

Navigating turbulence: innovations in business models within competitive and technological settings

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Abstract

This study explores how external environmental factors, competitive intensity and technological turbulence, influence business model innovation strategies in creative-sector small and medium-sized enterprises (SMEs). Environmental pressures create distinct strategic pathways: competitive intensity increased innovation activity focused on incremental adjustments, while technological turbulence increases exploratory innovation. Specifically, it examines the roles of business model experimentation (BME) and business model practice (BMP) as adaptive strategic responses, and the mediating role of innovativeness in shaping firm performance. Data were collected from 118 creative SMEs in Malang, Indonesia, and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to test a multi-path conceptual model. The results reveal that technological turbulence consistently drives both BME and BMP, highlighting its role as a key enabler of strategic renewal in dynamic environments. Competitive intensity, however, significantly influences BMP and innovativeness but has no direct effect on BME, suggesting that resource-constrained SMEs often favor incremental changes over riskier innovation paths. Innovativeness emerges as a significant mediator, especially in translating technological turbulence into improved performance outcomes. While BMP contributes directly to firm performance through process optimization and alignment with market expectations, BME does not show immediate performance benefits, reflecting its longer-term strategic nature. These findings underscore the importance of balancing exploration and exploitation in SME innovation strategies. The study offers theoretical contributions by integrating dynamic capabilities, contingency, and ambidexterity perspectives, and provides practical guidance for SMEs and policymakers aiming to foster resilience and adaptability in turbulent environments.

Keywords:

business model innovation; competitive intensity; innovativeness; SMEs; technological turbulence.

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Introduction

Small and medium-sized enterprises (SMEs) face strategic pressures to adapt their business models as technological change and market competition reshape opportunities for value creation and capture (Heikkilä et al., 2018). Business model innovation (BMI) encompasses changes to how firms organise activities, deliver value, and generate returns, extending adaptation beyond product and process improvements (Foss & Saebi, 2018; Schneider & Spieth, 2013). Chesbrough (2007) highlights the importance of business models in commercialising technological advances and posits that even groundbreaking technologies can fail to deliver value without an effective business model, while (Teece, 2010) connects their design to business strategy and value capture. The activity-system perspective similarly locates value creation in the configuration of interdependent business activities (Zott and Amit, (2001, 2015; 2010).

Environmental pressures can nevertheless encourage different strategic responses: competition raises the importance of responsive innovation, while technological change creates opportunities to explore alternative configurations (Calantone et al., 2003; Jansen et al., 2009). Competitive intensity concerns market rivalry and pressure for efficiency and responsiveness, whereas technological turbulence concerns changes in the technological environment (O’Leary, 2024; Porter, 1980). These pressures are relevant to creative SMEs, whose adaptation requires attention to both experimentation and the refinement of existing activities under resource constraints (O’Reilly III & Tushman, 2013).

Prior research offers competing expectations about how these pressures relate to BMI: technological turbulence has been associated with exploratory responses (Tetteh et al., 2025), whereas competitive intensity can favour incremental adjustment and operational responsiveness (Deshpandé et al., 2012; Sahi et al., 2019). Ambidexterity theory provides a basis for distinguishing these responses through exploration and exploitation (March, 1991; O’reilly III & Tushman, 2008). In this study, business model experimentation (BME) refers to the exploratory testing of alternative configurations. In contrast, business model practice (BMP) refers to the refinement and adjustment of existing arrangements (Raisch & Birkinshaw, 2008). Contextual ambidexterity further suggests that flexible organisational arrangements can support both orientations, including within resource-

constrained SMEs (Gibson & Birkinshaw, 2004; Mu et al., 2022). However, this distinction leaves open how competitive and technological pressures relate differently to BME and BMP and which internal capabilities help explain those relationships.

Organisational innovativeness offers a potential explanation because it concerns firms' capacity to generate, adopt, and implement new ideas and practices (Hassani & Mosconi, 2022). Research on external knowledge and absorptive capacity underscores the importance of internal capabilities in translating environmental information into organisational responses (Ferrerias-Méndez et al., 2015). Differences in firms' capacity to overcome innovation barriers may therefore qualify the assumption that similar external pressures produce similar strategic responses (Vlasova et al., 2024). The distinction also matters for performance: experimentation entails uncertain returns and potentially longer development horizons, whereas incremental adjustment may support more immediate operational improvements. Nevertheless, balancing exploration and exploitation requires understanding how environmental demands, internal innovativeness, and alternative innovation activities fit together rather than treating BMI as a uniform response to turbulence (O'Reilly III & Tushman, 2013).

This study aims to examine how competitive intensity and technological turbulence relate to business model experimentation, business model practice, and firm performance, and to assess the mediating roles of organisational innovativeness and the two BMI pathways. A quantitative survey was conducted among 118 creative-sector SMEs in Malang, Indonesia. Enterprises were selected purposively, with owners and managers providing assessments of environmental pressures, innovativeness, business model activities, and relative firm performance. Partial least squares structural equation modelling (PLS-SEM) was used to evaluate the measurement model and estimate the hypothesised direct and indirect relationships. This design enables the proposed pathways to be examined within a common framework, while its cross-sectional nature limits causal and temporal inference.

The study contributes to BMI research by distinguishing experimentation from ongoing business model refinement and examining their respective environmental and organisational antecedents. It applies an ambidexterity perspective to differentiated BMI activities and a dynamic capabilities perspective to the role of innovativeness in connecting external pressures with strategic responses. Incorporating firm performance further allows the analysis to distinguish relationships with innovation activities from relationships with organisational outcomes. The creative-SME setting provides a bounded context for understanding these pathways and informs managerial decisions about aligning business model activities with environmental demands and internal innovation capacity.

Literature review

Small and Medium Enterprises (SMEs) are increasingly recognised for their pivotal role in driving innovation, employment, and economic development across both emerging and developed economies. However, these firms often operate in turbulent environments marked by intense competition and rapid technological change, posing significant challenges to their sustainability and growth. To navigate such uncertainty, SMEs increasingly rely on Business Model Innovation (BMI), defined as the deliberate design and implementation of novel or refined business models to enhance firm performance and competitiveness (Foss & Saebi, 2018; Schneider & Spieth, 2013).

BMI encompasses two dominant forms: Business Model Experimentation (BME) and Business Model Practice (BMP). BME involves radical redesigns and explorative initiatives that seek to reconfigure the firm's core logic, typically associated with long-term strategic renewal (Heikkilä et al., 2018). In contrast, BMP represents incremental and exploitative changes aimed at refining existing models for efficiency and short-term gains (Dong & Wang, 2022). Understanding the antecedents and consequences of these strategic choices remains a critical yet underexplored area in innovation research, particularly within the SME and creative sector contexts.

This literature review synthesises existing knowledge around four core theoretical perspectives, Dynamic Capabilities Theory, Resource-Based View (RBV), Contingency Theory, and Ambidexterity Theory, to explain how external environmental pressures and internal capabilities jointly shape BMI decisions.

Dynamic capabilities theory

The dynamic capabilities framework offers a robust lens for examining how firms adapt to environmental turbulence through internal reconfiguration of resources (Dosi & Teece, 1998; Teece & Pisano, 2003). It emphasises three core capabilities: sensing opportunities, seizing them, and transforming organisational resources accordingly. In volatile markets characterised by technological turbulence and competitive intensity, dynamic capabilities enable firms to pursue proactive innovation, thereby supporting BMI (Arici & Gok, 2023).

Firms with strong dynamic capabilities are better positioned to implement BME, as these capabilities facilitate continuous experimentation and transformation (Coreynen et al., 2020). Innovativeness is an integral component of dynamic capabilities, enabling firms to respond creatively and flexibly to changing conditions. However, limited absorptive capacity often constrains SMEs' ability to leverage external knowledge, thereby limiting their innovation potential (Bodlaj & Čater, 2019).

Resource-based view (RBV)

The Resource-Based View (RBV) posits that competitive advantage stems from the possession of rare, valuable, and inimitable internal resources (Barney, 1991). Innovativeness is one such critical resource that enables firms to initiate and implement both radical and incremental innovations. Under RBV, firms with higher levels of innovativeness are more likely to develop and sustain differentiated business models, enhancing their competitive edge (Sahi et al., 2019).

In the context of BMI, firms with robust innovation capabilities tend to pursue BME to exploit new market opportunities and reposition their offerings (DeSarbo et al., 2007). Conversely, resource-constrained SMEs may adopt BMP to achieve incremental performance gains without significant risk (Deshpandé et al., 2012). Hence, RBV helps explain variation in BMI strategies based on firms' internal resource endowments.

Contingency theory

When firms are exposed to high technological turbulence, they are encouraged to adopt BME strategies that enable rapid adaptation and long-term value creation (Cozzolino et al., 2018). This perspective is especially relevant for SMEs that must choose between exploration and exploitation depending on the nature of environmental demands.

When firms are exposed to high technological turbulence, they are encouraged to adopt BME strategies that enable rapid adaptation and long-term value creation (Sinkovics et al., 2021; Tsai & Yang, 2013). In contrast, under high competitive intensity where market conditions demand quick, cost-effective responses, firms may prefer BMP to achieve operational efficiency (Dong & Wang, 2022). Recent research supports this dichotomy, suggesting that technological turbulence drives exploratory behaviour, while competitive intensity fosters exploitative strategies.

Ambidexterity theory

Ambidexterity theory distinguishes between exploration (radical innovation) and exploitation (incremental improvement) as two distinct yet complementary strategies that organisations must balance to survive and thrive in dynamic environments (March, 1991; O'reilly III & Tushman, 2008). BME aligns with exploration as it involves high risk, creativity, and long-term investment (Bocken et al., 2019). BMP, in contrast, corresponds to exploitation, focusing on refining existing models to improve efficiency (Heikkilä et al., 2018).

Organisational ambidexterity is particularly challenging for SMEs due to limited financial and managerial resources (Bodlaj & Čater, 2019). Yet, innovativeness can facilitate ambidexterity by equipping SMEs with the

cognitive and structural flexibility needed to manage dual innovation logics (Pulka et al., 2021). Contextual ambidexterity, characterised by a shared vision and participative leadership, is especially vital for SMEs to allocate attention between BME and BMP dynamically.

Environmental turbulence and business model innovation

Business Model Innovation has emerged as a primary strategic response for firms navigating turbulent environments (Foss & Saebi, 2018), encompassing both radical changes through BME and incremental refinements through BMP (Bouwman et al., 2019). Two dimensions of environmental turbulence are particularly relevant: competitive intensity, understood as the degree of rivalry among firms in a market (Coreynen et al., 2020), and technological turbulence, defined as the rate of technological change within the industry environment (Arici & Gok, 2023; Tsai & Yang, 2013).

The theoretical case for competitive intensity as a driver of BME rests on the premise that sustained rivalry pressures firms to differentiate their value propositions by redesigning their fundamental model (O'Leary et al., 2024). However, the empirical evidence is mixed. Several studies find that intense competition tends to produce short-horizon, efficiency-oriented innovation rather than radical experimentation, particularly among resource-constrained SMEs (Bodlaj & Cater, 2019; Sahi et al., 2019). The relationship between competitive intensity and BME is therefore posited to be positive and directional, while acknowledging that resource constraints may attenuate it. The evidence for competitive intensity as a driver of BMP is stronger: market rivalry that compresses margins and accelerates imitation creates immediate pressure to optimise existing models for cost and responsiveness (Dong & Wang, 2022).

Technological turbulence, by contrast, consistently emerges in the literature as a stimulus for exploratory rather than exploitative innovation. Accelerating technological change shortens the interval over which any given value-creation logic remains viable, thereby compressing the payback period of the existing model and weakening the case for continued refinement relative to the search for alternative configuration (Tsai and Yang, 2014; Molina-Castillo et al., 2024). Rapid technological advance simultaneously expands the set of feasible configurations, since capabilities that were previously unavailable become accessible and can be assembled into value propositions that the prior technological environment could not support. At the same time, the pace of technological change demands ongoing operational adaptation, supporting the view that technological turbulence also drives BMP (Coreynen et al., 2020).

H1: Competitive intensity positively influences business model experimentation (BME).

- H2: Competitive intensity positively influences business model practice (BMP).
- H3: Technological turbulence positively influences business model experimentation (BME).
- H4: Technological turbulence positively influences business model practice (BMP).

Innovativeness as mediating

Innovativeness concerns firms' capacity to generate and implement new ideas and practices (Hassani & Mosconi, 2022), providing a capability through which environmental pressures can inform strategic responses (Dosi & Teece, 1998). Innovative firms are better positioned to interpret turbulence as an opportunity and pursue exploratory responses (Arici & Gok, 2023; Tsai & Yang, 2013), whereas less innovative firms may favour conservative adjustments (Vlasova et al., 2024).

Competitive intensity stimulates innovativeness by exposing gaps in firms' offerings through competitors' pricing, products, and strategic initiatives (Sahi et al., 2019). As imitation erodes differentiation, firms face pressure to generate ideas and improve their offerings, although this search may remain focused on immediate, observable market demands. Bodlaj & Čater (2019) associate environmental turbulence with the importance SMEs attach to innovation, while Tsai & Yang (2013) show that competitive conditions shape the deployment and value of innovativeness.

- H5: Competitive intensity positively influences innovativeness.

Technological turbulence stimulates innovativeness through continuing demands for learning and capability renewal. Updating technological knowledge encourages experimentation and idea generation beyond individual adoption decisions (Abuseta et al., 2025; Troise et al., 2022). Evidence likewise associates technological turbulence with greater innovativeness (Arici & Gok, 2023; Bodlaj & Čater, 2019). Unlike responses centred on existing competitors, technological learning can extend firms' search beyond their current offerings.

- H6: Technological turbulence positively influences innovativeness.

Innovativeness, business model innovation, and firm performance

Innovativeness supports BME by providing routines for generating alternatives and evaluating unfamiliar knowledge, helping firms manage uncertainty during experimentation (Ferrerias-Méndez et al., 2015). These capabilities are relevant when testing changes to value creation and capture, whose consequences cannot readily be inferred from existing operations (Bocken et al., 2019; Heikkilä et al., 2018). Innovative firms may therefore be better equipped to interpret early feedback and revise configurations before committing further resources.

H7: Innovativeness positively influences business model experimentation (BME).

Innovativeness supports the recognition and correction of misalignment between existing business models and changing market conditions (Bouwman et al., 2019; Dong & Wang, 2022). Although incremental adjustment can draw on established routines, faster problem recognition and idea implementation should facilitate continued refinement.

H8: Innovativeness positively influences business model practice (BMP).

Innovativeness can also support performance independently of business model change through improvements in products, processes, and market responsiveness (Arici & Gok, 2023). Its performance implications may vary with environmental conditions and the complementary resources available to commercialise new ideas (Gupta & Batra, 2016; Tsai & Yang, 2013).

H9: Innovativeness positively influences firm performance.

Business model innovation and firm performance

BME can support strategic renewal and new value propositions, offering potential performance benefits over time (Leppänen et al., 2021; Teece, 2010). Evidence also links disruptive business model adoption to positive performance outcomes (Karimi & Walter, 2016). However, experimentation requires resources before a viable configuration is identified and scaled, which can create a lag between investment and returns (Teece, 2010). Configurational research further suggests that benefits depend on alignment with value drivers and environmental conditions (Leppänen et al., 2021). A positive relationship is therefore expected, while recognising that a cross-sectional assessment may capture these benefits incompletely. (Leppänen et al., 2021).

H10: Business model experimentation (BME) positively influences firm performance.

BMP offers a performance pathway through operational efficiency and market alignment. Adjustments to pricing, delivery, and customer interaction can improve responsiveness without requiring validation of an entirely new configuration (Clauss et al., 2019; Dong & Wang, 2022). SME research associates systematic business model practices with stronger performance (Bouwman et al., 2019; Latifi et al., 2021), while evidence on strategic agility highlights the value of continuous adjustment (Dayioglu et al., 2024).

H11: Business model practice (BMP) positively influences firm performance.

Mediation effects of innovativeness and business model innovation

Environmental pressures may relate to performance through internal capabilities and business model responses. This reasoning follows the dynamic capabilities perspective on capability development and deployment (Dosi & Teece, 1998; Teece et al., 1997), and the contingency perspective on responses

to different environmental demands (Dayioglu et al., 2024; Garcia et al., 2025). Accordingly, the proposed model specifies mediated pathways from turbulence to performance, with no direct paths between these constructs (Abuseta et al., 2025).

Innovativeness may mediate the relationships between turbulence and both BMI pathways by helping firms interpret environmental information and develop strategic responses (Arici & Gok, 2023; Molina-Castillo et al., 2024). Technological change requires firms to evaluate unfamiliar possibilities, while competitive pressure encourages responses to observable market initiatives. Innovativeness can support both processes through idea generation, evaluation, and implementation, enabling experimentation and incremental refinement.

H12a: Innovativeness mediates the relationship between competitive intensity and business model experimentation (BME).

H12b: Innovativeness mediates the relationship between competitive intensity and business model practice (BMP).

H13a: Innovativeness mediates the relationship between technological turbulence and business model experimentation (BME).

H13b: Innovativeness mediates the relationship between technological turbulence and business model practice (BMP).

Innovativeness may also link environmental turbulence to performance through improvements in products, processes, and responsiveness that do not require business model reconfiguration (Tsai & Yang, 2014). This pathway captures the performance implications of innovation capability separately from those associated with BME and BMP.

H14a: Innovativeness mediates the relationship between competitive intensity and firm performance.

H14b: Innovativeness mediates the relationship between technological turbulence and firm performance.

BME and BMP provide additional pathways linking environmental pressures to performance through strategic action (Clauss et al., 2019; Garcia et al., 2025). Experimentation responds through alternative value-creation configurations, while practice responds through efficiency and alignment within existing models. Their indirect relationships may differ because experimentation involves uncertain, potentially delayed returns, whereas incremental adjustments can yield more immediate operational benefits.

H15a: Business model experimentation (BME) mediates the relationship between competitive intensity and firm performance.

H15b: Business model practice (BMP) mediates the relationship between competitive intensity and firm performance.

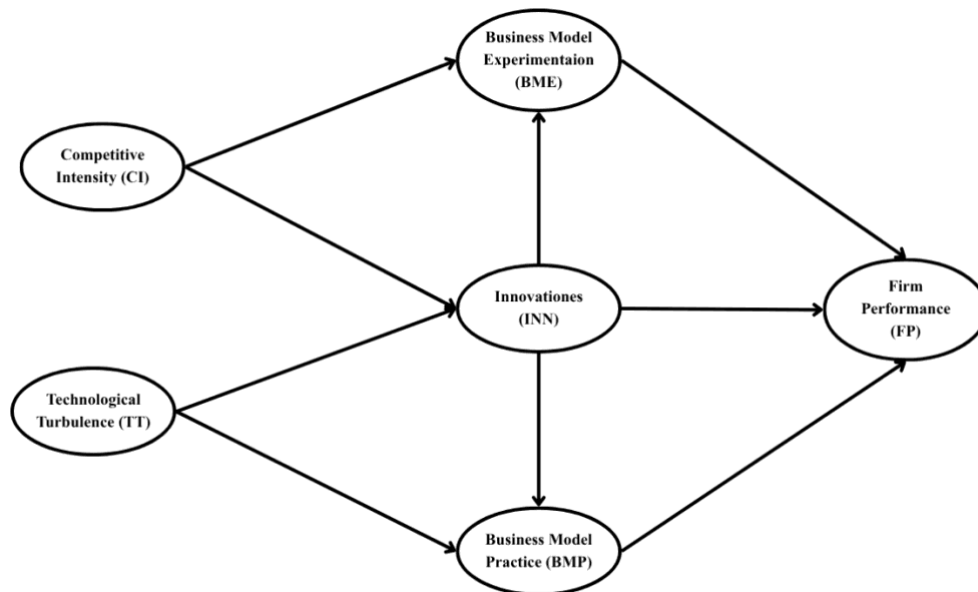
H16a: Business model experimentation (BME) mediates the relationship between technological turbulence and firm performance.

H16b: Business model practice (BMP) mediates the relationship between technological turbulence and firm performance.

Figure 1 depicts the hypothesised relationships linking competitive intensity and technological turbulence to firm performance through innovativeness, business model experimentation, and business model practice, encompassing the direct and mediated pathways specified in H1–H16.

Figure 1.

Research model



Source: Author's work (2025)

Research method

Research design

This study employed a quantitative survey to examine how competitive intensity and technological turbulence relate to business model experimentation (BME), business model practice (BMP), and firm performance, and to assess the mediating role of organisational innovativeness. This approach supports hypothesis testing and model estimation using structured data (Hair et al., 2014). The study focused on creative-sector SMEs in Malang City, East Java, Indonesia, a setting characterised by digital development and a dynamic creative economy (Badan Ekonomi Kreatif, 2022). Structured, self-administered questionnaires were distributed to business owners and managers.

Sampling and sample adequacy

Because no verified population register was available, purposive sampling was used. Eligible enterprises operated in the creative sector and met national SME classification thresholds. Respondents held ownership or

managerial positions and participated directly in strategic decision-making, ensuring familiarity with business model decisions. Screening for completeness and eligibility yielded 118 valid observations. Sample adequacy was initially assessed using the ten-times rule, based on the largest number of structural paths directed at a single construct (Hair et al., 2014). With three incoming paths, the corresponding minimum was 30 observations. The final sample exceeded this preliminary benchmark for PLS-SEM analysis (Hair et al., 2014). A complementary a priori power analysis was conducted in G*Power 3.1.9.7 using the F-test for multiple regression (fixed model, R^2 deviation from zero). With $f^2 = 0.20$, $\alpha = .05$, target power = .95, and three predictors, the analysis indicated a minimum sample size of 90, with power of 0.9503 at that sample size. The achieved sample of 118 exceeded this requirement under the specified assumptions.

Construct measurement

Competitive intensity (CI) was measured using three reflective items drawn from Coreynen et al. (2020). The original six-item scale was shortened before questionnaire administration to suit creative-sector SMEs (Coreynen et al., 2020), itself adapted from (Jaworski & Kohli, 1993). Item selection considered conceptual correspondence, contextual relevance, and clarity after translation into Indonesian. Three items addressing general rivalry, promotional competition, and competitor weakness were omitted; the reverse-coded competitor-weakness item was also excluded to reduce translation ambiguity. CI3 was reformulated to capture competitors' responsiveness to the firm's initiatives. The retained items addressed price rivalry, imitation, and competitor reactions. Because omitted items were never administered, reliability estimates for the full scale and before-and-after comparisons were unavailable.

Technological turbulence (TT) was measured using two indicators adapted from Tsai and Yang (2013) capturing the speed of technological change and development. The operationalisation focused on technological pace rather than unpredictability or disruption, reflecting SMEs' adoption of externally developed digital tools and platforms. Interpretation is therefore restricted to this dimension. Innovativeness (INN) was measured using three items adapted from Bouwman et al. (2019), assessing idea generation, implementation of innovations new to the market, and management of concurrent innovation projects.

Business model experimentation (BME) was assessed using three reflective items adapted from Bouwman et al. (2019). These captured experimentation with new configurations and the allocation of dedicated resources, including teams and budgets. Business model practice (BMP) was measured using three items adapted from Bouwman et al. (2019), addressing

strategically initiated changes, adjustments to market conditions, and routine business model updates. Firm performance (FP) was measured using five subjective indicators following Latifi et al. (2021). Respondents assessed performance relative to competitors in financial outcomes, market share, sales growth, new product development, and overall business development.

Common method bias assessment

The single-source, self-reported design raised potential common method bias (CMB), whereby measurement procedures introduce covariance unrelated to the underlying constructs (Podsakoff et al., 2003). This concern is particularly relevant when predictors and outcomes are assessed by the same respondent (Fuller et al., 2016). Procedural safeguards included psychological separation of constructs, varied scale formats, and clear, non-leading wording (Podsakoff et al., 2012). Constructs appeared in separate questionnaire sections, while assurances of anonymity and confidentiality were intended to reduce socially desirable responses.

Statistical assessment included Harman's single-factor test using unrotated exploratory factor analysis. The first factor explained less than 50% of total variance, indicating that no single factor dominated the responses. Full-collinearity assessment (Kock, 2015) additionally used a uniformly distributed random variable over [0,1] as an endogenous variable predicted by all six constructs. VIF values ranged from 1.341 to 1.913 (Appendix B), below the conservative threshold of 3.3. Together, these diagnostics provided no strong indication of substantial common-method influence, although they could not establish its complete absence.

Results

Appendix 1 reveals that SMEs perceive moderate to high levels of environmental turbulence and demonstrate proactive innovation behaviour, with BMP and innovativeness being slightly higher than BME. The measurement model was evaluated using indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Based on Appendix 2, all indicators had loadings above 0.70. Composite Reliability (CR) scores for all constructs have exceeded the recommended threshold of 0.70, demonstrating internal consistency. AVE values of all the constructs have exceeded 0.50, indicating strong convergent validity. The VIF values for all constructs fall within acceptable limits, indicating no significant multicollinearity in the model. This supports the reliability of the path coefficients and ensures that the indicators do not distort the analysis due to excessive correlation.

Discriminant validity was established using the Fornell–Larcker criterion and HTMT ratios. Based on the results presented in Appendix 3 and Appendix

4, it can be concluded that all constructs in the model exhibit strong discriminant validity. Specifically, the Fornell-Larcker criterion in Table 3 shows that the square root of the Average Variance Extracted (AVE) for each construct exceeds the corresponding correlations with other constructs, confirming their distinctiveness. Additionally, the HTMT ratios in Appendix 4 further support this conclusion, as all values are well below the 0.90 threshold, reinforcing the separation between constructs. Therefore, these findings confirm that the constructs are sufficiently distinct from one another, ensuring the robustness and reliability of the measurement model.

Following validation of the measurement model, the structural model was evaluated to assess the hypothesised relationships among constructs. This evaluation included an examination of path coefficients, significance levels (t-values and p-values), coefficients of determination (R^2), and predictive relevance (Q^2), as recommended by Hair et al. (2014). From Appendix 5, it can be concluded that Business Model Experimentation (BME) explains the highest amount of variance (39.6%) in the model, followed by Firm Performance (FP) at 35.3%, Business Model Practice (BMP) at 31.7%, and Innovativeness (INN) at 18.3%. After adjusting for the number of predictors, BME still holds the highest explanatory power with an adjusted R^2 of 0.380. Regarding predictive relevance, INN has the strongest predictive power ($Q^2 = 0.204$), followed by BMP ($Q^2 = 0.183$) and BME ($Q^2 = 0.164$), whereas FP shows the weakest ($Q^2 = 0.102$). BME shows the strongest explanatory and predictive power, while INN, despite its lower explanatory power, exhibits the highest predictive relevance residual (SRMR), d_ULS, d_G, chi-square, and Normed Fit Index (NFI).

Table 1.

Model fit

Metric	Saturated Model	Estimated Model
SRMR	0.074	0.088
d_ULS	1.039	1.459
d_G	0.528	0.568
Chi-square	360.787	373.587
NFI	0.748	0.739

Source: Author's work (2025)

The SRMR values for both models are below the 0.10 threshold, indicating acceptable model fit. Although the NFI values are below the preferred 0.90 threshold, this is not uncommon in PLS-SEM, where predictive relevance is prioritised over exact model fit, as shown in Table 1. The hypothesis testing process in PLS-SEM involves evaluating the significance of the hypothesised relationships within the structural model. To assess the significance of the direct and indirect paths, we employed bootstrapping with 5,000 resamples, a widely accepted method for generating t-statistics and p-

values. The significance of each path is assessed by examining the path coefficients (β), t-statistics, and p-values. A path is considered significant if the t-statistic exceeds 1.96 and the p-value is less than 0.05, indicating a statistically significant relationship at the 5% level. The results provide estimates of the relationships between competitive intensity, technological turbulence, business model experimentation, business model practice, innovation, and firm performance.

Table 2 summarises the direct effects, including path coefficients, t-statistics, p-values, and the level of support for each hypothesis.

Table 2.

Path coefficient and hypothesis testing

Hypothesis	Path	Coefficient (β)	t-Statistic	p-Value	Decision
H1	CI $\rightarrow$ BME	0.130	1.443	0.149	Not Supported
H2	CI $\rightarrow$ BMP	0.261	2.637	0.008	Supported
H3	TT $\rightarrow$ BME	0.330	3.859	<0.001	Supported
H4	TT $\rightarrow$ BMP	0.278	2.662	0.008	Supported
H5	CI $\rightarrow$ INN	0.194	2.005	0.045	Supported
H6	TT $\rightarrow$ INN	0.317	3.228	0.001	Supported
H7	INN $\rightarrow$ BME	0.350	4.445	<0.001	Supported
H8	INN $\rightarrow$ BMP	0.204	2.009	0.045	Supported
H9	INN $\rightarrow$ FP	0.347	3.869	<0.001	Supported
H10	BME $\rightarrow$ FP	0.146	1.349	0.178	Not Supported
H11	BMP $\rightarrow$ FP	0.235	2.638	0.008	Supported

Source: Author's work (2025)

Table 2 presents the results of the direct path hypothesis testing, showing the path coefficients, t-statistics, and p-values for H1–H11. The findings reveal several significant relationships, such as H2, where competitive intensity positively influences business model practice (BMP) ($\beta = 0.261$, $p = 0.008$), and H9, where innovativeness positively affects firm performance (FP) ($\beta = 0.347$, $p < 0.001$). On the other hand, H1 (competitive intensity $\rightarrow$ business model experimentation) was not significant ($p = 0.149$), indicating that competitive intensity does not significantly influence BME in this study.

For indirect effects, the mediation paths are evaluated similarly, with significant indirect paths indicating how one variable influences another through a mediator. Table 8 presents the results of the indirect effects, capturing the mediating roles of innovation, BME, and BMP in linking external environmental factors to firm performance.

Table 3 presents the indirect effects for hypotheses H12–H16, focusing on whether innovativeness or the business model constructs mediate the effects of external factors on firm performance. Notably, H13a (Technological turbulence $\rightarrow$ Innovativeness $\rightarrow$ BME) and H14b (Technological turbulence $\rightarrow$ Innovativeness $\rightarrow$ firm performance) were significant, with p-values of 0.014 and 0.016, respectively, suggesting that innovations mediate the relationships between technological turbulence and both BME and firm

performance. However, other mediation paths, such as H12a (Competitive intensity $\rightarrow$ Innovativeness $\rightarrow$ BME), were not significant ($p = 0.089$), indicating that the mediation effect is weaker in some cases.

Table 3.
Indirect effects

Hypothesis	Path	β	t-value	p-value	Decision
H12a	CI $\rightarrow$ INN $\rightarrow$ BME	0.068	1.703	0.089	Not Supported
H12b	CI $\rightarrow$ INN $\rightarrow$ BMP	0.040	1.157	0.247	Not Supported
H13a	TT $\rightarrow$ INN $\rightarrow$ BME	0.111	2.455	0.014	Supported
H13b	TT $\rightarrow$ INN $\rightarrow$ BMP	0.065	1.525	0.127	Not Supported
H14a	CI $\rightarrow$ INN $\rightarrow$ FP	0.067	1.577	0.115	Not Supported
H14b	TT $\rightarrow$ INN $\rightarrow$ FP	0.110	2.413	0.016	Supported
H15a	CI $\rightarrow$ BME $\rightarrow$ FP	0.019	0.784	0.433	Not Supported
H15b	CI $\rightarrow$ BMP $\rightarrow$ FP	0.061	1.786	0.074	Not Supported
H16a	TT $\rightarrow$ BME $\rightarrow$ FP	0.065	1.810	0.070	Not Supported
H16b	TT $\rightarrow$ BMP $\rightarrow$ FP	0.048	1.287	0.198	Not Supported

Source: Author's work (2025)

Discussion

This study examined the mechanisms through which external environmental conditions, specifically competitive intensity and technological turbulence, shape business model innovation (BMI) within creative-sector SMEs. The findings provide empirical evidence for the differentiated roles these external forces play and highlight innovativeness as a critical mediating capability. Drawing on theoretical perspectives such as dynamic capabilities theory, the resource-based view (RBV), contingency theory, and ambidexterity theory, this discussion revisits the research hypotheses. It interprets key findings in relation to extant literature.

Technological turbulence emerged as a strong and consistent predictor of both business model experimentation (BME) and business model practice (BMP), supporting Hypotheses H3 and H4. These results align with the dynamic capabilities framework, which posits that firms operating in high-velocity environments must be able to sense, seize, and reconfigure resources in response to rapid change (Arici & Gok, 2023; Teece & Pisano, 2003). The influence of technological turbulence on both radical (BME) and incremental (BMP) innovation pathways is consistent with studies indicating that the accelerating pace of technological change necessitates continuous adaptation to maintain competitiveness (Coreynen et al., 2020; Tsai & Yang, 2013).

In contrast, competitive intensity demonstrated a more selective influence, significantly affecting BMP (H2) and innovativeness (H5) but not BME (H1). This partially supports the expected hypotheses and indicates a nuanced response among SMEs facing intense market competition. These findings are in line with the RBV and contingency theory, which suggest that firms under resource constraints are more likely to pursue less risky and more efficient innovation paths (Bodlaj & Čater, 2019; Deshpandé et al., 2012). The

lack of a direct relationship between competitive intensity and BME reflects the cautious stance SMEs often adopt when radical changes require high levels of investment and uncertain returns (Sahi et al., 2019).

Innovativeness, conceptualised as the firm's capacity to generate and implement novel ideas, was hypothesised as a mediator between external forces and both BMI and firm performance (H12a–H13b; H14a–H14b). The empirical findings provide strong support for innovativeness as a mediator in the relationship between technological turbulence and both BMI and performance, validating hypotheses H13a and H14b. These results substantiate dynamic capabilities theory by underscoring the importance of internal competencies in translating environmental changes into innovative (Arici & Gok, 2023; Dosi & Teece, 1998).

However, the mediation pathways involving competitive intensity revealed weaker or non-significant effects, particularly concerning BME (H12a, H14a). This suggests that while competitive intensity may stimulate some level of innovation, it does not necessarily lead to radical experimentation. This divergence reinforces previous findings that competitive pressure often leads to short-term, efficiency-oriented innovations rather than transformative business model redesigns (Bao et al., 2012; Pulka et al., 2021).

The structural model results provide evidence for the distinct impacts of BME and BMP on firm performance. BMP demonstrated a significant and positive association with performance (H11), supporting the notion that incremental innovation enhances operational efficiency and market alignment. Conversely, BME did not significantly influence short-term performance (H10), a finding that mirrors prior studies emphasising the longer time horizon required for returns on radical innovation (Dong & Wang, 2022).

These findings point to the strategic trade-off SMEs must manage between the immediacy of performance gains from BMP and the future potential of BME. For resource-constrained firms, a focus on BMP may provide necessary short-term competitiveness, while selective investments in BME could secure long-term growth. This balancing act reflects the core premise of ambidexterity theory, which posits that firms must simultaneously explore new opportunities and exploit existing capabilities (O'Reilly III & Tushman, 2013).

One unexpected finding was the lack of a significant relationship between competitive intensity and BME, despite theoretical assumptions that competition compels firms to innovate. This outcome may be explained by the sectoral and contextual characteristics of the sampled SMEs. Creative-sector SMEs in Malang may lack the slack resources or organisational structures needed to support experimentation under competitive pressure (Bao et al., 2012). Additionally, managerial risk aversion and short-term survival goals may further inhibit engagement in high-risk innovation activities.

The integration of four theoretical frameworks, dynamic capabilities, RBV, contingency theory, and ambidexterity, allowed for a comprehensive analysis of how internal and external factors interact to influence innovation strategies in SMEs. The findings support the view that technological turbulence activates dynamic capabilities, particularly innovativeness, which in turn drives both exploratory and exploitative BMI. This confirms the theoretical expectation that environmental turbulence enhances the need for strategic flexibility and internal capability development (Cozzolino et al., 2018; Dosi & Teece, 1998).

The research questions centred on how competitive intensity and technological turbulence influence BME and BMP, and whether innovativeness mediates the relationships between them. The findings affirm that technological turbulence is a more consistent trigger for both forms of BMI, while competitive intensity exerts a narrower influence, largely stimulating BMP. Innovativeness plays a crucial mediating role, especially in technologically turbulent environments. These insights highlight the importance of aligning internal capabilities with external conditions, reinforcing contingency theory's core argument.

From a strategic standpoint, creative-sector SMEs should consider fostering innovation not merely as a goal but as a mechanism for translating external challenges into actionable innovations. Firms that invest in building innovation capacity, through training, cross-functional teams, and experimentation budgets, are better positioned to respond dynamically to technological change. Given the lack of immediate performance returns from BME, SMEs must manage resource allocation carefully, ensuring short-term viability through BMP while preparing for future competitiveness through BME.

Conclusion, limitation, and future research

This study examines how Small and Medium Enterprises (SMEs) in the creative sector navigate environmental turbulence through Business Model Innovation (BMI). The empirical evidence reveals that technological turbulence is a consistent driver of both Business Model Experimentation (BME) and Business Model Practice (BMP). In contrast, competitive intensity primarily influences BMP by prompting incremental innovation responses. Innovativeness emerges as a critical mediating mechanism in translating technological turbulence into business model experimentation and firm performance; its mediating role for competitive intensity and the indirect routes running through BME and BMP to performance were not statistically supported and should not be generalised. The findings demonstrate that SMEs pursue both BME and BMP directly in response to external pressures, consistent with contextual ambidexterity. However, the present data support

these as direct effects rather than as established mediating chains. While BMP delivers more immediate performance benefits, BME cultivates long-term strategic flexibility and adaptive capacity.

The research advances theoretical development by integrating dynamic capabilities and ambidexterity perspectives into BMI research. Innovativeness functions as a pivotal capability that bridges environmental sensing and strategic action, while the dual-path construct of BMI refines existing conceptualisations by revealing distinct antecedents and performance trajectories. This layered perspective contributes to understanding how organisational capabilities interrelate and evolve.

For practitioners, these findings suggest that SME managers should cultivate organisational innovativeness to respond effectively to rapid technological change by institutionalising mechanisms that encourage experimentation and operational refinement. Although BME may not generate immediate returns, it builds strategic resilience essential for long-term sustainability. Policymakers should support dual innovation pathways through targeted interventions, such as innovation grants, incubation platforms, and university-industry collaborations, that mitigate the risks associated with experimental business models while accelerating the adoption of proven practices.

Several limitations constrain the interpretation and generalizability of these findings. The cross-sectional design restricts causal inference regarding the relationships examined. The research instrument did not capture respondent demographic characteristics, including the specific creative subsector of each enterprise, firm age, and firm size. This omission precludes the presentation of a detailed respondent profile. It prevents comparative analysis across subsectors, which constrains contextual interpretation given that design, culinary, fashion, and digital media enterprises plausibly face different technological and competitive pressures. The sample's geographic and sectoral specificity—limited to creative-sector SMEs in Malang, Indonesia—may constrain applicability to other contexts. Reliance on self-reported data raises concerns regarding response bias and common method variance. The conceptual model examines only two environmental dimensions: competitive intensity and technological turbulence, while broader contextual factors such as regulatory frameworks, sustainability mandates, and digital transformation pressures remain unexplored. Future studies testing these specific relationships may benefit from a larger sample to achieve more robust detection of these weaker effects.

Future investigations should employ longitudinal designs to capture temporal dynamics of BME and BMP effects on performance, thereby enabling more robust causal inferences. Instruments that record subsector classification alongside firm age and size would permit multigroup comparison across

creative subsectors and enable assessment of whether the observed relationships hold uniformly across the creative economy. Comparative studies across diverse geographic regions, industrial sectors, and developmental stages would enhance understanding of the contextual contingencies that affect BMI adoption. Methodological triangulation, incorporating objective performance metrics, could address concerns about self-report bias. Expanding the theoretical framework to include additional environmental variables would provide a more comprehensive understanding of forces shaping SME innovation strategies. Research should also investigate alternative organisational capabilities—such as absorptive capacity, strategic agility, and digital readiness—as potential mediators or moderators influencing BMI processes and outcomes. These research directions would advance knowledge of how SMEs sustain innovation in dynamic settings and contribute to the development of more robust, context-sensitive frameworks for theory and practice.

Author contribution

Brillyanes Sanawiri: Conceptualisation, Investigation, Analysis, Writing – Original Draft, Research Design, Methodology. **Ari Irawan:** Supervision. **Rosalita Rachma Agusti:** Data Collection, Analysis, Editing and Formatting. **Mohammad Iqbal:** Data Analysis. **Rizal Alfisyahr:** Validation and Writing – Review and Editing.

Declaration of interest

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Appendix 1.

Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Competitive intensity	3.97	0.63	2.4	5.0
Technological turbulence	4.22	0.71	2.8	5.0
Innovativeness	4.06	0.68	2.5	5.0
Business model experimentation (BME)	3.85	0.61	2.6	5.0
Business model practice (BMP)	4.01	0.59	2.7	5.0
Firm performance	3.89	0.64	2.9	5.0

Source: Author's work (2025)

Appendix 2.

Convergent validity and reliability and VIF value

Items	Outer Loading	VIF
Competitive intensity ($\alpha = 0.744$; CR = 0.750; AVE = 0.659)		
CI.1 Price competition	0.777	1.240
CI.2 Competitors starting to offer similar product/service	0.803	1.883
CI.3 Competitor's reactions to your initiatives	0.854	1.968
Technological turbulence ($\alpha = 0.721$; CR = 0.875; AVE = 0.771)		
TT.1 Rapid changing technology	0.810	1.466
TT.2 Rapid increasing technological development	0.941	1.466
Innovativeness ($\alpha = 0.859$; CR = 0.860; AVE = 0.780)		
INN.1 We aim to create multiple innovations annually	0.874	2.016
INN2. We introduce innovations that are completely new to the market	0.876	2.164

INN3. Creating more than one innovation at the same time is common practice	0.899	2.428
Business model experimentation ($\alpha=0.750$; CR= 0.758; AVE= 0.665)		
BME1. Experimented with the (implementation of) their business model	0.783	1.279
BME2. Had a specific team to manage business model changes	0.795	1.836
BME3. Allocated budgets for business model experimentation	0.866	2.011
Business model practice ($\alpha=0.883$; CR= 0.855; AVE= 0.810)		
BMP1. Used to gain competitive advantages	0.891	2.454
BMP2. Designed in response to market circumstances	0.910	2.702
BMP3. Derived from enterprise's strategy	0.899	2.354
Firm performance ($\alpha=0.917$; CR= 0.919; AVE= 0.753)		
FP1. Relative to our competitors, our financial performance was much better.	0.779	1.946
FP2. Relative to our competitors, the market share of our organization was much better.	0.879	2.816
FP3. Relative to our competitors, the sales growth of our organization was much better.	0.885	3.607
FP4. Relative to our competitors, the product development of our organization was much better.	0.889	4.013
FP5. Relative to our competitors, the development of our organization was much better.	0.902	3.510

Source: Author's work (2025)

Appendix 3.

Fornell-Larcker criterion

Construct	CI	TT	INN	BME	BMP	FP
CI	0.812					
TT	0.362	0.878				
INN	0.309	0.388	0.883			
BME	0.357	0.512	0.517	0.815		
BMP	0.425	0.452	0.393	0.570	0.900	
FP	0.402	0.402	0.515	0.460	0.454	0.868

Source: Author's work (2025)

Appendix 4.

HTMT ratio

	CI	TT	INN	BME	BMP	FP
Competitive intensity						
Technological turbulence	0.504					
Innovativeness	0.382	0.445				
Business model experimentation	0.454	0.615	0.637			
Business model practice	0.508	0.570	0.450	0.690		
Firm performance	0.476	0.489	0.577	0.546	0.502	

Source: Author's work (2025)

Appendix 5.

Coefficient of determination (R^2)

Construct	R^2	R^2 Adjusted	Q^2
INN	0.183	0.169	0.204
BME	0.396	0.380	0.164
BMP	0.317	0.299	0.183
FP	0.353	0.336	0.102

Source: Author's work (2025)