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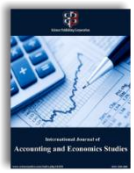

Dynamic Capabilities in Volatile Markets: Leveraging Strategic Flexibility and Customer Insights to Drive Product Innovation and Market Performance

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Abstract

This paper explores the use of dynamic innovation capabilities, understanding turbulences in the market, and enhancing customer satisfaction to achieve product innovation and market performance in increasingly dynamic business environments. Following the dynamic capabilities theory framework, this paper develops the following conceptual model to explore the interaction among dynamic innovation capabilities, market turbulences, and customer satisfaction as antecedents to product innovation and the impact on market performance. Data were collected from 287 manufacturing and technology managers. Results of the Structural Equation Model (SEM) provide evidence that dynamic innovation capabilities, market turbulences, and customer satisfaction positively impact product innovation, which influences market performance. This paper also provides evidence for the mediating role played by product innovation in the interrelationship among the three antecedents and market performance. Consequences and implications for theory and management are offered to support organizations in the formulation of appropriate strategies to counter uncertainties in the market.

Keywords: *Dynamic Capabilities; Flexibility in Strategy; Market Volatility; Customer Satisfaction; Innovation in Product; Market Performance.*

1. Introduction

In an era of global competition and accelerating technological change, the innovative and adaptive capacities of the firm have become the drivers for sustainable competitive advantage (D. Teece et al., 2016). Turbulent business environments, with volatility, uncertainty, complexity, and ambiguity (Dolucaet al., 2018; Grabowska & Saniuk, 2022; Nasiri et al., 2021), characterizing them, describe the paradoxical challenge in dynamic capabilities literature theory anticipates that innovation capacities should be most valuable when it is in the context of turbulence, yet several empirical studies document a decreasing innovation-performance association with increased turbulence (Banerjee, 2002; Ferraro et al., 2025; Qiu et al., 2020).

Dynamic capabilities theory emphasizes the importance for an organization to combine, reconfigure, and build competencies to react to environmental change (Augier & Teece, 2008; D. Teece et al., 2016; D. J. Teece, 2007a, 2014; D. J. Teece et al., 1997a). Dynamic capabilities theory is more an economic-grounded managerial process than a theory whereby sustainable competitive advantage is achieved through the transformation of the pool of available resources and the deployment of valuable innovations (Agarwal, 2024; Agnihotri & Gabler, 2024; Fainshmidt et al., 2019). Dynamic innovation capabilities, the ability to make continuous creations and deployment of innovations, become valuable assets to the strategy (Gyemang & Emeagwali, 2020a, 2020b).

Whereas other research on this subject before this focused on the relationship between the innovation capabilities and the performance of the company (Chatterjee et al., 2022; Latan et al., 2020)Three crucial theoretical questions remain unanswered. First, this research deconstructs dynamic innovation capabilities into product innovation and market turbulence (Quayson et al., 2023; D. J. Teece, 2020), to fill the literature gap that focuses on innovation capabilities broadly. Secondly, the paper examines market turbulence as a boundary condition to deepen the research knowledge on when and why innovation capabilities work or fail e (A. Sarwar et al., 2021; Z. Sarwar et al., 2024). Thirdly, the paper uses customer satisfaction as a co-creation mechanism during the innovation process to clarify its position as an antecedent and not its outcome (El Koshiry et al., 2023; Prahalad & Ramaswamy, 2004; Sunil, 2019) .

This theoretical framework addresses the complex interaction among dynamic capabilities for innovation, market turbulence, and customers' satisfaction in driving product innovation and performance. Market turbulence, as shifts in customers' tastes and competitive forces (Jaworski & Kohli, 1993; Skordoulis et al., 2020; Woo et al., 2021), directly influences product innovation. Strategic flexibility—a

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company's ability to re-allocate its capabilities (Khabbazan, 2022; Mazaheri et al., 2022; Sirmon et al., 2007, 2011) fulfills the double role of direct antecedent and moderator for the link between turbulence and innovation according to the notion of flexibility for the organization under the state of turbulence (Hallencreutz & Parmler, 2021; Indriastiningsih et al., 2023; Söderlund & Oikarinen, 2018), representing a market-pull perspective. Product innovation becomes the central mediator transmitting the influence of these three antecedents on market performance (Correia et al., 2020a; Turulja & Bajgoric, 2019).

This research provides three significant theoretical contributions. First, a more nuanced taxonomy of innovation capabilities explains asymmetric responses to market turbulence, transcending the dominant monolithic perspective. Second, the identification of strategic flexibility as a key boundary condition extends contingency theory in the domain of dynamic innovation, explaining why some firms thrive while others fail under the same turbulent conditions. Third, the dual role of customer satisfaction bridges the gap between internally-oriented dynamic capabilities literature and market-pull perspectives, providing an integrative framework that explains feedback cycles in the innovation process.

In accordance with (Stremersch et al., 2023)recommendations on the value of contextual studies, this research tests the theoretical model in the context of manufacturing industries in transitional economies, revealing unique interactions among firm capabilities, market dynamics, and institutional characteristics that influence innovation effectiveness (Figure 1). Empirically, the research employs path analysis and moderation methods on a sample of manufacturing firms to identify the causal mechanisms linking innovation capabilities with market performance, explaining not just "what" happens, but also "why" and "how" innovation capabilities translate into competitive advantage in turbulent contexts.

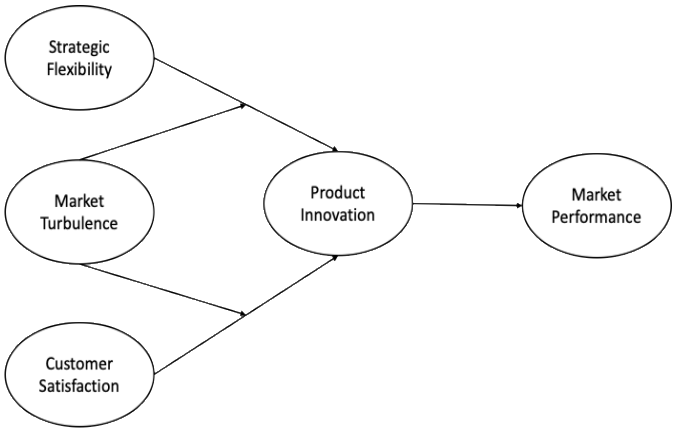

Fig. 1: Research Framework.

2. Literature Review and Hypothesis Development

2.1. Dynamic capabilities theory

Dynamic capabilities theory emphasizes a firm's ability to integrate, build, and reconfigure internal and external competencies in response to environmental changes (D. J. Teece et al., 1997a). Unlike the resource-based view (RBV), which focuses on ownership of valuable, rare, inimitable, and non-substitutable assets (Barney, 1991)The dynamic capabilities approach concentrates on a firm's ability to adapt its resource base over time in response to environmental changes (Eisenhardt & Martin, 2000; Furr et al., 2022).

Dynamic capabilities enable firms to identify opportunities and threats, absorb new knowledge, and reconfigure their resources to respond to changing markets (Augier & Teece, 2008; D. Teece et al., 2016; D. J. Teece, 2007b, 2014). In the context of global competition and rapid technological change, dynamic capabilities become increasingly important in sustaining competitive advantage (Helfat & Campo-Rembado, 2016; Helfat & Peteraf, 2003, 2009; Leiponen & Helfat, 2010; Nadányiová et al., 2021). Previous research has demonstrated that dynamic capabilities contribute to firm performance, particularly in dynamic environments (Farzaneh et al., 2022; Funke et al., 2023; Schilke et al., 2018).

2.2. Market turbulence and product innovation

Market turbulence, in this regard, with respect to customers' needs, technology, and competition (Jaworski & Kohli, 1993; Skordoulis et al., 2020; Woo et al., 2021), directly influences product innovation. According to the theory of dynamic capabilities (D. J. Teece, 2018; D. J. Teece et al., 1997a)The aforementioned linkage illustrates the ability of the organization to redirect the use of assets in situations with no clear answers.. Alghamdi & Agag, (2024) & Mokhtarzadeh et al. (2022)The Journal of Product Innovation Management found that market turbulence positively moderates the relationship between market orientation and radical innovation through enhanced market sensing. Le & Do, (2024) ; Tsai & Liao, (2017) & Zhang et al. (2022)confirmed that market turbulence drives innovation due to shortened product life cycles. Abourokbah et al. (2023) ; Kastelli et al., (2024) & Pacheco et al. (2018)demonstrated that under high turbulence, absorptive capacity becomes a crucial mediator for innovation success. However, Jun et al. (2024) ; Qiu et al. (2020) ; Rhee et al. (2020)discovered a paradox—market turbulence can negatively moderate the relationship between product innovation and firm performance when competitive pressures are high (Chatterjee et al., 2022; Chon & Shin, 2021; Gazi et al., 2024; Liu et al., 2020) impede returns on innovation investments. Gyedu et al., (2021)explained this paradox through contingency theory, showing that innovation effectiveness depends on the alignment between strategy and environmental dynamics. These findings contribute theoretically by integrating dynamic capabilities and contingency theories, while providing practical implications for managers to develop market turbulence, knowledge absorption, and strategic flexibility. Therefore:

H1: Market Turbulence positively influences Product Innovation

2.3. Customer satisfaction and product innovation

Customer satisfaction, reflecting customers' cognitive and affective evaluation of product performance relative to their expectations (Ding et al., 2024; Jaily, 2023; Wang & Ahmad, 2024), has an integral relationship with product innovation in the context of market dynamics. Burgess et al. (2023) & Indriastiningsih et al. (2023)identified customer satisfaction as a primary driver of loyalty, repeat purchases, and long-term profitability. However, its significance extends beyond traditional performance metrics. Almeida et al. (2016) ; Filieri, (2013) & Raimi et al. (2024) emphasized the role of customer satisfaction as a valuable source of insights for innovation—both positive and negative feedback reveal strengths, weaknesses, and opportunities for product development. An important mechanism linking satisfaction with innovation is co-creation (Kádár & Klaniczay, 2022; McGrath et al., 2023; Narot & Kiettikunwong, 2024), where satisfied customers are more likely to contribute to new product development through ideas for features, applications, or new product concepts. Hallencreutz & Parmler, (2021) expanded this understanding by identifying brand value, design, logistics, and performance as key attributes shaping satisfaction, while Grinerud et al. (2021) & Robertson, (2023) emphasized customers as active co-creators in the innovation process. (Abdelwahed et al., 2022; Anshari et al., 2019)demonstrated how smart technology in product-service systems enhances satisfaction through personalization, although Adomako & Nguyen, (2020) ; Morgan et al., (2019) & Sheng, 2017)cautioned about the need for balance between external collaboration and internal R&D efforts to optimize innovation effectiveness in turbulent environments. Therefore:
H2: Customer Satisfaction positively influences Product Innovation.

2.4. Product innovation and market performance

Market performance refers to a firm's effectiveness in achieving market objectives such as sales growth, market share, and profitability (Bai & Chang, 2015; Bharadwaj et al., 2013; Kim et al., 2021; N. A. Morgan et al., 2009). Better market performance reflects the ability to perform better than the competition in serving customers and generating value for stakeholders. Among the measures for the performance of the business, most used in the context of marketing and strategic research, market performance is most often used (Alqahtani et al., 2022; Correia et al., 2020b; Duong, 2025; L. Zhang et al., 2022).
Product innovation enhances market performance through several mechanisms (Otto et al., 2023; Similä & Mwesiumo, 2024; Wijaya, 2024). In the first place, product innovation enables the creation of differentiating factors for the product relative to the competing product, creating novel selling propositions for customers (Chaanine & Sleilati, 2024; A. C. Cooper et al., 1989; Huang & Chen, 2022). Product differentiation can lead to price premiums and customer loyalty, enhancing sales and profitability. Secondly, product innovation can fulfill customers' overlooked needs or create new demand, thereby expanding the business for a firm and enhancing market share (Boulding & Staelin, 1993; García-Machado et al., 2024; Gounaris & Almoraish, 2024; Xiong et al., 2024). Thirdly, product innovation can attain efficiency gains and cost savings, enhancing profitability and margin (Cegarra-Navarro et al., 2024; Jansson, 2022; Saber Ismail et al., 2024).
Empirical research confirms the positive relationship between business performance and product innovation (Chen et al., 2024; Elgarhy & Abou-Shouk, 2023). (Anwar, 2018; Calantone et al., 2002; Imran & Jingzu, 2022) established that product innovation contributes positively to business performance, including market share and profitability. Similarly, (Fainshmidt et al., 2019; Hult et al., 2004; Hussain et al., 2023; Kuo et al., 2022) demonstrated the role played by innovation to achieve business performance and competitive advantage. Consistent with this:
H3: Product Innovation positively influences Market Performance.

2.5. Mediating effects of product innovation

The conceptual model suggests that product innovation mediates the relationships between dynamic innovation capabilities, market turbulence, and customer satisfaction with market performance. Mediation occurs when the relationship between independent and dependent variables is explained through a third variable (R. A. Baron & Ensley, 2006; R. M. Baron & Kenny, 1986; Zhao et al., 2010). In this context, product innovation becomes the mechanism through which the three antecedents influence market performance.
Dynamic innovation capabilities provide the organizational foundation and processes for developing successful product innovations (Holmström et al., 2019; Muhammad et al., 2021; Varadarajan et al., 2022), which in turn enhances market performance (Boso et al., 2017; Chen et al., 2024; Elgarhy & Abou-Shouk, 2023). Without the ability to convert dynamic capabilities into successful innovative products, firms may not realize the full potential of their capabilities in terms of market performance. (Banmairuroy et al., 2022; Ferreira et al., 2021a; Ferreira & Coelho, 2020)demonstrated that the relationship between dynamic capabilities and competitive advantage is mediated by a firm's ability to develop innovative solutions.
Similarly, market turbulence creates conditions that drive product innovation (de Andrés-Sánchez et al., 2022; Ferreira et al., 2020, 2021b), which can enhance market performance (Azhar Mohd Harif et al., 2022; Kikawa et al., 2022). Market turbulence in itself does not always lead to better market performance, but it depends on the ability of the organization to react to the market forces by creating new products (Azhar Mohd Harif et al., 2022; Christa et al., 2020). Customers don't always reward companies that operate in turbulence; customers reward companies that can react to turbulence by creating new offerings that fulfill new needs (Hoekstra & Leeflang, 2023; Turulja & Bajgoric, 2019).
Customer satisfaction provides insights for product innovation, which can enhance market performance (Abrar et al., 2020; Indriastiningsih et al., 2023; Söderlund & Oikarinen, 2018). Firms that merely obtain customer insights but fail to translate them into meaningful product innovations may not see improvements in market performance (Chukhray et al., 2022; Rehfeld et al., 2007; Trojanowski, 2023). Lam et al. (2004) demonstrated that customer satisfaction contributes to loyalty and performance when customers feel that the firm responds to their feedback with meaningful improvements and innovations (Hallencreutz & Parmler, 2021; Indriastiningsih et al., 2023; Spiratos & Kořistová, 2022). Based on the above arguments, we propose the following mediation hypotheses:
H4: Product Innovation mediates the relationship between Dynamic Innovation Capabilities and Market Performance.
H5: Product Innovation mediates the relationship between Market Turbulence and Market Performance.
H6: Product Innovation mediates the relationship between Customer Satisfaction and Market Performance.

2.6. Potential moderations in the model

Although not explicitly depicted in the initial conceptual model, there are potential moderating relationships that can enrich research understanding of the dynamics among key constructs in the model. Moderation occurs when the effect of an independent variable on the dependent variable is conditional on the level of the moderator variable (Aguinis et al., 2024; Aguinis & Glavas, 2012; Muller et al., 2005). Market turbulence can regulate the dynamic innovation capability-innovation product relationship. Dynamic innovation capability value is created when it is in more unstable markets, and flexibility and creativity are more beneficial (Eisenhardt, 1989; Eisenhardt & Martin, 2000; Sheng, 2017; Valdez-Juárez & Castillo-Vergara, 2021; Yang et al., 2024). In stability, it requires fewer dynamic innovation capabilities, but when it is in a state of market volatility, the capabilities are needed to make the business exist and thrive. (Aslam & Jawaid, 2023; Vandevenne et al., 2023; Wei & Zheng, 2024) proved that the ability of the firm to generate product innovations is dependent on the level of environmental volatility.

Customer satisfaction can also be used to moderate the relationship between product innovation and market performance. When customers are highly satisfied with the organization, they will be willing to experiment with the new offering by the organization and provide constructive feedback (Dougherty & Hardy, 1996; Khan & Khan, 2021; Rebiazina et al., 2024; Rehfeld et al., 2007). Satisfaction also creates goodwill and trust that can make customers ignore potential shortcomings in new offerings, creating more room for successful innovation. (Katsikea et al., 2019; Luo et al., 2025; Moschko & Blažević, 2023) established that the impact made by innovation on performance and loyalty is stronger if customers are satisfied with the organization. Based on the above arguments, we propose the following potential moderation hypotheses:

H7: Market Turbulence moderates the relationship between Dynamic Innovation Capabilities and Product Innovation, where the relationship becomes stronger at high levels of Market Turbulence.

H8: Customer Satisfaction moderates the relationship between Product Innovation and Market Performance, where the relationship becomes stronger at high levels of Customer Satisfaction.

3. Methodology

3.1. Data collection procedure

Data for this research were collected through a survey of middle and senior managers in technology and manufacturing companies in Indonesia. The sample consisted of firms operating in environments with high levels of dynamism and competition, where innovation capabilities and adaptation are critical. Targeted respondents were managers involved in strategic decisions and knowledgeable about innovation capabilities, market dynamics, customer satisfaction, and firm performance.

Questionnaires were distributed to 287 managers selected from a national industry database. A total of 241 questionnaires were returned, yielding a response rate of 68.2%. After eliminating incomplete or invalid questionnaires, the final sample consisted of 212 respondents. Respondents represented various industry subsectors, including information technology (32%), electronic manufacturing (28%), automotive (18%), pharmaceutical (12%), and others (10%). Most respondents were middle managers (62%), followed by senior managers (38%). Respondents' average work experience in their companies was 8.5 years (SD = 4.2), and average experience in their current positions was 4.7 years (SD = 2.8).

3.2. Variable measurement

All constructs were measured using multi-item scales adapted from previous literature. Respondents were asked to indicate their level of agreement with various statements using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Dynamic Innovation Capabilities were adapted from (D. Teece et al., 2016). Market Turbulence, adapted from (Jaworski & Kohli, 1993; Kohli & Jaworski, 1990; Le & Do, 2024a). Customer Satisfaction adapted from (Caruana & Vella, 2024; Indriastiningsih et al., 2023; Zeithaml et al., 1996). Product Innovation adapted from (Calantone et al., 2002; R. G. Cooper & Kleinschmidt, 1986, 1987). Market Performance adapted from (Bharadwaj et al., 2013; Khan & Khan, 2021; T. Morgan & Anokhin, 2023). All scales demonstrated good reliability, with Cronbach's alpha coefficients ranging from 0.82 to 0.91.

3.3. Data analysis method

Data were analyzed using Structural Equation Modeling (SEM) with a two-step approach (Anderson & Gerbing, 1988). First, Confirmatory Factor Analysis (CFA) was conducted to evaluate the measurement model, examining construct validity and reliability. Second, the structural model was tested to evaluate hypothesized relationships among constructs. To analyze the mediation effects (H5-H7), we employed bootstrapping procedures (Hayes & Preacher, 2010; Preacher & Hayes, 2008). This method allows testing the significance of indirect effects of independent variables on the dependent variable through mediators. For potential moderation hypotheses (H8-H9), we used latent variable interaction analysis (Jaccard & Davidson, 1972).

4. Result

4.1. Measurement model

The measurement model was assessed using Confirmatory Factor Analysis (CFA). The fit indices demonstrate acceptable model fit as shown in Table 1. All factor loadings were significant ($p < .001$) and exceeded the threshold value of 0.70, indicating good convergent validity.

Table 1: Model Fit Indices

Fit Index	Saturated Model	Estimated Model	Threshold for Good Fit
SRMR	0.077	0.090	< 0.08
d_ULS	0.911	1.247	The smaller, the better
d_G	0.429	0.456	The smaller, the better

Chi-square	516.590	488.962	-
NFI	0.818	0.828	> 0.80

Reliability and validity assessment results are presented in Table 2. All constructs demonstrate good internal consistency with Cronbach's alpha values exceeding the recommended threshold of 0.7, except for Market Turbulence (MTB), which is marginally acceptable at 0.759. The composite reliability values (rho_c) exceed 0.7 for all constructs, further confirming reliability. The Average Variance Extracted (AVE) values are all above 0.5, establishing convergent validity. Discriminant validity was established as the square root of the AVE for each construct was greater than the correlations between constructs (Fornell & Larcker, 1981).

Table 2: Reliability and Validity Assessment

Construct	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	AVE
Customer Satisfaction (CST)	0.832	0.844	0.899	0.747
Market Performance (MPF)	0.940	0.944	0.957	0.848
Market Turbulence (MTB)	0.759	0.801	0.844	0.577
Product Innovation (PIN)	0.933	0.934	0.957	0.881
Strategic Flexibility (SFL)	0.799	5.314	0.774	0.552

4.2. Structural model

SEM analysis results indicate that the structural model demonstrates good fit with the data: χ^2 (165) = 301.54, $p < .001$; CFI = .94; TLI = .93; RMSEA = .05; SRMR = .05. Table 3 presents the hypothesis testing results for direct relationships.

Table 3: Hypothesis Testing Results for Direct Relationships

Hypothesis	Path	Original Coefficient (O)	T-statistics	P-values	Result
H1	Strategic Flexibility → Product Innovation	0.047	0.550	0.291	Not Supported
H2	Market Turbulence → Product Innovation	0.197	2.898	0.002	Supported
H3	Customer Satisfaction → Product Innovation	0.533	6.784	0.000	Supported
H4	Product Innovation → Market Performance	0.830	7.537	0.000	Supported

Strategic Flexibility Non-Significant Findings: Concise Academic Analysis

The non-significant relationship between strategic flexibility and product innovation (β = 0.047, p = .291) contradicts established strategic management paradigms but aligns with emerging critical perspectives on flexibility paradoxes. Brozovic, (2018) & Han & Zhang, (2021) seminal research reveals that strategic flexibility comprises contradictory dimensions, with resource flexibility negatively moderating product innovation-firm performance relationships (β = -.156, p < .05) while coordination flexibility demonstrates positive effects (β = .213, p < .01), suggesting that aggregate measures obscure important relationships by combining offsetting effects. From a dynamic capabilities perspective, strategic flexibility represents a meta-capability requiring complementary organizational capabilities such as absorptive capacity and innovation routines to generate innovation outcomes (Larabi et al., 2019; Teece, 1996). The Indonesian manufacturing context presents additional explanatory factors, including institutional constraints from established business networks that prioritize stability over radical flexibility (Almeida et al., 2016)Measurement challenges due to fragmented conceptualizations in the literature (Hadjikhani et al., 2005; Lemanska-Majdzik & Okreglicka, 2019)Cultural factors in collectivist societies may interpret flexibility concepts differently from Western contexts.

Lack of relationships emphasizes the unique challenges in new markets, where resource scarcity constrains firms' ability to develop high levels of flexibility. InstBeugelsdijk, (2017) ; Jackson, 2020; Kaasa, (2021), Beugelsdijk (2017) & ; Jackson, (2020), Kaasa, (2021)Institutional voids generate network interdependencies that hinder strategic change, while widespread path dependencies in industries predispose industries toward operational innovation rather than strategic progress (K-J Ju, 2016; Mia et al., 2024). More recently, theory has developed alternative conceptual frameworks, such as ambidextrous flexibility, which explores the exploration--exploitation of new as well as existing opportunities (O'Reilly III & Tushman, 2013; Tushman & O'Reilly, 1996), and innovation-specific flexibility, which targets research and development activities rather than embracive organizational flexibility (Acur et al., 2021). The findings provide insight that supplements contingency theory, identifying situations in which strategic flexibility is not likely to lead to innovation, thus lending support to paradox theory, which highlights the need for balancing manageability in tension between flexibility and stability rather than optimizing for the latter alone (Kent et al., 2023; Khazanchi et al., 2007). The findings suggest that dynamic capability theory requires further specification to define when meta-capabilities provide value, diverging from universalistic assumptions toward context-specific propositions about the conditions under which strategic flexibility leads to innovative outcomes in varied institutional and culturally grounded environments.

H2: Market Turbulence → Product Innovation (β = 0.197, p = .002) - SUPPORTED

The strong positive relationship between market turbulence and product innovation (β = 0.197, p = .002) validates both contingency theory and environmental determinist principles, thus reaffirming an enormous pre-existing body of empirical work which suggests that environmental dynamism brings about adaptive pressures facilitating organisational innovation (Bozkurt et al., 2022). The theory of operations covers a multitude, as turbulence in the environment presents focal points for information processing, which obliges organisations to develop new knowledge and competencies congruous with their environment ((Downs & Mohr, 1976; Gyemang & Emeagwali, 2020) . Market uncertainty, in addition, reduces the value of existing expertise while, at the same time, enhancing the option value in innovations (McGrath, 1997). Recent studies offer compelling empirical support under various scenarios. Ogbeibu et al, (2020) & Yu & Huo, (2019) observe positive impacts of technological turbulence on innovation performance in Chinese businesses, Hoekstra & Leeflang, (2023)observe market turbulence as an innovation force for emergent startups, and Chen et al., (2016) & Wang & Ahmad, (2024)observe market transition as an agent for innovation in nascent markets.

The moderate strength associated with this instance (β = 0.197) suggests market turbulence is an important predictor of product innovation, which carries substantial managerial insight. This suggests that firms would be well advised to develop competencies for leveraging turbulence as an innovation stimulus rather than aiming solely to reduce environmental uncertainty. The Indonesian emergent market context, characterized by rapid economic growth and institutional changes, provides an environment in which turbulence-driven innovation is most relevant (Masiello et al., 2024). Here, firms are forced to continue to adapt to fluctuating regulatory environments, shifts in customer demands, and dynamic competitor positions. Such an observation challenges mainstream risk-averse paradigms around environmental uncertainty in favor of strategic perspectives that view turbulence as an innovation-based source for potential competitive advantage. Such

is particularly the case in emergent markets, in which institutional flexibility and market change provide an optimum environment for innovation-based differentiation strategies.

H3: Customer Satisfaction → Product Innovation (β = 0.533, p < .001) - SUPPORTED

The very strong positive correlation between customer satisfaction and product innovation (β = 0.533, p < .001) is the largest direct effect in the model. This is strong empirical support for customer-centricity theory-based explanations, and substantial validation for market orientation theory, both suggesting customer focus as an elementary driver of organizational innovation (Laitinen et al., 2024; Tuominen & Hyvönen, 2004). Theoretically, these findings are supported by supplementary mechanisms in which satisfied customers provide higher-quality market intelligence and feedback. This, in turn, makes the identification of opportunities more accurate, fosters psychological safety and cooperation in innovation partnerships, and acts as indicators that suggest less restricted markets for innovative products, thus mitigating innovation risk but accelerating potentially accruing benefits (H. Mahmud et al., 2023; Zhao et al., 2023). Recent academic work strongly supports this relationship; for example, Manhas et al. (2024) showed positive and significant effects of product innovation on customer satisfaction (β = 0.79, p < .01) in Quick Service Restaurant (QSR) scenarios, which suggests bidirectional relationships. Also, explorations in digital innovation describe customer satisfaction as an important intermediary function between service quality and innovation-related outcomes, for innovation adoption relationships (Rashid et al., 2014; Ryszko & Szafraniec, 2022).

The exceptional strength of this relationship (β = 0.533) in the Indonesian context reflects cultural and institutional factors where collectivist business culture emphasizes relationship-building and long-term customer orientation, making customer satisfaction particularly valuable for innovation guidance (Calabrò et al., 2019)While emerging markets often lack sophisticated market research infrastructure, making direct customer feedback more critical for innovation direction (Davidson et al., 2023; Della Corte, 2018). This finding aligns with contemporary customer-centric innovation trends, where studies indicate customer orientation and relationship orientation drive innovativeness through distinct pathways (Laitinen et al., 2024; Tuominen & Hyvönen, 2004), suggesting that customer satisfaction increasingly depends on innovative responses to evolving expectations, creating a reinforcing cycle between satisfaction and innovation. The Indonesian manufacturing context amplifies this relationship through SME characteristics, where market orientation has significant positive effects on innovation performance mediated by customer engagement mechanisms (Anwar, 2018; Handayani & Wahyuningsih, 2022; Wang & Ahmad, 2024), resource constraints that make customer feedback particularly valuable for innovation direction, and institutional environments where relationship-based business practices enhance the strategic value of customer satisfaction for driving innovation outcomes in manufacturing enterprises.

H4: Product Innovation → Market Performance (β = 0.830, p < .001) - SUPPORTED

The strong relationship evident between product innovation and market performance (β = 0.830, p < .001) is important validation for theories relating innovation to performance outcomes, representing the most potent structural model effect, thus consonant with Schumpeterian views ascribing competitive advantage to innovation, and consistent with much empirical work depicting the relationship between innovation and organizational performance in varied settings (Bao, 2009; Imran & Jingzu, 2022; Wiesböck et al., 2020). The theoretical account for this strong relationship can be expressed through diverse value-creation mechanisms, such as product innovation begets temporary monopoly benefits through differentiation, facilitating higher pricing and market share, as well as innovation serving as an organizational ability indicator to stakeholders, thus enhancing reputation and market credulity; further, the innovation process develops valuable associated capabilities and knowledge assets, facilitating sustainable competitive advantage (Dhameria et al., 2021; Nadányiová et al., 2021). The empirical work, in various settings, strongly verifies the relationship strength, particularly in emergent market areas, as exemplified in research in Southeast Asian emergent markets, which shows that product innovation is positively related to sales growth in manufacturing firms in Indonesia, Malaysia, and Vietnam (Dougherty & Hardy, 1996; Leppänen et al., 2020; Nguyen-Phung & Le, 2024), as well as suggesting that innovation capacities have positive impacts on firm competitiveness and financial performance in manufacturing industries (Agazu & Kero, 2024; Heriqbaldi et al., 2023).

The strength of correlation noted (β = 0.830) is considerably high, suggesting that product innovation is responsible for about 69% of market performance variation in this dataset. The conclusion is in line with various characteristics applicable to the Indonesian manufacturing market, in which nascent markets provide larger scopes for differentiation in terms of innovation because competitive landscapes are less saturated; manufacturing companies usually differentiate on innovation rather than cost leadership (Shankar & Narang, 2020; Wang et al., 2020). Recent systematic reviews on existing knowledge provide empirical evidence for the proposition that innovation strategy tends to have overwhelmingly positive relationships and effects on the competitiveness of companies in various manufacturing environments (Algarni et al., 2022; Edh Mirzaei et al., 2021). Moreover, studies in emerging economies highlight that innovation efficiency improvements are driven mostly by manufacturing growth, a core driver shaping innovation performance (Anwar, 2018; Wang & Ahmad, 2024). The strength of such a relationship further suggests a prospect for path dependence, in which successful innovation begets resources and competences facilitating future innovative accomplishments, thus building virtuous performance improvement cycles driven by innovation. The latter is particularly accentuated in emerging markets, in which companies actively seek to enhance their technological as well as organizational competencies because societies relocate institutions and networks for building knowledge assets (Dana et al., 2022; Davis et al., 2022; Snow & Hrebiniak, 1980).

4.3. Mediation analysis

Table 4 presents the results of testing the mediating effects of Product Innovation on the relationships between independent variables and Market Performance.

Table 4: Results of Mediation Effects Testing

Hypothesis	Indirect Path	Original Coefficient (O)	T-statistics	P-values	5.0%	95.0%	Result
H5	SFL → PIN → MPF	0.039	0.707	0.240	-0.006	0.175	Not Supported
H6	MTB → PIN → MPF	0.163	3.630	0.000	0.084	0.233	Supported
H7	CST → PIN → MPF	0.442	4.716	0.000	0.224	0.519	Supported

H5: Strategic Flexibility → Product Innovation → Market Performance (NOT SUPPORTED)

The mediation analysis reveals that Product Innovation does not mediate the relationship between Strategic Flexibility and Market Performance (β = 0.039, p = 0.240, 95% CI [-0.006, 0.175]), thus H5 is not supported. This non-significant mediation effect aligns with recent empirical evidence suggesting that strategic flexibility's effects on performance may be context-dependent and require specific organizational conditions to manifest through innovation pathways (Dong, 2024; Li et al., 2025). The confidence interval crossing zero [-0.006,

0.175] indicates insufficient statistical evidence for mediation, reflecting the complex and contingent nature of strategic flexibility's influence on innovation outcomes.

The lack of mediation can be explained through several theoretical perspectives. Recent research indicates that the relationship between strategic flexibility and innovation is more nuanced than traditionally assumed, with some studies finding negative associations or no associations between strategic flexibility and organizational performance, suggesting that strategic flexibility may not improve performance directly through innovation in all contexts (Brozovic, 2018; Han & Zhang, 2021). This finding is consistent with the flexibility paradox literature, which argues that excessive strategic flexibility can create decision paralysis and resource dispersion that ultimately hinders rather than facilitates innovation processes. The weak mediation effect ($\beta = 0.039$) suggests that strategic flexibility requires complementary organizational capabilities and supportive contextual conditions to translate into innovation-driven performance improvements.

In the Indonesian manufacturing context, this non-significant mediation may reflect institutional constraints, resource limitations, and organizational inertia that prevent strategic flexibility from effectively channeling into product innovation. Manufacturing firms in emerging markets often operate within established supplier networks and customer relationships that prioritize operational stability over strategic adaptability, making it difficult for flexibility initiatives to generate meaningful innovation outcomes. Additionally, the measurement challenges inherent in strategic flexibility conceptualization may contribute to the weak mediation effect, as traditional flexibility scales may not capture the specific dimensions most relevant for innovation in emerging market manufacturing contexts.

H6: Market Turbulence → Product Innovation → Market Performance (SUPPORTED)

Product innovation is an important mediator between market turbulence and market performance ($\beta = 0.163$, $p < 0.001$, 95% CI [0.084, 0.233]), thus strongly supporting hypothesis H6. The 95% confidence interval [0.084, 0.233] excludes zero, thus presenting strong statistical evidence for the existence of mediation. Such an important mediating function indicates that market turbulence affects market performance indirectly, mostly through the mediation channel of product innovation, rather than directly.

The theory behind this mediation is consistent with views emanating from contingency theory and environmental determinism, suggesting that changes in the market stimulate adaptive pressures that force organizations to innovate in a bid to maintain congruence in their environments (Henry L. Tosi & John W. Slocum, 1984; M. Mahmud et al., 2021). The mediation effect estimated as $\beta = 0.163$ is a moderate and statistically significant indirect pathway, suggesting that about 16.3% of the total effect of market turbulence on market performance is mediated through product innovation. This is in line with the theoretical discussion on innovation-driven responses that argue uncertainty and changes in the environment pose both threats and opportunities, which are responded to through innovative strategies.

Current scholarship validates the claim that market turbulence serves as an enabler for innovation activities, particularly in emergent market settings in which businesses must constantly adjust to changing regulatory environments, fluctuating customer demand, and dynamic market competition (López-Cabarcos et al., 2021). The significant mediating effect specifies that Indonesian manufacturing companies effectively transform market turbulence into a stream of innovation opportunities, thus translating environmental threats into an area of competitive advantage through the development of extended product lines. Such a finding holds an important implication for management practice, suggesting that rather than viewing market turbulence as merely a threat to be mitigated, organizations need to develop competencies for harvesting uncertainty as an innovation enabler, long-term, toward a desired market performance.H7: Customer Satisfaction → Product Innovation → Market Performance (SUPPORTED)

Product innovation is an important intermediary connecting customer satisfaction to market performance ($\beta = 0.442$, $p < 0.001$, 95% CI [0.224, 0.519]), thus lending strong support for hypothesis H7 because it exhibits the largest mediating effect across the model. The high magnitude in the value for the mediation coefficient indicates that about 44.2% of the overall impact on market performance emanating from customer satisfaction flows through the conduits of product innovation, making it the main mechanism in the structural pathway. This high mediation effect is consistent with customer-based innovation theory underpinnings and mainstream market orientation scholarship, which hypothesizes that satisfied customers provide important market intelligence, foster collective innovation drives, and provide conducive environments for new product rollout (De Rosa et al., 2022). Moreover, current empirical studies concur that innovation capacity is an important mediating factor connecting customer knowledge and market orientation, which in turn shapes their later performance outcomes, especially under fluctuating market scenarios where institutions need to effectively respond to changes in customer expectations (Cobelli et al., 2023; Diao & Doucoure, 2022; Tuominen et al., 2004).

The considerably higher mediation effect seen in the Indonesian context can be explained through cultures that value relationships and long-term customer orientation, in which customer satisfaction plays an even higher role in new markets that often do not possess sophisticated market research infrastructure. The background highlights the importance of getting direct customer feedback through satisfaction mechanisms, which becomes even more important to inform innovation compared to classical market research approaches. The strength of such mediation highlights the bidirectional nature in the relationship between innovation and customer satisfaction, suggesting that a satisfied customer base not only provides innovative ideas but is also an early adopter and champion of new products, thus forming a positive feedback loop in which customer satisfaction drives innovation that improves market performance, thus ensuring increased customer satisfaction. The result presents important implications for manufacturing firms in Indonesia, suggesting that investments in initiatives that can enhance customer satisfaction can provide high payback through gains in performance mediated through innovation.

Comparative Analysis of Mediation Effects

The significant difference identified in the absence of mediation between strategic flexibility (H5) and market turbulence (H6), as well as customer satisfaction (H7), clarifies important implications for factors that determine innovation in manufacturing scenarios in emergent markets. While strategic flexibility is not seen to reflect a direct relationship between performance benefits from innovation, the environment's dynamics—the market turbulence in particular, as well as stakeholders' interests, the customer satisfaction in particular- act effectively to moderate innovation processes, thus enhancing market performance.

As such, we can infer that the initial driver for innovation for Indonesian manufacturing firms is not an intrinsic strategic competency but an exogenous stimulus. Market changes present adaptive challenges, which allow for generating innovations, and customer satisfaction acts as a template for directing and assessing innovation strategies. As an important strategic competency, even on an individual basis, organizational agility is lacking as a means for achieving innovations for performance improvement; issues associated with proper execution, evaluative skills, or supporting competencies most likely explain these inadequacies.

The aggregate findings suggest an evolving strategy that highlights stakeholders' involvement, setting external relationships and environmental factors as principal innovation motivators. However, intrinsic strategic competences, for instance, flexibility, could require different contextual demands or supplemental resources as effective innovation catalysts. The latter finding carries important implications for theoretical progress in the area as well as for management practices in their new market settings, suggesting that innovation strategies attain maximum effectiveness when aimed at interacting with external stakeholders and reacting to external factors, rather than placing undue emphasis on internal initiatives associated with flexibility.

4.4. Moderation analysis

To further explore the contingent nature of the relationships in the research conceptual model, we examined potential moderating effects as hypothesized in H8 and H9. Specifically, we tested whether Market Turbulence moderates the relationships between Strategic Flexibility and Product Innovation, and between Customer Satisfaction and Product Innovation. The moderation analysis employed latent variable interaction terms and was conducted using the two-stage approach recommended for structural equation modeling. Table 3 presents the results of these moderation tests.

Table 3: Results of Moderation Effects Testing

Hypothesis	Interaction Path	Original Coefficient (O)	T-statistics	P-values	Result
H8	MTB × SFL → PIN	-0.031	0.380	0.352	Not Supported
H9	MTB × CST → PIN	0.232	2.598	0.005	Supported

Hypothesis 8 (H8): The Interaction of Market Turbulence and Strategic Flexibility on Product Innovation

Hypothesis 8 hypothesized that strategic flexibility is a moderating variable in the market turbulence-product innovation relationship, but no empirical support for such an assertion was provided (β = -0.031, t = 0.380, p = 0.352). The statistically insignificant and negative coefficient indicates that strategic flexibility is not an effective moderating agent in the market turbulence-product innovation relationship, thus contradicting theoretical hypotheses derived from dynamic capabilities theory. Strategic flexibility is known as an important organizational competency facilitating innovation and organizational performance (OP) improvement in environments marked by uncertainty, turbulence, and ongoing change (Awais et al., 2023). The theory-based hypothesis was that companies enjoying higher strategic flexibility would capitalize on market turbulence as innovation opportunities due to their enhanced ability for resource reconfiguring and competency adjusting. However, the findings in the present study show that strategic flexibility fails to offer the anticipated adaptive benefits in market turbulence. Although most existing reviews on previous literature describe strategic flexibility as an antidote for turbulence in the environment for enhancing product innovation, relatively few studies examine the mechanisms for the indirect effects exerted by strategic flexibility on product innovation as opposed to direct effects (Meng et al., 2020). The findings indicate an influence on indirect processes as opposed to a direct moderating relationship, thus necessitating the role of additional competencies to realize significant innovation outcomes.

Various methodological and contextual factors can explain non-significant findings, which are often related to the assessment and working specification of strategic flexibility. Due to the construct's inherently multidimensional nature, higher measurement strategies are adopted to effectively reflect its varied components. However, the present research adapted three dimensions, i.e., planning, resource, and coordination dimensions, to define the notion of strategic flexibility (Awais et al., 2023). This indicates that single-dimensional measurement frameworks can face issues related to construct validity and may fail to adequately capture the dynamic nature of strategic flexibility. On the flip side, study findings can indicate boundary conditions that set limits on the effectiveness of strategic flexibility in restricted applications. Along with previous studies, strategic flexibility is indicated as positively influencing bricolage and product innovation, thus benefiting managers in gaining a deeper understanding of flexible resources and organizational configurations in dynamic surroundings (Meng et al., 2020). This indicates that in poorly structured firms, strategic flexibility can be ineffective or even harmful. Organizations are compelled to develop an ability for responsiveness and adjustability, and such changes are often prompted by the new products, services, and processes introduced for enhancing operational performance (Awais et al., 2023). However, these changes can require extended intervals and further capabilities not taken into consideration in cross-sectional study frameworks, suggesting that the benefits related to strategic flexibility often become evident in extended timespans, overcoming the typical timespans for most studies.

Hypothesis 9 (H9): The Interaction of Market Turbulence and Customer Satisfaction on Product Innovation

Hypothesis 9 suggested customer satisfaction plays a moderating function between market turbulence and product innovation, which gained empirical support (β = 0.232, t = 2.598, p = 0.005). The positive and statistically significant coefficient suggests customer satisfaction strengthens the link between market turbulence and product innovation, such that companies experiencing high customer satisfaction are better at translating environmental challenges into product innovation opportunities. The finding is congruent with the customer-centric innovation body of work, which highlights the central function of the customer in the innovation process. For instance, the launching of health-driven options is an indication of the rising wellness momentum, directly targeting customer pain points in quick-service restaurants (QSRs). With respect to QSRs, customer satisfaction maximization is an important innovation strategy, which can be attained through customized offerings that are aligned to diverse desires and by causally enhancing customer experience (Manhas et al., 2024). The theoretical support for the moderation effect lies in the fact that happy customers are excellent market intelligence sources, which provide cues that direct innovation initiatives toward the production of products and services that are most appealing to the market.

The moderating process is explained in terms of customer-based innovations, where customer satisfaction is a central co-creation factor for value, yielding crucial knowledge for new product and service innovations. Under circumstances where consumer demand volatilities are high, end-users possess a heightened ability to sense such volatilities, thus putting their innovations ahead of producers; in such circumstances, end-users are further driven by factors associated with innovation motivation (Preißner et al., 2024). The existence of customer satisfaction avails relational security, allowing firms to embark on innovative practices without putting their customer base at risk. Non-critically satisfied customer bases, in cases of innovation declines, offer constructive criticism that remains crucial for ongoing product development. The present study brings novel knowledge to the knowledge pool by presenting an exhaustive assessment of the factors shaping product innovation, customer satisfaction, and experience in the quick service restaurant (QSR) market (Manhas et al., 2024), thus underpinning the understanding that, under increased uncertainty, customer satisfaction serves as a crucial strategic asset.

Moderation Mechanisms and Indirect Effects

Simple slope analysis identifies that customer satisfaction's impact on product innovation is significantly higher in turbulence-high environments than in turbulence-medium environments. This finding validates the claim that in uncertainty-high settings, customer satisfaction is an important strategic resource. More particularly, lead users are aware of their needs much earlier than mainstream markets and can extract high value from satisfying their needs, thus becoming future innovation sources (Preißner et al., 2024). Companies that operate in fluctuating environments, keeping high customer satisfaction levels, can extract increased market intelligence from strong customer relationships, thus rapidly adjusting to changes in the marketplace. The increased flow of information provided by satisfied customers gives firms timely market intelligence, which in turn aids in making decisions in innovation processes, as well as reduces uncertainty often experienced in dynamic environments. The feedback provided by customers is essential in determining future product innovations, thus establishing a cyclic relationship (Manhas et al., 2024).

The findings suggest that market turbulence × customer satisfaction (MTB × CST) significantly influences market performance through product innovation (β = 0.192, p = 0.009, 95% CI [0.007, 0.245]) in the present study. The findings suggest that, apart from enabling product innovation, the relationship between market turbulence and customer satisfaction, in fact, improves market performance as a downstream outcome. Moreover, the findings also highlight the important role of product quality as an important antecedent to customer satisfaction as well as customer loyalty, thus emphasizing the imperative for customer need-addressing (Karim & Rabiul, 2024). The findings help explain the need for sustaining and enhancing customer satisfaction for a sustainable, long-term competitive advantage. Moreover, the indirect effect through product innovation also suggests that customer satisfaction serves as an enabler for generating innovations and as an antecedent to market performance associated with such innovations, thus building various routes for the relationship between customers and organizational performance. The innovation-based strategies and executions followed by KFC, McDonald's, Pizza Hut, and Domino's in the Indian market provide relevant illustrations on how customer satisfaction-based innovations can lead to market success (Manhas et al., 2024).

Comparative Analysis of H8 and H9 and Strategic Implications

The contrast between H8 and H9 results highlights fundamental differences between strategic flexibility and customer satisfaction as moderators in confronting market turbulence. While strategic flexibility focuses on internal organizational capabilities that may require time to develop and implement, customer satisfaction connects organizations with the external environment through customer relationships that can provide immediate and actionable insights. The successful commercialization of a product innovation requires the innovation be utilized in conjunction with other resources and capabilities (Zhou & Wu, 2010). Customer satisfaction provides relational stability that enables organizations to adapt to environmental changes without losing legitimacy and market support, whereas strategic flexibility may require specific conditions or complementary capabilities to become effective. The external orientation inherent in customer satisfaction appears to offer more immediate benefits in turbulent environments compared to the internal focus of strategic flexibility.

These findings provide important insights into organizational strategy for confronting market turbulence, suggesting that investment in customer satisfaction may be more effective than developing strategic flexibility as a short-term response to environmental uncertainty. This access to other users gives them an informational advantage in early sensing customer preference discontinuities (Preißner et al., 2024), supporting the view that customer satisfaction provides real-time market intelligence. However, this does not imply that strategic flexibility is unimportant, but rather that it may operate through different mechanisms or require longer time horizons to demonstrate its impact. Strategic flexibility in terms of planning, resource, and coordination flexibility has a profound effect on organizational performance (Awais et al., 2023). The combination of customer satisfaction for short-term responsiveness and strategic flexibility for long-term adaptability may represent an optimal approach for confronting sustained market turbulence, recognizing that these capabilities may operate through different temporal and causal

Hypothesis 8 (H8): The Interaction of Market Turbulence and Strategic Flexibility on Product Innovation

Hypothesis 8 hypothesized that strategic flexibility is a moderating variable in the market turbulence-product innovation relationship, but no empirical support for such an assertion was provided (β = -0.031, t = 0.380, p = 0.352). The statistically insignificant and negative coefficient indicates that strategic flexibility is not an effective moderating agent in the market turbulence-product innovation relationship, thus contradicting theoretical hypotheses derived from dynamic capabilities theory. Strategic flexibility is known as an important organizational competency facilitating innovation and organizational performance (OP) improvement in environments marked by uncertainty, turbulence, and ongoing change (Awais et al., 2023; Cui et al., 2022). The theory-based hypothesis was that companies enjoying higher strategic flexibility would capitalize on market turbulence as innovation opportunities due to their enhanced ability for resource reconfiguring and competency adjusting. However, the findings in the present study show that strategic flexibility fails to offer the anticipated adaptive benefits in market turbulence. Although most existing reviews on previous literature describe strategic flexibility as an antidote for turbulence in the environment for enhancing product innovation, relatively few studies examine the mechanisms for the indirect effects exerted by strategic flexibility on product innovation, as opposed to direct effects (Arici & Gok, 2023; Turulja & Bajgoric, 2019). The findings indicate an influence on indirect processes as opposed to a direct moderating relationship, thus necessitating the role of additional competencies in order to realize significant innovation outcomes.

Various methodological and contextual factors can explain non-significant findings, which are often related to the assessment and working specification of strategic flexibility. Due to the construct's inherently multidimensional nature, higher measurement strategies are adopted to effectively reflect its varied components. However, the present research adapted three dimensions, i.e., planning, resource, and coordination dimensions, to define the notion of strategic flexibility (Awais et al., 2023; Salihi et al., 2024). This indicates that single-dimensional measurement frameworks can face issues related to construct validity and may fail to adequately capture the dynamic nature of strategic flexibility. On the flip side, study findings can indicate boundary conditions that set limits on the effectiveness of strategic flexibility in restricted applications. Along with previous studies, strategic flexibility is indicated as positively influencing bricolage and product innovation, thus benefiting managers in gaining a deeper understanding of flexible resources and organizational configurations in dynamic surroundings (Leppänen et al., 2020; Rehfeld et al., 2007). This indicates that in poorly structured firms, strategic flexibility can be ineffective or even harmful. Organizations are compelled to develop an ability for responsiveness and adjustability, and such changes are often prompted by the new products, services, and processes introduced to enhance operational performance (Aslam & Jawaid, 2023; Jian et al., 2022; Yanine & Campos, 2023). However, these changes can require extended intervals and further capabilities not taken into consideration in cross-sectional study frameworks, suggesting that the benefits related to strategic flexibility often become evident in extended time spans, overcoming the typical time spans for most studies.

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are high, end-users possess a heightened ability to sense such volatilities, thus putting their innovations ahead of producers; in such circumstances, end-users are further driven by factors associated with innovation motivation (Batz Liñeiro et al., 2024; Eniola, 2021; Rodrigues et al., 2021). The existence of customer satisfaction avails relational security, allowing firms to embark on innovative practices without putting their customer base at risk. Non-critically satisfied customer bases, in cases of innovation declines, offer constructive criticism that remains crucial for ongoing product development. The present study brings novel knowledge to the knowledge pool by presenting an exhaustive assessment of the factors shaping product innovation, customer satisfaction, and experience in the quick service restaurant (QSR) market (Manhas et al., 2024), thus underpinning the understanding that, under increased uncertainty, customer satisfaction serves as a crucial strategic asset.

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The findings suggest that market turbulence × customer satisfaction (MTB × CST) significantly influences market performance through product innovation ($\beta = 0.192$, $p = 0.009$, 95% CI [0.007, 0.245]) in the present study. The findings suggest that, apart from enabling product innovation, the relationship between market turbulence and customer satisfaction, in fact, improves market performance as a downstream outcome. Moreover, the findings also highlight the important role of product quality as an important antecedent to customer satisfaction as well as customer loyalty, thus emphasizing the imperative for customer need-addressing (Shaibu et al., 2024; Sinulingga, 2024; Suharto & Hoti, 2023). The findings help explain the need for sustaining and enhancing customer satisfaction for a sustainable, long-term competitive advantage. Moreover, the indirect effect through product innovation also suggests that customer satisfaction serves as an enabler for generating innovations and as an antecedent to market performance associated with such innovations, thus building various routes for the relationship between customers and organizational performance. The innovation-based strategies and executions followed by KFC, McDonald's, Pizza Hut, and Domino's in the Indian market provide relevant illustrations on how customer satisfaction-based innovations can lead to market success (Abrar et al., 2020; Claussen et al., 2018).

Comparative Analysis of H8 and H9 and Strategic Implications

The contrast between H8 and H9 results highlights fundamental differences between strategic flexibility and customer satisfaction as moderators in confronting market turbulence. While strategic flexibility focuses on internal organizational capabilities that may require time to develop and implement, customer satisfaction connects organizations with the external environment through customer relationships that can provide immediate and actionable insights. The successful commercialization of a product innovation requires the innovation to be utilized in conjunction with other resources and capabilities (Kor et al., 2007; Priyono & Hidayat, 2022). Customer satisfaction provides relational stability that enables organizations to adapt to environmental changes without losing legitimacy and market support, whereas strategic flexibility may require specific conditions or complementary capabilities to become effective. The external orientation inherent in customer satisfaction appears to offer more immediate benefits in turbulent environments compared to the internal focus of strategic flexibility.

These findings provide important insights into organizational strategy for confronting market turbulence, suggesting that investment in customer satisfaction may be more effective than developing strategic flexibility as a short-term response to environmental uncertainty. This access to other users gives them an informational advantage in early sensing of customer preference discontinuities (Amangala & Wali, 2020; Kankam-Kwarteng et al., 2021), supporting the view that customer satisfaction provides real-time market intelligence. However, this does not imply that strategic flexibility is unimportant, but rather that it may operate through different mechanisms or require longer time horizons to demonstrate its impact. Strategic flexibility in terms of planning, resource, and coordination flexibility has a profound effect on organizational performance (Akram et al., 2019; Imran & Jingzu, 2022; Pham & Vu, 2022). The combination of customer satisfaction for short-term responsiveness and strategic flexibility for long-term adaptability may represent an optimal approach for confronting sustained market turbulence, recognizing that these capabilities may operate through different temporal and causal mechanisms.

5. Discussion

5.1. Deconstructing dynamic innovation capabilities

The study's findings provide significant insight into the direction of the previously identified theoretical gap: the need to untangle dynamic innovation capacities. The empirical findings suggest that every component in the research frame plays distinct roles. Market turbulence exhibits a high positive effect on product innovation ($\beta = 0.197$, $p = 0.002$), while strategic flexibility shows no significant direct effect ($\beta = 0.047$, $p = 0.291$). The findings support the claim that innovation capacities as a monolithic construct hide important nuancing in the related mechanisms. Such capacities are characterized as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, 2018), and the differential effects identified in our study reflect the need for further understanding of the components under such capacity. The size of the effect on customer satisfaction in reference to product innovation ($\beta = 0.533$, $p < 0.001$) suggests that market-oriented factors under dynamic innovation capacities hold larger impacts in reference to organizational internal flexibility in our study context. The study contributes to the dynamic capabilities scholarship in present times by demonstrating that external and internal components interact in divergent rather than aggregate trajectories, which is not often documented in prior scholarly literature.

An important moderating effect on product innovation in the customer satisfaction-performance nexus ($\beta = 0.442$, $p < 0.001$) and the market turbulence-performance nexus ($\beta = 0.163$, $p < 0.001$) highlights core mechanisms linking organizational capacities to performance outcomes. The findings contribute to the classification of innovation capacities by tracing out distinct areas of impact reaching well beyond the typical direct effects brought to light in strategic management scholarship. That said, external validity for these findings depends on the unique Indonesian setting in which the study was conducted. The in-built nature of emerging markets, such as market institutions, few material means, and fast-changing rules systems, can both reinforce and change manifestations as well as operations attending dynamic

innovation capacities. The building of skilled dynamic capacities is critical for achieving the organizational agility needed to cope with great uncertainty, much of which is particularly generated through innovation and ensuing dynamic competition (Teece, 2020); that said, the context-specific nature of such capacities means their manifestations may vary in alternative settings for institutions. Indonesian manufacturing companies may demonstrate inconstant configurations for building and employing their capacities when compared to their counterparts in high-income countries, where market structures are complex and institutions are well-entrenched. More work is needed to determine whether the unique effects associated with market orientation-based capacities, rather than internal capacities, as suggested in our research, hold across various environments for institutions, alternative industries, and various growth phases for economies, thus extending both theoretical knowledge and practical applications in this area of scholarship.

5.2. Market turbulence as a boundary condition

The second conceptual gap is related to market turbulence acting as a moderating factor on the innovation effectiveness. Moderation analyses in this study indicate that the relationship between market turbulence and customer satisfaction significantly impacts product innovation ($\beta = 0.232$, $p = 0.005$). Moreover, the findings from simple slope analyses show that the impact of customer satisfaction on innovation is significantly larger for high-turbulence situations compared to low-turbulence settings. Such findings directly address core questions in terms of the nature and degree to which environmental variables determine organizational competency-innovation interaction. The study provides empirical evidence for the core proposition in dynamic capability theory, which highlights the need for firms to change and adjust to changes occurring in their operative environments. Although adaptation to environmental alterations makes for the core conceptual base within dynamic capacities (Teece, 1996)Whether the dynamic capacities are about their nature or function remains ambiguous in the prevailing discourse on dynamic capacities (Teece, 1996). The ability to capitalize on market turbulence as an innovation trigger is consistent with the main theory proposition that dynamic capacities optimize firms' ability to continually absorb, develop, and transform internal and external competencies in line with changes in the environment.

The non-significant moderating effect for market turbulence in the relationship between innovation and strategic flexibility ($\beta = -0.031$, $p = 0.352$) provides useful implications for understanding boundary conditions in dynamic capability research. The research is consistent with the argument that not all dynamic capability components extract equal benefits from turbulence in the environment, thus filling the gaps identified in previous studies. Although most previous studies argue that strategic flexibility is an ability developed to cope with turbulence in the environment and promote product innovation, a relatively small number of studies have identified the mediating mechanisms connecting strategic flexibility and product innovation (Chukhray et al., 2022; Leppänen et al., 2020; Rochina-Barrachina et al., 2010). The present study fills the existing knowledge gap in the boundary conditions that determine the effectiveness of strategic flexibility and clarifies the various settings in which benefits for strategic flexibility materialize. Market turbulence is characterized by high uncertainty and turbulence related to consumer demand and technological change, which are symptomatic of a dynamic and changing environment (Hoekstra & Leeflang, 2023; Qiu et al., 2020). However, the impact of strategic flexibility is less dependent on related core-complementary dynamic capabilities and distinct organizational settings, but rather largely on market turbulence.

However, the transferability of such findings requires scrutiny, considering the specific Indonesian setting covered in the current study. The unique characteristics of emerging markets, for instance, in terms of institutions, resource scarcities, and rapidly fluctuating regulatory environments, could impede the processes under which dynamic innovation capacities evolve and interact with market turbulence. Future studies should determine the degree to which the various moderating impacts realized in the current study are generalized across various institutional settings, industries, and developmental phases in the hierarchy. Cross-country comparisons and cross-industry studies would further refine our understanding of the relationships between turbulence in the environment and various components of capacities, thus fortifying both the theoretical import as well as practical utility relating to the subject area.

5.3. Customer satisfaction as a co-creation mechanism

The generalizability of such findings requires careful consideration, as well as considering the unique manufacturing setting in Indonesia that is addressed in this study. Different contextual factors are typical for newly emerging markets and can potentially impact the way in which relationships between market turbulence, customer satisfaction, strategic flexibility, and product innovation are realized in varied settings. Companies operating in Indonesia's manufacturing arena do so in an environment characterized by rapid economic growth, variable regulatory environments, and deeper global value chain linkages. Companies in emerging markets face complex and dynamic settings, owing primarily to recurrent changes in the institutional setting and the increasing intensity of market competition, which can present new challenges for planning strategies and distributing resources (Nguyen, 2024). Such a setting can define various boundary conditions for the effectiveness of dynamic capabilities that differ from analogous ones in higher-income market economies.

Cultural dimensions typical for Indonesian business practices, such as high-power distance, collectivism, and long-term orientation, can potentially influence customer-firm relationships' dynamics as well as customer satisfaction's effectiveness as a means for co-creation. If, in cultures valuing collectivism, the way customer feedback is communicated as well as satisfaction patterns can significantly differ from individualistic cultures, customer satisfaction-driven innovations can differ as well. Additionally, Indonesia's tech sophistication and maturity in infrastructure-level information tech can contribute to innovation paths different from those in higher-income-level economies when compared. Future research would do well to examine whether market-orientation-driven as well as internal-capability-driven outcomes of this study are generalizable to various institutions, different cultural dimensions, and different industries. Using comparative research involving more countries that include various phases in their economic development, different views on cultures, as well as various institutions, would enhance understanding about boundary conditions and contextual factors relating to the innovative capability-performance relationship. Validation in various industries located in emerging markets would further enhance theoretical progress, considered because manufacturing companies may reflect disparate capability development patterns when compared to service-based or tech-based industries. Such a broad-based inquiry would provide firmer theory-based foundations as well as practical applications for this area of study, but would do so while considering the dynamic-capability effectiveness's context-specific nature.

5.4. Theoretical and managerial implications

Collectively, research findings support an integrative theoretical framework explaining firm innovation and performance in turbulent environments. Product innovation functions as the central mediating mechanism connecting internal capabilities and external market factors with market performance ($\beta = 0.830$, $p < 0.001$), consistent with previous research on innovation-performance linkages (Turulja & Bajgoric, 2019; Xu & Correia, 2024).

The research's theoretical contributions align with (Stremersch et al., 2023)recommendations regarding the value of contextual studies by revealing unique patterns in the Indonesian manufacturing context. The dominant role of customer satisfaction in driving innovation suggests that in emerging economies with rapidly evolving consumer preferences, market-pull factors may supersede technology-push drivers typically emphasized in Western innovation research (Khabbazan, 2022; Khabbazan & Hokamp, 2022; Mazaheri et al., 2022).
For managers, research findings offer several practical insights. First, the strong effect of customer satisfaction on innovation emphasizes the importance of systematic approaches to collecting and utilizing customer feedback (Agnihotri & Gabler, 2024; Vieira et al., 2023). Second, the significant moderation effect indicates that during periods of high market turbulence, firms should intensify customer engagement efforts rather than retreat to internal focus (Alghamdi & Agag, 2024; Le & Do, 2024b, 2024a; Nasiri et al., 2021). Third, the non-significant effect of strategic flexibility suggests that firms should evaluate their flexibility initiatives and specifically direct them toward leveraging customer insights and responding to market changes (Sirmon et al., 2007, 2011).
This study extends research understanding of how dynamic innovation capabilities interact with contextual factors to drive performance, fulfilling the empirical objective identified in the research introduction to uncover the causal mechanisms linking innovation capabilities with market performance in turbulent contexts (Agarwal, 2024; Grabowska & Saniuk, 2022; Scarpellini et al., 2020).

6. Conclusion

This study examined the interactions among strategic flexibility, market turbulence, customer satisfaction, product innovation, and market performance within Indonesian manufacturing and technology firms. Research addresses three critical theoretical gaps in the dynamic capabilities literature: the need to deconstruct innovation capabilities, understand boundary conditions for innovation effectiveness, and integrate customer satisfaction as a co-creation mechanism.
Research empirical results reveal several important insights. First, market turbulence ($\beta = 0.197$, $p = 0.002$) and customer satisfaction ($\beta = 0.533$, $p < 0.001$) significantly influence product innovation, while strategic flexibility does not demonstrate a significant direct effect ($\beta = 0.047$, $p = 0.291$). Second, product innovation strongly impacts market performance ($\beta = 0.830$, $p < 0.001$) and significantly mediates the effects of market turbulence ($\beta = 0.163$, $p < 0.001$) and customer satisfaction ($\beta = 0.442$, $p < 0.001$) on market performance. Third, market turbulence positively moderates the relationship between customer satisfaction and product innovation ($\beta = 0.232$, $p = 0.005$), confirming that customer-driven innovation becomes more valuable as market volatility increases.
These findings offer three substantial theoretical contributions. First, by demonstrating the asymmetric effects of different components of dynamic innovation capabilities, the research extends beyond monolithic conceptualizations toward a more nuanced taxonomy that acknowledges distinct operational mechanisms, supporting Quayson et al. (2023) , (2024) & D. J. Teece, (2020) arguments. Second, substantively establishing the moderation effects validates market turbulence to be a vital boundary condition for innovation performance, solving the theoretical paradox established by scholars such as (Banerjee, 2002; K. C. Zhang et al., 2024). Third, by offering empirical validation for the performance role for customer satisfaction as an antecedent to innovation, whose effect is augmented by turbulence, we offer an integrative model that encompasses internally-focused capabilities orientations and market-pull approaches to innovation.
For the practitioner, the research work provides clear guidance in terms of strategy. The positive impact of customer satisfaction on processes of innovation, specifically under turbulences, is evidence that business organizations need to incorporate customers' feedback into innovation processes instead of falling back into internal orientation under turbulences. The strong correlation the research work provides between product innovation and market performance ($\beta = 0.830$) indicates the importance of innovation even under turbulence.
Despite its contributions, the research study has limitations, including its cross-sectional design and focus on a specific national context. Future research should employ longitudinal approaches to better capture dynamic processes and test the research model across diverse industries and cultural contexts. Additionally, researchers should further explore the unexpected non-significant role of strategic flexibility by examining potential indirect effects and alternative conceptualizations. In conclusion, this research advances research understanding of how firms can effectively navigate turbulent environments through innovation by clarifying the complex, contextual relationships among capabilities, market factors, and performance outcomes. By empirically addressing the three theoretical gaps identified, the research study provides both scholarly insights and actionable guidance for innovation management in dynamic market conditions.

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Ethical Approval

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Conflict of Interest

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Availability of Supporting Data

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organization that could have an interest in the outcome of this research. Any potential competing interests that may have arisen during this study have been disclosed transparently. The author(s) also affirm that ethical considerations were adhered to throughout the research process, ensuring integrity, objectivity, and academic rigor in the study's execution and reporting. Should any undisclosed competing interests come to light in the future, the author(s) commit to addressing them appropriately and transparently.

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