

Synergising competitiveness and technological innovation to enhance micro, small and medium enterprise resilience through entrepreneurial orientation in the digital era



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Background: Micro, small and medium enterprises (MSMEs) are vital to Indonesia's economy but remain vulnerable to global competition, economic shocks and digital disruption, challenges intensified by the coronavirus disease 2019 crisis.

Aim: This study aims to develop an integrated model to enhance MSME resilience by synergising competitiveness and technological innovation, with entrepreneurial orientation (EO) as a mediating factor.

Setting: The research was conducted in Makassar City, Indonesia, involving digitally adaptive MSMEs across various sectors.

Methods: A mixed-methods approach was employed, combining quantitative analysis through structural equation modelling–partial least squares based on responses from 200 MSMEs and qualitative data from interviews and focus group discussions with 10 key informants. Seventeen questionnaire items were used to measure four constructs: competitiveness, technological innovation, EO and business resilience.

Results: Competitiveness significantly enhances business resilience, while technological innovation influences it indirectly through EO. Both competitiveness and innovation strengthen EO, which positively impacts resilience. Qualitative findings highlight proactive mindsets, risk-taking and digital adaptability as key to sustainability.

Conclusion: Micro, small and medium enterprise resilience relies not only on competitiveness or technology adoption but also on EO that transforms these resources into adaptive strategies.

Contribution: This study enriches strategic entrepreneurship literature by validating an integrative model and offering policy insights to foster entrepreneurial capability and technology adoption.

Keywords: MSME resilience; competitiveness; technological innovation; entrepreneurial orientation; digital era.

Introduction

Business resilience has emerged as a critical pillar for micro, small and medium enterprises (MSMEs) as they grapple with the uncertainties of a rapidly evolving global landscape. This includes economic globalisation, technological disruption and intensified market competition (Hokmabadi, Rezvani & De Matos 2024). In Indonesia, where MSMEs contribute more than 60% to the gross domestic product (GDP) and provide over 90% of national employment, ensuring their resilience is not just a business concern – it is an economic imperative (Hidayat et al. 2020; Tambunan 2019).

The coronavirus disease 2019 (COVID-19) pandemic further underscored the fragility of MSMEs. Many experienced substantial revenue losses, supply chain disruptions and shifts in consumer behaviour which necessitated rapid strategic adjustments (Bresciani et al. 2021). These disruptions revealed structural weaknesses, particularly the limited digital capacity and financial buffers among MSMEs. As a result, resilience building has become a central objective in both business strategy and policy frameworks aimed at supporting MSMEs' survival and growth in the post-pandemic era (Kraus, Breier & Dasí 2020; Muhammad et al. 2021).

One foundational component of MSME resilience is competitiveness. Competitive businesses are not only better positioned to survive economic downturns but they also possess the adaptive capability to seize new market opportunities. Factors that bolster competitiveness include product innovation, operational efficiency, quality improvement and customer-centric strategies (Hidayat et al. 2020). Moreover, effective positioning in digital marketplaces is essential in an environment where traditional market boundaries are rapidly dissolving.

In the digital era, MSMEs can no longer rely solely on conventional models of competition. The integration of technology has redefined how businesses create value, interact with customers and manage operations (Cunningham et al. 2023). Competitiveness now depends heavily on digital readiness – ranging from digital marketing and online customer engagement to the use of enterprise resource planning systems (Hidayat 2022). In this context, digital transformation is not optional; it is a prerequisite for sustainability and scale.

Technological innovation serves as both a catalyst and an enabler of resilience. Innovation enables MSMEs to boost productivity, lower operational costs and create differentiated products that align with shifting consumer preferences. This potential is increasingly realised through digital tools that translate innovation into practical outcomes. E-commerce platforms, mobile applications, digital payment systems and cloud-based inventory solutions open access to wider markets and improve business efficiency (Handayani & Soeparan 2022). Yet, adoption across the sector remains uneven, hindered by barriers such as inadequate infrastructure, limited digital literacy and restricted financial access (Novita, Oktaningrum & Sanjaya 2022). To fully leverage these opportunities, competitiveness and innovation must be grounded in a strong entrepreneurial orientation (EO). Such an orientation – defined by innovativeness, proactiveness and risk-taking – enables MSMEs to manage uncertainty and pursue continuous strategic renewal (Rauch et al. 2009). For MSMEs, EO plays a mediating role, transforming technological capabilities and competitive advantage into tangible business resilience and performance outcomes (Hidayat, Maryadi & Zaeni 2024).

Furthermore, EO enables MSMEs to be opportunity-driven rather than problem-reactive. This is especially crucial in environments characterised by volatility and complexity, where static business models often fail. By fostering a mindset of continuous innovation and market responsiveness, EO allows MSMEs to realign their strategies with changing external conditions, enhancing their long-term viability (Lumpkin & Dess 1996).

Ismiyanti et al. (2025) and Akbar and Amir (2024) confirm the importance of combining these three strategic elements – competitiveness, innovation and entrepreneurship. However, there remains a gap in integrated models that simultaneously

explore their synergistic effect on resilience, particularly in developing economies such as Indonesia. This gap often overlooks the interdependencies essential for holistic business sustainability (Firman & Hidayat 2023; Octasyilva et al. 2022). Addressing this gap is crucial for formulating evidence-based policies and practical frameworks that support MSMEs. To this end, a synergistic model that incorporates EO as a mediating mechanism between competitiveness and technological innovation offers a promising avenue for research and application. Such a model can inform interventions that not only enhance MSME resilience but also foster inclusive economic development.

Micro, small and medium enterprise resilience in the digital era is no longer a function of size or capital alone. It requires strategic alignment of competitiveness, technological innovation and EO. Policymakers, business associations and development agencies must collaboratively support MSMEs in building these capabilities to ensure their growth and survival in an increasingly uncertain world (Hokmabadi et al. 2024; Napontun, Sophachit & Senachai 2025).

Competitiveness and business resilience

Competitiveness is widely recognised as a critical determinant of business resilience, particularly in the face of market volatility and economic shocks. Porter's (1985) theory of competitive advantage posits that business can sustain superior performance by differentiating their products or becoming cost leaders. These competitive strategies are essential for MSMEs, which often face resource constraints yet operate in highly dynamic markets. Barney's (1991) resource-based view (RBV) also reinforces the idea that internal capabilities – such as knowledge, innovation and operational excellence – are key to building and sustaining competitive advantage, which in turn supports long-term resilience.

European studies offer additional insights into how competitiveness links to business survival and adaptive capacity. For instance, Fernández-Mesa and Alegre (2015), studying Spanish manufacturing small and medium enterprises (SMEs), found that competitive strategy moderated by innovation capability significantly influenced business resilience and performance. Similarly, Crick and Crick (2016) demonstrated that competitive positioning and strategic alliances played a crucial role in enhancing the agility and resilience of UK-based SMEs during periods of uncertainty. These findings highlight the importance of not only possessing internal strengths but also maintaining flexibility in business models to withstand external shocks.

Research from East Asia, particularly China, further supports the argument that competitiveness contributes to business resilience. For example, Wang, Hong and Kwon (2020) found that Chinese SMEs that actively pursued digital transformation and supply chain partnerships were more resilient during the US-China trade conflict and the COVID-19 pandemic. Their ability to integrate customer-centric innovation and lean operations helped them absorb

disruptions and rebound faster. This aligns with the findings of Zhang and Zhu (2022), who emphasised the role of dynamic capability in mediating the effect of market competitiveness on business survival. These studies indicate that competitiveness, when combined with strategic foresight and responsiveness, is not merely a market advantage but a foundational element of business resilience. To sustain competitive advantage, MSME strategies and public policies must jointly foster innovation and accelerate digital technology adoption, laying the foundation for stronger business resilience.

Technological innovation and business resilience

Technological innovation is widely regarded as a critical enabler of business resilience, especially in the context of digital transformation. The innovation diffusion theory (Rogers 2003) explains how, why and at what rate new technologies are adopted within a population. For MSMEs, technological adoption can lead to improved efficiency, customer reach and market access. Digital technologies such as e-commerce platforms, mobile payment systems and cloud-based services have revolutionised the way MSMEs operate by enhancing their agility and adaptability (Bresciani et al. 2021; Handayani & Soeparan 2022).

From a strategic standpoint, innovation capabilities are integral to organisational learning and renewal. The dynamic capabilities theory (Teece, Pisano, & Shuen 1997) emphasises the importance of a business ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments. Micro, small and medium enterprises that are able to swiftly integrate digital solutions are more resilient because they can reconfigure their operations, marketing channels and customer engagement processes in real time. This is supported by Novita et al. (2022), who found that MSMEs leveraging digital platforms experienced increased market resilience and revenue recovery during pandemic-induced lockdowns.

However, technological innovation is not without its barriers. Despite the proven benefits, many MSMEs struggle with adoption because of limited digital literacy, inadequate infrastructure and financial constraints (Tambunan 2019). Research by Hidayat (2025) highlights the uneven distribution of technological capability among MSMEs, which affects their resilience. The study emphasises the need for targeted policies and capacity-building initiatives to enable more inclusive technological diffusion across the MSME sector. As such, enhancing innovation readiness becomes a strategic priority for both business survival and long-term competitiveness.

Entrepreneurial orientation as a mediator

Entrepreneurial orientation is defined as the strategic posture of a business that reflects its inclination towards innovation, proactiveness and risk-taking (Lumpkin & Dess 1996). Entrepreneurial orientation serves as a critical mediator that

translates external capabilities such as competitiveness and innovation into performance and resilience outcomes. Businesses with a high level of EO are more likely to explore new opportunities, reconfigure strategies under pressure and foster a culture of continuous improvement. In the context of MSMEs, EO enables strategic adaptability, which is essential for surviving in uncertain and complex environments (Rauch et al. 2009).

The mediating role of EO is grounded in the strategic entrepreneurship framework, which emphasises the integration of opportunity-seeking (entrepreneurship) and advantage-seeking (strategy) behaviours (Ireland, Hitt & Sirmon 2003). Entrepreneurial orientation mediates the impact of competitiveness by enabling MSMEs to convert strategic advantages into innovative practices and market expansion. For example, Hidayat et al. (2024) found that EO significantly mediates the relationship between digital competencies and business performance among MSMEs in Indonesia. This implies that competitiveness alone is not sufficient – entrepreneurial thinking is necessary to actualise its benefits.

Likewise, EO acts as a bridge between technological innovation and resilience. Micro, small and medium enterprises that adopt digital technologies but lack an entrepreneurial mindset often fail to leverage these tools effectively. Hidayat (2025) showed that MSMEs with high EO were more likely to implement innovative solutions in ways that aligned with market demands and organisational goals. Moreover, EO fosters organisational learning, experimentation and strategic agility, all of which are essential for resilience. Therefore, fostering EO within MSMEs not only enhances the impact of competitiveness and innovation but also ensures their sustainable performance in the digital economy.

Hypothesis development

Business resilience depends heavily on a business's ability to compete effectively in dynamic environments. According to the RBV (Barney 1991), businesses with unique and inimitable competitive resources are more likely to withstand market turbulence. Prior research by Crick and Crick (2016) and Wang et al. (2020) demonstrated that SMEs with strong competitive positioning – through innovation, operational efficiency and market responsiveness – show greater adaptive capacity during crises, such as the COVID-19 pandemic. Therefore, competitiveness enhances resilience by equipping business with strategic flexibility to respond to external disruptions:

H1: *Competitiveness has a significant positive effect on business resilience.*

The dynamic capabilities theory (Teece et al. 1997) argues that firms that can integrate, reconfigure and renew their technological capabilities are more likely to survive and grow in changing environments. Technological innovation allows MSMEs to digitise operations, reach new markets and

streamline supply chains, thereby improving their resilience. Empirical studies by Bresciani et al. (2021) and Zhang and Zhu (2022) show that SMEs that adopted digital platforms and cloud-based systems during the pandemic were better able to maintain continuity and recover quickly. Innovation thus acts as a buffer against environmental shocks:

H2: *Technological innovation has a significant positive effect on business resilience.*

Firms with strong competitive strategies often foster a culture of proactive market engagement, risk-taking and innovation – all core dimensions of EO (Lumpkin & Dess 1996). Competitiveness encourages business to anticipate customer needs and experiment with novel business models, which are hallmarks of entrepreneurial behaviour. Research by Fernández-Mesa and Alegre (2015) and Hughes and Morgan (2007) confirms that competitive pressure and resource optimisation drive higher EO among SMEs, leading to more agile and opportunity-seeking behaviour:

H3: *Competitiveness has a significant positive effect on entrepreneurial orientation.*

Technological innovation not only transforms operational capabilities but also promotes an entrepreneurial mindset by encouraging experimentation and new value creation. The innovation diffusion theory (Rogers 2003) explains how early adopters of technology often exhibit characteristics associated with high EO. Studies by Rauch et al. (2009) and Hidayat et al. (2024) indicate that digital tools enhance strategic proactiveness and enable SMEs to identify and exploit market opportunities more effectively. Hence, innovation capability fuels EO by fostering risk-taking and innovative practices:

H4: *Technological innovation has a significant positive effect on entrepreneurial orientation.*

Entrepreneurial orientation is a critical enabler of organisational adaptability and survival. Businesses with high EO are more likely to innovate, take calculated risks and respond swiftly to market changes, thereby strengthening their resilience. The strategic entrepreneurship framework (Ireland et al. 2003) emphasises EO as a means of aligning opportunity-seeking behaviour with strategic advantage. Empirical research by Kraus et al. (2020) and Rauch et al. (2009) supports this, showing that EO positively influences a business ability to pivot during crises and sustain performance under uncertainty:

H5: *Entrepreneurial orientation has a significant positive effect on business resilience.*

Entrepreneurial orientation acts as a mediating mechanism that transforms competitive advantage into resilience. While competitiveness provides the foundation – such as market access and resource efficiency – EO operationalises these assets into innovative actions that help business adapt to change. Studies by Wiklund and Shepherd (2005) and Firman and Hidayat (2023) reveal that EO enhances the impact of competitive strategies by fostering flexibility and

responsiveness, ultimately strengthening business resilience in volatile environments:

H6: *Competitiveness has a significant positive effect on business resilience through entrepreneurial orientation.*

The indirect pathway from technological innovation to resilience through EO is supported by the notion that innovation, when filtered through an entrepreneurial lens, leads to more effective strategic adaptation. Business that are technologically advanced but lack EO may not fully exploit their innovation potential. According to Zhang and Zhu (2022) and Ireland et al. (2003), EO mediates the transformation of innovation into actionable strategies that enhance responsiveness and problem-solving under pressure, thereby contributing significantly to business resilience.

H7: *Technological innovation has a significant positive effect on business resilience through entrepreneurial orientation.*

Research methods and design

Research design

This study employed a convergent mixed-methods design to achieve a comprehensive understanding of the causal and mediating relationships among competitiveness, technological innovation, EO and business resilience within the MSME context. This design was chosen because it allows quantitative and qualitative data to be collected and analysed in parallel, enabling the results to complement and validate each other, thereby providing a richer and more reliable interpretation aligned with the research objectives. The primary quantitative method involved structural equation modelling using the partial least squares approach (SEM-PLS), which is well-suited for predictive modelling and examining complex interdependencies, including both direct and indirect effects among latent constructs.

To complement the quantitative analysis, qualitative data were collected and analysed using Miles and Huberman's (1994) thematic framework, which includes data reduction, display, verification and conclusion drawing. This integration facilitates methodological triangulation and enhances the validity of the findings.

The research process commenced with an extensive review of extant literature to inform the development of a conceptual model and to derive seven research hypotheses. Research instruments – comprising structured questionnaires and semi-structured interview protocols – were subsequently developed and validated. Using purposive sampling, 200 MSME respondent from various sectors in Makassar City, Indonesia, were selected, all of whom had adopted technological innovations initiatives. In addition, 10 key informants, including business owners and industry experts, participated in in-depth interviews, while focus group discussions (FGDs) were conducted with local MSME stakeholders to provide triangulated insights.

Quantitative data were analysed using Smart-PLS 4.0 to assess measurement and structural models, including reliability, validity and the estimation of path coefficients. Meanwhile, qualitative data were thematically coded and interpreted to elucidate underlying mechanisms and contextual factors influencing the constructs. The combination of statistical rigour and qualitative richness rendered this methodology particularly robust for investigating dynamic, innovation-driven MSME ecosystems in emerging markets.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Institut Teknologi Dan Bisnis Nobel Indonesia Ethical Review Committee (No. 001/KE/ITB-Nobel/VII/2025).

Results

Quantitative results

Using SEM-PLS through Smart-PLS 4.0, this study empirically examined the structural relationships among the latent constructs of competitiveness, technological innovation, EO and business resilience. A total of 200 MSME respondents from Makassar City were selected using purposive sampling, focusing on businesses that had adopted competitive strategies and digital innovation in their operations. In this research, a total of 17 questionnaire items were used, consisting of 4 items for competitiveness, 3 items for technological innovation, 5 items for EO and 5 items for business resilience. These questionnaires were tested for validity and reliability, and the results indicated acceptable goodness-of-fit values, confirming that all items were valid and reliable for use in this study (Hair et al. 2021; Henseler, Hubona & Ray 2016). The data collection employed validated instruments with multiple indicators per construct, measured on a five-point Likert scale (Likert 1932). This methodological approach allowed for a comprehensive assessment of both the measurement model (validity and reliability of indicators) and the structural model (interrelations among constructs), making SEM-PLS particularly suitable for theory testing and exploratory research in the context of emerging markets (Chin 1998; Hair et al. 2019).

The model was designed to test seven hypotheses, capturing both direct and indirect effects. Direct paths were assessed to determine whether competitiveness and technological innovation had immediate impacts on business resilience and EO. Indirect paths were explored to evaluate the mediating role of EO in linking competitiveness and innovation to resilience. The use of bootstrapping procedures further strengthened the robustness of the estimates, allowing for significance testing of both the direct and mediating effects. This comprehensive modelling approach provides a nuanced understanding of how internal strategic resources and entrepreneurial behaviours interact to enhance the resilience of MSMEs facing environmental uncertainty and digital transformation pressures.

Loading factor

The loading factor analysis provides critical insights into the validity of the measurement model by examining how well each indicator reflects its respective construct. High loading values indicate strong correlations between observed variables and their latent constructs, affirming the reliability and internal consistency of the questionnaire items. In this study, all indicator loadings exceeded the recommended threshold of 0.70, demonstrating that each item significantly contributes to the measurement of its corresponding variable.

The loading factor analysis reveals that all indicators exhibit strong and acceptable values, exceeding the commonly recommended threshold of 0.70 (Table 1), illustrate the respective loading factor values. This confirms that each item effectively measures its corresponding latent construct. For the competitiveness variable, loading factors range from 0.839 to 0.915, indicating a consistently strong association between the observed indicators and the construct. Similarly, technological innovation indicators show loading values between 0.924 and 0.944, reflecting reliable measurement quality. The EO construct is represented by indicators with loading values from 0.832 to 0.944, where EO2 demonstrates the highest contribution, suggesting a particularly strong alignment with the entrepreneurial mindset dimension. Business resilience indicators yield some of the strongest loadings in the dataset, ranging from 0.839 to 0.915, with BR4 standing out as the most dominant item. These findings confirm the presence of convergent validity across all constructs, supporting the reliability of the measurement model and indicating that the instrument used in this study is robust in capturing the intended latent dimensions.

Model fit and reliability

The evaluation of model fit and reliability is a critical step in SEM, as it ensures that the measurement model is both statistically sound and conceptually coherent. This process involves assessing the extent to which the observed variables reliably capture the underlying latent constructs. A well-fitted model enhances the credibility of the research findings by demonstrating that the indicators used are both consistent and valid in measuring what they are intended to represent. Ensuring model fit also provides confidence that the structural paths among constructs are not distorted by measurement errors or conceptual misalignment.

In this study, the reliability and validity of the model were rigorously tested using four key statistical indicators: composite reliability (CR), Cronbach's alpha, average variance extracted (AVE) and the heterotrait-monotrait (HTMT) ratio. The CR and Cronbach's alpha values for all constructs exceeded the recommended threshold of 0.70, confirming strong internal consistency. Average variance extracted values were above 0.50, establishing convergent validity by

TABLE 1: Loading factors.

Construct	Loading factor
COM1	0.854
COM2	0.891
COM3	0.872
COM4	0.891
TI1	0.923
TI2	0.944
TI3	0.930
EO1	0.891
EO2	0.882
EO3	0.832
EO4	0.871
EO5	0.944
BR1	0.896
BR2	0.839
BR3	0.901
BR4	0.915
BR5	0.881

COM, competitiveness; TI, technological innovation; EO, entrepreneurial orientation; BR, business resilience.

indicating that the constructs explain more than half of the variance in their indicators. Furthermore, HTMT values were below the conservative cut-off of 0.90 for all construct pairs, supporting discriminant validity by showing that each construct is empirically distinct from the others. Together, these results affirm the robustness of the measurement model and its suitability for further structural analysis.

The reliability and validity of the measurement model were assessed using Cronbach's alpha, CR, AVE and the HTMT ratio (Table 2). The results confirm that the measurement model demonstrates strong internal consistency, convergent validity and discriminant validity. Cronbach's alpha values for all constructs range from 0.901 to 0.932, exceeding the recommended threshold of 0.70. This indicates that the items within each construct are consistently measuring the same underlying concept. Composite reliability values are also satisfactory, ranging from 0.906 (competitiveness) to 0.939 (business resilience), further confirming internal consistency and construct reliability.

The AVE values, which assess the amount of variance captured by the construct in relation to measurement error, are all above the minimum recommended level of 0.50. Average variance extracted values range from 0.770 to 0.869, demonstrating acceptable convergent validity across all constructs. Heterotrait–monotrait ratios for all construct pairs are reported as less than 0.90, satisfying the criterion for discriminant validity. These results collectively indicate that the model is statistically reliable and valid, and that the constructs are distinct yet conceptually coherent within the structural model.

Coefficient determination (R-square)

R^2 (coefficient of determination) is a key indicator of how well the model explains the variance in the dependent variables. In SEM-PLS, a higher R^2 value indicates stronger predictive power and a better-fitting model. Interpreting R^2 is important because it shows the extent to which the

TABLE 2: Model fit and reliability.

Construct	Cronbach's alpha	CR	AVE	HTMT (max vs other constructs)
Competitiveness	0.901	0.906	0.770	<0.9
Technological innovation	0.925	0.929	0.869	<0.9
Entrepreneurial orientation	0.930	0.937	0.783	<0.9
Business resilience	0.932	0.939	0.786	<0.9

CR, Composite reliability; AVE, average variance extracted; HTMT, heterotrait–monotrait.

TABLE 3: Coefficient determination (r -square).

Construct (dependent variable)	Predictors	Adjusted R^2
EO	COM, TI	0.630 (63%)
BR	COM, TI, EO	0.509 (50.9%)

EO, Entrepreneurial orientation; BR, Business resilience; COM, Competitiveness; TI, Technological innovation.

independent variables – such as competitiveness, technological innovation and EO – collectively account for changes in business resilience. According to Hair et al. (2019), R^2 values of 0.25, 0.50 and 0.75 can be considered weak, moderate and substantial, respectively, providing a benchmark for assessing the strength of the model.

The adjusted R^2 values (Table 3) indicate that the model demonstrates strong explanatory power. Entrepreneurial orientation is explained by competitiveness and technological innovation at 63%, confirming that these predictors substantially influence the development of an entrepreneurial mindset among MSMEs. Similarly, business resilience is explained by competitiveness, technological innovation and EO at 50.9%, reflecting a moderate level of model fit and predictive relevance. These results validate the theoretical framework, showing that strategic resources and entrepreneurial behaviour collectively provide a robust explanation of MSME resilience and support the model's applicability for guiding policy and managerial decisions in dynamic business environments.

Direct effect (algorithm analysis)

The analysis of direct effects through the algorithm procedure in SEM-PLS is essential for evaluating the strength and significance of the hypothesised relationships between constructs. This step provides insight into how independent variables such as competitiveness and technological innovation directly influence business resilience and EO. In this study (Table 4), all direct path coefficients were found to be significant, indicating robust and meaningful relationships that support the proposed theoretical framework.

The analysis of the direct effects with SEM-PLS showed that of the five pathways tested, four pathways proved to be statistically significant, while one pathway was insignificant. This can be seen from the β coefficients, t -values and p -values produced.

For H1, the path competitiveness $\rightarrow$ business resilience shows a β coefficient of 0.327 with a t -value of 4.143,

TABLE 4: Direct effect.

Pathway	β coefficient	<i>t</i> -value	<i>p</i> -value	Decision
COM $\rightarrow$ BR	0.327	4.143	0.000	Supported
TI $\rightarrow$ BR	-0.11	0.108	0.914	Not supported
COM $\rightarrow$ EO	0.288	4.293	0.000	Supported
TI $\rightarrow$ EO	0.569	8.574	0.000	Supported
EO $\rightarrow$ BR	0.465	5.750	0.000	Supported

COM, competitiveness; TI, technological innovation; EO, entrepreneurial orientation; BR, business resilience.

TABLE 5: Indirect effect (bootstrapping).

Indirect path	β Coefficient	<i>t</i> -value	<i>p</i> -value	Decision
COM $\rightarrow$ EO $\rightarrow$ BR	0.134	3.434	0.001	Supported
TI $\rightarrow$ EO $\rightarrow$ BR	0.265	4.687	0.000	Supported

COM, competitiveness; TI, technological innovation; EO, entrepreneurial orientation; BR, business resilience.

supporting the hypothesis that competitiveness significantly enhances resilience. This finding is consistent with the RBV (Barney 1991), which posits that business-specific capabilities, such as competitive advantage, play a critical role in surviving market turbulence. The result aligns with Crick and Crick (2016) and Wang et al. (2020), who found that competitive SMEs were more adaptive during crises like the COVID-19 pandemic. Furthermore, these findings are consistent with Fernández-Mesa and Alegre (2015), who demonstrated that competitive strategies, when strengthened by innovation capability, have a significant positive impact on firm resilience and performance.

For H2, the technology innovation $\rightarrow$ business resilience pathway was not significant, with a coefficient of $\beta = -0.11$, *t*-value = 0.108 and *p*-value = 0.914. This means that technological innovation in the context of this research sample does not directly increase business resilience. These findings show that technology adoption alone is not enough to ensure resilience, without strong managerial capabilities and business strategies. These results differ from some previous studies (e.g. Bresciani et al. 2021; Zhang & Zhu 2022), so it can be an indication of the presence of contextual factors that influence.

Regarding H3, the relationship between competitiveness and EO has a strong β coefficient of 0.288 with a *t*-value of 4.293 and a *p*-value of 0.000. This confirms that competitiveness positively influences the development of an entrepreneurial mindset, characterised by innovation, risk-taking and proactiveness (Lumpkin & Dess 1996). Businesses under competitive pressure are more likely to experiment with market strategies and display entrepreneurial behaviour, consistent with Fernández-Mesa and Alegre (2015) and Hughes and Morgan (2007).

For H4, the effect of technological innovation on EO is also significant, with a β coefficient of 0.569 and a *t*-value of 8.574. This finding validates the innovation diffusion theory (Rogers 2003), which posits that early adopters of technology often exhibit characteristics of EO. The result is supported by Rauch et al. (2009) and Hidayat et al. (2024), who show that technological capabilities foster EO by enhancing strategic proactiveness and market opportunity recognition.

For H5, the path EO $\rightarrow$ business resilience is validated, with a β coefficient of 0.465 and a *t*-value of 5.750. This demonstrates that EO significantly contributes to business resilience. Entrepreneurial orientation enables business to swiftly adapt, innovate and respond to uncertainty – core elements emphasised in the strategic entrepreneurship framework (Ireland et al. 2003). The result also reflects the empirical findings of Kraus et al. (2020) and Rauch et al. (2009), who confirm the resilience-enhancing effect of EO in dynamic and crisis-prone environments.

The mediation analysis reveals that EO significantly mediates the relationships between both competitiveness and technological innovation with business resilience (Table 5). This supports hypotheses H6 and H7, as shown by statistically significant indirect path coefficients and robust *t*-values.

For H6, the indirect path competitiveness $\rightarrow$ EO $\rightarrow$ business resilience yields a β coefficient of 0.134, with a *t*-value of 3.434 and a *p*-value of 0.001, indicating strong statistical support for the mediating role of EO. This suggests that competitiveness alone does not directly translate into resilience without being activated through entrepreneurial behaviour. The finding is consistent with theoretical perspectives by Wiklund and Shepherd (2005), who argue that EO enables business to convert static competitive resources into dynamic capabilities, and with Firman and Hidayat (2023), who highlight that EO fosters strategic responsiveness, innovation and flexibility under uncertain conditions.

Similarly, for H7, the indirect effect technological innovation $\rightarrow$ EO $\rightarrow$ business resilience has a β coefficient of 0.265, a *t*-value of 4.687 and a *p*-value of 0.000, confirming that EO plays a crucial role in transforming innovation capacity into organisational resilience. While technological innovation provides the tools for adaptation, it is the entrepreneurial mindset that drives their strategic implementation. This aligns with findings by Zhang and Zhu (2022) and Ireland et al. (2003), who emphasise the role of EO in facilitating technological inputs into effective problem-solving, opportunity-seeking and continuous renewal.

Together, these findings reinforce that EO is a vital mediating mechanism that enables MSMEs to convert competitive advantages and innovation capabilities into tangible resilience outcomes. The statistical significance of both indirect pathways confirms the validity of the proposed model and highlights the strategic value of cultivating EO within MSMEs to maximise the impact of competitiveness and innovation.

Qualitative insights

The qualitative analysis, derived from in-depth interviews and FGDs with 10 carefully selected key informants – including MSME owners, industry experts and local stakeholders – was designed to affirm and contextualise the

quantitative findings. In qualitative research, the focus is not on large sample sizes but on obtaining rich, meaningful and contextually relevant insights. The selection of 10 informants was guided by the principle of data saturation, where additional interviews were unlikely to yield new themes or insights (Miles & Huberman 1994). This approach ensured that the data collected were sufficiently deep and diverse to capture the complexity of MSME resilience. Through systematic thematic coding and interpretation, the analysis uncovered rich, narrative-driven evidence that supports the structural model tested quantitatively, resulting in three interrelated themes that highlight the behavioural, strategic and technological dimensions of MSME resilience.

Strategic competitiveness and market survival

Respondents emphasised that competitiveness – particularly in the areas of pricing strategy, product differentiation and the adoption of digital marketing – played a crucial role in helping their businesses withstand the severe market turbulence caused by the COVID-19 pandemic. One MSME owner explained, *‘Without continuously updating our market strategy and product value, we would have collapsed under pressure from larger competitors and digital marketplaces.’*

This qualitative insight aligns directly with the quantitative findings, where the path coefficient for competitiveness → business resilience was statistically significant ($\beta = 0.327$, $t = 4.143$, $p = 0.000$). The empirical evidence supports the view that competitive capabilities provide MSMEs with the strategic flexibility to adapt in uncertain conditions. The qualitative narratives further reinforce the idea that resilience is not solely built on internal strengths but on the ability to actively respond to market changes through competitive action. Thus, the integration of qualitative and quantitative findings clearly demonstrates that competitiveness – when backed by proactive strategy and market responsiveness – serves as a key driver of business resilience.

Innovation readiness and business continuity

Digital adoption – such as the use of e-commerce platforms, online payment systems and mobile-based applications – remains emerging as an important strategy that encourages MSMEs to maintain operational continuity and expand their market reach during crisis periods. Respondents emphasised that the transition to digital channels not only improves efficiency but also opens up new avenues for customer engagement amid physical restrictions. A source revealed, *‘Our move to a digital platform wasn’t just about trends – it saved our business. We can still serve customers even during the lockdown’*. This narrative confirms that technological innovation is seen as an essential element to survive, especially during the height of the COVID-19 pandemic when conventional business models are disrupted.

However, the results of quantitative analysis through SEM-PLS show that technological innovation does not directly have a significant effect on business resilience. On the other hand, the influence of technological innovation becomes real when mediated by EO. Scientifically, this shows that simply adopting digital technology is not enough to ensure the resilience of MSMEs. The success of digital transformation is highly determined by how business actors internalise EO, such as the courage to take risks, the ability to innovate further and the acumen in capturing market opportunities.

This integration of qualitative and quantitative findings reinforces the argument that technological innovation serves more as *an enabler* than a single determinant. This means that technology is only an effective tool if it is accompanied by an adaptive and proactive entrepreneurial mindset. Thus, EO acts as a connecting mechanism that transforms technological potential into a strategic advantage for business resilience. This conclusion emphasises that digital readiness must be combined with entrepreneurial spirit so that MSMEs are not only able to survive in the midst of external shocks but also build a solid foundation for long-term business sustainability.

Entrepreneurial orientation as a strategic lever

Several MSME respondents highlighted the fact that their ability to survive and adapt in times of disruption was not solely the result of adopting new technologies or improving competitiveness. Instead, they emphasised the critical role of their entrepreneurial mindset – a willingness to take calculated risks, explore new business models and respond proactively to changing market conditions. One entrepreneur expressed this sentiment clearly: *‘Technology helps, yes, but it’s our willingness to explore, fail, and try again that kept us going. That’s the entrepreneurial spirit’*. This reflection illustrates that beyond structural resources, it is the behavioural orientation of the entrepreneur that drives meaningful change and resilience.

This qualitative insight directly supports the quantitative findings from the mediation analysis, where EO significantly mediated both the relationship between competitiveness and business resilience ($\beta = 0.134$, $t = 3.434$, $p = 0.001$) and between technological innovation and business resilience ($\beta = 0.265$, $t = 4.687$, $p = 0.000$). These results confirm that EO acts as a strategic enabler, transforming competitive and technological capabilities into adaptive and resilient business outcomes. The convergence between qualitative narratives and quantitative data strengthens the conclusion that fostering entrepreneurial behaviour – such as innovation, proactiveness and risk-taking – is essential for MSMEs seeking to convert resources into sustainable resilience.

Discussion

The integrated quantitative and qualitative data analysis in this study provides strong empirical and contextual support for a research model that links competitiveness, technological

innovation, EO and business resilience in the context of MSMEs. These findings enrich the literature on strategic entrepreneurship and digital transformation in emerging markets by providing evidence that business resilience is not only influenced by competitive strategies and technology adoption but is also highly determined by EO.

Quantitative results show that competitiveness has a significant direct effect on business resilience ($\beta = 0.327$, $p < 0.001$), supporting the H1 hypothesis. This confirms the RBV (Barney 1991) argument that internal forces such as operational efficiency, product differentiation and market responsiveness contribute significantly to the ability of MSMEs to absorb external shocks. In contrast, technological innovation has not been shown to have a direct effect on business resilience ($\beta = -0.11$, $p = 0.914$), so the H2 hypothesis is not supported. These findings differ from some previous studies (e.g. Bresciani et al. 2021; Zhang & Zhu 2022) and show that technology adoption alone does not automatically increase resilience without the support of adequate EO and managerial strategies.

Furthermore, the results of the analysis support H3 and H4, where competitiveness ($\beta = 0.288$, $p < 0.001$) and technological innovation ($\beta = 0.569$, $p < 0.001$) have a significant effect on EO. This shows that both competitive advantage and the use of technology encourage the formation of a proactive, innovative and risk-taking mindset among entrepreneurs. These findings are in line with the views of Lumpkin and Dess (1996) and Rauch et al. (2009), who emphasise that EO develops when companies face competitive pressures as well as opportunities from technological advancements.

Entrepreneurial orientation itself was shown to have a significant direct effect on business resilience ($\beta = 0.465$, $p < 0.001$), supporting H5. This confirms EO as a strategic bridge that connects external capabilities with the adaptability of the company (Ireland et al. 2003). Micro, small and medium enterprises with high EO tend to be more agile, dare to take strategic risks and are able to innovate, so they are better prepared to face uncertainty.

Further mediation analysis supports H6 and H7. Entrepreneurial orientation mediated the relationship between competitiveness and business resilience ($\beta = 0.134$, $p = 0.001$) and the relationship between technological innovation and business resilience ($\beta = 0.265$, $p < 0.001$). These findings confirm that competitiveness and new technological innovations can contribute to resilience when facilitated by EO. Without EOs, the potential of technology and competitive strategies is not fully actualised.

The qualitative results reinforce the quantitative findings. The respondents' narrative confirms that pricing, branding and digital marketing strategies are key elements that help them survive market turbulence, aligned with the significant path of competitiveness $\rightarrow$ resilience. They also

emphasised that the adoption of digital technologies, such as e-commerce and online payments, is essential for business continuity, although its success depends on the willingness of entrepreneurs to innovate, take risks and adapt. These insights reinforce the mediation role of EO as shown in H6 and H7.

Thus, this study emphasises that MSME resilience is a multidimensional construction that is not enough to be built only with competitiveness or technology. Entrepreneurial orientation is a strategic leverage factor that allows MSMEs to convert these resources into adaptive strategies. The practical implication is that support programmes for MSMEs need to emphasise not only on providing access to technology and capital but also on developing entrepreneurial capacity, such as the courage to take risks, innovate and strategic decision-making in the midst of uncertain conditions.

Academic implication

This study advances the theoretical discourse in strategic entrepreneurship and resource-based perspectives by empirically demonstrating the mediating role of EO in transforming competitiveness and technological innovation into business resilience. By integrating constructs from the RBV, dynamic capabilities theory and the strategic entrepreneurship framework, the research offers a nuanced understanding of how behavioural and strategic factors interplay to drive organisational adaptability in MSMEs. The findings enrich existing literature by positioning EO not only as a driver of innovation and risk-taking but also as a strategic mechanism that operationalises business capabilities into resilience outcomes. This study also contributes methodologically by employing a mixed-method design that combines SEM-PLS and qualitative inquiry, offering a robust empirical model for future research on MSMEs in emerging economies.

Practical implication

From a practical perspective, the findings underscore the importance of fostering EO among MSME practitioners to enhance their resilience in the face of disruption and market uncertainty. Policymakers and business development agencies should design support programmes that not only provide access to technology and competitive resources but also build soft capabilities such as strategic risk-taking, innovation capacity and proactive decision-making. Training programmes focused on digital entrepreneurship, adaptive leadership and market opportunity sensing can empower MSMEs to translate technological investments and competitive strategies into sustained resilience. Additionally, the role of local business networks, incubators and digital platforms should be strengthened to facilitate knowledge exchange and capacity-building that supports entrepreneurial agility and long-term business sustainability.

Conclusion

This study provides comprehensive empirical evidence that competitiveness has a significant direct effect on MSME

business resilience, while technological innovation does not directly strengthen resilience. Instead, technological innovation enhances resilience indirectly through EO. The findings, supported by both quantitative data and qualitative insights, affirm that resilience is not merely the outcome of competitive strategies or technological adoption but also depends on behavioural and cognitive capabilities rooted in entrepreneurial thinking. Entrepreneurial orientation plays a crucial role by translating competitive positioning and technological resources into adaptive strategies that foster innovation, proactiveness and agility in uncertain environments.

The study contributes to the theoretical advancement of the RBV, dynamic capabilities theory and the strategic entrepreneurship framework by demonstrating that EO is a vital mechanism that bridges the gap between competitiveness, technological innovation and resilience outcomes. Practically, the results highlight the need for integrated policy interventions that not only provide infrastructure, financing and technology access but also foster entrepreneurial capabilities such as strategic risk-taking, digital literacy and innovation capacity. Strengthening EO is therefore essential to building sustainable and resilient MSME ecosystems in volatile and resource-constrained contexts, particularly in developing economies such as Indonesia.

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Competing interests

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CRedit authorship contribution

Muhammad Hidayat: Conceptualisation, Methodology, Formal analysis, Funding acquisition, Investigation, Supervision, Writing – original draft, Writing – review & editing. Badaruddin Badaruddin: Data Curation, Formal analysis, Funding acquisition, Project administration, Software. Andi Widiawati: Data curation, Funding acquisition, Investigation, Project administration, Resources.

All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication and take responsibility for the integrity of its findings.

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Data availability

The data that support this study are available from the corresponding author, Muhammad Hidayat, upon reasonable request.

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