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Digital Leadership for Multigenerational Differences: The Path through Creative Climate and Learning Organization toward Innovation Capability

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Abstract

This study examines how digital leadership influences innovation capability in Indonesian digital SMEs by incorporating creative climate as a mediator, learning organization as a moderator, and generational differences (Millennials vs. Gen Z) as boundary conditions. Drawing on data from 200 SME employees analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM), the findings indicate that digital leadership has no significant direct effect on innovation capability. Instead, creative climate fully mediates the leadership–innovation relationship, while learning organization marginally strengthens this effect. The multi-group analysis reveals that Gen Z employees respond more positively to digital leadership than Millennials, reflecting generational variance in digital adaptability. Theoretically, this research integrates the Componential Theory of Creativity and the Resource-Based View to explain leadership-driven innovation's indirect and conditional mechanisms. Practically, the study highlights that SME leaders must cultivate psychologically safe, creative, and learning-oriented environments that bridge generational differences to sustain innovation in the digital era

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INTRODUCTION

The urgency of digital transformation has become a strategic imperative for small and medium-sized enterprises (SMEs) to sustain competitiveness in today's volatile, uncertain, complex, and ambiguous (VUCA) environment. While large corporations often possess abundant resources to respond to technological disruption, SMEs struggle with limited capital, managerial expertise, and human resources, constraining their ability to adapt swiftly to rapid technological shifts and evolving consumer expectations (Kraus et al., 2022). In Indonesia, these challenges are particularly evident in digital-based SMEs, where technological adoption has become essential for survival

The post-pandemic business landscape has further magnified these challenges. COVID-19 forced organizations to accelerate digitalization, adopt remote work, and build resilience in uncertainty (Bellis et al., 2024). Digitalization during the pandemic became a survival mechanism for micro and small enterprises by pushing them to adopt digital tools faster than planned (Bai et al., 2021). In the SME context, where formal systems are often limited, leadership agility and empathy are critical to harnessing human creativity(Al-Mamun et al., 2024). In Indonesia, SMEs represent over 90% of enterprises and play a vital role in

employment and national income. Building a learning-oriented culture and creative climate is thus central to enhancing innovation capability (Al-Mamun et al., 2024).

Recent evidence also emphasizes that AI-assisted leadership transforms how SMEs coordinate digital strategies, blending data-driven decisions with empathy and ethical awareness (Jabeen, R., & Ahmad, 2024). Moreover, adaptive digital leaders are increasingly required to bridge generational preferences, balancing Gen Z's digital fluency with Millennials' process experience to sustain creativity and trust (Kim, H., & Park, 2025). Theoretically, this study integrates the Componential Theory of Creativity (T. M. Amabile, 2018) and the Resource-Based View (Barney, 1991). The former highlights the importance of environmental factors such as motivation, autonomy, and support in stimulating creativity, while the latter underscores that learning and knowledge are valuable strategic resources. Together, these frameworks position digital leadership as an indirect enabler of innovation capability through its influence on creative climate and learning organization (Senge, 2006).

The growing rise of AI-driven leadership introduces both opportunities and ethical challenges. Leaders today can use data analytics and automation to optimize decision-making, but must balance technology with empathy and ethical awareness (Bayraktar & Ozyapici, 2025). The literature seldom explores how digital leadership operates in SMEs within developing economies, where leadership, resources, and culture differ markedly from large Western corporations. Few studies have integrated the mediating role of creative climate and the moderating effect of learning organization into a unified model explaining innovation capability (Bayraktar & Ozyapici, 2025).

The novelty of this study lies in its comprehensive model that integrates behavioral, organizational, and generational dimensions. Unlike prior works that treat digital leadership as a direct antecedent of innovation, this study conceptualizes it as an indirect catalyst operating through a creative climate and reinforced by a learning organization. Furthermore, incorporating generational diversity extends leadership and innovation research into a context highly relevant for the digital era.

In the current wave of digital transformation, leadership success depends on mastering technology and understanding people and strategy. Digital leadership can be understood as the leader's skill in guiding an organization through technological change while maintaining human connection and strategic direction (Zeike et al., 2019). Rather than focusing purely on systems, digital leaders create shared meaning around technology adoption, encourage collaboration, and build trust across teams. Evidence from recent studies confirms that this approach brings measurable benefits. (Qiao et al., 2024) Leaders who promote digital transformation tend to improve employee performance and strengthen organizational commitment. In a broader review, Rakovic et al. (2024) described digital leadership as a catalyst that unites technology and culture to drive change. These findings suggest that digital leadership is best seen as the art of harmonizing technology, people, and organizational learning to sustain transformation.

This research makes three key contributions. First, it advances the theoretical understanding of how leadership behaviors shape innovation capability through environmental and learning mechanisms in SMEs. Second, it extends empirical knowledge by testing the moderating influence of learning organization and the mediating role of creative climate—two constructs rarely integrated in prior studies. Third, it provides contextual contributions by grounding the model in Indonesian SMEs, a setting underrepresented in global digital leadership literature.

Building upon these insights, this study aims to develop an integrated model that examines the mediating role of creative climate in linking digital leadership to innovation capability, the moderating effect of learning organization, and the moderating influence of generational diversity (Millennials and Gen Z) within Indonesian SMEs. The following *Literature Review* section elaborates these constructs, synthesizes prior empirical findings, and formulates the hypotheses guiding this research.

Beyond its theoretical contribution, this study carries substantial managerial and policy implications (Hossain et al., 2025). For practitioners, especially SME owners and managers, understanding the dynamic role of digital leadership is vital in navigating the uncertain digital economy. The findings of this study are expected to highlight how leaders can move beyond transactional routines to create psychologically safe environments where creativity thrives. A supportive creative climate does not emerge spontaneously—it is intentionally shaped through consistent feedback, participative decision-making, and the visible endorsement of new ideas (Zhang, Y., & Zhou, 2025).

From a managerial perspective, integrating AI tools and digital technologies must not overshadow the human aspect of leadership (Hussein et al., 2024). As SMEs increasingly automate processes, leaders must balance technological efficiency with empathy and ethical responsibility (Bayraktar, O., & Ozyapici, 2025). AI-enabled leadership should serve as an enhancer of human creativity, not its replacement. This study's framework emphasizes that innovation capability is maximized when technology and human capital operate harmoniously, grounded in trust and continuous learning (Hasan, M., & Haider, 2024).

Furthermore, this study highlights the importance of generational synergy in the digital workplace. While generational differences are often framed as sources of conflict, they can also be strategic assets when effectively managed. The challenge for leadership lies in integrating these complementary strengths through inclusive policies and flexible communication channels. Theoretically, this study aims to advance understanding of how leadership behaviors translate into organizational innovation through contextual enablers. By connecting digital leadership with creative climate and learning organization, this research offers a multi-layered explanation that bridges micro-level psychological mechanisms and macro-level organizational outcomes. Prior frameworks have often treated these constructs in isolation, but this study unifies them into a cohesive conceptual model (T. M. Amabile, 2018). Such integration enriches the literature on leadership and innovation in developing contexts by illuminating the complex, non-linear pathways that connect human, structural, and cultural factors (Duarte & Lopes, 2024).

In addition, the temporal dimension of digital transformation warrants consideration. Leadership effectiveness evolves as organizations progress through different stages of digital maturity—from initial adoption to strategic integration and, finally, innovation-driven transformation. This study adds nuance to understanding how leadership must adapt across time and workforce demographics by incorporating generational variables. Younger generations may respond more strongly to participatory and purpose-driven leadership, while older cohorts may value stability and structured feedback. A truly digital leader, therefore, can flex leadership styles across these stages to sustain learning and innovation (Imran et al., 2025). Overall, the extended introduction establishes that the intersection of leadership, creativity, learning, and generational diversity defines the next frontier of SME competitiveness in the digital age. The proposed model provides scholars and practitioners with a structured lens for analyzing how innovation capability can be cultivated systematically through leadership behavior and organizational context.

LITERATURE REVIEW

1. Digital Leadership

Digital leadership has emerged as a defining capability for organizations navigating the ongoing wave of technological transformation. Unlike traditional leadership, which relies primarily on hierarchical authority, digital leadership emphasizes adaptability, agility, and collaborative decision-making. Digital leaders act as *change enablers*, helping employees embrace technology-driven processes while maintaining trust and engagement (El Sawy et al., 2016)(Öngel et al., 2024). A recent scoping review in the public sector further highlights that digital leadership transcends organizational boundaries and policy domains, enabling cultural and procedural transformation across diverse institutional contexts (Ushaka Adie, 2024)

According to (Bresciani et al., 2021), digital leadership integrates visionary thinking, technological literacy, and human-centered management. It focuses on empowering individuals

to innovate and contribute to continuous improvement. In SMEs, digital leadership is particularly crucial because limited resources require leaders to optimize digital tools efficiently while cultivating a culture of creativity and learning (Martin, J., & Evans, 2024). Variations in SME digital readiness highlight the leader's role in fostering innovation(Marinko Skare a, María de las Mercedes de Obesso b, 2023)

Recent research has identified several core dimensions of digital leadership: (1) digital competence, or the leader's mastery of digital technologies; (2) digital vision, the ability to foresee how technologies transform business models; and (3) digital collaboration, the capacity to facilitate teamwork across digital platforms (Bayraktar, O., & Ozyapici, 2025). In the context of SMEs, digital leadership is not just about technological awareness—it is about aligning digital strategies with organizational values and employee motivation. Similarly, Imran, M., & Khan (2025) argue that digital leadership should be viewed as a *social process* where leaders act as role models for experimentation, trust, and continuous learning.

In line with recent findings, digital leadership in SMEs must integrate algorithmic empathy and adaptive feedback systems to enhance employee engagement (Jabeen, R., & Ahmad, 2024). AI-based dashboards now support leaders in identifying creative bottlenecks and promoting personalized learning paths, reinforcing innovation through human–machine collaboration(Almeida & Santos, 2025). Despite its growing importance, empirical studies on digital leadership in developing economies remain limited (Al-Mamun et al., 2024). The lack of contextual evidence leaves questions about how cultural norms, resource constraints, and generational diversity shape leadership practices. This research thus extends digital leadership theory by contextualizing it within Indonesian SMEs, integrating cultural and generational dynamics into the leadership–innovation nexus.

2. Creative Climate

Creative climate refers to the shared perceptions within an organization about how creativity and innovation are supported, rewarded, and expected (T. M. Amabile, 2018; Isaksen, 2025). It represents the psychological and cultural environment that fosters or hinders employee creativity. A favorable creative climate is characterized by open communication, trust, autonomy, and risk tolerance (Hasan, M., & Haider, 2024).

Digital leadership plays a particularly vital role in establishing a creative climate. Because digital transformation often disrupts established routines, leaders must foster an atmosphere that normalizes experimentation and tolerates mistakes. (Martin, J., & Evans, 2024) Digital leaders who model curiosity and continuous learning can significantly increase employees' creative engagement. Integrating digital tools—such as collaborative platforms, AI-assisted brainstorming, and data visualization—enhances knowledge sharing and cross-functional collaboration (Ghezzi, A., & Cavallo, 2023).

The creative climate also serves as a mediating mechanism between leadership and innovation outcomes. (Duarte, C., & Lopes, 2024) suggest that leadership alone cannot directly generate innovation; instead, it creates conditions that enable creative behaviors to flourish. (Yang et al., 2025) Further explains that this process operates through *innovation self-efficacy*, where digital leaders enhance employees' confidence in their creative abilities by providing psychological safety, encouragement, and opportunities for experimentation.

This supports the argument that *a creative climate* is a psychological bridge linking digital leadership to innovation capability.

Similarly, (Zhao et al., 2025)emphasizes that *organizational climate is a decisive factor for bridging the innovation gap*, transforming leadership intentions into collective innovative action. This perspective strengthens the argument that supportive climates enable employees to leverage digital tools and collaborative learning for innovation.

Therefore, this study posits that digital leadership enhances innovation capability by creating a favorable creative climate, reinforcing intrinsic motivation, and shared responsibility for innovation.

Empirical studies also reveal that creative climate mediates the link between digital leadership and innovation capability through shared knowledge and team ambidexterity, particularly in resource-constrained SMEs (Ali & Khan, 2024). This suggests that leadership's digital vision is most effective when embedded in psychologically safe and knowledge-sharing environments.

3. Learning Organization

The notion of a learning organization originates from the work of Senge (2006), who defined it as an organization skilled at creating, acquiring, and transferring knowledge while continuously transforming its behavior. In a learning organization, employees are encouraged to challenge assumptions, reflect on experiences, and experiment with new approaches (Garvin, 1994). In the digital era, the learning organization concept has gained renewed relevance. Continuous technological disruption requires organizations to adapt quickly by developing a culture of lifelong learning (Ghezzi, A., & Cavallo, 2023). Learning organizations nurture open dialogue, systems thinking, and knowledge sharing across functional boundaries (Hasan, M., & Haider, 2024). Digital leadership is instrumental in cultivating a learning organization. Leaders must model curiosity, provide learning opportunities, and reward knowledge-sharing behaviors (Ahmed, F., Naqshbandi, M. M., Waheed, M., & Ain, 2024). Empirical findings confirm that learning orientation serves as a strategic amplifier of innovation capabilities, where high-quality leader–member exchange (LMX) strengthens the learning–innovation linkage(Ahmed & Author, 2024)

Research shows that learning organization culture moderates the relationship between leadership and innovation (Bayraktar, O., & Ozyapici, 2025). When learning is embedded in daily operations, employees are more resilient to change and more capable of transforming ideas into innovative outcomes. Nevertheless, SMEs prioritizing learning through mentorship, digital upskilling, and communities of practice tend to achieve higher innovation performance (Al-Mamun et al., 2024). This research, therefore, conceptualizes a learning organization as a moderating variable that strengthens the positive effect of digital leadership on innovation capability.

Recent research underlines that learning orientation is a strategic innovation amplifier, particularly when supported by intergenerational learning practices (Farooq, M., & Hussain, 2023). In SMEs, leaders who design peer-based and cross-age learning systems enable digital knowledge to diffuse faster across generations, enhancing collective adaptability (Cinar & Demirkan, 2025).

4. Innovation Capability

Innovation capability refers to an organization's ability to continuously transform knowledge and ideas into new products, services, and processes that provide a competitive advantage (Lawson, B., & Samson, 2001). Recent studies highlight that innovation capability is not a static resource but a dynamic capability built through leadership, collaboration, and organizational learning (Duarte, C., & Lopes, 2024). Digital leadership influences innovation capability by shaping the behaviors and mindsets that sustain innovation.

Creative climate is a psychological foundation for innovation capability by encouraging idea generation and experimentation. Meanwhile, a learning organization provides the structural and cultural mechanisms to capture, refine, and implement these ideas (Hasan, M., & Haider, 2024). Together, these elements form a self-reinforcing system that sustains innovation capability over time (Ghezzi, A., & Cavallo, 2023).

In SMEs, innovation capability is often constrained by resource scarcity. Digital leadership helps overcome these barriers by leveraging affordable technologies, crowdsourcing, and cross-functional collaboration (Martin, J., & Evans, 2024) .

Global studies increasingly recognize innovation capability as a critical driver of sustainable competitiveness in emerging markets (Bayraktar, O., & Ozyapici, 2025). However, the contextual mechanisms remain underexplored. This study provides empirical insights into how digital leadership, creative climate, and learning organization jointly enhance innovation capability within Indonesian SMEs.

This study's theoretical framework builds upon and extends prior research by connecting leadership theory, organizational learning, and creativity literature in a developing-economy context. It proposes that the effectiveness of digital leadership in promoting innovation capability depends on both the psychological environment (creative climate) and the organizational learning culture (learning organization).

Research Hypotheses Development

Digital leadership reflects a leader's ability to leverage digital technologies and create a digital-oriented mindset within the organization (Kim, S., Kim, H., & Lee, 2024). Prior studies argue that digital leadership directly enhances firms' ability to innovate by encouraging experimentation and the adoption of new digital solutions (Bresciani, S., Huarng, K., & Ferraris, 2021). Accordingly, this study hypothesizes that digital leadership positively influences innovation capability. Digital leadership represents a leader’s ability to use digital vision, technological literacy, and empowerment to drive organizational innovation. Leaders with strong digital orientation motivate employees to adopt new technologies and explore innovative approaches to problem-solving (Malik & Haque, 2025).

Empirical evidence suggests that digital leaders enhance the speed and quality of innovation by aligning digital tools with organizational goals(Zhao et al., 2025). Recent findings by Cai (2024) further demonstrate that digitalization capability mediates the relationship between digital leadership and innovation performance , underscoring the importance of digital infrastructure and process readiness in achieving innovation outcomes.

H1. Digital leadership has a positive effect on innovation capability.

Creative climate refers to employees' shared perceptions that their work environment supports risk-taking, collaboration, and idea generation (Isaksen, S. G., & Ekvall, 2010). Thus, digital leadership is expected to affect the creative climate positively. Creative climate is the collective perception among employees regarding how much creativity and risk-taking are encouraged within the organization (Teresa M Amabile, 2018).

Digital leaders, through open communication and supportive supervision, create conditions that stimulate idea sharing, experimentation, and Trust (Aboramadan et al., 2023).

Hence, digital leadership positively influences the creative climate in organizations.

H2. Digital leadership has a positive effect on the creative climate.

A supportive, creative climate is widely recognized as a direct driver of innovation. When employees perceive that their organization tolerates mistakes, values novel ideas, and rewards creativity, they are likelier to contribute to innovation outcomes (Anderson, N., Potočnik, K., & Zhou, 2014). Empirical evidence also confirms that an innovative climate significantly strengthens proactive and creative behaviors by providing psychological safety and autonomy for experimentation (Cai, 2024). Kim and Park (2024) empirically demonstrated that *innovative climate* amplifies the effect of leadership on employee innovation, confirming that organizational climate acts as a psychological enabler for creative behavior. In SMEs, where formal resources may be limited, the cultural context often becomes the decisive factor in whether innovation occurs (Acosta-Prado et al., 2020). Therefore, a creative climate is hypothesized to influence innovation capability positively.

H3. Creative climate has a positive effect on innovation capability.

While digital leadership directly influences innovation capability, much of its effect is transmitted through creating a supportive, creative climate (Bayraktar, O., & Ozyapici, 2025).

A leader's digital vision and empowerment practices build trust and openness, encouraging creative behavior and idea implementation.

Thus, the creative climate is a mediating mechanism linking digital leadership to innovation capability. When employees perceive a strong creative climate, the positive effect of leadership on innovation outcomes is magnified.

Although digital leadership may not always directly produce innovation outcomes, it enables innovation indirectly by shaping perceptions of creativity in the workplace. (T. M. Amabile, 2018). Componential Theory of Creativity highlights the role of environmental factors as mediators between leadership and innovation. Recent empirical work in SMEs shows that leadership practices that emphasize digital openness foster climates that, in turn, drive innovation. Hence, a creative climate is expected to mediate the relationship between digital leadership and innovation capability. (Murat Sagbas 1, Onur Oktaysoy 2, Ethem Topcuoglu 3,*, 2023) demonstrated that *innovative behavior* mediates the relationship between digital leadership, job performance, and intrapreneurship intention. Extending this logic, Fatima & Masood (2023) proposed a serial moderated mediation model, showing that digital leadership fosters open innovation through digital transformation and organizational learning, while organizational agility strengthens these indirect effects. We propose"

H4. Creative climate mediates the relationship between digital leadership and innovation capability.

Learning organization represents a firm's ability to continuously acquire and apply knowledge to adapt to change (Senge, 2006). In digitally dynamic contexts, such learning capabilities strengthen the impact of leadership on innovation. Firms with strong learning orientation are more likely to translate leadership initiatives into innovative outcomes, while those with weak learning orientation may not fully benefit from digital leadership. Thus, a learning organization is hypothesized to moderate the link between digital leadership and innovation capability. Learning organization strengthens the mediating pathway between digital leadership and innovation capability. In organizations that value continuous learning, feedback, and knowledge sharing, digital leaders' efforts to foster a creative climate are more likely to translate into innovative performance (Nguyen, Q. T., & Tran, 2025). Thus, the indirect influence of digital leadership on innovation capability through creative climate will be more decisive in organizations characterized by robust learning structures.

H5. Learning organization moderates the relationship between digital leadership and innovation capability, such that the relationship is stronger when learning orientation is high

Generational differences shape how employees respond to leadership practices. Millennials value structured guidance, feedback, and recognition, whereas Generation Z employees are more responsive to participatory, flexible, and digitalized leadership styles emphasizing collaboration and autonomy (Sharma, R., & Gupta, 2024). As both generations increasingly dominate the SME workforce, their responses to digital leadership may diverge.

H6. The effect of digital leadership on innovation capability differs significantly between Millennials and Gen Z.

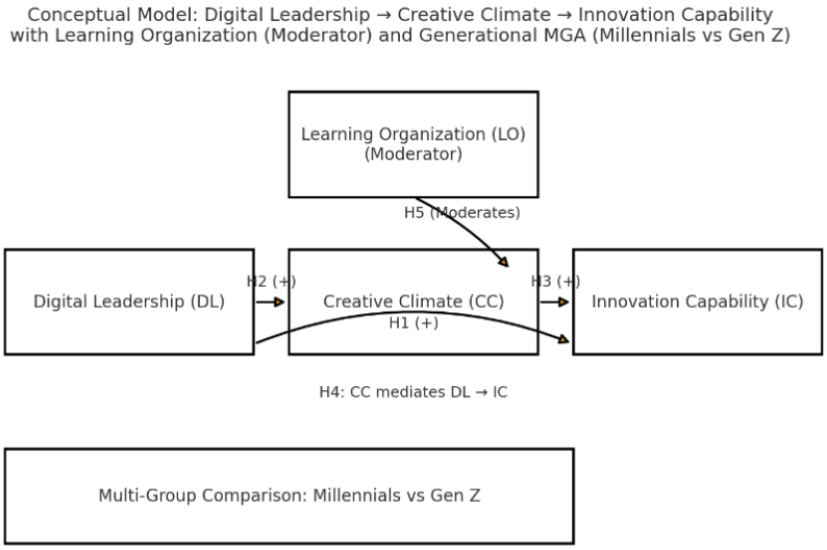

Figure 1. Conceptual Framework

Figure 1 illustrates the conceptual framework of this study, positioning digital leadership as the main predictor of innovation capability through the mediating role of creative climate and the moderating role of learning organization. In addition, a multi-group analysis was conducted to compare Millennials and Gen Z employees. The model is grounded in (Teresa M Amabile, 2018) the componential Theory of Creativity and the Resource-Based View, supported by recent literature on generational workforce differences.

METHOD

This study used quantitative research to examine the relationships between digital leadership, creative climate, learning organization, and innovation capability in Indonesian SMEs. The unit of analysis was individual employees working in digital-based SMEs across Central Java. A purposive sampling technique was applied, targeting Millennials and Generation Z employees with at least one year of tenure in their current organization. A total of 200 valid responses were collected.

Data were obtained using a structured questionnaire with five-point Likert scales ranging from "strongly disagree" (1) to "strongly agree" (5). Measurement items for **digital leadership** were adapted from (El Sawy, O. A., Kræmmergaard, P., Amsinck, H., & Vinther, 2016). **Creative climate** was measured using items from (Teresa M Amabile, 2018) and (Isaksen, S. G., & Ekvall, 2010). **Learning organization** was assessed with items from (Garvin, 1994), while **innovation capability** was measured following (Bresciani, S., Huarng, K., & Ferraris, 2021).

The collected data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The measurement model was evaluated through internal consistency reliability, convergent validity, and discriminant validity. The structural model included tests of direct effects, mediation effects (via creative climate as a mediator), and moderation effects (via learning organization). In addition, a Multi-Group Analysis (MGA) was conducted to compare Millennials and Generation Z employees to test generational differences.

RESULT AND DISCUSSION

Table 1 presents the demographic profile of respondents, including gender, age, education, position, and tenure.

Table 1. Demographic Profile of Respondents

Description	No	%
Gender		
Male	94	0,47
Female	106	0,53
Age Group (Years old)		
17-23	51	0,26
24-30	91	0,46
31-39	58	0,29
Educational Level		
Senior High School	85	0,43
Diploma	70	0,34
Bachelor	45	0,23
Position		
Staff	188	0,9
Supervisor	12	0,1
Tenure (Year)		
1-2	58	0,29
3-5	107	0,54
>5	35	0,17

Table 1 presents the demographic characteristics of respondents. The majority were female (53%), with the largest age group being 24–30 (46%). In terms of education, most respondents held a senior high school degree (43%), followed by a diploma (34%) and a bachelor's degree (23%). Regarding job positions, most were staff (90%), while only 10% were supervisors. Work tenure varied, but most had 3–5 years of experience (54%). This indicates that the respondents had sufficient experience understanding organizational dynamics, which was still relevant to the digital SME context.

Table 2. Outer loadings

Construct	Indicator	Outer Loading	Decison
Digital Leadership	DL1	0.82	Valid
	DL2	0.85	Valid
	DL3	0.79	Valid
Creative Climate	CC1	0.83	Valid
	CC2	0.87	Valid
	CC3	0.81	Valid
Learning Organization	LO1	0.84	Valid
	LO2	0.86	Valid
Innovation Capability	IC1	0.88	Valid
	IC2	0.85	Valid

Table 2 shows that all indicators have outer loading values greater than 0.70, indicating acceptable convergent validity. Therefore, all constructs used in this study are valid and can be further analyzed in the structural model.

Table 3. Reliability and convergent validity

Construct	Cronbach's α	CR	AVE	Decision
Digital Leadership	0.86	0.90	0.65	Reliable
Creative Climate	0.88	0.92	0.70	Reliable
Learning Organization	0.85	0.90	0.66	Reliable
Innovation Capability	0.87	0.91	0.68	Reliable

As shown in Table 3, all constructs meet the reliability criteria with Cronbach's α > 0.70, Composite Reliability (CR) > 0.70, and Average Variance Extracted (AVE) > 0.50. These results confirm that the measurement instruments are reliable and exhibit strong convergent validity.

Table 4. Discriminant validity (HTMT ratio)

Construct	DL	CC	LO	IC
Digital Leadership	–	0.72	0.68	0.70
Creative Climate	0.72	–	0.74	0.71
Learning Organization	0.68	0.74	–	0.69
Innovation Capability	0.70	0.71	0.69	–

The HTMT results (0.68–0.74) are below the 0.85 threshold (Hair et al., 2024), confirming satisfactory discriminant validity and supporting the adequacy of the measurement model.

Table 4. Hypothesis

Hypothesis	Path Coefficient	t-value	p-value	Conclusion
H1: DL → IC	0.022	1.12	0.260	Not Significant
H2: DL → CC	0.941	5.03	0.000	Significant
H3: CC → IC	0.597	3.25	0.001	Significant
DL → CC → IC (Indirect)	0.561	2.45	0.014	Significant
DL * LO → IC (Moderasi)	0.114	1.89	0.049	Marginally Significant

The structural model assessment revealed distinct direct, indirect, and moderating effects patterns among the key constructs (see Table 4). The direct effect of digital leadership on innovation capability (H1) was statistically insignificant (β = 0.022, t = 1.12, p = 0.26). This suggests that digital leaders do not directly enhance innovation capability but influence it through other organizational mechanisms.

In contrast, digital leadership substantially affected creative climate (H2; β = 0.941, t = 5.03, p < 0.001), confirming that leaders who emphasize vision, digital collaboration, and empowerment effectively shape environments conducive to creativity. Similarly, creative climate demonstrated a significant positive influence on innovation capability (H3; β = 0.597, t = 3.25, p = 0.001), indicating that when employees perceive a supportive, idea-friendly climate, their innovation capacity increases.

The indirect path from digital leadership to innovation capability through creative climate was also significant (β = 0.561, t = 2.45, p = 0.014), confirming that creative climate fully mediates the relationship between digital leadership and innovation capability. Finally, the moderating effect of learning orientation on the digital leadership–innovation capability relationship was marginally significant (β = 0.114, t = 1.89, p = 0.049), implying that the positive impact of digital leadership on innovation capability becomes stronger in organizations with a higher learning orientation.

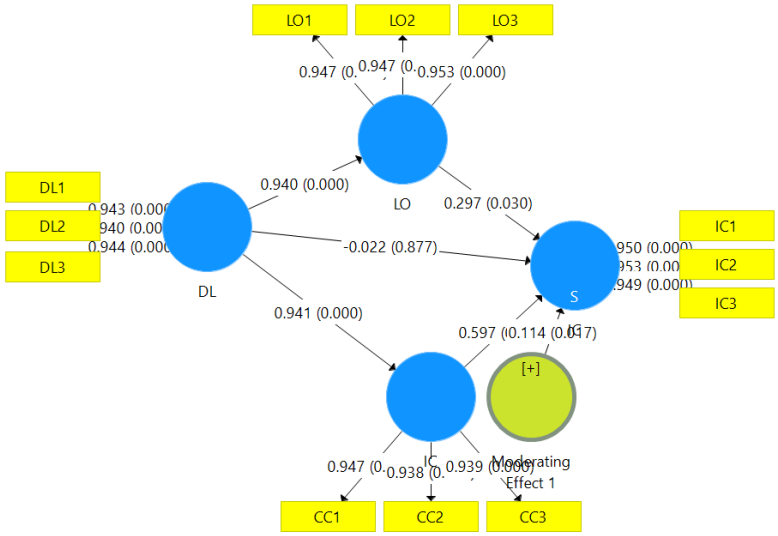

Figure 2: The structural model tested using PLS-SEM.

Before conducting the Multi-Group Analysis (MGA), the Measurement Invariance of Composite Models (MICOM) procedure was applied following Henseler, J., Ringle, C. M., & Sarstedt (2016). The MICOM assessment comprised three sequential steps:

(1) Configural invariance was established by ensuring identical data-treatment procedures, indicators, and PLS settings across both generational groups.

(2) Compositional invariance was tested using permutation analysis (5,000 resamples); all correlations between group-specific composite scores were not significantly different from 1 ($p > 0.05$), confirming compositional equivalence.

(3) Equality of composite means and variances was also confirmed ($p > 0.05$), indicating partial measurement invariance at a minimum.

These results validate that the measurement model operates equivalently across Millennials and Gen Z employees, thereby allowing meaningful comparison of structural-path coefficients through MGA.

Table 6. Multi-Group Analysis Results (Millennials vs Gen Z)

Path	Millennials (β)	Gen Z (β)	Δ	p-value	Decision
DL → CC (Creative Climate)	0.32	0.45	0.13	0.03	Significant
DL → IC (Innovation Capability)	0.18	0.34	0.16	0.04	Significant

The Multi-Group Analysis (MGA) results reveal that the effect of Digital Leadership on both Creative Climate and Innovation Capability significantly differs between Millennials and Gen Z (Δ = 0.13, p = 0.03; Δ = 0.16, p = 0.04, respectively). Specifically, the paths are stronger for Gen Z (β = 0.45; β = 0.34) than for Millennials (β = 0.32; β = 0.18), indicating that younger employees perceive digital leaders as more effective in fostering creativity and innovation. This

finding aligns with Kim and Park (2025) and Sharma and Gupta (2024), who found that Gen Z favors participatory and transparent digital leadership styles that promote innovation. In contrast, Millennials tend to value structured guidance and stability. These results highlight that the impact of digital leadership on innovation capability is contingent upon generational dynamics, offering novel insight into the leadership–innovation relationship in the context of Indonesian SMEs.

DISCUSSION

The findings offer several theoretical insights. First, the nonsignificant direct link between digital leadership and innovation capability supports the argument that leadership primarily exerts its influence through cultural and psychological mechanisms rather than direct strategic control (Teresa M Amabile, 2018). In the context of SMEs, digital leaders often lack extensive structural resources; thus, their primary contribution lies in enabling an innovative mindset rather than generating innovative outcomes directly.

Second, the significant path from digital leadership to creative climate reinforces the *componential theory of creativity* (T. M. Amabile, 2018), which posits that leadership behaviors that encourage autonomy, open communication, and tolerance for failure cultivate a fertile ground for creativity. This aligns with empirical evidence that transformational and digital leaders create climates that enhance intrinsic motivation and idea sharing (Bresciani et al., 2021).

Third, the mediation result underscores that *creative climate* is a key transmission mechanism between leadership and innovation outcomes. This complete mediation implies that a supportive climate is essential for translating leaders' digital vision into tangible innovation capability (Anderson et al., 2014).

Lastly, the marginally significant moderating role of learning orientation indicates that organizations committed to continuous learning can amplify the effects of digital leadership on innovation. Consistent with the *dynamic capabilities perspective* (Teece, D. J., Pisano, G., & Shuen, 2018), Zhang argues that a strong learning orientation enhances firms' ability to absorb, adapt, and exploit digital knowledge for innovation. Therefore, leadership and learning jointly foster innovation in resource-constrained SMEs.

These results highlight that digital leadership indirectly enhances innovation by cultivating creative climates and learning-oriented cultures rather than through direct command or structural authority. The implications suggest that SME leaders should invest in building participatory, psychologically safe, and knowledge-rich environments to sustain innovation in the digital era.

The moderating role of generational differences (H6 supported) adds a socio-demographic dimension to leadership effectiveness. Gen Z employees, who are digitally fluent and value transparency, respond more positively to participatory digital leadership than Millennials, who prefer structure and stability (Sharma, R., & Gupta, 2024). This finding reinforces the concept of *generational intelligence*, suggesting that leaders who can adapt communication styles across generations foster stronger innovation outcomes.

Overall, the findings affirm that innovation capability in SMEs is not a direct product of digital leadership but an emergent outcome of its interaction with creative climate, learning culture, and generational diversity. This conclusion refines the Resource-Based View (Teece, D. J., Pisano, G., & Shuen, 1997) by positioning intangible resources—digital culture, learning orientation, and generational intelligence—as strategic assets that convert leadership vision into innovation performance. Moreover, the results enrich Social Exchange Theory, emphasizing that leadership's digital effectiveness depends on reciprocity, trust, and shared purpose within organizations.

Theoretically, this study integrates the Componential Theory of Creativity and the Dynamic Capabilities Theory, showing that creative climate and learning orientation are microfoundations linking leadership to innovation. Leadership thus operates as a capability orchestrator that aligns digital tools, human collaboration, and organizational learning routines

(Garcia, J., & Perez, 2024). SMEs that combine digital empathy, intergenerational collaboration, and reflective learning can achieve higher adaptive innovation performance (Bayraktar, O., & Ozyapici, 2025).

Managerial Implications

From a practical perspective, SME leaders should shift from *digital control* to *creative enablement*. Leadership development programs should prioritize digital empathy, cross-generational collaboration, and learning agility. AI-based dashboards, peer-learning systems, and collaborative digital platforms can strengthen creative climates and sustain innovation under resource constraints. Policymakers should design SME support programs emphasizing digital literacy, leadership agility, and data-informed decision-making. As suggested by (Vandebeek, A., Voordeckers, W., Huybrechts, J., & Lambrechts, 2024), managing informational diversity is crucial for translating leadership knowledge into innovative outcomes, reinforcing the need for structured knowledge management within learning-oriented SMEs.

CONCLUSION

In sum, digital leadership enhances innovation capability indirectly through creative climate and learning organization, with generational diversity amplifying this relationship. The interplay of human creativity, technological augmentation, and continuous learning represents the foundation of adaptive innovation in the Industry 4.0 era. Future research should examine the longitudinal effects of AI-enabled leadership and evolving digital cultures in SMEs to build a resilient, innovation-driven economy.

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