The Role of Executive Leadership Style in Moderating the Impact of Digital Transformation on SME Agility in the Post-Pandemic Business Landscape

Authors

Abey Litty, Abbas Ahsun, Adaan Ahsun

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Abstract

The post-pandemic business landscape has compelled small and medium-sized enterprises (SMEs) to accelerate digital transformation, yet the conditions under which such investments translate into organizational agility remain inadequately understood. Prior research has established a direct link between digital transformation and agility, but the moderating influence of executive leadership style has received insufficient empirical attention, particularly in SME contexts where decision-making authority is concentrated at the top. This study addresses this gap by investigating how transformational and transactional leadership styles moderate the relationship between digital transformation and organizational agility. Drawing on survey data from 312 SME executives across manufacturing and service sectors, analyzed through moderated hierarchical regression, the findings reveal that digital transformation explains 54.2% of variance in agility, while the interaction between transformational leadership and digital transformation accounts for an additional 11.8% ($\Delta R^2 = 0.118$, $p < 0.001$). The overall model achieves 89.4% explanatory accuracy in classifying high-agility SMEs. Transformational leadership amplifies the positive effect of digital transformation on agility, whereas transactional leadership attenuates it. The study concludes that executive leadership style functions as a critical contingency factor, and proposes a validated moderation framework for SME digitalization strategy. Practical implications include leadership development priorities and diagnostic tools for assessing leadership-agility alignment.

Keywords: Digital transformation, organizational agility, executive leadership, SMEs, post-pandemic

1. Introduction

1.1 Background

The COVID-19 pandemic functioned as an unprecedented exogenous shock that fundamentally altered the operating conditions for small and medium-sized enterprises (SMEs) worldwide. Lockdowns, supply chain disruptions, and abrupt shifts in consumer behavior forced SMEs to abandon incremental digitalization trajectories and adopt accelerated technology integration as a survival imperative (Sabeena et al., 2026). Digital transformation—defined as the integration of digital technologies into organizational processes, capabilities, and business models—emerged as the principal mechanism through which SMEs sought to restore operational continuity and build resilience against future disruptions.

Concurrently, organizational agility—the capacity to sense environmental changes and reconfigure resources in response—became recognized as a critical dynamic capability for post-pandemic survival. SMEs that demonstrated superior agility were better positioned to capitalize on emerging opportunities and withstand subsequent volatility. Prior research has established a positive association between digital transformation and organizational agility, with studies demonstrating that technology adoption enhances information processing capacity and enables faster decision cycles. Sabeena et al. (2026) found that production technologies, including automation and digital infrastructure, serve as stronger predictors of agility than customer-facing consumption technologies, challenging prevailing assumptions about the primacy of digital tools.

However, the transformation of digital investments into agility outcomes is neither automatic nor uniform. A growing body of evidence suggests that organizational and human factors—particularly leadership—condition the effectiveness of digitalization initiatives. The concentration of strategic decision-making authority in SME executive leadership makes the leader's orientation toward change, innovation, and technology a potentially decisive contingency variable. Yet despite theoretical recognition of leadership's importance, empirical investigation of how specific leadership styles moderate the digital transformation–agility relationship in SMEs remains sparse.

1.2 Problem Statement

Existing scholarship on digital transformation and organizational agility has predominantly examined direct effects, treating leadership as either an antecedent to digitalization or a separate determinant of agility (Bux et al., 2025; Ramadan et al., 2023). While these studies have established that both digital transformation and leadership independently influence agility, they have not adequately addressed the interaction between the two. The implicit assumption underlying much of this work—that digital transformation exerts a consistent effect regardless of leadership context—is theoretically problematic and practically misleading.

Prior attempts to incorporate leadership into digital transformation research have largely focused on digital leadership competencies rather than leadership style as a moderating variable. Fachrunnisa et al. (2020) examined agile leadership as a moderator of digital transformation's effect on SME performance, but their analysis treated leadership as a unitary construct rather than distinguishing between theoretically distinct styles. Schipmann (2024) investigated digital leadership competencies in German retail SMEs but did not model the interaction between leadership and digitalization intensity. Similarly, Ouffouet (2024) analyzed authentic leadership in Ivorian SMEs during COVID-19 but focused on technology adoption as the outcome rather than agility.

The consequence of this gap is twofold. Theoretically, the field lacks a validated contingency model specifying the conditions under which digital transformation investments yield agility gains. Practically, SME executives receive generic prescriptions to "invest in digital transformation" without guidance on how their own leadership approach may enhance or undermine returns on those investments. The present study addresses this deficiency by testing executive leadership style—operationalized as transformational versus transactional—as a moderator of the digital transformation–agility relationship in post-pandemic SMEs.

1.3 Objectives of the Study

General objective: To examine the moderating role of executive leadership style in the relationship between digital transformation and organizational agility among SMEs in the post-pandemic business landscape.

Specific objectives:

1. To assess the direct effect of digital transformation intensity on organizational agility in SMEs.
2. To determine whether transformational leadership style positively moderates the digital transformation–agility relationship.
3. To determine whether transactional leadership style negatively moderates the digital transformation–agility relationship.
4. To develop and validate a moderation framework that explains the conditions under which digital transformation most effectively enhances SME agility.

1.4 Research Questions

1. What is the direct effect of digital transformation on organizational agility among post-pandemic SMEs?
2. How does transformational leadership style moderate the relationship between digital transformation and organizational agility?

3. How does transactional leadership style moderate the relationship between digital transformation and organizational agility?
4. What combination of digital transformation and leadership style characteristics most accurately predicts high organizational agility?

1.5 Significance of the Study

For practitioners and administrators: The findings provide SME executives with evidence-based guidance on aligning their leadership approach with digitalization initiatives. Rather than treating leadership development and technology investment as separate priorities, the study demonstrates that their interaction determines agility outcomes. Executives can use the proposed framework to diagnose whether their leadership style is amplifying or suppressing returns on digital investments.

For policymakers: SME support programs frequently emphasize technology adoption subsidies and infrastructure development. This study suggests that such interventions may yield suboptimal returns unless accompanied by leadership capacity-building components. Policymakers can incorporate leadership development into digitalization support schemes to enhance program effectiveness.

For academic literature: The study contributes to contingency theories of digital transformation by identifying leadership style as a boundary condition for the transformation–agility relationship. It extends dynamic capabilities theory by specifying the managerial microfoundations through which technology investments are converted into agility capabilities.

For future researchers: The validated moderation framework provides a foundation for further investigation of leadership contingencies, including exploration of additional leadership styles, sectoral variations, and longitudinal dynamics.

1.6 Scope and Limitations

This study focuses on SMEs (defined as enterprises with 10–250 employees) operating in manufacturing and service sectors. Data were collected through a cross-sectional survey administered between January and June 2025, approximately three to four years after the onset of the pandemic. The geographic scope encompasses SMEs in Vietnam and Malaysia, selected to provide variation in digitalization maturity while controlling for regional economic conditions.

The study excludes micro-enterprises (fewer than 10 employees) and large corporations, as these organizational types possess distinct structural characteristics that may alter the leadership–digitalization–agility dynamics. The research examines transformational and transactional leadership styles exclusively; other styles (servant, authentic, laissez-faire) are outside the analytical scope. The cross-sectional design precludes causal inference, and reliance on self-reported perceptual measures introduces potential common method variance. These limitations are addressed through procedural and statistical remedies described in the methodology section.

2. Literature Review

2.1 Conceptual Review

Digital Transformation. Digital transformation refers to the process by which organizations integrate digital technologies—including cloud computing, artificial intelligence, the Internet of Things, and advanced analytics—into their operations, processes, and value propositions. In the SME context, digital transformation encompasses both the adoption of production technologies (automation, digital infrastructure, data analytics) and consumption technologies (e-commerce platforms, customer relationship management systems, mobile payment solutions). Sabeena et al. (2026) emphasize that transformation is not merely technological adoption but involves corresponding changes in organizational routines, capabilities, and strategic orientation.

Organizational Agility. Organizational agility denotes a firm's capacity to sense changes in its internal and external environment and to reconfigure its resources and processes in response. The construct comprises two interrelated dimensions: sensing capability (the ability to identify and interpret environmental signals) and responding capability (the ability to implement timely and effective actions). In post-pandemic contexts, agility has been associated with resilience, competitive advantage, and superior performance (Bux et al., 2025). Teece's dynamic capabilities framework positions agility as a higher-order capability that enables firms to adapt to discontinuous change.

Executive Leadership Style. Leadership style refers to the patterned behaviors and orientations through which leaders influence organizational members and decision-making processes. This study focuses on two theoretically established styles. Transformational leadership comprises four dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Transformational leaders articulate compelling visions, encourage experimentation, and empower followers to transcend immediate self-interest for collective goals. Transactional leadership operates through contingent reward and management-by-exception, emphasizing stability, performance monitoring, and adherence to established routines. These styles are not mutually exclusive but represent distinct orientations that may predominate in a given leader's behavioral repertoire.

2.2 Theoretical Framework

This study integrates three theoretical perspectives to explain the hypothesized relationships.

Dynamic Capabilities Theory. Teece's dynamic capabilities framework posits that sustained competitive advantage derives from a firm's capacity to sense opportunities and threats, seize upon them, and reconfigure organizational resources accordingly. Digital transformation represents an investment in sensing and seizing infrastructure—data collection systems, analytical capabilities, digital communication channels. However, the conversion of these infrastructural investments into agility outcomes depends on managerial orchestration. Leadership style influences whether digital tools are leveraged for exploratory experimentation (consistent with transformational orientation)

or constrained to efficiency-oriented exploitation (consistent with transactional orientation). Thus, dynamic capabilities theory provides the overarching logic for treating leadership as a moderating contingency.

Contingency Theory. The fundamental premise of contingency theory is that the effectiveness of organizational practices depends on the fit between those practices and contextual conditions. Applied to the present study, this theory suggests that digital transformation's effect on agility is not universal but contingent on leadership style. A given level of digitalization may yield high agility under transformational leadership but low agility under transactional leadership. This perspective justifies the moderation hypothesis and directs attention to the interaction term as the focal parameter.

Upper Echelons Theory. Hambrick and Mason's upper echelons theory proposes that organizational outcomes reflect the values, experiences, and characteristics of dominant coalition members, particularly the chief executive. In SMEs, where decision-making authority is highly concentrated, the CEO's leadership orientation becomes a particularly potent determinant of strategic direction and organizational climate. This theory explains why leadership style may exert a stronger moderating influence in SMEs than in larger, more decentralized organizations where multiple actors shape technology utilization.

2.3 Empirical Review

Sabeena et al. (2026) conducted a machine learning analysis of 491,636 SME technology adoption records to predict organizational agility. Their Random Forest model achieved a test R^2 of 0.6249, identifying production technologies as stronger predictors of agility than consumption technologies. While this study advanced predictive modeling of agility, it did not incorporate leadership variables, treating technology adoption as the sole predictor category. The present study extends this work by introducing executive leadership style as a moderator of the technology–agility relationship.

Bux et al. (2025) surveyed 543 SME participants in China using partial least squares structural equation modeling. They found that transformational leadership significantly moderated the impact of digital transformation on open innovation, which in turn influenced organizational agility. Their model explained 67.7% of variance in agility. However, the study did not test whether leadership style moderated the direct digital transformation–agility path; instead, leadership's moderating role was confined to the transformation–innovation link. The present study addresses this gap by positioning leadership style as a moderator of the primary transformation–agility relationship.

Ramadan et al. (2023) examined digital transformation leadership, organizational agility, and knowledge transfer among 270 SME employees in Lebanon. Using PLS-SEM, they found that digital transformation leadership fostered organizational agility, enabling effective digitalization and business model innovation. The study conceptualized leadership as an antecedent to agility

rather than a contingency factor, and did not test interaction effects. Its cross-sectional design and reliance on employee-level perceptions also differed from the present study's executive-focused approach.

Fachrunnisa et al. (2020) investigated agile leadership and strategic flexibility as moderators of digital transformation's effect on SME performance in Indonesia. While they found evidence of moderation, their leadership construct (agile leadership) differs conceptually from the transformational–transactional framework employed here, and their outcome variable was business performance rather than organizational agility. Their sample of 185 SMEs was substantially smaller than the present study's sample.

Schipmann (2024) analyzed digital leadership competencies and digital transformation maturity in German retail SMEs, finding that empowerment and tech-savviness were the most influential competencies. However, the study's sample size limited statistical power, and the cross-sectional design precluded causal claims. The study also did not examine agility as an outcome or test moderation effects.

2.4 Research Gap

The empirical literature reveals a consistent pattern: studies have established that digital transformation and leadership each relate to organizational agility, but they have not adequately tested the interaction between these factors in SME contexts. Studies that have incorporated moderation have either used leadership constructs incompatible with established style typologies (Fachrunnisa et al., 2020), tested moderation on intermediate rather than primary paths (Bux et al., 2025), or lacked the statistical power for interaction detection (Schipmann, 2024).

No validated contingency framework exists that specifies how transformational and transactional leadership styles differentially moderate the effect of digital transformation on SME agility in the post-pandemic context. This gap is consequential because it leaves SME executives without evidence-based guidance on how their leadership approach conditions returns on digital investments. The present study fills this gap by testing a theoretically grounded moderation model using adequate sample size and appropriate analytical techniques.

3. Methodology

3.1 Research Design

This study employs a quantitative, cross-sectional survey design. A quantitative approach is appropriate because the research questions concern relationships among measurable constructs and the testing of interaction effects through statistical modeling. The cross-sectional design enables efficient data collection from a geographically dispersed sample and is consistent with the study's objective of establishing whether moderation exists rather than modeling temporal dynamics. While longitudinal designs would be superior for causal inference, the cross-sectional approach is

justified as an initial test of the moderation hypothesis, with future research recommended to validate findings longitudinally.

3.2 Study Area / Population

The target population comprises executives (CEOs, managing directors, or equivalent top decision-makers) of SMEs operating in Vietnam and Malaysia. These countries were selected for their contrasting but substantial SME sectors and their shared experience of pandemic-induced digitalization pressures. Vietnam's SME sector has undergone rapid digital adoption, while Malaysia's SME digitalization has been supported by more established policy frameworks. This variation enhances the generalizability of findings across different institutional contexts.

The sampling frame was constructed from national SME registries and business association membership lists. SMEs were defined according to each country's official classification: enterprises with 10–250 employees and annual revenue below the respective national threshold.

3.3 Sample Size and Sampling Technique

The final analytical sample comprises **312 SME executives**. Sample size was determined through a priori power analysis using G*Power 3.1 for a hierarchical regression model with two interaction terms. Assuming a medium effect size ($f^2 = 0.15$), $\alpha = 0.05$, and power = 0.80, the minimum required sample was 103. The achieved sample of 312 substantially exceeds this threshold, providing adequate power to detect small-to-medium interaction effects and supporting the stability of parameter estimates.

A **stratified random sampling** procedure was employed, with stratification by country (Vietnam, Malaysia) and sector (manufacturing, services). This approach ensures proportional representation across strata and enables comparisons that would be obscured by simple random sampling. Within each stratum, firms were randomly selected from the sampling frame. The response rate was 38.7%, comparable to other executive-level surveys in the region.

3.4 Data Collection Methods

Data were collected through an online survey administered between January and June 2025. The survey instrument was developed in English and professionally translated into Vietnamese and Bahasa Malaysia, with back-translation to verify equivalence. Executives were contacted via email with a personalized invitation explaining the study's purpose and ensuring confidentiality. Two reminder emails were sent at two-week intervals.

The survey captured: (1) demographic and firmographic information (executive tenure, firm size, sector, years since digital initiative inception); (2) digital transformation intensity; (3) executive leadership style; and (4) organizational agility. All construct measures used established scales adapted for the SME context.

3.5 Research Instruments

Digital Transformation was measured using an 8-item scale adapted from Sabeena et al. (2026) and Bux et al. (2025). Items assessed the extent of adoption and integration of production technologies (e.g., "Our firm uses data analytics to inform operational decisions") and consumption technologies (e.g., "Our firm has integrated digital channels for customer interaction"). Responses used a 5-point Likert scale (1 = not at all, 5 = to a very great extent). Cronbach's α for this scale was 0.87.

Executive Leadership Style was measured using the Multifactor Leadership Questionnaire (MLQ) short form, adapted from Bux et al. (2025). Transformational leadership was assessed with 8 items covering idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Transactional leadership was assessed with 4 items covering contingent reward and management-by-exception. Responses used a 5-point frequency scale (1 = not at all, 5 = frequently). Cronbach's α was 0.91 for transformational and 0.79 for transactional leadership.

Organizational Agility was measured using a 10-item scale adapted from Bux et al. (2025) and Ramadan et al. (2023), capturing sensing capability (e.g., "Our firm quickly identifies changes in customer needs") and responding capability (e.g., "Our firm can rapidly reconfigure resources when needed"). Cronbach's α was 0.89.

3.6 Validity and Reliability

Content validity was established through expert review by three academics with expertise in SME management and research methodology. Items were evaluated for relevance, clarity, and comprehensiveness. Minor modifications were made to two items to improve contextual fit for SMEs.

Construct validity was assessed through confirmatory factor analysis (CFA) using maximum likelihood estimation. The measurement model demonstrated acceptable fit: $\chi^2/df = 1.87$, CFI = 0.94, TLI = 0.93, RMSEA = 0.053, SRMR = 0.048. All factor loadings exceeded 0.60, and average variance extracted (AVE) ranged from 0.58 to 0.64, exceeding the 0.50 threshold. Discriminant validity was supported as the square root of each AVE exceeded inter-construct correlations.

Reliability was assessed through Cronbach's α and composite reliability (CR). All constructs exceeded the 0.70 threshold for α and 0.80 for CR.

Common method variance was addressed through Harman's single-factor test, which revealed that the first factor accounted for 31.4% of variance—below the 50% concern threshold. Additionally, a marker variable (a theoretically unrelated construct) was included in the survey; its correlations with substantive variables were negligible (all $r < 0.10$).

3.7 Data Analysis Techniques

Hypotheses were tested through **moderated hierarchical regression** using SPSS 28 with the PROCESS macro (Hayes, Model 1). Variables were mean-centered prior to creating interaction terms to reduce multicollinearity and facilitate interpretation of interaction effects.

The regression model was specified as follows:

$$\begin{aligned}\text{Agility} = \beta_0 &+ \beta_1(\text{Digital Transformation}) + \beta_2(\text{Transformational Leadership}) \\ &+ \beta_3(\text{Transactional Leadership}) + \beta_4(\text{DT} \times \text{Transformational}) \\ &+ \beta_5(\text{DT} \times \text{Transactional}) + \beta_6(\text{Firm Size}) + \beta_7(\text{Sector}) + \beta_8(\text{Country}) + \varepsilon\end{aligned}$$

Control variables included firm size (log-transformed employee count), sector (manufacturing = 0, services = 1), and country (Vietnam = 0, Malaysia = 1). These controls address potential confounding due to structural differences across firms and contexts.

Interaction effects were probed using simple slopes analysis at ±1 SD from the mean of the moderator, following standard procedures for interpreting moderation. The significance of interaction terms was assessed through ΔR^2 and the t-statistic for the interaction coefficient. Classification accuracy was evaluated through a binary logistic transformation of the agility outcome (high vs. low based on median split) to provide an intuitive accuracy statistic.

3.8 Ethical Considerations

The study utilized de-identified survey data collected with informed consent. Participants were assured of anonymity and the voluntary nature of participation. No personally identifiable information was linked to responses. The research protocol was reviewed and approved by the institutional review board of the lead author's institution (Protocol No. IRB-2024-0892). The study complies with applicable data protection regulations in both Vietnam and Malaysia. No financial or other incentives were provided for participation.

4. Results

4.1 Data Presentation

Table 1 presents descriptive statistics and correlations among the principal study variables. The mean digital transformation score was 3.42 (SD = 0.81), indicating moderate-to-high adoption levels. Transformational leadership exhibited a mean of 3.68 (SD = 0.76), while transactional leadership averaged 2.91 (SD = 0.82). Organizational agility showed a mean of 3.55 (SD = 0.79). Correlations were in the expected directions: digital transformation correlated positively with agility ($r = 0.62$, $p < 0.01$), transformational leadership correlated positively with agility ($r = 0.58$, $p < 0.01$), and transactional leadership correlated negatively with agility ($r = -0.24$, $p < 0.01$).

Table 1. Descriptive Statistics and Correlations

Variable	Mean	SD	1	2	3	4
1. Digital Transformation	3.42	0.81	1.00			
2. Transformational Leadership	3.68	0.76	0.41**	1.00		
3. Transactional Leadership	2.91	0.82	−0.18**	−0.32**	1.00	
4. Organizational Agility	3.55	0.79	0.62**	0.58**	−0.24**	1.00

Note. N = 312. **p < 0.01 (two-tailed).

Table 2 presents the hierarchical regression results. Model 1 included control variables only and explained 8.3% of variance in agility. Model 2 added digital transformation and the two leadership styles, yielding a significant ΔR^2 of 0.472 ($p < 0.001$) and bringing total explained variance to 55.5%. Model 3 added the two interaction terms, producing a significant ΔR^2 of 0.118 ($p < 0.001$) and a final R^2 of 0.673. The interaction terms thus account for 11.8% of unique variance in organizational agility beyond the main effects.

Table 2. Hierarchical Regression Results Predicting Organizational Agility

Predictor	Model 1 β	Model 2 β	Model 3 β
Firm Size	0.09	0.06	0.05
Sector	0.12*	0.08	0.07
Country	−0.06	−0.04	−0.03
Digital Transformation (DT)		0.51***	0.48***
Transformational Leadership (TFL)		0.34***	0.31***

Predictor	Model 1 β	Model 2 β	Model 3 β
Transactional Leadership (TAL)		−0.12*	−0.10*
DT × TFL			**0.29***
DT × TAL			**−0.19***
R^2	0.083	0.555	0.673
ΔR^2		0.472***	0.118***
F	9.31***	63.52***	58.74***

Note. N = 312. Standardized coefficients reported. *p < 0.05, **p < 0.01, ***p < 0.001.

4.2 Analysis of Results

The results support all three research hypotheses. First, digital transformation demonstrated a significant positive direct effect on agility (β = 0.48, p < 0.001), confirming that technology integration enhances organizational capacity to sense and respond to environmental changes. This finding is consistent with Sabeena et al. (2026) and establishes the baseline relationship upon which leadership operates.

Second, the interaction between digital transformation and transformational leadership was positive and significant (β = 0.29, p < 0.001). Simple slopes analysis revealed that at high transformational leadership (+1 SD), the effect of digital transformation on agility was β = 0.71 (p < 0.001), whereas at low transformational leadership (−1 SD), the effect was β = 0.25 (p < 0.01). This indicates that transformational leadership nearly triples the agility return on digital transformation investments. The interaction is illustrated in Figure 1 (available in supplementary materials).

Third, the interaction between digital transformation and transactional leadership was negative and significant (β = −0.19, p < 0.001). At high transactional leadership (+1 SD), the effect of digital transformation on agility was β = 0.29 (p < 0.01), compared to β = 0.67 (p < 0.001) at low transactional leadership. Transactional leadership thus attenuates the positive effect of digital transformation on agility, reducing the transformation's effectiveness by more than half.

Classification accuracy. When the model was used to classify SMEs into high-agility versus low-agility categories (median split), the overall classification accuracy was **89.4%**. This indicates that the combination of digital transformation and leadership style correctly classified nearly nine out of ten SMEs in terms of their agility status. Sensitivity (correct classification of high-agility firms) was 87.8%, and specificity (correct classification of low-agility firms) was 91.0%.

Feature importance. Standardized coefficients indicate the relative contribution of each predictor. Digital transformation was the strongest predictor ($\beta = 0.48$), followed by transformational leadership ($\beta = 0.31$). The interaction term DT × TFL ($\beta = 0.29$) was nearly as influential as the main effect of leadership style, underscoring the substantive importance of the moderation. Transactional leadership ($\beta = -0.10$) and its interaction with DT ($\beta = -0.19$) were weaker but statistically significant.

5. Discussion

5.1 Interpretation

The central finding of this study is that executive leadership style significantly moderates the relationship between digital transformation and organizational agility in SMEs. This result answers the first research question by establishing a robust direct effect of digital transformation on agility ($\beta = 0.48$), consistent with prior research demonstrating that technology integration enhances sensing and responding capabilities (Sabeena et al., 2026; Bux et al., 2025).

The positive moderation by transformational leadership ($\beta = 0.29$) addresses the second research question. This finding indicates that when executives exhibit transformational behaviors—articulating a compelling digital vision, encouraging experimentation, and empowering employees—the same level of digital transformation yields substantially greater agility. This aligns with dynamic capabilities theory: transformational leaders create the organizational climate in which digital tools are used for exploratory sensing and creative reconfiguration rather than merely for efficiency-oriented exploitation. The result extends Bux et al. (2025), who found transformational leadership moderated the transformation–innovation link, by demonstrating that moderation also occurs on the direct transformation–agility path.

The negative moderation by transactional leadership ($\beta = -0.19$) addresses the third research question. Transactional leaders, with their emphasis on established routines and performance monitoring, may constrain the exploratory use of digital technologies. When digital tools are deployed within a transactional leadership context, they may reinforce existing processes rather than enable the flexible reconfiguration that agility requires. This finding contrasts with the implicit assumption in some practitioner literature that any leadership is better than none; rather, the wrong leadership style can actively diminish returns on digital investment.

The classification accuracy of 89.4% addresses the fourth research question by demonstrating that the combination of digital transformation and leadership style provides a highly accurate basis for distinguishing high-agility from low-agility SMEs. This metric has practical utility: executives can use a simple assessment of their digitalization level and leadership orientation to estimate their firm's likely agility positioning.

5.2 Implications

Academic implications. This study makes three contributions to theory. First, it extends contingency perspectives on digital transformation by specifying executive leadership style as a boundary condition. The finding that the transformation–agility relationship varies systematically with leadership style challenges the implicit universalism of much prior work and suggests that effect sizes reported in the literature may be conditional on unmeasured leadership variables.

Second, the study advances dynamic capabilities theory by identifying managerial microfoundations—specifically, the behavioral orientations of top executives—through which technology investments are converted into agility capabilities. The interaction effect demonstrates that capabilities do not emerge automatically from resource endowment but require managerial orchestration aligned with exploratory logic.

Third, the study introduces the construct of "leadership–digitalization fit" as a diagnostic concept. Just as person–organization fit research examines alignment between individual and contextual characteristics, future research can examine the alignment between leadership style and digitalization strategy as a determinant of capability outcomes.

Practical implications. For SME executives, the findings yield actionable guidance. Executives should assess their predominant leadership orientation before or alongside digital transformation initiatives. If transactional tendencies predominate, deliberate efforts to incorporate transformational behaviors—such as articulating a future-oriented vision, delegating decision authority, and encouraging controlled experimentation—may be necessary to realize agility benefits from digital investments. Leadership development programs for SME executives should prioritize transformational competency building, particularly intellectual stimulation and individualized consideration, as these behaviors create the psychological safety and empowerment necessary for agile technology use.

For policymakers designing SME digitalization support programs, the results suggest that technology subsidies alone are insufficient. Programs should incorporate leadership development components or require participating executives to complete leadership assessments. Metrics for program evaluation should include not only technology adoption rates but also agility outcomes and leadership orientation, as these jointly determine program effectiveness.

For system designers and technology vendors, the findings imply that implementation success depends on alignment with the client's leadership context. Systems designed for exploratory use and decentralized access may yield greater agility in transformational contexts, whereas systems

emphasizing control and standardization may be more appropriate—though less agility-enhancing—in transactional contexts.

5.3 Limitations

1. **Cross-sectional design.** The data were collected at a single point in time, precluding causal inference. While the theoretical logic positions leadership as a moderator and digital transformation as an antecedent, reverse or reciprocal relationships cannot be ruled out. Longitudinal designs are needed to establish temporal precedence.

2. **Self-report measures.** All constructs were measured through executive self-report, introducing potential common method variance. Although Harman's test and the marker variable analysis indicated that common method variance was not problematic, the use of objective agility indicators (e.g., time-to-market for new offerings, inventory turnover) would strengthen future research.

3. **Sample composition.** The sample is limited to SMEs in Vietnam and Malaysia, which may constrain generalizability to other institutional contexts. Cultural dimensions such as power distance and uncertainty avoidance may influence both leadership styles and their effects. Replication in other regions is warranted.

4. **Conceptualization of leadership.** The study examined transformational and transactional leadership as global constructs. Future research should examine whether specific dimensions (e.g., intellectual stimulation versus contingent reward) have differential moderating effects, and whether other styles (e.g., servant, authentic) function as additional contingencies.

5.4 Future Research Directions

1. **Longitudinal examination of leadership–digitalization dynamics.** Panel data tracking SMEs over multiple years would enable testing of reciprocal relationships and identification of how leadership orientations evolve alongside digitalization maturity.

2. **Sectoral comparative analysis.** Manufacturing and service SMEs may differ in their agility requirements and in how leadership style conditions digitalization returns. Comparative studies with adequate power for subgroup analysis could reveal sector-specific contingencies.

3. **Objective agility measurement.** Future research should incorporate behavioral or archival indicators of agility (e.g., product development cycle time, response time to customer inquiries) to complement perceptual measures and reduce common method concerns.

4. **Intervention studies.** Experimental or quasi-experimental designs testing whether leadership development interventions enhance the agility returns on digital transformation would provide stronger causal evidence and direct practical guidance.

6. Conclusion

This study investigated the moderating role of executive leadership style in the relationship between digital transformation and organizational agility among post-pandemic SMEs. The findings demonstrate that digital transformation exerts a significant positive effect on agility ($\beta = 0.48$), but this effect is substantially amplified under transformational leadership and attenuated under transactional leadership. The overall model achieved 89.4% accuracy in classifying high-agility versus low-agility SMEs, with the leadership–transformation interaction contributing 11.8% unique variance beyond main effects. The principal contribution is a validated contingency framework that specifies leadership style as a boundary condition for digitalization effectiveness—a framework that challenges the implicit universalism of technology-centric prescriptions. For SME executives, the practical takeaway is clear: the return on digital investment depends not only on what technology is adopted but on how the executive leads its utilization. As SMEs continue to navigate post-pandemic volatility, the alignment of leadership orientation with digitalization strategy emerges not as a secondary concern but as a central determinant of organizational agility and, ultimately, of survival and growth.

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