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Overcoming AI Adoption Friction Gap in Small and Medium Enterprises

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Abstract

The adoption of artificial intelligence presents a strategic opportunity for small and medium-sized enterprises (SME). However, these organizations frequently struggle to translate technological investments into operational value. The business problem addressed in this study is the failure of small and medium-sized enterprises to realize the expected benefits of artificial intelligence due to a misalignment between technical capabilities, organizational readiness, and environmental constraints. The purpose of this study was to explore the subjective perceptions of business leaders regarding the factors influencing adoption decisions. Data were collected through semi-structured interviews with 10 SME leaders and analyzed using reflexive thematic analysis. The results identified four themes: technological incompatibility creates an adoption friction gap, strategic leadership mediates cultural alignment, workforce anxiety necessitates psychological reassurance, and environmental uncertainty drives defensive governance. The findings extend the technology, organization, and environment (TOE) framework by demonstrating that structural constraints cannot be resolved through software procurement alone. Business leaders must instead prioritize data architecture readiness, utilize targeted diagnostics to manage employee job replacement fears, and enforce strict human-in-the-loop oversight to navigate regulatory ambiguity.

Keywords: *Artificial Intelligence, Small and Medium Enterprises, Technology Adoption, Change Management, TOE Framework, Strategic Leadership*

Introduction

Artificial intelligence capabilities offer small and medium-sized enterprises significant opportunities for operational efficiency and competitive differentiation. Small businesses represent a substantial share of economic activity in the United States, accounting for 99.9% of all commercial entities (U.S. Small Business Administration, 2024). Despite the macroeconomic importance of this sector, integration success remains highly concentrated in large, digitally mature enterprises. Industry reports indicate that up to 95% of organizations achieve zero return on their generative technology investments, revealing a stark capability divide (Challapally et al., 2025).

The general business problem is that small and medium-sized enterprises frequently fail to realize the expected benefits of artificial intelligence due to structural, organizational, and resource-related constraints. Prior research indicates that uneven adoption widens competitive disparities between digitally mature firms and those lacking the capabilities to implement advanced systems (Weiss & Vance, 2025). A distinct gap in management practice persists. While current literature catalogs the general determinants of technology acceptance, there is a scarcity of qualitative understanding regarding how leaders perceive, prioritize, and operationalize these factors within resource-constrained environments (Alsheibani et al., 2020).

The purpose of this qualitative inquiry was to explore the perceptions of business leaders in the United States regarding the specific barriers and enablers influencing their adoption strategies. By generating practice-informed insights grounded in operational realities, this study provides actionable strategic guidance for leaders navigating digital transformation.

Literature Review

The technology, organization, and environment (TOE) framework provides a structured, multi-dimensional model for examining how firms evaluate and implement technological innovations (Baker, 2012; Tornatzky & Fleischer, 1990). The framework is particularly suited for this inquiry because, unlike models that focus solely on individual user acceptance, TOE addresses the firm-level conditions required for organizational adoption. The framework necessitates a distinct analysis of three interacting domains.

The technological context refers to relevant internal and external infrastructures, including legacy systems, data architecture, and the characteristics of the emerging technology itself. Recent literature confirms that small and medium-sized enterprises face unique constraints within this domain. Technologically, these firms struggle with digital infrastructure readiness, system compatibility, and a lack of deep technical knowledge (Aish & Noor, 2025). The practitioner literature presents a stark picture of an emerging capability divide where organizations are trapped in early pilot phases. The Boston Consulting Group (2024) observed that a vast majority of firms remain stuck in pilot purgatory, unable to transition tools into core operational workflows. Challapally et al. (2025) noted that barriers to successful adoption are highly complex and deeply rooted in integration architecture rather than mere access to software.

The organizational context includes leadership structure, human capital, innovation culture, and the availability of resources. Organizationally, top management support is consistently identified as the most critical enabler of adoption. Conversely, skill shortages and change resistance act as primary barriers (Marocco et al., 2024). Davenport and Ronanki (2018) established that successful artificial intelligence projects typically augment human capabilities rather than replace employees. This principle remains highly relevant. Employees are far more likely to embrace new tools when they are positioned as aids for decision-making rather than existential threats to their employment. Potts (2020) argued that managing the human side of innovation requires securing genuine buy-in, as resistance frequently nullifies potential technological benefits. The psychological components of adoption, specifically the tension between skill acquisition and job insecurity, represent a critical gap in current SME literature.

The environmental context encompasses external pressures such as regulations, market dynamics, and vendor partnerships. Environmentally, regulatory ambiguity and competitive pressure dictate strategic pacing. External influences, including the threat of data breaches, intellectual property loss, and legal liabilities, actively shape the decision-making calculus of senior leadership (KPMG, 2025; McKinsey, 2025). Emerging concepts such as agentic systems and digital teammates introduce new layers of complexity and risk, forcing smaller organizations to balance the pursuit of competitive advantage against the necessity of strict compliance (Bojinov et al., 2025).

Despite these theoretical insights, current adoption models for SMEs often rely on generalized checklists derived from large enterprise data. These models implicitly assume mature digital infrastructures and dedicated innovation budgets, rendering them inadequate for smaller firms. This study builds upon the canonical synthesis of the technology, organization, and environment framework by capturing the nuanced ways these theoretical constructs manifest in real-world, resource-constrained environments (Baker, 2012).

Methodology

Research Design

This study utilized a generic qualitative inquiry design to explore the subjective experiences of business leaders. This methodology is specifically suited for investigating heterogeneous organizational environments where the objective is to elicit and synthesize participant realities rather than test statistical hypotheses. Unlike highly structured quantitative designs, a qualitative approach enables the researcher to capture the complexity of technology adoption as it is genuinely experienced by decision-makers (Alsheibani et al., 2020).

Participant Selection

As shown in Table 1, the participant pool consisted of 10 senior leaders, including chief executive officers, founders, and chief operating officers. Purposive sampling was utilized to ensure that participants possessed deep, experiential knowledge of the phenomenon under investigation. These individuals represented small and medium-sized enterprises across diverse sectors, including technology, construction, real estate, and professional services. Participants were purposefully selected based on their direct, authoritative involvement in the procurement and implementation decisions regarding artificial intelligence within their respective firms.

Table 1

Participant Demographic Information

Participant	Industry	Region	Current position/title
P01	Internet	West	Chief Executive Officer
P02	Technology Services	West	Chief Operating Officer
P03	Real Estate	East	Business Owner
P04	Professional Services	Southeast	Chief Executive Officer
P05	Construction/Building Materials	Southeast	Business Owner
P06	Computer Software / SaaS	Southwest	Co-Founder
P07	Professional Services	Southeast	Business Owner
P08	Technology Services	East	Chief Executive Officer
P09	Construction/Building Materials	Midwest	Business Owner
P10	Marketing and Advertising	East	Manager

Note. Participants were senior organizational decision-makers representing a range of industries and U.S. regions. All participants held direct responsibility or significant influence over technology strategy and AI adoption decisions within their organizations. The sample was selected purposively to provide information-rich perspectives relevant to understanding AI adoption within U.S. small and medium-sized enterprises and to support analytic transferability rather than statistical generalization.

Data Collection

This research was formally approved by the Capella University Institutional Review Board. Informed consent was obtained from all participants prior to data collection. To ensure ethical compliance and confidentiality, all participant identifiers and organizational affiliations were anonymized throughout the analysis and reporting phases.

Data were collected through one-on-one, semi-structured interviews. Each interview lasted approximately 45 to 60 minutes. The interview protocol utilized open-ended questions mapped directly to the technology, organization, and environment framework. This deductive mapping ensured conceptual coherence across the dataset while preserving the analytic openness required to discover emergent factors that standard quantitative surveys might overlook.

Data Analysis Procedure

Data were analyzed using reflexive thematic analysis to move from inductive coding to the development of higher-order interpretive themes (Braun & Clarke, 2006). This approach provides a systematic framework for identifying, organizing, and offering insight into patterns of meaning across a dataset. The researcher conducted a thorough reflexive thematic analysis by transcribing and familiarizing with the data, generating and clustering codes into meaningful categories, and synthesizing these into clearly defined themes aligned with the TOE framework. The process concluded with the creation of a cohesive analytical narrative supported by illustrative data extracts to present the study's findings.

Results

The reflexive thematic analysis of the interview transcripts generated four distinct interpretive themes regarding the barriers and enablers of artificial intelligence adoption.

Theme 1: Technological incompatibility and data fragmentation create a friction gap that impedes adoption.

Participants universally described a severe disconnect between vendor promises and their legacy software infrastructures. The lack of native interoperability created immediate operational friction, heavily constraining scalability. This theme was characterized by two prominent sub-themes: integration friction and data fragmentation.

Regarding integration friction, participants noted that acquiring advanced algorithms did not equate to operational readiness due to incompatible legacy systems. The lack of internal coding expertise exacerbated this barrier. One participant clearly articulated the limitation of application programming interfaces without dedicated technical staff: "It is a limitation that we cannot get to function. It should function using an API, but I am not a coder." (P05)

Participants noted data fragmentation as an integration friction that frequently forced employees into redundant workflows. Artificial intelligence systems demand centralized, clean data to function effectively, yet SME infrastructures are frequently siloed. An enterprise services executive highlighted the complexity of dealing with sensitive client information across fragmented systems: "Quick integration into different data silos that we have... We have sensitive data." (P08)

Rather than experiencing immediate automation, participants found that their new artificial intelligence tools functioned as parallel systems. The technology outpaced their infrastructure, creating a structural barrier that prevented the solutions from scaling across the enterprise.

Theme 2: Strategic leadership mediates adoption through cultural alignment and incremental value definition.

Leadership championing was identified as the critical mechanism for overcoming technical friction. Participants achieved success by pacing implementation and prioritizing safety over rapid transformation. This theme highlights that leadership action, rather than software capability, dictates successful adoption.

Participants described a piecemeal adoption strategy. Rather than attempting sweeping digital transformations, successful leaders focused on narrow, easily verifiable use cases. A construction executive detailed how an incremental methodology built internal trust and mitigated risk: "It is redoing the way we have been doing things, and that takes time. We decided to do it piecemeal, a little bit at a time, instead of going fully into it. We do not have subject matter experts for AI. We are just going off what we know. The idea was that we are trying to be safe rather than sorry, make sure it works, and identify potential problems or security issues." (P02)

This same executive provided a stark contrast between successful and unsuccessful projects based on complexity. A successful initiative involved writing a simple program to automate legacy inventory information. An unsuccessful initiative involved an overly complex attempt to extend operations into the United Kingdom, which was ultimately abandoned because it exceeded their internal capabilities.

Executive championing was crucial. The data indicated that delegation to external consultants was insufficient. Visible executive sponsorship was required to drive cultural acceptance. One leader emphasized the necessity of top-down engagement: "I co-champion with them because as CEO it is my role to make sure everyone is on board." (P01)

Theme 3: Workforce anxiety and skill deficits necessitate a dual strategy of upskilling and psychological reassurance.

Adoption was heavily constrained by employee fear. Leaders observed that technical training was entirely ineffective if psychological safety concerns were ignored. The data revealed a profound workforce readiness divide defined by two sub-themes: fear of job obsolescence and resistance to continuous learning.

Participants noted their fear of obsolescence. The deepest organizational barrier was not a lack of technical capability, but an existential threat to employment. A real estate executive highlighted this concern directly, noting how efficiency gains conflict with human relationships in smaller firms: "I do not know that it is necessarily the technology. Not all the people that work for me are as tech-savvy as other people... The biggest hang-up we are seeing isn't necessarily with integration. It is the threat of people losing their jobs. I am completely open with them and told them I am embracing this. I love my team, but it is likely that some of them will probably be replaced. That has been the biggest barrier: the personal, human side of it." (P03)

Participants' narratives revealed resistance to continuous learning. This profound anxiety frequently manifested as passive resistance or outright refusal to engage with the technology. One participant noted that tenured employees reacted defensively to training sessions, perceiving the new tools as an unreasonable burden: "They look at it as though they should not have to learn anything else." (P05). Similarly, another executive noted the difficulty of penetrating this psychological barrier despite leadership directives: "I do have two employees specifically who are concerned, and they just will have nothing to do with it." (P09). Leaders were forced to manage not only a deficit in technical skills, such as prompt engineering, but also a deep psychological resistance to operational change.

Theme 4: Environmental uncertainty drives a defensive governance posture focused on human oversight and risk mitigation.

Market volatility, regulatory ambiguity, and algorithmic hallucinations forced leaders toward highly risk-conscious adoption strategies. Firms prioritized data sovereignty to protect client agreements and mitigate legal exposure.

The external environment presented significant risks regarding data privacy. One technology executive detailed a critical near-miss scenario involving healthcare regulations: "Most recently, I pushed out a beta of a product that would technically be covered by HIPAA. Someone chimed in and said it was not exactly HIPAA compliant. It was a nitpicky argument, but valid nonetheless, regarding how we were saving information... We could have been sued or put out of business. This made me realize that having everything under one roof could be a danger, so I am going to take that product and spin it off as an LLC to keep everything safe." (P01). To protect non-disclosure agreements, leaders frequently opted to limit functionality in exchange for security: "If I am using information subject to an NDA... I am probably not going to use cloud models." (P01)

Strict human-in-the-loop validation remained a non-negotiable requirement across all analyzed firms due to the unpredictable nature of algorithmic outputs. One executive shared a personal anecdote regarding an external vendor's failure: "An AI customer service program denied my refund because it saw a tracking number existed, even though it was a spoof. It eventually required human intervention to get my refund. My biggest concern is if a customer had that same experience with me where the AI didn't recognize a mistake in a listing." (P03)

The realization was immediate. If a client experienced a similar error, the reputational damage to the small business would be catastrophic. Consequently, treating artificial intelligence outputs as provisional drafts requiring human validation became a mandatory defensive posture.

Discussion

The findings of this study challenge linear adoption narratives that equate software acquisition with operational readiness. The results confirm the existence of a severe capability gap within the small business sector, aligning directly with Challapally et al. (2025), who identified a massive divide between initial investment and realized return.

By applying the technology, organization, and environment framework to the small business context, this research expands upon Baker's (2012) canonical model. The findings demonstrate that in resource-constrained environments, the three domains are highly interdependent. Technological tools cannot function independently of the organizational culture. Strategic leadership serves as the mandatory mediating structure required to connect fragmented infrastructure to an anxious workforce while shielding the firm from environmental uncertainty.

Furthermore, the results fundamentally reframe the academic conceptualization of change resistance within digital transformation. While practitioner literature frequently cites skills gaps or a lack of technological literacy as the primary organizational barrier (Weiss & Vance, 2025), the qualitative data indicate that resistance is fundamentally rooted in job insecurity. Employees do not reject artificial intelligence strictly because it is overly complex. They reject it because they perceive it as an existential threat to their livelihood.

This finding echoes the earlier assertions of Davenport and Ronanki (2018) regarding the necessity of human augmentation strategies. Resolving the technical skill deficit through training programs without simultaneously addressing the psychological anxiety deficit leads inevitably to stalled initiatives. Technical proficiency cannot override the primal fear of obsolescence.

Conclusion

The promise of plug-and-play artificial intelligence is an illusion for small and medium-sized enterprises. Scaling these technologies successfully requires leaders to bridge a structural friction gap caused by fragmented data and legacy systems. Realizing operational value demands that leaders actively manage workforce anxiety through incremental pacing and deploy defensive governance to mitigate environmental risks. Digital transformation in this context is not a discrete procurement event. It is a highly managed, culturally sensitive, and risk-conscious organizational process that relies entirely on deliberate executive leadership.

Implications for Practice

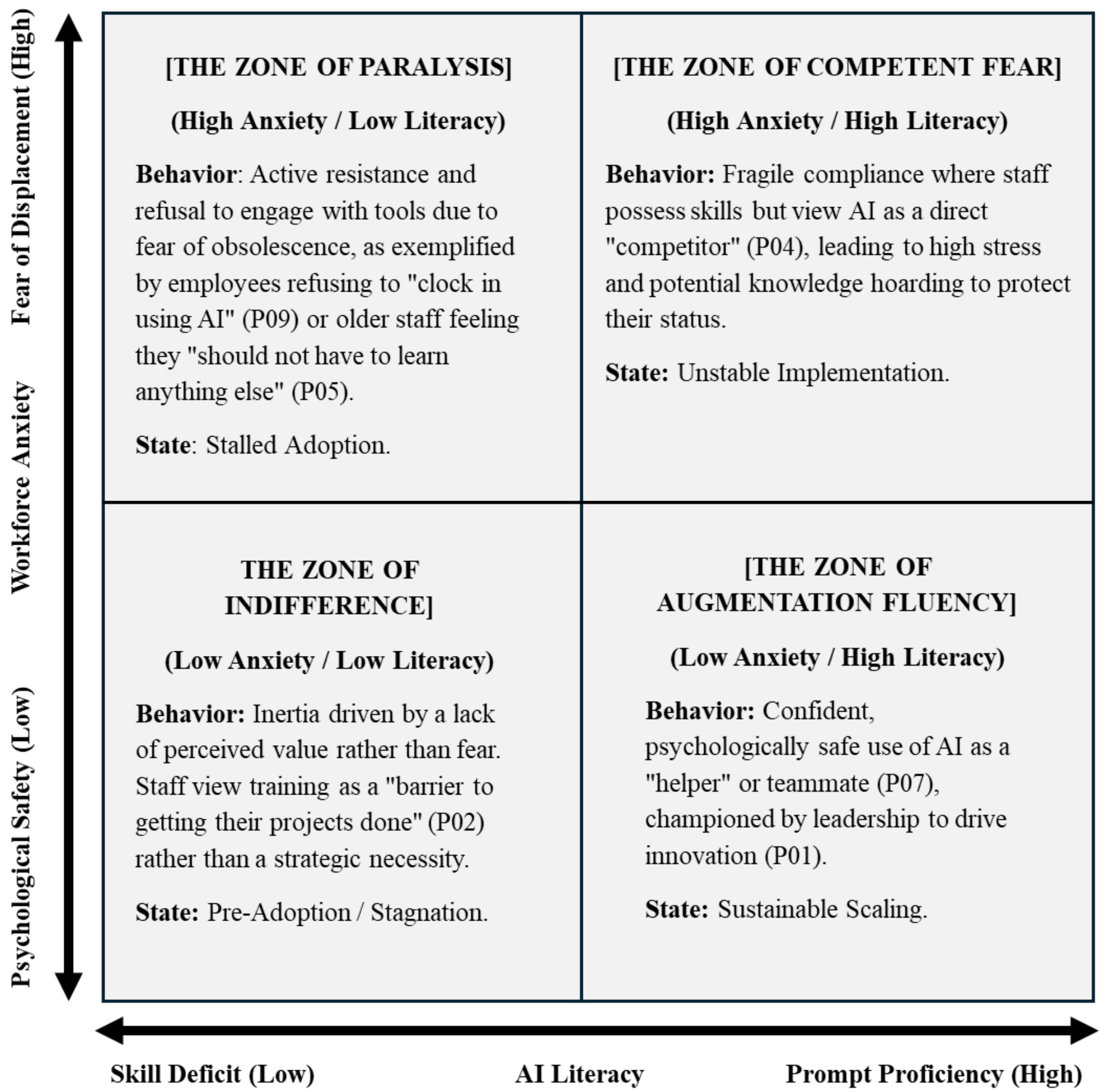
To navigate the barriers identified in this study, business managers and entrepreneurs must abandon generic adoption models and implement the following concrete strategies.

First, leaders must map and address what I named the "adoption friction gap". The adoption friction gap refers to the structural disconnect between the marketed promise of seamless, plug-and-play artificial intelligence and the operational reality of small and medium-sized enterprises, wherein fragmented data architectures, legacy system incompatibilities, and limited integration capacity constrain the translation of AI capabilities into scalable organizational value. Before allocating capital to new software, organizations must conduct a rigorous data readiness audit. Management must ensure that new algorithmic tools possess native integration capabilities with their core operational software. Investing in tools that create parallel workflows or require manual data transfer will strictly compound operational inefficiencies rather than resolve them. Leaders should decline vendor contracts that do not guarantee seamless integration into existing legacy architectures.

Second, leaders must utilize targeted diagnostics to manage employee resistance. Participants consistently interpreted workforce readiness as an organizational barrier characterized by a readiness divide, in which leaders were required to manage both technical skill gaps (e.g., prompting and AI literacy) and emotional resistance driven by fear of replacement. The findings support the conceptual use of a workforce readiness matrix (Figure 1) to categorize employees by their digital literacy and fear of replacement.

Figure 1

The Workforce Readiness & Anxiety Matrix



Note. This figure presents an empirically derived typology constructed from Theme 3 that maps the socio-technical friction described by participants. Workforce readiness is conceptualized as the interaction between AI literacy (prompt proficiency) and workforce anxiety (fear of replacement). The quadrants represent distinct behavioral states observed across cases, indicating that leaders must actively shift workforce sentiment from paralyzed resistance (Quadrant 1) toward confident augmentation (Quadrant 4) through concurrent investments in technical upskilling and psychological reassurance.

For employees exhibiting high anxiety and low literacy, leaders must pause technical training and begin with psychological reassurance. Management must explicitly define how the technology protects the firm's overall competitiveness and outline clear pathways for role evolution. Conversely, employees who demonstrate high literacy and low anxiety should be empowered as internal champions to build shared prompt libraries and drive peer-to-peer adoption.

Third, organizations must embrace defensive governance. To protect against algorithmic errors, hallucinations, and regulatory breaches, leaders must mandate strict human-in-the-loop workflows. Treating algorithmic outputs strictly as provisional drafts mitigates reputational risk and reinforces the necessity of human judgment within the firm. In highly regulated environments, leaders should consider structural isolation, such as spinning off high-risk AI operations into separate limited liability entities, to protect the core enterprise.

Limitations

This study has specific boundaries that contextualize the findings. The research relied on a qualitative sample of 10 senior leaders located within the United States. Consequently, the findings provide analytical transferability to similar organizational contexts but lack statistical generalizability across the entire macroeconomic sector. Additionally, the perspectives regarding workforce resistance and employee anxiety were derived entirely from leadership interpretations rather than direct employee interviews, introducing potential observational bias regarding the true motives of the workforce.

Future Research Directions

Future research should empirically test the conceptual findings generated by this qualitative inquiry. Quantitative methodologies could be employed to validate the prevalence of the friction gap and the readiness matrix across different industry verticals. Longitudinal studies are required to track how defensive governance strategies evolve as artificial intelligence capabilities mature and regulatory frameworks solidify. Finally, research should directly assess the employee perspective through studies to compare ground-level workforce anxiety against leadership perceptions, yielding a more comprehensive understanding of organizational change resistance.

Data Availability Statement

Due to strict confidentiality agreements and the ethical necessity to protect participant anonymity and sensitive commercial strategies, the raw interview transcripts, coding trees, and associated qualitative data are not publicly available.

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