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LEADERSHIP EFFECTIVENESS AND DIGITAL TECHNOLOGY ADOPTION IN MALAYSIA: INSIGHTS FOR NAVIGATING INDUSTRY

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ABSTRACT

In Malaysia's ongoing transition toward Industry 4.0 and the MyDIGITAL Blueprint, effective leadership has become the cornerstone of successful digital transformation. This study examines how leadership effectiveness mediates the relationship between key determinants—perceived usefulness, perceived ease of use, cost-effectiveness, communication effectiveness, and digital literacy—and digital technology adoption across Malaysian organizations. Employing a quantitative design with 351 respondents from diverse sectors and analyzed via Partial Least Squares Structural Equation Modelling (PLS-SEM), the results reveal that leadership effectiveness exerts a significant mediating influence, transforming readiness and perceptions into actual adoption outcomes. Notably, perceived ease of use and cost-effectiveness show weak direct effects but become impactful through leadership mediation, underscoring leaders' role in simplifying complexity, aligning strategy, and driving behavioral change. Theoretically, this study extends the Technology Acceptance Model (TAM) and Technology-Organization-Environment (TOE) frameworks by embedding leadership as a central mediator. Practically, it provides actionable insights for policymakers, organizational leaders, and educators seeking to strengthen Malaysia's digital readiness and competitiveness. The findings advocate for digital leadership development, cross-sectoral collaboration, and sustainable adoption strategies that empower Malaysia's government, SMEs, and service industries to thrive in a rapidly evolving global digital economy.

INTRODUCTION

Digital transformation has become a defining feature of the global economy, reshaping industries, governments, and societies. The digital economy contributed 15.5% of global GDP in 2022 and is projected to grow rapidly with the adoption of artificial intelligence (AI), data analytics, and automation (World Bank, 2023). For Malaysia, this transformation is not only an economic opportunity but also a strategic imperative. National initiatives such as the MyDIGITAL Blueprint and the Industry4WRD policy aim to accelerate digital adoption across sectors, while the launch of AI Malaysia in 2025 reflects the government's determination to align national strategies with global technological shifts. Despite these ambitious agendas, challenges persist. While Malaysia's digital economy contributed 23% of GDP in 2023 (Department of Statistics Malaysia, 2023), adoption levels remain uneven. Small and medium-sized enterprises (SMEs), which form the backbone of the Malaysian economy, face barriers in financing, digital literacy, and change management. Public sector organizations also struggle with bureaucratic inertia and fragmented infrastructures, slowing the progress of e-government and innovation-led service delivery. These gaps underscore the reality that technology policies alone are insufficient to guarantee successful adoption.

At the organizational level, leadership effectiveness plays a decisive role in bridging the gap between policy ambition and implementation. Leaders shape organizational culture, motivate employees, and ensure alignment between technological initiatives and strategic goals. In the context of digital adoption, leadership effectiveness can mediate the impact of technological and organizational factors such as perceived usefulness, ease of use, communication effectiveness, cost considerations, and digital literacy on actual adoption outcomes. Without effective leadership, even well-designed digital initiatives risk underperformance or failure. However, empirical evidence on the role of leadership in Malaysia's digital adoption remains limited. Previous studies have largely focused on technology-related variables or single-sector analyses, with less emphasis on how leadership effectiveness mediates adoption across different organizational contexts (Wong & Kee, 2022; Rasiah, 2022). This creates a significant gap in both theory and practice, particularly given Malaysia's ambition to position itself as a regional leader in the digital economy.

2. Digital Transformation

Digital transformation (DT) has emerged as a strategic imperative for organizations and governments worldwide. According to Ghobakhloo (2020), DT extends beyond the basic digitization of processes, encompassing organizational restructuring, cultural renewal, and value creation through emerging technologies. Scholars such as Skare and Soriano (2021) argue that DT represents a paradigm shift, where firms must adapt to new logics of competitiveness shaped by artificial intelligence (AI), cloud computing, and data-driven decision-making. The COVID-19 pandemic accelerated these trends by forcing organizations to adopt remote work systems, digital collaboration platforms, and e-commerce models. Verhoef et al. (2021) highlight that firms with high digital maturity not only ensured business continuity but also gained resilience during global disruptions. At the macro level, the World Bank (2023) estimates that the digital economy contributed 15.5% of global GDP in 2022, with projections suggesting a 50% increase by 2030. While advanced economies such as South Korea and Singapore enjoy smoother transitions due to robust infrastructures and strong governance (IMD, 2023), emerging economies face uneven adoption. Raimo et al. (2023) caution that infrastructural gaps, low digital literacy, and leadership constraints can undermine DT outcomes in developing nations. Within ASEAN, Singapore leads with advanced ecosystems, whereas countries like Vietnam and Indonesia show rapid growth but remain constrained by policy and infrastructure (ASEAN, 2024).

Table 1. Global Perspectives on Digital Transformation

Region/Context	Key Features	Enablers	Barriers
Advanced Economies (e.g., South Korea, Germany, Singapore)	High digital maturity; AI and IoT integration	Strong infrastructure, R&D investment, skilled workforce	Rising costs of innovation, ethical concerns
Emerging Economies (e.g., Malaysia, Vietnam, Indonesia)	Rapid digital adoption post-COVID	Policy frameworks, youthful workforce, growing digital markets	Digital divide, SME readiness, weak leadership capacity
Global View	Digital economy 15.5% of GDP in 2022; expected +50% by 2030	AI, cloud, blockchain, predictive analytics	Inequality of access, cyber risks, governance gaps

According Susanti et al. (2023), it emphasize that DT requires firms to reconfigure resources and adopt agile, networked structures. Hanelt et al. (2021) similarly argue that without cultural change and leadership alignment, technology adoption risks failure. Leaders thus emerge as central actors, shaping organizational vision, mobilizing resources, and ensuring employee readiness (Vidgen et al., 2017). Roberts et al. (2021) show that digitally competent leaders improve adoption outcomes by linking technology with strategy, confirming that DT success hinges on leadership effectiveness. In summary, global perspectives highlight DT as both an economic necessity and a disruptive challenge. While advanced economies leverage DT to maintain competitiveness, emerging nations such as Malaysia must bridge gaps in infrastructure, literacy, and leadership to fully harness digital opportunities.

2.2 Digital Adoption in Emerging Economies

Digital adoption has become a cornerstone of economic transformation in many emerging economies. The World Bank (2023) notes that digital technologies are not just enhancing productivity but also closing long-standing developmental gaps. In these settings, countries often bypass traditional infrastructures and move directly into advanced solutions, a process widely referred to as "leapfrogging. "The leapfrogging phenomenon is particularly visible in mobile finance and healthcare. In India, digital payment platforms such as UPI enabled millions to access banking services almost overnight. A similar trend was observed in Kenya with the rapid success of M-Pesa, which expanded financial inclusion far beyond the reach of conventional banks. These cases illustrate how adoption in emerging markets is driven more by necessity than convenience, but their long-term sustainability depends heavily on supportive institutions and effective leadership to manage rapid change.

ASEAN offers one of the most dynamic illustrations of digital adoption in emerging economies. With a combined population of over 600 million, the region is projected to generate USD 1 trillion in digital economic value by 2030 (ASEAN, 2024). Growth is powered by a young demographic profile, rising internet penetration, and the rapid expansion of e-commerce platforms. Yet adoption is far from uniform. Singapore continues to rank among the global leaders in digital competitiveness, according to the IMD Digital Competitiveness Report (2023), while Vietnam and Indonesia show strong momentum but face uneven infrastructure and skills shortages. Malaysia occupies a middle position within this regional spectrum. On the one hand, it benefits from clear national strategies such as the MyDIGITAL Blueprint, Industry4WRD, and the recent AI Malaysia 2025 initiative. The Ministry of International Trade and Industry (MITI, 2025) has described these policies as the backbone of Malaysia's ambition to become a regional digital hub. On the other hand, organizational challenges persist. Small and medium-sized enterprises, which account for almost all registered businesses in Malaysia, still struggle with financing, limited digital literacy, and leadership gaps that restrict adoption (Rasiah, 2022). The

public sector, while making progress, remains slower compared to Singapore, where e-government has been a national priority for over a decade.

Table 2.1: Digital Adoption in Selected ASEAN Economies

Country	Strengths	Barriers	Key Policies
Singapore	World-class infrastructure, AI integration, advanced e-government	High innovation costs, cybersecurity risks	Smart Nation, AI Singapore
Malaysia	Strong digital blueprints, ICT infrastructure	SME adoption lag, bureaucratic inertia	MyDIGITAL, Industry4WRD, AI Malaysia 2025
Vietnam	Rapid e-commerce growth, youthful workforce	Weak institutions, uneven infrastructure	National Digital Transformation Program
Indonesia	Large consumer base, fintech growth	Regional disparities, regulatory complexity	Making Indonesia 4.0, Digital Roadmap
Philippines	High internet penetration, platform-driven growth	Infrastructure bottlenecks, weak SME base	Digital Transformation Strategy 2025
Thailand	Strong FDI in ICT, advanced policy frameworks	Skills shortages, uneven SME maturity	Thailand 4.0, Digital Economy Masterplan

Leadership emerges as a critical enabler across these economies. Policies and infrastructure may set the stage, but adoption ultimately depends on how leaders motivate people, allocate resources, and manage change. In Malaysia, the government has repeatedly emphasized leadership development as part of the digital agenda. MITI (2025) framed leadership effectiveness as the "missing link" between ambitious policies and actual adoption outcomes. Similarly, ASEAN's digital strategies highlight investment in leadership training as a priority for building a future-ready workforce (ASEAN, 2024).Digital adoption in ASEAN reflects both promise and paradox. The region is advancing rapidly, supported by large markets and strong policies, yet faces persistent barriers in infrastructure, literacy, and governance. Malaysia mirrors this duality: ambitious national frameworks exist, but their success depends on the ability of leaders to translate vision into practice.

3. Theoretical Framework

The adoption of digital technologies in organizations is most often explained using the Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE) framework. TAM, introduced by Davis (1989), highlights two critical factors: perceived usefulness (PU) and perceived ease of use (PEOU). These constructs have been widely validated in predicting technology adoption across diverse contexts, from banking and healthcare to education. The model suggests that when employees believe a system is both useful and easy to use, the likelihood of adoption increases significantly. While TAM captures individual attitudes, it does not fully explain adoption in complex organizational settings. For this reason, scholars often rely on the TOE framework, which broadens the analysis to include organizational readiness, external pressures, and resource availability. Tornatzky and Fleischer (1990) emphasized that adoption is shaped not only by the technology itself but also by internal factors such as communication effectiveness and digital literacy, as well as external constraints like cost and competitive pressures. In emerging economies such as Malaysia, these organizational and environmental dimensions are particularly relevant because many firms, especially

SMEs, struggle with resource limitations and skills shortages. Bringing these perspectives together, this study integrates TAM and TOE with leadership theories into a single conceptual framework. The model proposes that technological and organizational variables such as perceived usefulness, perceived ease of use, digital literacy, communication effectiveness, and cost-effectiveness contribute to adoption, but their influence is strengthened when mediated by leadership effectiveness.

4. Research Methodology

This study employs a quantitative research design using survey data analysed through Partial Least Squares Structural Equation Modelling (PLS-SEM). The design was selected because it allows the simultaneous testing of complex relationships between latent constructs, including mediation effects, while accommodating relatively small to medium sample sizes. PLS-SEM is also recommended for predictive studies, particularly in the context of emerging economies where data distributions may not meet the assumptions required for covariance-based SEM (Hair et al., 2021). The study adopts a cross-sectional approach, collecting data at a single point in time from employees across multiple sectors in Malaysia. This approach is suitable for capturing perceptions of digital adoption, leadership effectiveness, and organizational readiness within the timeframe of Malaysia's ongoing digital transformation initiatives.

Population and Sampling

The population targeted for this study comprised employees from both the public and private sectors in Malaysia, reflecting the country's diverse digital adoption landscape. In line with Malaysia's economic profile, particular emphasis was placed on SMEs, which account for 98.5% of registered businesses, while also including participants from large enterprises and government agencies to ensure broader representation.The sampling method applied was purposive sampling, focusing on individuals with experience in digital technology adoption within their organizations. Respondents included managers, team leaders, and staff directly involved in digital projects or system use. Based on Krejcie and Morgan's (1970) table, a minimum of 351 responses was required to achieve representativeness. This benchmark was met, with usable responses collected from a range of industries including manufacturing, services, education, and healthcare.

Data Collection

Data were collected via a structured online questionnaire distributed through organizational networks, professional groups, and industry associations. Online surveys were chosen for cost efficiency, wider reach, and suitability given Malaysia's high internet penetration. The questionnaire was pilot-tested with 30 respondents to ensure clarity, validity, and reliability of items. Feedback led to minor revisions in wording to reduce ambiguity. Ethical considerations were observed by ensuring voluntary participation, anonymity, and informed consent. Participants were briefed on the purpose of the study, data confidentiality, and their right to withdraw at any stage.

Measurement of Constructs

All constructs were measured using previously validated scales, adapted to fit the Malaysian organizational context. A five-point Likert scale (1 = strongly disagree, 5 = strongly agree) was used for consistency.

Table 4.1: Measurement of Constructs

Construct	Sample Items (adapted)	Sources
Perceived Usefulness (PU)	"Using digital systems improves my job performance."	Davis (1989)
Perceived Ease of Use (PEOU)	"Learning to use digital tools is easy for me."	Davis (1989)
Digital Literacy	"I feel confident in using digital platforms for work."	Ghobakhloo (2020); Zhong & Ma (2025)

Communication Effectiveness	"Digital tools improve collaboration in my organization."	Wong & Kee (2022)
Cost-effectiveness	"The benefits of digital adoption outweigh the costs."	Rasiah (2022)
Leadership Effectiveness	"Leaders in my organization inspire employees to adopt digital tools."	Northouse (2022); Roberts et al. (2021)
Digital Adoption (DV)	"My organization has successfully integrated digital systems into daily operations."	Verhoef et al. (2021)

Each construct was measured with 3–5 items to ensure reliability. Items were adapted to align with Malaysia's cultural and economic context, without altering their theoretical meaning.

5. Data Analysis and Findings

A total of 351 usable responses were collected, exceeding the minimum requirement suggested by Krejcie and Morgan (1970) for a population above 10,000. Respondents were drawn from diverse sectors including services (42%), manufacturing (25%), education (18%), and healthcare (15%). About 55% were from SMEs, while the remainder represented large firms and government agencies.

Table 5.1: Demographic Profile of Respondents

Category	**Frequency (n)**	**Percentage (%)**
Gender: Male	192	54.7
Gender: Female	159	45.3
Age < 30	81	23.1
Age 30–39	137	39.0
Age 40–49	92	26.2
Age 50+	41	11.7
Sector: Services	148	42.2
Sector: Manufacturing	87	24.8
Sector: Education	64	18.2
Sector: Healthcare	52	14.8
Organization Type: SME	193	55.0
Organization Type: Large/Gov	158	45.0

The distribution indicates balanced representation across demographics, ensuring findings are generalizable within the Malaysian context.

Assessment of Measurement Model - Reliability and Convergent Validity

Internal consistency reliability was assessed using Cronbach's Alpha and Composite Reliability (CR). All constructs exceeded the threshold of 0.70 (Hair et al., 2021). Convergent validity was supported as Average Variance Extracted (AVE) values were above 0.50.

Table 5.2: Reliability and Validity Results

Construct	**Cronbach's Alpha**	**CR**	**AVE**
PU	0.82	0.88	0.60
PEOU	0.80	0.87	0.59
Digital Literacy	0.85	0.90	0.65
Communication Effectiveness	0.81	0.88	0.62
Cost-effectiveness	0.78	0.85	0.57
Leadership Effectiveness	0.87	0.91	0.66

Digital Adoption (DV)	0.86	0.90	0.64

Discriminant Validity

Discriminant validity was assessed using the HTMT criterion. All values were below 0.85, confirming distinctiveness of constructs.

Assessment of Structural Model - Variance Explained (R^2)

The model explained substantial variance:

- Leadership Effectiveness (MV): $R^2 = 0.52$
- Digital Adoption (DV): $R^2 = 0.63$

This suggests that the predictors accounted for 52% of variance in leadership effectiveness and 63% in digital adoption.

Hypothesis Testing

Bootstrapping with 5,000 subsamples was conducted to assess path coefficients.

Table 5.3: Path Coefficients and Hypothesis Testing

Path	**β**	**t-value**	**p-value**	**Result**
PU → Leadership Effectiveness	0.28	5.21	0.000	Supported
PEOU → Leadership Effectiveness	0.24	4.62	0.000	Supported
Digital Literacy → Leadership Effectiveness	0.31	6.04	0.000	Supported
Communication → Leadership Effectiveness	0.19	3.58	0.000	Supported
Cost-effectiveness → Leadership Effectiveness	0.15	2.91	0.004	Supported
Leadership Effectiveness → Digital Adoption	0.44	8.25	0.000	Supported
PU → Digital Adoption	0.12	2.34	0.019	Supported
PEOU → Digital Adoption	0.09	1.85	0.065	Not Supported
Digital Literacy → Digital Adoption	0.18	3.12	0.002	Supported
Communication → Digital Adoption	0.11	2.08	0.037	Supported
Cost-effectiveness → Digital Adoption	0.07	1.41	0.158	Not Supported

Mediation Analysis

The mediation role of leadership effectiveness was tested. Results show partial mediation between several IVs (PU, Digital Literacy, Communication) and digital adoption, while for PEOU and cost-effectiveness, leadership played a full mediation role.

Table 5.4: Mediation Results

Indirect Effect (via Leadership)	**β**	**t-value**	**p-value**	**Mediation**
PU → Leadership → Adoption	0.12	4.15	0.000	Partial
PEOU → Leadership → Adoption	0.11	3.96	0.000	Full
Digital Literacy → Leadership → Adoption	0.14	5.03	0.000	Partial
Communication → Leadership → Adoption	0.08	3.14	0.002	Partial
Cost-effectiveness → Leadership → Adoption	0.09	2.87	0.004	Full

Key Findings

1. Technological factors (PU, PEOU) significantly predicted leadership effectiveness, highlighting that leaders' perceptions of technology shape their ability to inspire adoption.
2. Organizational factors (digital literacy, communication, cost) also contributed, though cost showed weaker influence.
3. Leadership effectiveness strongly predicted digital adoption (β = 0.44), confirming its central mediating role.

4. Direct effects of PEOU and cost-effectiveness on adoption were insignificant, but their indirect effects via leadership were significant, suggesting that leadership bridges these weaker determinants.
5. Overall, the model demonstrates that without effective leadership, organizational readiness and technology perceptions are insufficient to drive adoption.

The analysis confirms that leadership effectiveness is a crucial mediator in Malaysia's digital adoption landscape. The model explains 63% of variance in adoption, a strong indicator of predictive power. Results provide empirical support for integrating leadership into TAM and TOE frameworks, extending their applicability in emerging economies.

6. Discussion

The purpose of this study was to examine how leadership effectiveness mediates the relationship between technological and organizational factors and digital adoption in Malaysia. Using a sample of 351 employees across sectors, the study confirmed that leadership plays a critical role in bridging policy ambitions and organizational realities. The findings add depth to the Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE) framework by incorporating leadership as a mediating construct.

Leadership as a Mediator of Digital Adoption

The results demonstrate that leadership effectiveness significantly mediates the effects of both technological (PU, PEOU) and organizational factors (digital literacy, communication, cost) on digital adoption. This confirms the argument by Roberts et al. (2021) that leaders are catalysts in digital transformation, enabling organizations to translate technology readiness into meaningful outcomes. While TAM has traditionally focused on perceptions of usefulness and ease of use (Davis, 1989), this study shows that these perceptions only translate into adoption when leaders actively support, communicate, and align digital initiatives with organizational strategy. In Malaysia, this is particularly relevant. SMEs dominate the economy, yet many lack digital champions who can mobilize resources and guide adoption. The results that cost-effectiveness and PEOU had no significant direct impact but became significant when mediated by leadership reinforce the importance of leaders as interpreters. Leaders can reduce employees' perceptions of complexity and justify cost-benefit trade-offs, making digital tools more acceptable.

Comparison with ASEAN and Global Evidence

Findings align with regional evidence showing that digital adoption in ASEAN is uneven, with leadership gaps often cited as a key barrier (ASEAN, 2024). For instance, while Singapore has embedded digital leadership development into its Smart Nation agenda, countries such as Malaysia, Vietnam, and Indonesia continue to struggle with leadership readiness. This study empirically validates that gap, confirming that leadership effectiveness explains much of the variance in adoption outcomes. Globally, the findings resonate with Zhong and Ma's (2025) study of Chinese SMEs, which highlighted digital leadership skills as critical to adoption success. Similarly, Susanti et al. (2023) noted in Indonesian manufacturing that digital literacy alone is insufficient without leaders who can champion organizational change. These parallels underscore that leadership is not only a Malaysian issue but a broader concern for emerging economies navigating Industry 4.0.

Implications for TAM and TOE

Theoretically, this study contributes to extending TAM and TOE frameworks. TAM has been criticized for being too narrow in organizational contexts (Venkatesh et al., 2003). By showing that leadership mediates TAM's core constructs (PU and PEOU), this study provides a richer understanding of how individual perceptions are operationalized at organizational levels. Likewise, the TOE framework is strengthened by the inclusion of leadership, as it explains why organizational readiness factors such as digital literacy and communication may not directly produce adoption without leadership intervention. This integration addresses calls from scholars such as Hanelt et al. (2021), who argued

that digital transformation requires more than technical readiness; it requires cultural and leadership alignment. The findings confirm that leadership is the "missing middle" that transforms readiness into adoption, particularly in resource-constrained environments.

Insights for Malaysia's Digital Agenda

For Malaysia, the results highlight both progress and challenges. On the one hand, national strategies such as MyDIGITAL, Industry4WRD, and AI Malaysia 2025 provide a strong policy foundation. On the other hand, the effectiveness of these strategies depends heavily on leadership at the organizational level. SMEs, in particular, need leaders who can interpret these national frameworks, build digital skills among employees, and ensure investments in technology are utilized effectively. Public sector implications are equally significant. While Singapore's e-government success is often attributed to robust systems, scholars point out that leadership commitment at the highest levels was decisive. Malaysia's slower public sector transformation may therefore reflect not just bureaucratic inertia but also leadership gaps in driving digital adoption. Strengthening digital leadership in government agencies could accelerate the translation of national policies into service delivery outcomes.

Implications for Emerging Economies

The findings also carry broader implications for emerging economies. Many such countries share Malaysia's duality: ambitious digital policies but uneven organizational execution. By empirically confirming leadership's mediating role, this study suggests that investments in infrastructure and technology must be matched with leadership development. This aligns with the World Bank's (2023) call for human capital strategies to accompany digital transformation agendas. Without this balance, digital divides risk widening even as national policies expand.

Practical Implications

For practitioners, the results highlight three key insights:

1. Leadership Development is Critical: Organizations must invest in leadership training focused on digital competencies, change management, and strategic communication.
2. SME Support Structures: Government agencies and industry associations should provide resources and mentoring for SME leaders, enabling them to champion adoption effectively.
3. Integrating Leadership in Policy: National policies such as AI Malaysia 2025 should explicitly include leadership capacity-building as a pillar, ensuring that adoption is not hindered by human factors.

Limitations and Future Research

While the study provides strong empirical support, it has limitations. The cross-sectional design restricts conclusions about causality. Future research could use longitudinal designs to track how leadership influences adoption over time. Additionally, while this study focused on Malaysia, comparative studies across ASEAN could deepen understanding of how cultural and institutional contexts shape the leadership–adoption relationship. Finally, qualitative methods such as interviews could complement survey findings by providing richer insights into leaders' strategies and challenges.This study confirms that leadership effectiveness is a decisive factor in digital adoption in Malaysia. It validates and extends TAM and TOE by positioning leadership as a mediator, bridging the gap between technological readiness and organizational outcomes. For Malaysia and other emerging economies, the implication is clear: digital adoption is not only about technology or policy but fundamentally about leadership.

Conclusion

This study set out to examine how leadership effectiveness mediates the relationship between technological and organizational factors and digital adoption in Malaysia. Drawing upon the Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE) framework, the research integrated leadership as a mediating construct to provide a more comprehensive explanation of adoption dynamics. Using survey data from 351 employees across

multiple sectors, analyzed through PLS-SEM, the findings strongly support the view that leadership effectiveness is the missing link between policy frameworks and organizational adoption outcomes. The results demonstrated that while technological factors such as perceived usefulness (PU) and perceived ease of use (PEOU), and organizational factors such as digital literacy, communication, and cost-effectiveness are significant predictors, their influence on adoption becomes substantially stronger when mediated by leadership effectiveness. In particular, the study found that PEOU and cost-effectiveness exerted little direct influence on adoption, but their effects became significant through leadership. This highlights that leaders are instrumental in interpreting the value of technologies, reducing complexity, and justifying investments to employees. In the absence of such leadership, even well-designed policies and accessible technologies may fail to achieve their intended impact.

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