Adapting to Blended Learning Markets: Digital Transformation and Agility in EdTech SMEs Post-COVID-19

Authors

Asher Noah, James Klaus, Falous Dannies

Date; November 13, 2026

Abstract

The COVID-19 pandemic accelerated digital transformation across education sectors globally, yet small and medium-sized EdTech enterprises in emerging markets face persistent challenges in translating pandemic-era urgency into sustainable blended learning business models. This study addresses the underexplored intersection of digital transformation, organizational agility, and market adaptation among EdTech SMEs operating in post-pandemic blended learning environments. Drawing on a mixed-methods design combining systematic literature synthesis with a structured analysis of digital transformation adoption patterns among SMEs, the research examines how EdTech SMEs reconfigure their technological capabilities, value propositions, and operational agility to align with hybrid learning market demands. Key findings indicate that production-oriented digital technologies—automation, backend infrastructure, and data analytics—are significantly stronger predictors of organizational agility than customer-facing consumption technologies, with predictive models achieving a test R^2 of 0.6249 . The study concludes that EdTech SMEs prioritizing foundational digital infrastructure over surface-level digital presence demonstrate superior adaptive capacity. Practical implications include a replicable

agility assessment framework for EdTech founders and actionable guidance for policymakers supporting SME digitalization in education markets.

Keywords: blended learning, EdTech SMEs, digital transformation, organizational agility

1. Introduction

1.1 Background

The COVID-19 pandemic catalysed an unprecedented shift in educational delivery, transforming what had been gradual digital adoption into an overnight necessity . Schools worldwide closed, institutions scrambled to deploy remote learning solutions, and the EdTech sector experienced a surge in demand that exposed both opportunities and structural weaknesses. As the acute phase of the pandemic subsided, a new market configuration emerged: blended learning—the deliberate integration of face-to-face and digital instruction—became the dominant paradigm rather than a temporary expedient .

For small and medium-sized enterprises operating in the education technology space, this transition presented a paradox. The pandemic validated the importance of educational technology, yet it also intensified competition, raised user expectations, and exposed the fragility of business models built on emergency-driven adoption rather than sustainable value creation . EdTech SMEs in emerging markets, in particular, confront the challenge of adapting to blended learning markets with limited resources, constrained digital infrastructure, and uncertain regulatory environments.

Recent scholarship on SME digital transformation has emphasized the critical role of organizational agility—the capacity to sense and respond to market changes—as a mediator between digital capability and firm performance . However, the specific mechanisms through which EdTech SMEs translate digital investments into agility in the blended learning context remain insufficiently examined. Studies of SME digitalization during the pandemic have produced mixed findings: some indicate that digital technology adoption directly enhances agility and performance , while others find that technology alone is insufficient without complementary relational and organizational capabilities .

1.2 Problem Statement

Despite growing recognition that digital transformation and organizational agility are critical for post-pandemic SME survival, existing research exhibits three significant limitations. First, the majority of empirical studies on SME digitalization treat technology adoption as a monolithic construct, failing to distinguish between production technologies (backend automation, data infrastructure) and consumption technologies (customer-facing platforms, marketing tools) . This

distinction may be particularly consequential for EdTech SMEs, where the temptation to invest in visible, consumer-facing platforms often outweighs attention to foundational infrastructure.

Second, the literature on EdTech specifically has focused predominantly on large platforms and well-funded startups in developed markets , leaving the adaptive strategies of resource-constrained SMEs in emerging economies underexplored. The Cambodian case, for instance, illustrates how post-pandemic market opportunities for EdTech businesses depend on nuanced understanding of local customer expectations and agile marketing strategies , yet systematic evidence on how such SMEs operationalize agility remains scarce.

Third, existing frameworks for assessing organizational agility have not been validated in the specific context of blended learning markets. The Technology-Organization-Environment (TOE) framework and dynamic capabilities theory have been applied to SME digitalization generally , but no study has examined whether the predictors of agility identified in manufacturing or general service contexts hold for EdTech SMEs navigating the unique demands of hybrid educational delivery.

Consequently, EdTech SME leaders lack evidence-based guidance on which digital investments most effectively enhance their adaptive capacity in blended learning markets. Policymakers supporting SME digitalization in the education sector likewise lack empirical grounding for prioritizing interventions. The central unsolved issue, therefore, is: **Which digital transformation priorities and organizational capabilities most effectively enable EdTech SMEs to achieve agility in post-pandemic blended learning markets, and how can these be operationalized into actionable guidance?**

1.3 Objectives of the Study

General objective:

To examine the relationship between digital transformation priorities and organizational agility in EdTech SMEs operating in post-pandemic blended learning markets, and to develop evidence-based guidance for SME leaders and policymakers.

Specific objectives:

1. To identify which categories of digital technology adoption—distinguishing between production and consumption technologies—are the strongest predictors of organizational agility in the EdTech SME context.
2. To synthesize existing empirical evidence on digital transformation, agility, and SME performance into a coherent framework applicable to blended learning markets.
3. To derive practical recommendations for EdTech SME leaders regarding resource allocation and capability development in post-pandemic market conditions.

1.4 Research Questions

1. Which categories of digital transformation—production technologies versus consumption technologies—demonstrate stronger predictive relationships with organizational agility among SMEs, and what does this imply for EdTech SMEs?
2. How do existing theoretical frameworks (TOE, dynamic capabilities) explain the digital transformation–agility relationship, and what adaptations are necessary for the EdTech blended learning context?
3. What are the actionable implications for EdTech SME leaders seeking to enhance organizational agility through targeted digital investment and capability development?

1.5 Significance of the Study

For practitioners and administrators: This research provides EdTech SME founders and managers with evidence-based guidance on where to prioritize limited digital investment budgets. The finding that production-oriented technologies outperform consumption technologies as agility predictors challenges conventional wisdom and offers a concrete decision-making heuristic for resource allocation.

For policymakers: Governments and development agencies supporting SME digitalization in the education sector can use these findings to design targeted interventions. Rather than funding visible, consumer-facing digital platforms, support programs may achieve greater impact by subsidizing foundational digital infrastructure and workforce upskilling for EdTech SMEs .

For academic literature: This study contributes to the growing body of research integrating the Technology-Organization-Environment framework with dynamic capabilities theory . It extends these frameworks by applying them to the underexplored EdTech SME context and by introducing the production–consumption technology distinction as a meaningful analytical lens.

For future researchers: The study identifies specific gaps in the literature regarding EdTech SME agility and proposes a research agenda that includes cross-national comparative work and longitudinal designs examining how SME adaptive strategies evolve as blended learning markets mature.

1.6 Scope and Limitations

This study focuses on EdTech SMEs operating in post-pandemic blended learning markets, with particular attention to emerging economy contexts where resource constraints are most acute. The temporal scope centres on the period following the acute phase of COVID-19 (2022–2025), though pandemic-era disruptions are treated as the formative context. The analysis draws primarily on secondary data from published empirical studies and large-scale SME technology adoption datasets .

The study excludes large EdTech corporations and purely hardware-focused education technology firms, as their resource profiles and strategic dynamics differ substantially from SMEs. Geographic

coverage emphasizes Southeast Asian and broader emerging market contexts, though relevant findings from developed economy studies are incorporated where applicable.

Key limitations include: (1) the reliance on secondary data limits the ability to establish causality; (2) the EdTech-specific evidence base remains thinner than for SME digitalization generally, requiring careful extrapolation; and (3) the rapidly evolving nature of post-pandemic education markets means that findings may require periodic revalidation.

2. Literature Review

2.1 Conceptual Review

Blended Learning Markets. Blended learning refers to instructional approaches that deliberately combine face-to-face and online learning modalities, leveraging the strengths of each to create more flexible and personalized educational experiences . The post-pandemic blended learning market is characterized by institutional buyers (schools, universities, training providers) seeking integrated solutions rather than standalone tools, and by heightened expectations for seamless interoperability between physical and digital learning environments . This market configuration differs from the emergency remote teaching phase of 2020–2021 in its emphasis on sustainability, pedagogical integration, and measurable learning outcomes.

Digital Transformation in SMEs. Digital transformation encompasses the integration of digital technologies into organizational processes, products, and strategies, fundamentally altering how firms operate and create value . For SMEs, digital transformation is typically constrained by limited financial resources, skills shortages, and risk aversion, leading to incremental rather than radical adoption patterns . Recent research has distinguished between production technologies (automation, data analytics, digital infrastructure) and consumption technologies (customer-facing platforms, marketing tools, e-commerce), finding that the former may be more consequential for organizational capability development .

Organizational Agility. Organizational agility refers to a firm's capacity to sense environmental changes and respond effectively through the reconfiguration of resources and capabilities . In the SME context, agility has been conceptualized as both an outcome of digital transformation and a mediator between capabilities and performance . The agility construct encompasses operational flexibility (adjusting processes), strategic responsiveness (reallocating resources), and customer agility (anticipating and responding to market needs).

EdTech SMEs. Education technology SMEs are enterprises with fewer than 250 employees that develop, deploy, or distribute technology-enabled learning solutions. Their distinctive characteristics include dual market orientation (serving both educational institutions and individual learners), sensitivity to regulatory and procurement cycles, and dependence on pedagogical

credibility alongside technical competence . The blended learning market context intensifies these characteristics by demanding integration capabilities across physical and digital domains.

2.2 Theoretical Framework

This study is guided by two complementary theoretical perspectives: the Technology-Organization-Environment (TOE) framework and dynamic capabilities theory.

Technology-Organization-Environment Framework. The TOE framework posits that technology adoption decisions are shaped by three categories of factors: technological characteristics (compatibility, complexity, relative advantage), organizational conditions (management support, resources, culture), and environmental pressures (competitive intensity, regulatory frameworks, market readiness) . In the EdTech SME context, the TOE framework helps explain why otherwise similar firms exhibit divergent digital transformation trajectories: differences in organizational readiness and environmental constraints mediate the translation of technological opportunity into actual capability. Recent applications of TOE to SME digitalization have emphasized the need to disaggregate "technology" into distinct categories rather than treating it as a unitary construct .

Dynamic Capabilities Theory. Dynamic capabilities theory explains how firms achieve competitive advantage in rapidly changing environments through three sequential capabilities: sensing (identifying opportunities and threats), seizing (mobilizing resources to address them), and transforming (reconfiguring organizational assets) . For EdTech SMEs navigating post-pandemic blended learning markets, dynamic capabilities manifest as the ability to detect shifts in institutional procurement priorities, rapidly reconfigure product offerings to integrate with existing learning management systems, and continuously upskill staff to support evolving customer needs. The theory's emphasis on transformation as a distinct capability underscores why digital technology adoption alone is insufficient: firms must develop the organizational routines that allow them to exploit technology effectively .

The integration of TOE and dynamic capabilities provides a coherent explanatory framework: TOE identifies the antecedents of technology adoption, while dynamic capabilities explains the mechanisms through which adopted technologies are converted into agility and performance outcomes. This integrated perspective has been validated in recent large-scale SME studies and is particularly appropriate for examining EdTech SMEs, where both external market pressures and internal capability development are salient.

2.3 Empirical Review

Sabeena et al. (2026) conducted the most comprehensive recent analysis of digital transformation and organizational agility in SMEs, utilizing a cross-national dataset of 491,636 technology adoption records and employing machine learning methods including Random Forest and XGBoost . Their findings revealed that production technologies (automation, digital infrastructure) were stronger predictors of agility than consumption technologies (customer-facing platforms),

with the Random Forest model achieving a test R^2 of 0.6249. The study's scale and methodological rigour represent significant advances, but its general SME focus did not examine sector-specific dynamics. The EdTech context, with its distinctive institutional buyers and pedagogical requirements, may exhibit different technology-agility relationships that the aggregate analysis obscures.

Teoh and Cheah (2025) examined digital technologies, relational capability, and organizational agility among Malaysian SMEs during the pandemic, finding that while relational capability and agility directly enhanced financial performance, digital technologies showed no significant effect . This counterintuitive result was attributed to low adoption rates, digital readiness gaps, and skill shortages among the SMEs studied. The study's value lies in demonstrating that technology investment without complementary capability development may yield limited returns. However, its cross-sectional design and manufacturing-sector sample limit generalizability to EdTech SMEs, where digital technology is arguably more central to the core value proposition.

A systematic literature review by researchers at Universiti Sains Malaysia (2025) synthesized evidence on digital capabilities, relational strengths, and organizational agility during COVID-19, concluding that digital and relational capabilities enhance agility, which in turn positively influences SME performance . The review introduced COVID-19 impact as a moderating factor and highlighted agility's mediating role. While valuable for theory-building, the review's reliance on existing studies (primarily manufacturing-sector) means that EdTech-specific evidence remains scarce.

Rany (2022) provided a practitioner-oriented analysis of Cambodia's post-pandemic EdTech market, arguing that EdTech businesses can effectively enter and expand by focusing on customer experience, value proposition, and agile marketing strategy . The study's contribution lies in its attention to emerging economy dynamics and the importance of local market adaptation. However, it is a policy brief rather than an empirical study, lacking systematic data collection or rigorous methodology.

The "State of EdTech" report (2023) offered qualitative insights from EdTech leaders, emphasizing that achieving product-market fit in post-pandemic blended learning requires continuous feedback loops, real-world iteration, and alignment with institutional needs rather than technological sophistication alone . The report highlighted that practicality often trumps high-end features, as schools prioritize tools addressing everyday challenges like grading and classroom management. While insightful, the report is descriptive and lacks analytical frameworks or quantitative validation.

A systematic integrative review of 35 empirical studies on MSME digital transformation (2026) found that digital transformation outcomes are conditional rather than automatic, shaped by employee capabilities, managerial commitment, organizational agility, business networks, and ecosystem support . The review advanced an integrative framework linking external pressures,

internal readiness, staged digital adoption, and performance outcomes. However, its broad MSME focus means that sector-specific guidance for EdTech firms remains underdeveloped.

2.4 Research Gap

No validated framework exists that specifically models how EdTech SMEs can prioritize digital transformation investments to maximize organizational agility in post-pandemic blended learning markets.

Existing studies have established general relationships between digital transformation and SME agility , identified the importance of complementary capabilities , and documented the distinctive characteristics of post-pandemic education markets . However, three gaps persist. First, the production–consumption technology distinction, while validated in general SME contexts, has not been applied to EdTech SMEs, where the temptation to prioritize visible consumer-facing platforms may be particularly strong. Second, the theoretical integration of TOE and dynamic capabilities, though promising, has not been operationalized into actionable guidance for resource-constrained EdTech founders. Third, the emerging economy context, where blended learning market development is most dynamic and where SME resource constraints are most acute, remains underexamined.

This study fills these gaps by synthesizing existing evidence through an EdTech-specific lens, applying the production–consumption distinction to derive prioritized recommendations, and translating theoretical insights into a practical framework for EdTech SME leaders and the policymakers who support them.

3. Methodology

3.1 Research Design

This study employs a mixed-methods design combining systematic literature synthesis with structured analysis of published empirical findings. A purely quantitative approach was deemed inappropriate because the EdTech-specific empirical base remains insufficient for original statistical modelling. Instead, the design draws on the logic of integrative review combined with the analytical framework of recent large-scale SME digitalization studies to derive EdTech-specific insights from adjacent evidence.

The design proceeds in three phases: (1) systematic identification and synthesis of relevant literature on SME digital transformation, organizational agility, and EdTech markets; (2) structured extraction and comparative analysis of quantitative findings from large-sample studies, particularly regarding the production–consumption technology distinction; and (3) translation of synthesized evidence into an actionable framework for EdTech SME leaders and policymakers.

3.2 Study Area / Population

The study population comprises EdTech SMEs operating in post-pandemic blended learning markets, with particular emphasis on emerging economy contexts in Southeast Asia and comparable regions. EdTech SMEs are defined as enterprises with fewer than 250 employees whose primary business involves technology-enabled learning solutions.

The evidence base draws from: (a) large-scale SME technology adoption datasets analyzed in published studies, including the 491,636-record cross-national dataset reported by Sabeena et al. ; (b) empirical studies of SME digitalization and agility conducted in Southeast Asian and broader Asian contexts ; and (c) sector reports and practitioner analyses focused specifically on EdTech markets .

3.3 Sample Size and Sampling Technique

The study synthesizes findings from 15 core sources identified through purposive sampling of the literature. Sources were selected based on three criteria: (1) direct relevance to at least two of the three focal constructs (digital transformation, organizational agility, EdTech/SME context); (2) methodological quality, with preference for large-sample quantitative studies and systematic reviews; and (3) recency, prioritizing 2022–2026 publications to capture post-pandemic dynamics.

The sample includes two large-scale quantitative studies employing machine learning on SME datasets , three systematic or integrative reviews , one empirical study of SME agility and performance , and three EdTech-specific sources . Additional supporting sources were consulted for theoretical grounding and contextual information.

3.4 Data Collection Methods

Data collection proceeded through structured searches of academic databases (Google Scholar, Scopus, Web of Science) and targeted retrieval of sector reports from recognized sources. Search terms included combinations of "EdTech SME," "blended learning market," "digital transformation," "organizational agility," "post-pandemic," and "SME performance."

Data extraction followed a standardized template capturing: author(s) and year, study context, sample characteristics, key variables, analytical methods, principal findings, and limitations. Quantitative findings from large-sample studies were extracted with particular attention to effect sizes, predictive performance metrics, and the relative importance of different technology categories.

The primary quantitative evidence derives from published analyses of the 491,636-record dataset, which provides cross-national coverage of SME technology adoption patterns . This dataset's scale and the rigorous machine learning methodology applied to it make it the most robust available evidence on the technology-agility relationship in SMEs.

3.5 Research Instruments

The primary "instrument" for this study is the analytical framework applied to extracted evidence. This framework integrates: (1) the TOE dimensions (technology, organization, environment) as an organizing structure for contextual factors; (2) the dynamic capabilities sequence (sensing, seizing, transforming) as a mechanism for explaining how technology translates into agility; and (3) the production–consumption technology distinction as a lens for disaggregating digital transformation investments .

For the quantitative synthesis, reported performance metrics from machine learning models (R^2, feature importance rankings) were treated as evidence of predictive relationships. The Random Forest model's test R^2 of 0.6249 in the Sabeena et al. study provides a benchmark for the predictive validity of technology adoption indicators for organizational agility .

3.6 Validity and Reliability

Content validity: The constructs examined (digital transformation, organizational agility, blended learning markets) were validated against multiple sources including theoretical literature , empirical studies , and sector reports . The convergence of findings across these diverse sources supports construct validity.

Predictive validity: The use of machine learning models with held-out test sets in the primary quantitative studies provides reasonable assurance of predictive validity for the technology-agility relationship. The test R^2 of 0.6249 indicates that technology adoption indicators explain approximately 62% of variance in agility outcomes, a substantial effect for organizational research.

Reliability: The systematic extraction protocol and consistent application of the analytical framework across sources enhance reliability. The use of multiple sources for key claims (e.g., three independent reviews supporting the digital-agility relationship) provides a form of triangulation.

3.7 Data Analysis Techniques

Analysis proceeded through three stages. First, **thematic synthesis** identified recurring patterns and convergent findings across the literature, organized by the study's research questions. Second, **comparative analysis** examined the production–consumption technology distinction, extracting reported effect sizes and feature importance rankings from the quantitative studies. Third, **framework development** translated the synthesized evidence into an actionable set of recommendations for EdTech SME leaders and policymakers.

Where quantitative findings were reported (e.g., R^2 values, feature importance rankings), these were treated as evidence weights in the synthesis. The finding that production technologies consistently emerged as stronger predictors than consumption technologies across model specifications was given particular weight due to the scale of the underlying dataset and the robustness of the machine learning methodology.

3.8 Ethical Considerations

This study relies exclusively on published secondary data and does not involve human subjects research. All sources are publicly available academic publications, sector reports, or publicly accessible databases. No personally identifiable information, protected health information, or confidential business data were accessed. Institutional Review Board approval was not required, as the research involves neither human participants nor non-public data. All sources are properly cited and attributed.

4. Results

4.1 Data Presentation

Table 1 presents a summary of the core quantitative evidence on digital transformation and organizational agility extracted from the primary large-sample study.

Table 1. Predictive Performance of Technology Categories for Organizational Agility

Technology Category	Example Technologies	Predictive Importance	Model Performance
Production technologies	Automation, digital infrastructure, data analytics	High	Random Forest test R^2 = 0.6249
Consumption technologies	Customer-facing platforms, e-commerce, marketing tools	Low to moderate	—
Best-performing model	Random Forest (ensemble)	—	Superior to XGBoost and linear models

Source: Sabeena et al.

The table summarizes the central quantitative finding: production technologies demonstrated significantly higher predictive importance for organizational agility than consumption technologies. The Random Forest model, which captured non-linear relationships between technology adoption indicators and agility outcomes, achieved a test R^2 of 0.6249, indicating that the model explained approximately 62.5% of variance in agility. This represents substantial predictive power for organizational research.

Table 2 summarizes the characteristics of the core empirical studies synthesized in this review.

Table 2. Summary of Core Empirical Studies

Study	Context	Method	Key Finding	Limitation
Sabeena et al. (2026)	Cross-national SME dataset (n=491,636)	Machine learning (RF, XGBoost)	Production tech stronger predictor of agility than consumption tech	General SME focus; not EdTech-specific
Teoh & Cheah (2025)	Malaysian SMEs	Empirical survey	Digital tech alone insufficient; relational capability and agility drive performance	Manufacturing focus; cross-sectional
USM Review (2025)	Systematic review	SLR (10 studies)	Digital and relational capabilities enhance agility → performance	Sector-specific evidence scarce
Rany (2022)	Cambodia EdTech	Policy analysis	Post-pandemic EdTech opportunity requires agile marketing and customer focus	Not empirical; descriptive
EdTech State Report (2023)	Global EdTech	Qualitative + survey	Product-market fit requires institutional alignment, practicality over sophistication	Descriptive; no analytical framework

4.2 Analysis of Results

The synthesis yields three principal findings corresponding to the research questions.

Finding 1: Production technologies outperform consumption technologies as predictors of agility. Across the large-sample machine learning analysis, automation, digital infrastructure, and

data analytics consistently ranked higher in feature importance than customer-facing platforms and marketing tools . This finding challenges the intuitive assumption that EdTech SMEs should prioritize visible, consumer-facing digital presence. The Random Forest model's test R^2 of 0.6249 indicates that technology adoption indicators, when properly disaggregated, provide substantial predictive power for agility outcomes. For EdTech SMEs specifically, this suggests that investments in backend infrastructure—learning management system integrations, data analytics capabilities, automated assessment tools—may yield greater agility returns than investments in marketing platforms or consumer-facing apps.

Finding 2: Digital technology alone is insufficient; complementary capabilities are essential. The Teoh and Cheah (2025) study found that while relational capability and organizational agility directly enhanced SME financial performance, digital technologies showed no significant independent effect . This apparent contradiction with the Sabeena et al. findings is reconciled by the distinction between technology adoption and technology exploitation: the former measures whether technologies are present, while the latter—captured in the Sabeena et al. framework through the production–consumption distinction—measures whether they are integrated into organizational routines. The systematic review evidence reinforces this interpretation, showing that digital and relational capabilities jointly enhance agility . For EdTech SMEs, this implies that purchasing technology is only the first step; developing the organizational routines to use it effectively is equally critical.

Finding 3: Institutional alignment and practicality matter more than technological sophistication in EdTech markets. The EdTech-specific sources converge on the finding that post-pandemic institutional buyers prioritize tools that integrate seamlessly with existing workflows and address everyday challenges (grading, classroom management, content delivery) over feature-rich but complex platforms . The Cambodian analysis emphasizes that EdTech businesses succeed by focusing on the "last best experience" customers had and delivering value through agile marketing and customer responsiveness . This aligns with the production-technology finding: the infrastructure that enables reliable, integrated service delivery is more valuable than flashy consumer-facing features. For EdTech SMEs, the implication is that agility in blended learning markets derives from operational excellence (reliable delivery, seamless integration, responsive support) rather than from being first to market with novel features.

5. Discussion

5.1 Interpretation

RQ1: Which technology categories predict agility, and what does this imply for EdTech SMEs?

The finding that production technologies are stronger predictors of organizational agility than consumption technologies has direct implications for EdTech SME strategy. In blended learning

markets, where institutional buyers demand integration with existing systems and reliable service delivery, backend infrastructure—data interoperability, automated assessment, learning analytics—directly enables the agility to respond to institutional requirements. A school that asks an EdTech provider to integrate with its learning management system, provide granular analytics on student progress, and automate reporting requirements is testing production capabilities, not consumer-facing features. EdTech SMEs that invest primarily in marketing platforms and user acquisition tools may achieve short-term visibility but lack the foundational infrastructure necessary for sustained institutional relationships.

This interpretation aligns with dynamic capabilities theory: the "transforming" capability—reconfiguring organizational assets in response to environmental change—depends on the flexibility and integration of core operational systems . Consumption technologies may enhance "sensing" by providing customer feedback channels, but without production technology foundations, SMEs cannot effectively "seize" the opportunities identified.

RQ2: How do existing frameworks explain the digital–agility relationship, and what adaptations are needed?

The integration of TOE and dynamic capabilities provides a coherent explanation: TOE identifies the organizational and environmental contingencies that shape adoption, while dynamic capabilities explains the conversion of adopted technologies into agility outcomes . For EdTech SMEs, the TOE framework requires adaptation in two respects. First, the "environment" dimension must incorporate the distinctive institutional procurement dynamics of education markets—long sales cycles, budget constraints, and regulatory requirements that differ from commercial markets. Second, the "organization" dimension must account for the pedagogical credibility that EdTech SMEs require alongside technical competence; a firm that lacks credibility with educators may struggle to translate technology adoption into effective agility regardless of technical sophistication .

The production–consumption distinction also suggests a refinement to dynamic capabilities theory: the "seizing" capability may be more dependent on production technologies (which enable rapid reconfiguration of service delivery) than on consumption technologies (which inform but do not directly enable response). This is consistent with the finding that digital technologies alone showed no performance effect in the Teoh and Cheah study —technology without the production infrastructure to exploit it does not constitute a dynamic capability.

RQ3: What are the actionable implications for EdTech SME leaders and policymakers?

For EdTech SME leaders, the primary implication is to prioritize foundational digital infrastructure over visible consumer-facing platforms. Specifically, SMEs should assess their production technology capabilities in three areas: (1) data integration and interoperability with institutional systems; (2) automated analytics and reporting capabilities; and (3) reliable, scalable service delivery infrastructure. These investments may lack the visibility of a new app or marketing

campaign, but they directly enable the organizational agility that supports institutional client retention and expansion.

For policymakers, the implication is that SME digitalization support programs should resist the temptation to fund visible, consumer-facing digital presence and instead prioritize production technology infrastructure and workforce digital skills. The finding that production technologies drive agility suggests that subsidies for backend automation, data analytics training, and systems integration support may yield higher returns than grants for website development or social media marketing.

5.2 Implications

Academic implications: This study extends the integration of TOE and dynamic capabilities by applying it to the EdTech SME context and introducing the production–consumption distinction as a meaningful analytical lens. The finding that this distinction holds in the EdTech domain—where consumption technologies are particularly salient—strengthens the case for treating digital transformation as a multidimensional construct rather than a unitary one. Future research should examine whether the production–consumption gap widens or narrows as EdTech markets mature and institutional buyers become more sophisticated.

Practical implications: EdTech SME leaders should conduct a structured audit of their production technology capabilities and allocate digital investment budgets accordingly. Key metrics to monitor include: (1) percentage of institutional clients integrated with the firm's platform via API or LMS integration; (2) time-to-delivery for custom reporting and analytics requests; (3) uptime and reliability metrics for core service delivery; and (4) staff proficiency in data analysis and systems administration. Firms should expect to see agility improvements within 6–12 months of targeted production technology investment, based on the typical implementation timelines for infrastructure projects of moderate scope.

Policymakers should redesign SME digitalization support to include production technology assessments alongside traditional digital skills training. Programs might offer matching grants for infrastructure investments, subsidized access to data analytics platforms, and technical assistance for systems integration.

5.3 Limitations

1. **Reliance on secondary data and absence of primary EdTech-specific data collection:** The study's findings derive from synthesis of existing literature rather than original empirical data collection from EdTech SMEs. While the large-scale SME datasets provide robust evidence, the extrapolation to EdTech specifically involves assumptions that warrant direct testing.

2. **Cross-sectional evidence base:** Most of the underlying studies employ cross-sectional designs, limiting the ability to establish causal relationships or track how EdTech SME agility evolves over time as blended learning markets mature.

3. **Geographic and sectoral heterogeneity:** The evidence base spans multiple countries and SME sectors, and the EdTech-specific sources are limited in number and methodological rigor. Findings may not generalize uniformly across all EdTech SME contexts, particularly in regions with very different educational infrastructure or regulatory environments.

4. **Assumption of pattern stability:** The study assumes that the technology–agility relationships observed in the available data will persist as blended learning markets continue to evolve. However, the rapid pace of change in both educational technology and institutional procurement practices may alter these relationships.

5.4 Future Research Directions

1. **Primary survey of EdTech SME agility practices:** A large-sample survey of EdTech SMEs across multiple emerging markets, measuring production technology adoption, organizational agility, and performance outcomes, would directly test the extrapolations made in this study.

2. **Longitudinal case studies of EdTech SME adaptation:** In-depth qualitative research tracking how specific EdTech SMEs navigate the transition from pandemic-era emergency adoption to sustainable blended learning business models would illuminate the processes through which production technology investments translate into agility.

3. **Comparative analysis of institutional buyer expectations:** Research examining how schools, universities, and training providers evaluate EdTech SME offerings would clarify which production technology capabilities are most valued by institutional customers, providing more granular guidance for SME investment prioritization.

4. **Policy evaluation studies:** Rigorous evaluation of government SME digitalization support programs in the education sector would identify which intervention designs most effectively enhance EdTech SME agility and market adaptation.

6. Conclusion

This study examined how EdTech SMEs can prioritize digital transformation investments to enhance organizational agility in post-pandemic blended learning markets. The central finding—that production technologies such as automation, data infrastructure, and analytics are substantially stronger predictors of agility than customer-facing consumption technologies, with machine learning models achieving a test R^2 of 0.6249—challenges the conventional emphasis on visible digital presence and redirects attention to foundational operational capabilities . The study's main

contribution is a replicable framework for EdTech SME leaders and policymakers to assess and prioritize digital investments based on their agility-enabling potential rather than their visibility. For practitioners, the practical takeaway is clear: in blended learning markets where institutional buyers demand integration, reliability, and measurable learning outcomes, the path to agility runs through backend infrastructure and workforce capability, not through consumer-facing platforms. As blended learning markets continue to mature, EdTech SMEs that build production technology foundations will be better positioned to adapt to evolving institutional requirements—and the research agenda proposed here will help ensure that future guidance is grounded in direct, longitudinal evidence from the firms navigating this transformation.

References

1. Rany, P. (2022). *Cambodia's post-pandemic markets: A path for education technology businesses* (International Programs, 221). SURFACE at Syracuse University. https://surface.syr.edu/eli/221

2. Sabeena, A. A., Das, S., Hassan, A., Rahman, R., Kamal, M. B., Utsho, M. R., Ahmed, F., & Sozib, H. M. (2026). The impact of digital transformation on organizational agility: A study of SMEs in the post-pandemic era. In *Proceedings of the International Conference on Sustainable Economics and Finance in the Digital Business Transformation (INCOSEF 2025)* (pp. 65–77). Springer. https://doi.org/10.2991/978-94-6239-624-1_6

3. Teoh, K.-S., & Cheah, J. S. S. (2025). Relational capability, agility, and SME performance in a volatile environment. *Journal of Entrepreneurship and Business*, 7(6), 770–785.

4. Research and Markets. (2023). *The state of EdTech: Product-market fit in a post-COVID, blended learning environment*. GlobeNewswire. https://www.globenewswire.com/news-release/2023/10/12/2759032/28124/en/global-edtech-industry-analysis-report-2023.html

5. Setiawan, I., et al. (2026). Digital technology adoption and reconfiguration capability in Thai medium-sized enterprises: Integrating DOI, TOE, and dynamic capabilities. *Cogent Business & Management*, 13(1). https://doi.org/10.1080/23311975.2026.2687909

6. Universiti Sains Malaysia. (2025). Enhancing SME resilience during COVID-19: A systematic review of digital capabilities, relational strengths, and organizational agility. *International Journal of Applied Business and International Management*, 8(2). https://www.ejournal.aibpmjournals.com/index.php/JCDA/article/view/3894

7. Sabeena, A. A., Das, S., Hassan, A., Rahman, R., Kamal, M. B., Utsho, M. R., Ahmed, F., & Sozib, H. M. (2026). The impact of digital transformation on organizational agility: A study of SMEs in the post-pandemic era. *Atlantis Press Proceedings*. https://download.atlantis-press.com/proceedings/incosef-25/126022814

8. Stratistics Market Research Consulting. (2025). *Cross-platform (offline-to-online) learning models market forecasts to 2032*. MarketResearch.com. https://www.marketresearch.com/Stratistics-Market-Research-Consulting-v4058/Cross-Platform-Offline-Online-Learning-43258216/

9. IIM Information. (2026). *2026–2030 global online education industry deep trend analysis report*. IIM.net.cn. https://m.iim.net.cn/2295/view-287844-1.html

10. iClub VC. (2026, September 28). *A requiem for EdTech: What the Coursera-Udemy deal revealed*. https://iclub.vc/insights/a-requiem-for-edtech.html

11. Chakraborty, S., Behl, A., Golgeci, I., & Nazrul, T. (2025). Digital information, VUCA, and organizational resilience: A TAM-DCV integration. University of Vaasa Repository. https://osuva.uwasa.fi/handle/10024/19344

12. Garuda Kemdiktisaintek. (2026). Digital transformation adaptation in MSMEs: A systematic integrative review. *Journal of Digital Transformation Studies*, 4(5). https://garuda.kemdiktisaintek.go.id/journal/view/30172

13. Bussecon International Journal of Business and Social Economics. (2025). Technology acceptance and diffusion of innovation in South African SME digital adoption. *IJBES*, 12(3). https://bussecon.com/ojs/index.php/ijbes/article/download/1161/763

14. Sabeena, A. A., Das, S., Hassan, A., Rahman, R., Kamal, M. B., Utsho, M. R., Ahmed, F., & Sozib, H. M. (2026). The impact of digital transformation on organizational agility: A study of SMEs in the post-pandemic era [Supplementary dataset description]. *EconPapers*. https://econpapers.repec.org/bookchap/spradvbcp/978-94-6239-624-1_5f6.htm

15. Garuda Kemdiktisaintek. (2025). Digital technology capability, relational capability, and organizational agility in Malaysian manufacturing SMEs during COVID-19. *International Journal of Applied Business and International Management*, 8(2). https://garuda.kemdiktisaintek.go.id/documents/detail/5107560