but also an enabling condition that strengthens knowledge exchange. The study therefore extends understanding of how digital capability affects innovation behavior by showing that organizational climate and knowledge processes are internally connected rather than analytically isolated. This sequential mechanism deepens current knowledge by explaining why digital capability may produce stronger innovation outcomes in organizations where supportive norms and collaborative exchange reinforce one another.

Fourth, the study contributes context-sensitive evidence from ASEAN, a region characterized by substantial variation in digital development, organizational conditions, and resource availability. Research on digital innovation in emerging economies has often treated such contexts in relatively broad or homogeneous terms. By demonstrating that the mediating role of innovation atmosphere is particularly salient in SMEs and relatively resource-constrained settings, the study shows that the pathways through which digital capability affects innovation are contingent on organizational and developmental context. This finding suggests that the internal mechanisms linking digital capability and innovation may vary in relative importance across heterogeneous emerging-market settings, thereby adding context-sensitive evidence to the digital transformation literature. This macro-

institutional reading resonates with Peráček and Kaššaj, underscoring that micro-level digital innovation and macro-level smart-governance design are two expressions of the same connectivity-and-governance paradigm [1].

5.2. Practical Implications

The findings generate several practical implications that follow directly from the empirical results of this study.

First, because corporate digital capability was found to positively promote sustainable employee innovation behavior, firms should treat digital capability not only as an operational resource but also as an innovation-enabling organizational condition. In practice, this means that investments in digital platforms, cross-border collaboration tools, data integration systems, and employee digital skills development should be aligned with the goal of supporting employees' idea generation, experimentation, and implementation in daily work.

Second, the results show that innovation atmosphere is an important mechanism through which corporate digital capability translates into sustainable employee innovation behavior. This suggests that digital investment alone is insufficient if employees do not experience a supportive climate for innovation. Firms should therefore use digital systems in ways that visibly support idea submission, reasonable tolerance for failure, managerial recognition, and cross-border collaboration. In the context of ASEAN IT services, where employees often work across geographically and culturally diverse settings, a clear and supportive innovation atmosphere can help reduce hesitation toward proposing and testing new ideas.

Third, knowledge sharing was also found to mediate the relationship between corporate digital capability and sustainable employee innovation behavior. This indicates that firms should prioritize digital arrangements that make knowledge exchange easier, faster, and more accessible across teams and national units. Practical measures include shared knowledge repositories, structured cross-border communication routines, collaborative problem-solving sessions, and internal platforms for exchanging technical and market knowledge. These measures are especially important when employees need to respond to diverse regional client needs.

Fourth, the positive relationship between innovation atmosphere and knowledge sharing suggests that firms should not treat these as separate management tasks. A supportive innovation climate encourages employees to share expertise, experiences, and solutions more openly, which in turn strengthens innovation outcomes. Managers should therefore build organizational conditions in which employees feel psychologically safe to contribute knowledge without fear of criticism or loss of status.

Finally, the subgroup results suggest that these mechanisms are particularly salient in SMEs and in relatively resource-constrained contexts. This means that smaller firms do not necessarily need to imitate the scale of digital investment seen in large firms; rather, they may obtain substantial innovation benefits by combining targeted digital capability building with a supportive climate and strong internal knowledge-sharing practices. Because our multigroup results show that the IA pathway is especially potent in SMEs, managers in resource-constrained settings should prioritize climate-based rather than capital-intensive interventions. Concrete low-cost measures include adopting free or freemium cloud collaboration tools; instituting lightweight recognition schemes such as a monthly "idea spotlight"; publicly endorsing reasonable failure to reduce hierarchy-induced risk aversion; and designating cross-border "knowledge brokers" who seed peer-to-peer exchange. These steps enable smaller firms to reap innovation benefits without matching the digital-investment scale of large firms. For policymakers and regional industry bodies, this finding implies that

support programs should not focus exclusively on technology adoption, but also on helping firms develop innovation-supportive management practices and cross-organizational knowledge exchange capabilities.

5.3. Limitations and Future Research Directions

Several limitations of this study suggest productive avenues for future research. First, the cross-sectional research design precludes causal inference regarding the temporal ordering of CDC, IA, KS, and EIB. Although the theoretical framework grounded in COR and SIPT specifies directional relationships, longitudinal data collected over three to five years would allow for stronger causal claims and would capture the dynamic co-evolution of digital capabilities, organizational climates, and innovation behaviors as firms progress through different stages of digital maturity. Second, the sample, while spanning five ASEAN countries, excludes Vietnam, Cambodia, Laos, and Myanmar—markets that differ substantially in digital infrastructure quality and institutional development. Expanding the geographic coverage would test the model's generalizability across the full spectrum of ASEAN's digital divide and would enable more fine-grained multigroup analyses comparing countries at similar development stages. Third, the study does not examine potential moderators such as national cultural dimensions (e.g., uncertainty avoidance, individualism-collectivism), regulatory environment stringency, or industry subsector. Future research could investigate whether the mediating effects of IA and KS are amplified or attenuated under varying cultural and institutional conditions. Fourth, the reliance on self-reported measures introduces the possibility of common method bias, although the Harman single-factor test results (37.8%) suggest this is not a severe concern. Future studies could complement survey data with objective indicators such as patent filings, digital tool adoption logs, or supervisor-rated innovation performance, and could employ qualitative methods—particularly in-depth interviews and case studies—to surface the micro-processes through which digital capability translates into innovative behavior in specific organizational and cultural contexts. Finally, extending the model to other ASEAN priority sectors such as fintech, e-commerce, and manufacturing would test its sectoral generalizability and would enable policymakers to design more targeted interventions. The CDC → IA → KS → EIB mechanism is likely to hold in other knowledge- and digitally intensive sectors where cross-border collaboration and knowledge recombination are equally central. The relative weight of the mediators may nonetheless shift: in more capital-intensive or regulation-heavy sectors (e.g., fintech, digital manufacturing) the KS pathway may dominate, whereas in creative or client-facing service sectors the IA pathway may be more salient. We advance these as testable propositions for future sectoral replication.

6. Conclusions

This study investigated the relationship between corporate digital capability and employee innovation behavior in ASEAN IT services firms, examining innovation atmosphere and knowledge sharing as parallel mediating mechanisms within a theoretical framework grounded in conservation of resources theory and social information processing theory. Drawing on survey data from 257 employees across five ASEAN countries, the analysis yielded three principal findings. First, CDC exerts a significant direct effect on EIB, confirming that digital capability functions as a foundational resource for individual-level innovation even after accounting for demographic and firm-level heterogeneity. Second, IA and KS each partially mediate this relationship, representing two conceptually distinct pathways: an affective-climate pathway through which CDC reduces risk aversion by fostering psychological safety and recognition norms, and a cognitive-interactive pathway through which CDC enables knowledge recombination by lowering the costs of cross-border ex-

change. Third, IA positively predicts KS, forming a sequential mediation chain (CDC → IA → KS → EIB) that highlights how organizational climate serves as an antecedent condition for knowledge-sharing behaviors.

This study makes three principal contributions to the literature on digital transformation and employee innovation in emerging economies. Theoretically, it advances understanding by demonstrating that corporate digital capability does not automatically translate into sustainable employee innovation but operates through two conceptually distinct mechanisms—innovation atmosphere and knowledge sharing—which jointly mediate and sequentially reinforce this relationship. By integrating Conservation of Resources theory and Social Information Processing Theory, the study provides a dual-lens explanation that accounts for both the resource-based conditions (what enables innovation) and the social-cognitive triggers (what makes innovation psychologically legitimate), offering a more nuanced framework than prior studies that have treated these mechanisms in isolation. Methodologically, the study contributes context-sensitive evidence from five ASEAN countries representing diverse economic development levels, revealing that the relative importance of these mediating pathways varies systematically across institutional contexts—innovation atmosphere plays a particularly compensatory role in resource-constrained settings and SMEs, whereas knowledge sharing functions as a comparatively universal mechanism. Practically, the findings inform both firm-level managerial strategies and regional policy design by highlighting that digital capability investments must be complemented by climate-building initiatives and knowledge-sharing infrastructure to realize their full innovation potential—an insight with direct relevance to the ASEAN Digital Economy Framework Agreement and regional integration objectives.

Author Contributions: Methodology, Z.J. and T.H.; conceptualization, Z.J. and R.L.; writing—original draft, T.H. and R.L.; writing—review and editing, T.H., D.M. and T.H. All authors have read and agreed to the published version of the manuscript.

Funding: This study was supported by the 2026 Key Project of Shanxi Federation of Social Sciences: Synergistic Coupling Between Inclusive Finance, Small-Scale Industrial Entities and Rural Revitalization of Shanxi Province. 2026 Annual Science and Technology Innovation Think Tank Construction Research Project of Taiyuan Association for Science and Technology: Research on the Specialization and High-Value Chain Extension of Taiyuan's Productive Service Industry during the 15th Five-Year Plan Period. General Program of the Youth Fund for Humanities and Social Sciences of the Ministry of Education: A Study of the Post-war Japanese Tax System (1945–1989) (No.: 20YJC770033).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available upon request from the corresponding authors.

Conflicts of Interest: Author Rong Li was employed by the iSoftStone Information Technology (Group) Co., Ltd. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Abbreviations

Abbreviation	Full Term
ASEAN	Association of Southeast Asian Nations
CDC	Corporate Digital Capability
COR	Conservation of Resources (theory)
DEFA	ASEAN Digital Economy Framework Agreement
EIB	(Sustainable) Employee Innovation Behavior
IA	Innovation Atmosphere

KS	Knowledge Sharing
SIPT	Social Information Processing Theory
SME	Small- and Medium-sized Enterprise

References

1. Peráček, T.; Kaššaj, M. The impact of effective public administration and European digital connectivity on building smart cities: An analysis of legal frameworks, policy initiatives, and transformative impact in the emerging era. *Jurid. Trib.—Rev. Comp. Int. Law* **2025**, *15*, 720–745.
2. Nambisan, S.; Wright, M.; Feldman, M. The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Res. Policy* **2019**, *48*, 103773. [\[CrossRef\]](#)
3. Scott, S.G.; Bruce, R.A. Determinants of innovative behavior: A path model of individual innovation in the workplace. *Acad. Manag. J.* **1994**, *37*, 580–607. [\[CrossRef\]](#)
4. Alavi, M.; Leidner, D.E. Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Q.* **2001**, *25*, 107–136. [\[CrossRef\]](#)
5. Bharadwaj, A.S. A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Q.* **2000**, *24*, 169–196. [\[CrossRef\]](#)
6. Vial, G. Understanding digital transformation: A review and a research agenda. *J. Strateg. Inf. Syst.* **2019**, *28*, 118–144. [\[CrossRef\]](#)
7. Amabile, T.M. A model of creativity and innovation in organizations. In *Research in Organizational Behavior*; Staw, B.M., Cummings, L.L., Eds.; JAI Press: Greenwich, CT, USA, 1988; Volume 10, pp. 123–167.
8. Ployhart, R.E.; Moliterno, T.P. Emergence of the human capital resource: A multilevel model. *Acad. Manag. Rev.* **2011**, *36*, 127–150. [\[CrossRef\]](#)
9. March, J.G. Exploration and exploitation in organizational learning. *Organ. Sci.* **1991**, *2*, 71–87. [\[CrossRef\]](#)
10. Hobfoll, S.E. Conservation of resources: A new attempt at conceptualizing stress. *Am. Psychol.* **1989**, *44*, 513–524. [\[CrossRef\]](#) [\[PubMed\]](#)
11. Barney, J. Firm resources and sustained competitive advantage. *J. Manag.* **1991**, *17*, 99–120. [\[CrossRef\]](#)
12. Hofstede, G. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*, 2nd ed.; Sage: Thousand Oaks, CA, USA, 2001.
13. Salancik, G.R.; Pfeffer, J. A social information processing approach to job attitudes and task design. *Adm. Sci. Q.* **1978**, *23*, 224–253. [\[CrossRef\]](#)
14. Leonardi, P.M. When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS Q.* **2011**, *35*, 147–167. [\[CrossRef\]](#)
15. Orlikowski, W.J. Using technology and constituting structures: A practice lens for studying technology in organizations. *Organ. Sci.* **2000**, *11*, 404–428. [\[CrossRef\]](#)
16. Weick, K.E.; Sutcliffe, K.M.; Obstfeld, D. Organizing and the process of sensemaking. *Organ. Sci.* **2005**, *16*, 409–421. [\[CrossRef\]](#)
17. Ivančík, R.; Andrassy, V. Role of social media in spreading conspiracy theories. *Entrep. Sustain. Issues* **2024**, *11*, 31–43. [\[CrossRef\]](#) [\[PubMed\]](#)
18. Chen, Y.; Wang, Y.; Nevo, S.; Jin, J.; Wang, L.; Chow, W.S. IT capability and organizational performance: The roles of business process agility and environmental factors. *Eur. J. Inf. Syst.* **2014**, *23*, 326–342. [\[CrossRef\]](#)
19. Liu, Z.; Chen, X.; Ni, Y. Good tools are essential to do the job: A study of impact of digital competencies on innovative work behavior of Chinese remote work employees. *Inf. Dev.* **2024**, *40*, 1–15. [\[CrossRef\]](#)
20. Chen, H.; Zheng, Y.; Zeng, S.; Yi, Y. When is digital technology beneficial toward corporate innovation? A meta-analysis. *IEEE Trans. Eng. Manag.* **2024**, *71*, 5574–5587. [\[CrossRef\]](#)
21. Cheng, Z.; Jin, X.; Kwak, W.J. Using the new positive aspect of digital leadership to improve organizational sustainability: Testing moderated mediation model. *Acta Psychol.* **2025**, *255*, 104963. [\[CrossRef\]](#)
22. Dang, L.H.; Vuong, B.N.; Huan, D.D. How human resource management practices promote job performance through innovative work behavior: Does innovative climate matter? *Cogent Psychol.* **2025**, *12*, 2498245. [\[CrossRef\]](#)
23. Wang, S.; Noe, R.A. Knowledge sharing: A review and directions for future research. *Hum. Resour. Manag. Rev.* **2010**, *20*, 115–131. [\[CrossRef\]](#)
24. Janssen, O. Job demands, perceptions of effort-reward fairness and innovative work behaviour. *J. Occup. Organ. Psychol.* **2000**, *73*, 287–302. [\[CrossRef\]](#)
25. Preacher, K.J.; Hayes, A.F. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav. Res. Methods* **2008**, *40*, 879–891. [\[CrossRef\]](#) [\[PubMed\]](#)
26. Brislin, R.W. Translation and content analysis of oral and written material. In *Handbook of Cross-Cultural Psychology*; Triandis, H.C., Berry, J.W., Eds.; Allyn & Bacon: Boston, MA, USA, 1980; Volume 2, pp. 389–444.

27. e-Conomy SEA. *e-Conomy SEA Report 2023: Navigating ASEAN's Digital Decade*; Google, Temasek, Bain & Company: Singapore, 2023.
28. OECD. *OECD Digital Economy Outlook 2022*; OECD Publishing: Paris, France, 2022.
29. World Bank. *World Development Report 2024: Digital Transformation and Economic Development*; World Bank: Washington, DC, USA, 2024.
30. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.-Y.; Podsakoff, N.P. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. [[CrossRef](#)] [[PubMed](#)]
31. Nunnally, J.C. *Psychometric Theory*, 2nd ed.; McGraw-Hill: New York, NY, USA, 1978.
32. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*, 7th ed.; Pearson: Upper Saddle River, NJ, USA, 2010.
33. Baron, R.M.; Kenny, D.A. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* **1986**, *51*, 1173–1182. [[CrossRef](#)] [[PubMed](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.