Drivers of AI Adoption: The Role of Innovation Attributes, Organizational Capability, and the External Environment

Maria Hashmi[1*], Naelati Tubastuvi[2]

[1] *Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia*
[2] *Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia*

[*]Corresponding author's e- mail: hashmimaria08@gmail.com

ABSTRACT

Artificial Intelligence (AI) continues to reshape the ICT sector in Pakistan, yet organizations differ widely in how and why they adopt this technology. This study explores the key drivers of AI adoption by focusing on national ICT professionals who work directly with digital systems and emerging technologies. A total of 110 valid responses were collected through an organized online survey using purposive sampling. The investigation was guided by Technology Organization Environment framework combined with innovation characteristics from Diffusion of Innovation theory. The variables examined include the perceived suitability of AI to current systems, the benefits and complexity of adopting AI, organizational technical capability, and external environmental pressures. Data analysis involved Smart PLS-SEM, which facilitated reliability and validity assessment along with hypothesis evaluation. The outcomes highlight that seamless compatibility with existing infrastructure plays a key role in encouraging AI adoption, offers clear operational value, and is not overly difficult to implement. Technical capability also demonstrates a strong influence, indicating that firms with mature digital systems are better prepared to integrate AI solutions. In contrast, external environmental pressures did not show a significant role in the adoption process. These findings highlight that internal technological perceptions and readiness are stronger predictors of AI adoption than external forces in operating ICT firms in Pakistan. The study provides insights that can help organizations strengthen their technical readiness and make more confident decisions when transitioning toward AI enabled transformation. This study contributes to AI adoption literature by isolating organizational technical capability and providing national level evidence from an emerging ICT economy.

Keywords: AI Adoption; Innovation Attributes of AI; Organizational Capability; the External Environment; ICT Sector

Introduction

Artificial Intelligence (AI) has rapidly become a core driver of technological revolution in industries in Pakistan , reshaping how organizations operate, innovate, and compete in digital economies (Akter et al., 2023). Within the Information Technology (IT) sector, AI adoption has accelerated due to growing demand for intelligent automation, data driven decisionmaking, and scalable digital infrastructure (Chatterjee et al., 2021). These developments demonstrate that organizations now view AI as a strategic necessity rather than an elective digital tool (Min & Kim, 2024).

Pakistan's Information and Communication Technology (ICT) sector represents one of the country's fastest growing industries and a central driver of digital transformation. The sector contributes significantly to employment generation and software exports, with firms increasingly adopting data driven and automated

technologies during FY (2023–24). Recent export growth and expanding digital infrastructure have further strengthened its economic role, supported by government initiatives, rising international demand, and the growing participation of skilled professionals and freelancers from 24 to 39%. Despite this progress, adoption of advanced technologies such as artificial intelligence remains uneven across ICT firms, largely due to differences in technical readiness and system compatibility (ul Haq & Suki, 2024). This variation makes the sector particularly suitable for examining how innovation attributes and organizational technical capability influence AI adoption decisions within an emerging economy context (Chatterjee et al., 2021; Flavio Calvino & Luca Fontanelli, 2023).

According to TOE framework, technology adoption is shaped by technical characteristics, organizational readiness, and the external environmental pressures (Tornatzky & Eveland, 2022). The industrial context, represented in this study by innovation attributes of AI, includes essential characteristics such as compatibility with existing systems, perceived relative advantage, and complexity, all of which influence an organization's willingness to integrate emerging technologies (Rogers & Everett, 1983). Prior research consistently highlights these attributes as strong predictors of adoption, especially in digital and ICT driven environments (Chen et al., 2021).

The organizational context, focusing here on technical organizational capability, refers to the digital infrastructure, standardized IT processes, and system readiness that support the adoption of complex technologies like AI. Firms with mature technical capabilities tend to integrate AI more smoothly because they possess the structural foundation required for system interoperability, data security, and scalable digital operations (Teece, 2018). Although previous studies frequently examine organizational capability as a broad construct, the specific effect of technical capability alone excluding managerial capability remains insufficiently explored, especially within ICT sector where technical readiness is often more critical than managerial attributes (Al-Kfairy, 2025).

The external environment, that includes competitive pressure, government support, market uncertainty, and the vendor partnerships, also influences organizational adoption behavior. Several studies show that stable regulatory frameworks, industry competitiveness, and strong vendor ecosystems can accelerate AI implementation by reducing uncertainty and providing supportive external conditions (Qu & Kim, 2025). However, findings across regions remain inconsistent because firms operating in Pakistan face diverse regulatory landscapes and competitive structures, reducing the uniform influence of environmental factors (Flavio Calvino & Luca Fontanelli, 2023).

Although previous studies explore technological, organizational, and environmental determinants of AI adoption, three major gaps persist. First, most research examines these dimensions separately rather than integrating them within the TOE model for a more general understanding (Odeibat, 2023). Second, empirical studies focusing on national ICT firms remain limited, despite clear differences in AI readiness across national contexts (Yue et al., 2023). Third, the unique impact of organizational technical capability excluding managerial capability has not been adequately examined, even

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

though technical readiness plays a central role in AI adoption in digitally mature industries (Collins et al., 2021). To address these gaps, this study investigates AI adoption among ICT firms across major cities in Pakistan by examining how innovation attribute of AI, organizational technical capability, and the external environmental conditions influence adoption decisions within the TOE theoretical framework (Tornatzky & Eveland, 2022). This integrated perspective provides a perfect understanding of the factors that drive AI operation in technologically intensive and distributed environments, contributing to the ongoing academic and practical discourse on AI readiness and digital transformation in ICT sector.

Literature Review
Technology Organization Environment (TOE) Framework

The Technology Organization Environment (TOE) framework provides a structured and widely accepted model for understanding how organizations adopt new technologies by examining technological, organizational, and the environmental conditions (Tornatzky & Eveland, 2022). The framework argues that adoption decisions arise from the interaction between the individualities of technology, the organization's internal readiness, and external forces shaping the business environment (Davis, 1989). This study integrates the TOE framework with Diffusion of Innovation (DOI) theory by embedding innovation attributes within the technological context of TOE, enabling a more comprehensive explanation of AI adoption behavior.

In the context of AI, TOE has been used to explain how digital infrastructure, innovation characteristics, institutional pressures, and environmental uncertainty influence organizational choices in adopting advanced technologies (Flavio Calvino & Luca Fontanelli, 2023). For ICT firms operating, integrating the TOE framework enables a comprehensive analysis that captures both internal technical capacity and external market dynamics influencing AI adoption (Badghish & Soomro, 2024a).

Innovation Attributes of AI and AI Adoption

Innovation attributes are derived from Diffusion of Innovation (DOI) theory, which emphasizes that the perceived characteristics of a technology influence the rate and likelihood of its adoption (Rogers & Everett, 1983). In AI adoption studies, three attributes compatibility, complexity and relative advantage have emerged as the most influential. Compatibility captures how well AI aligns with an organization's existing systems, data infrastructures, and workflows, and higher compatibility consistently increases the likelihood of adoption in ICT environments (Min & Kim, 2024). Similarly, relative advantage reflects the perceived benefits of Artificial Intelligence, such as improved efficiency, better resource utilization, and enhanced automation which strongly motivate firms to invest in AI technologies (Chatterjee et al., 2021). On the other side, complexity describes the perceived difficulty of integrating AI and remains a major barrier, especially for firms with lower digital maturity (Arroyabe et al., 2024).

Studies across various industries from telecommunications to healthcare and manufacturing confirm that these innovation attributes significantly influence adoption decisions, particularly when organizations evaluate the feasibility and strategic value of AI enabled solutions or specialized skills (Chen et al., 2021) & (Radhakrishnan et al., 2022). Overall, empirical evidence consistently supports a positive relationship between favorable innovation attributes and AI adoption, reinforcing the relevance of DOI theory in explaining AI adoption behavior in ICT firms (Flavio Calvino & Luca Fontanelli, 2023).

Hypothesis 1: Innovation Attributes of AI have a positive effect on AI adoption.

Organizational Capability and AI Adoption

Organizational capability refers to the internal technical foundation that enables firms to acquire, integrate, and exploit new technologies effectively (Teece, 2018). In AI adoption research, technical capability includes elements such as digital infrastructure, standardized IT processes, cybersecurity capacity, system interoperability, and data architecture maturity (Kurup & Gupta, 2022). These capabilities determine whether a firm can support complex technologies like AI, especially those requiring robust data processing and system integration.

Prior studies consistently show that organizations with well developed technical capability achieve higher success rates in implementing AI driven systems, due to their ability to manage operational changes, support automation processes, and maintain secure and scalable digital environments (Al-Kfairy, 2025). Moreover, research within ICT intensive industries shows that technical capability serves as a foundational enabler of AI adoption because firms rely heavily on strong system reliability and digital alignment to fit in AI into existing operations (Kurup & Gupta, 2022) and (Collins et al., 2021). Despite its significance, prior literature often merges technical capability with managerial or strategic capability, creating a gap in understanding the distinct influence of technical capability alone on AI adoption in technology heavy industries (Romeo & Lacko, 2025). Addressing this gap is particularly important in ICT sectors, where technical readiness often plays a more decisive role than managerial factors in enabling AI integration.

Hypothesis 2: Organizational capability has a positive effect on AI adoption.

External Environment and AI Adoption

The external environment encompasses the market, regulatory, and industry level conditions that shape an organization's technology adoption behavior (Tornatzky & Eveland, 2022). For AI adoption, this includes government involvement, market uncertainty, competitive pressure, and vendor partnerships, all of which can either support or constrain an organization's readiness to adopt advanced technologies. Prior research shows that government policies such as digital transformation strategies, AI regulations, and national innovation initiatives play a critical role in reducing uncertainty and motivating firms to adopt AI (Qu & Kim, 2025). Competitive pressure further influences

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

adoption by pushing firms to integrate AI in order to maintain performance advantages, especially in fast evolving digital industries (Akter et al., 2023). Vendor partnerships also matter, as AI vendors serve as external knowledge sources that offer technical expertise and integration support, thereby lowering adoption risks for organizations (Badghish & Soomro, 2024b). However, findings in ICT industries remain mixed because these firms operate under various regulatory conditions, competitive structures, and technological ecosystems, making the environmental influence less consistent across regions (Flavio Calvino & Luca Fontanelli, 2023). These inconsistencies highlight the need for more national evidence to better understand how environmental conditions shape AI adoption decisions across diverse digital economies (Yue et al., 2023).

Further supporting this view, research on digital and AI adoption indicates that environmental factors tend to play a secondary or indirect role when internal technological readiness and organizational capability are more salient determinants of adoption decisions (Kurup & Gupta, 2022). Similar findings have been reported in national level studies, where government support and competitive pressure showed limited explanatory power compared to internal technological and organizational drivers (Flavio Calvino & Luca Fontanelli, 2023) and (Yue et al., 2023). These studies suggest that environmental influences may be more effective as enabling conditions rather than direct predictors of AI adoption.

Although prior studies have made significant progress in explaining AI adoption, three major gaps become clear. First, much of the existing literature focuses on only one determinant either technological, organizational, or environmental rather than integrating them within TOE model for a rounded view of adoption dynamics (Odeibat, 2023). Second, there is a shortage of empirical studies inspecting in Pakistan ICT firms, despite evident differences in AI infrastructure, regulations, and competitive landscapes across different regions (Flavio Calvino & Luca Fontanelli, 2023). Third, technical organizational capability has rarely been studied independently, as many prior studies combine it with managerial capability, resulting in limited understanding of how technical capability alone influences AI adoption in technologically advanced sectors (Collins et al., 2021). Addressing these gaps contributes to deeper visions into the determinants of AI adoption in ICT environments, where technical readiness and innovation attributes may outweigh traditional managerial or environmental influences.

Hypothesis 3: The external environment has a positive effect on AI adoption.
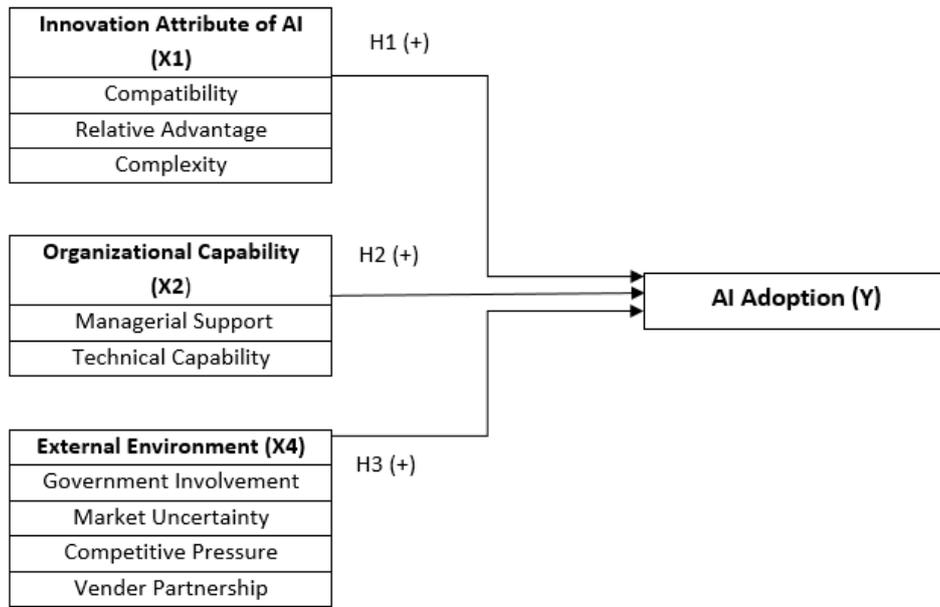
Figure 1
Model of Variables

Source: Author (2025)

Research Methodology
Research Design

This study employed a quantitative research design to test the determinants of AI adoption in ICT sector in Pakistan, focusing on innovation attributes of AI, organizational technical capability, and the external environment. A quantitative approach was selected because it enables the systematic measurement of latent constructs and allows for testing of theoretical relationships within Technology Organization Environment (TOE) framework (Tornatzky & Eveland, 2022). Structural equation modeling was used to calculate both measurement and structural relationships, providing a robust method for analyzing complex adoption models involving multiple variables (Joseph F. Hair Jr., n.d.; Ringle & Sarstedt, 2021).

Population and Sample

The target population consisted of professionals working in Pakistan in IT organizations, including IT engineers, AI specialists, software developers, and middle to senior technical managers involved in AI related decisionmaking. These individuals were selected because the ICT sector represents one of the leading adopters of artificial intelligence solutions (Flavio Calvino & Luca Fontanelli, 2023).

A purposive sampling method was adopted to ensure that respondents possessed adequate information of AI usage, technological readiness, and organizational digital infrastructure (Budhwar et al., 2023). The respondents were largely young professionals,

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
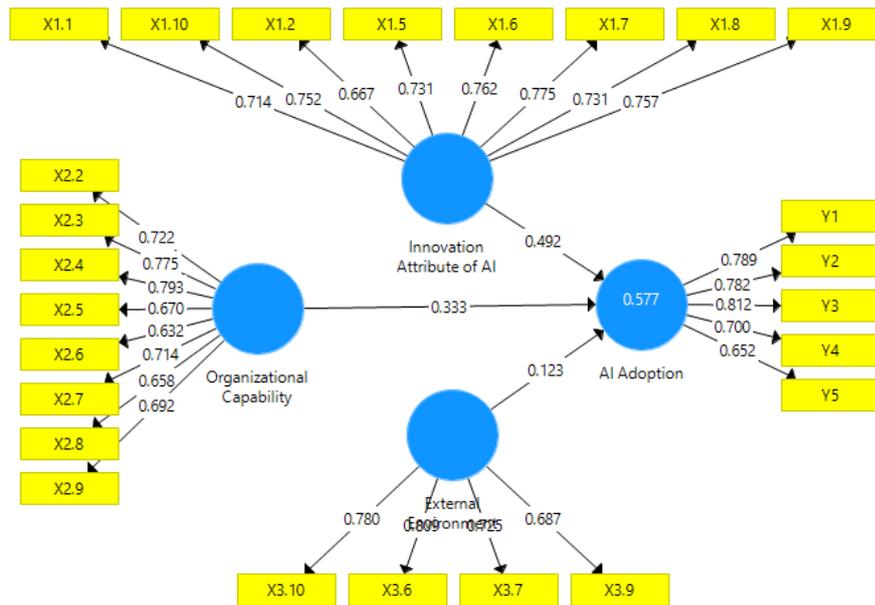December 11, 2025

with most falling between 20 and 35 years of age, reflecting an active and digitally skilled workforce within the ICT sector. In terms of education, the majority held at least a bachelor's or master's degree, and most respondents had academic backgrounds in IT, computer science, software engineering, or related technology fields. Their work experience mainly ranged from one to six years, indicating that the sample represents professionals who are directly involved in operational and technical roles related to AI and digital systems. Data collection was accompanied through an online questionnaire distributed across professional networks and ICT communities in different cities of Pakistan. It was total of 110 valid responses were received, that were retained after screening for completeness, consistency, and outliers. This sample size meets the recommended thresholds for Partial Least Squares (PLS-SEM), constructed on 10 times rule and statistical power considerations (Ringle & Sarstedt, 2021).

Table 1.
Constructs, Measurement Items, and Sources

Construct	Code	Measurement Items	Source
AI Adoption (Y)	Y1	A timely AI technical implementation and application migration plan has been developed.	(Chau et al., 2014; Reich & Benbasat, 1990)
	Y2	The plan has already been endorsed by managers.	
	Y3	A financial budget and a migration schedule have been approved.	
	Y4	Our customers highly accept new products and services using AI innovations.	
	Y5	We get improvement in the competitive position after adopting AI innovation. (Deleted)	
Innovation Attributes of AI (X1)			
Compatibility	X1.1	AI application is compatible with our current communication/network environment.	(Chang et al., 2006; Chong et al., 2009; Thong, 1999)
	X1.2	AI application is compatible with our current software environment. (Deleted)	
	X1.5	AI application is compatible with computerized data resources.	
Relative Advantage	X1.6	AI application can increase revenues and profitability. (Deleted)	
	X1.7	AI application can get higher employee productivity.	(Chong et al., 2009; Thong, 1999)
	X1.8	AI application can improve customer service.	
	X1.9	AI application can better utilize IT resources.	

Construct	Code	Measurement Items	Source
	X1.10	AI application can promote flexibility and integration.	
Organizational Capability (X2)			
Managerial Support	X2.2	Managers are willing to take risks involved in the adoption of AI.	(Garrison et al., 2015; Han et al., 2008)
	X2.3	Our managers have the ability to exploit new technologies before our competitors.	
	X2.4	Our managers have the ability to leverage IT new technologies as a strategic core competence.	
	X2.5	Our managers have a strong understanding of how AI technology can be used to increase business performance.	
Technical Capability	X2.6	We have standardized process for IT innovation.	(Garrison et al., 2015; Han et al., 2008)
	X2.7	We have the ability to quickly integrate new AI technologies into our existing infrastructure. (Deleted)	
	X2.8	Our IT strategies support our business strategies.	
	X2.9	We have suitable hardware/software to protect the security and privacy of our systems and networks.	
External Environment (X3)	X3.6	There is a trend in our principal industry to utilize more AI technologies for business development and applications.	(Chau et al., 2014)
	X3.7	AI has broad application prospects in our principal industry.	
	X3.9	AI can help our company to gain competitiveness.	
Competitive Pressure	X3.10	The rate of innovation of new operating processes and new products or services in our principal industry has increased dramatically.	(Chang et al., 2006)

Source: Journal of Management Analytics (Chen et al., 2021)

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

Figure. 2
Bootstrapping Results

Source: The Authors (2025)

Data Collection Procedure

Data were collected using an organized, self administered questionnaire distributed between August and October 2025. The online format ensured accessibility and reduced geographical barriers, consistent with methodological guidelines for collecting national technology acceptance data (Chatterjee et al., 2021). The questionnaire used closed ended items rated on a five point Likert scale, where 1 indicated strong disagreement and 5 indicated strong agreement. These scales are commonly used for technology adoption research because they facilitate standardization and comparability across respondents (Chen et al., 2021). Participants were secure of confidentiality and anonymity to minimize social desirability bias and enhance response accuracy. Ethical compliance was ensured by informing respondents about the study purpose and obtaining their voluntary participation, aligned with research ethics protocols (McElheran et al., 2024).

Results

To analyze the data, Partial Least Squares SEM was utilized for assessing the measurement components and the overall structural framework. The results provide clarity on the direction, strength, and significance of the relationships among innovation attributes of AI, organizational capability, the external environment, and AI adoption.

Table 2.
Construct Reliability and Validity

Variables	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
AI Adoption	0.821	0.804	0.864	0.562
Innovation Attribute of AI	0.881	0.884	0.838	0.565
Organizational Capability	0.881	0.884	0.905	0.543
External Environment	0.751	0.782	0.838	0.565

Source: Data Proceed (2025)

Measurement Model Results

Before testing the hypotheses, the reliability and validity of each construct were calculated. Cronbach's Alpha and Composite Reliability values for every variables exceeded the acceptable threshold of 0.70, approving internal consistency (Ringle & Sarstedt, 2021). Convergent validity was also supported, as all Average Variance Extracted (AVE) values surpassed the lowest required benchmark of 0.60, except for the external environment construct, which remained slightly lower but still acceptable for exploratory studies (Fornell & Larcker, 1981). These results indicate that the measurement model validates adequate reliability and validity for further structural testing (Chen et al., 2021).

Table 3.
Discriminant Validity

	AI Adoption	External Environment	Innovation Attributes of AI	Organizational Capability
AI Adoption	0.750			
External Environment	0.437	0.752		
Innovation Attribute of AI	0.679	0.428	0.737	
Organizational Capability	0.568	0.308	0.401	0.709

Source: Data Proceed (2025)

Structural Model Results

The structural model measured by examining path coefficients, t statistics, and p values through a bootstrapping method with resamples. The findings explain how each independent variable contributes to AI adoption within the ICT sector.

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

Table 4.
R Square

	R Square	R Square Adjusted
AI Adoption	0.577	0.565

Source: Data Proceed (2025)

The model explains 57.7% of the variance in AI adoption, primarily driven by innovation attributes and organizational capability.

Table 5.
F Square

	AI Adoption	External Environment	Innovation Attribute of AI	Organizational Capability
AI Adoption				
Innovation Attribute of AI	0.422			
Organizational Capability	0.214			
External Environment	0.029			

Source: Data Proceed (2025)

Table 4 shows that Innovation Attributes of AI and Organizational Capability meaningfully support AI adoption, while the External Environment has only a minor influence.

Table 6.
Hypothesis Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Innovation Attribute of AI on AI Adoption	0.492	0.454	0.150	3.293	0.001
Organizational Capability on AI Adoption	0.333	0.365	0.105	3.182	0.002
External Environment on AI Adoption	0.123	0.138	0.082	1.507	0.132

Source: Data Proceed (2025)

Innovation Attributes of AI have a positive effect on AI adoption

The innovation attributes of AI showed a strong and statistically significant positive affect on AI adoption ($\beta = 0.492$, $t = 3.498$, $p = 0.001$). This result recommends that when AI technologies are perceived as compatible, beneficial, and reasonably manageable in complexity, organizations are more likely to adopt them. This finding reinforces the central role of technological perceptions in shaping technology related decisions (Chatterjee et al., 2021; Rogers & Everett, 1983).

Hypothesis 1: Supported and has positive impact
Innovation attributes have a significant positive effect on AI adoption (p = 0.001).

Organizational capability has a positive effect on AI adoption

Organizational capability also demonstrated a significant positive affect on AI adoption ($\beta = 0.333$, $t = 3.182$, $p = 0.002$). Firms with stronger digital infrastructure, standardized processes, and robust technical readiness showed higher levels of commitment toward implementing AI technologies. This highlights the importance of internal preparedness and resource availability as foundational elements in supporting successful AI integration (Kurup & Gupta, 2022; Teece, 2018).

Hypothesis 2: Supported and has positive impact
Organizational technical capability has a significant positive effect on AI adoption (p = 0.002).

The external environment has a positive effect on AI adoption

The external environment didn't exhibit a statistically significant affect on AI adoption ($\beta = 0.123$, $t = 1.507$, $p = 0.132$). While features such as vendor collaborations, government support, market uncertainty, and competitive pressure remain relevant, their influence was not strong enough to independently predict adoption behavior within the ICT sample in Pakistan. This may be due to varying regional conditions and inconsistent regulatory environments across different areas of Pakistan, which dilute the uniform impact of environmental forces on adoption outcomes (Flavio Calvino & Luca Fontanelli, 2023).

Hypothesis 3: Not Supported but has positive impact
External environmental factors do not have a significant effect on AI adoption (p = 0.132).

Discussion

The results of this study offer important visions into how ICT firms adopt artificial intelligence, demonstrating that technological perceptions and internal technical readiness play a stronger part in shaping adoption decisions than external environmental pressures in Pakistan. These findings reinforce the importance of Technology Organization Environment (TOE) framework while also revealing areas where its predictive power varies across different cities in Pakistan contexts.

Innovation Attributes of AI on AI Adoption

The findings of this study can be clearly explained through the combined lens of the Technology Organization Environment (TOE) framework and Diffusion of Innovation (DOI) theory. Innovation attributes occurred as the strongest predictor of AI

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

adoption, highlighting that organizations are more willing to integrate AI when they perceive it as beneficial, compatible with present systems, and manageable in terms of complexity. This result aligns closely with Diffusion of Innovation (DOI) theory, that states the compatibility and relative advantage accelerate adoption while complexity slows it (Radhakrishnan et al., 2022). The strong positive effect observed in this study supports previous research showing that perceived usefulness and ease of integration remain central determinants of AI adoption, especially in data intensive and technology driven industries (Chatterjee et al., 2021). These findings suggest that firms will continue prioritizing AI solutions that seamlessly integrate into their existing digital infrastructure and directly enhance operational performance (Chen et al., 2021).

Organizational Capability on AI Adoption

The organizational dimension of the TOE framework also provides a strong explanation for the observed results. The significant effect of organizational technical capability further emphasizes the importance of internal readiness in dynamic AI adoption. Firms with strong digital infrastructures, standardized processes, and secure technology environments demonstrated higher chances of adopting AI. This supports earlier research arguing that technical resources and digital maturity enable firms to manage the complexities of AI more effectively (Teece, 2018). It also extends previous findings by highlighting the importance of technical capability independent of managerial capability a dimension often overlooked or merged in prior studies (Kurup & Gupta, 2022). In the context of ICT firms, where digital operations form the core of business functions, technical capability acts as both an enabler and stabilizer, ensuring that organizations have the structural capacity to integrate, deploy, and scale AI solutions successfully (Collins et al., 2021).

The External Environment on AI Adoption

The external environment did not significantly predict AI adoption, which contrasts with many technology adoption studies where regulatory frameworks, vendor partnerships, and competitive pressures strongly influence adoption behaviour (Qu & Kim, 2025). This nonsignificant result may be attributed to the nature of the sample in Pakistan. Firms across different cities operate under varying levels of government involvement, market uncertainty, and technological ecosystems, leading to inconsistent external pressures that may cancel each other out statistically (Flavio Calvino & Luca Fontanelli, 2023). Additionally, ICT firms often possess high internal autonomy and rely more heavily on internal digital readiness than on external mandates, which reduces the relative influence of external factors (Badghish & Soomro, 2024a). This finding underscores the need to consider sector specific in Pakistan, variations when applying the technological and organizational dimensions of TOE framework to AI adoption research (Yue et al., 2023).

Theoretical and Practical Implications

Theoretically, these findings reinforce the central role of technological and organizational contexts within the TOE framework while suggesting that environmental factors may have weaker or more context specific effects in Pakistan distributed ICT sector (Tornatzky & Eveland, 2022). Practically, the results indicate that firms planning to adopt AI should strengthen their technical infrastructure, improve data management systems, and prioritize the selection of AI tools that align closely with existing technological processes (Min & Kim, 2024). The strong influence of innovation attributes suggests that vendors should focus on improving AI compatibility, simplifying integration, and demonstrating clear operational benefits to enhance adoption possibility (Arroyabe et al., 2024).

Conclusion

This study set out to understand what drives AI adoption in ICT firms in Pakistan by examining the role of innovation attributes, organizational technical capability, and external environmental conditions through TOE framework. The findings show that the choice to adopt AI is shaped mostly by how organizations perceive the technology itself and their internal technical readiness to support it. When AI is viewed as beneficial, compatible with current systems, and not overly difficult, firms are far more expected to integrate it into their operations. Likewise, organizations with strong digital infrastructure and well established technical processes are improved positioned to adopt and implement AI successfully.

In contrast, the external environment such as government policies, market conditions, and competitive pressure did not significantly affect adoption in this study. This suggests that operating ICT firms, internal factors matter more than external ones, especially when digital capabilities are already advanced and decision making is led by technological considerations rather than regulatory or market forces. Overall, the results highlight the importance of strengthening technical readiness and focusing on selecting AI solutions that align well with existing digital systems. The study also contributes to existing research by separating technical capability from broader organizational constructs and by exploring AI adoption across a diverse, national ICT context. These insights can help researchers and industry professionals better understand how AI adoption decisions are formed and where organizations should focus their efforts when planning to integrate AI into their operations.

Bibliography

Akter, S., Hossain, M. A., Sajib, S., Sultana, S., Rahman, M., Vrontis, D., & McCarthy, G. (2023). A framework for AI-powered service innovation capability: Review and agenda for future research. *Technovation*, *125*, 1–48. https://doi.org/10.1016/j.technovation.2023.102768

Al-Kfairy, M. (2025). Strategic Integration of Generative AI in Organizational Settings: Applications, Challenges and Adoption Requirements. *IEEE Engineering Management Review*, *PP*, 1–14. https://doi.org/10.1109/EMR.2025.3534034

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

Arroyabe, M. F., Arranz, C. F. A., Fernandez De Arroyabe, I., & Fernandez de Arroyabe, J. C. (2024). Analyzing AI adoption in European SMEs: A study of digital capabilities, innovation, and external environment. *Technology in Society*, *79*(November 2023), 102733. https://doi.org/10.1016/j.techsoc.2024.102733

Badghish, S., & Soomro, Y. A. (2024a). Artificial Intelligence Adoption by SMEs to Achieve Sustainable Business Performance: Application of Technology–Organization–Environment Framework. *Sustainability (Switzerland)* , *16*(5). https://doi.org/10.3390/su16051864

Badghish, S., & Soomro, Y. A. (2024b). Artificial intelligence adoption by smes to achieve sustainable business performance. *Sustainability*, *16*(5), 1–24.

Budhwar, P., Chowdhury, S., Wood, G., Aguinis, H., Bamber, G. J., Beltran, J. R., Boselie, P., Lee Cooke, F., Decker, S., DeNisi, A., Dey, P. K., Guest, D., Knoblich, A. J., Malik, A., Paauwe, J., Papagiannidis, S., Patel, C., Pereira, V., Ren, S., … Varma, A. (2023). Human resource management in the age of generative artificial intelligence: Perspectives and research directions on ChatGPT. *Human Resource Management Journal*, *33*(3), 606–659. https://doi.org/10.1111/1748-8583.12524

Chang, I. C., Hwang, H. G., Yen, D. C., & Lian, J. W. (2006). Critical factors for adopting PACS in Taiwan: Views of radiology department directors. *Decision Support Systems*, *42*(2), 1042–1053. https://doi.org/10.1016/j.dss.2005.08.007

Chatterjee, S., Rana, N. P., Dwivedi, Y. K., & Baabdullah, A. M. (2021). Understanding AI adoption in manufacturing and production firms using an integrated TAM-TOE model. *Technological Forecasting and Social Change*, *170*(May), 120880. https://doi.org/10.1016/j.techfore.2021.120880

Chau, P. Y. K., Tam, K. Y., & Tam, K. Y. (2014). Factors Affecting the Adoption of Open Systems : An Exploratory. *MIS Quarterly*, *21*(1), 1–24.

Chen, H., Li, L., & Chen, Y. (2021). Explore success factors that impact artificial intelligence adoption on telecom industry in China. *Journal of Management Analytics*, *8*(1), 36–68. https://doi.org/10.1080/23270012.2020.1852895

Chong, A. Y. L., Lin, B., Ooi, K. B., & Raman, M. (2009). Factors affecting the adoption level of c-commerce: An empirical study. *Journal of Computer Information Systems*, *50*(2), 13–22. https://doi.org/10.1080/08874417.2009.11645380

Collins, C., Dennehy, D., Conboy, K., & Mikalef, P. (2021). Artificial intelligence in information systems research: A systematic literature review and research agenda. *International Journal of Information Management*, *60*(July), 102383. https://doi.org/10.1016/j.ijinfomgt.2021.102383

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339. https://doi.org/10.2307/249008

Flavio Calvino, & Luca Fontanelli. (2023). A portrait of AI adopters across countries. *Oecd*, *2023/02*. https://www.oecd.org/en/publications/a-portrait-of-ai-adopters-across-countries_0fb79bb9-en.html

Garrison, G., Wakefield, R. L., & Kim, S. (2015). The effects of IT capabilities and delivery model on cloud computing success and firm performance for cloud

supported processes and operations. *International Journal of Information Management*, *35*(4), 377–393. https://doi.org/10.1016/j.ijinfomgt.2015.03.001

Han, H. S., Lee, J. N., & Seo, Y. W. (2008). Analyzing the impact of a firm's capability on outsourcing success: A process perspective. *Information and Management*, *45*(1), 31–42. https://doi.org/10.1016/j.im.2007.09.004

Joseph F. Hair Jr. (n.d.). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*.

Kurup, S., & Gupta, V. (2022). Factors Influencing the AI Adoption in Organizations. *Metamorphosis: A Journal of Management Research*, *21*(2), 129–139. https://doi.org/10.1177/09726225221124035

McElheran, K., Li, J. F., Brynjolfsson, E., Kroff, Z., Dinlersoz, E., Foster, L., & Zolas, N. (2024). AI adoption in America: Who, what, and where. *Journal of Economics and Management Strategy*, *33*(2), 375–415. https://doi.org/10.1111/jems.12576

Min, S., & Kim, B. (2024). Adopting Artificial Intelligence Technology for Network Operations in Digital Transformation. *Administrative Sciences*, *14*(4). https://doi.org/10.3390/admsci14040070

Odeibat, A. S. (2023). Exploring the Impact of Managerial Capabilities on the Innovation Potential of Artificial Intelligence and Organizational Capabilities: A Literature Review. *Review of Applied Socio-Economic Research*, *26*(2), 94–108. https://doi.org/10.54609/reaser.v26i2.420

Qu, C., & Kim, E. (2025). Investigating AI Adoption, Knowledge Absorptive Capacity, and Open Innovation in Chinese Apparel MSMEs: An Extended TAM-TOE Model with PLS-SEM Analysis. *Sustainability (Switzerland)*, *17*(5), 1–31. https://doi.org/10.3390/su17051873

Radhakrishnan, J., Gupta, S., & Prashar, S. (2022). Understanding organizations' artificial intelligence journey: A qualitative approach. *Pacific Asia Journal of the Association for Information Systems*, *14*(6), 43–77. https://doi.org/10.17705/1pais.14602

Reich, B. H., & Benbasat, I. (1990). An empirical investigation of factors influencing the success of customer-oriented strategic systems. *Information Systems Research*, *1*(3), 325–347. https://doi.org/10.1287/isre.1.3.325

Ringle, C. M., & Sarstedt, M. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*.

Rogers, E. M., & Everett, M. (1983). DIFFUSION OF Third Edition. In *Collier Macmillan Publisher: Vol. Third Edit*. teddykw2.files.wordpress.com/.../everett-m-rogers-diffusion-of-innovati..

Romeo, E., & Lacko, J. (2025). Adoption and integration of AI in organizations: a systematic review of challenges and drivers towards future directions of research. *Kybernetes*, *September*. https://doi.org/10.1108/K-07-2024-2002

Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, *51*(1), 40–49. https://doi.org/10.1016/j.lrp.2017.06.007

Thong, J. Y. L. (1999). An integrated model of information systems adoption in small

Proceeding of the 3rd International Conference of International Conference on Business and Economics
Faculty of Economy and Business, Universitas Pattimura,
December 11, 2025

businesses. *Journal of Management Information Systems*, *15*(4), 187–214. https://doi.org/10.1080/07421222.1999.11518227

Tornatzky, L. G., & Eveland, J. (2022). Innovation As a Process. *EMC Review - Časopis Za Ekonomiju - APEIRON*, *23*(1). https://doi.org/10.7251/emc2201237t

ul Haq, F., & Suki, N. M. (2024). Mediating role of AI adoption between the relationship of leadership vision, change management capability, competitive pressure, trading partnerships, and SME performance. *Pakistan Journal of Commerce and Social Sciences*, *18*(4), 872–892.

Yue, Y., Jun, Z., Yao, N., Yanwen, F., Yiting, Z., & Yiting, F. (2023). The influence of adolescents' internet adaptation on internet addiction: the mediating role of internet cultural adaptation. *Frontiers in Psychiatry*, *14*(January), 1–13. https://doi.org/10.3389/fpsyt.2023.1338343