

THEORETICAL INTEGRATION OF THE “TOE” FRAMEWORK AND ORGANISATIONAL AMBIDEXTERITY: A CONCEPTUAL MODEL AND FUTURE PROSPECTS OF MULTIDIMENSIONAL FIRM RESILIENCE

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Article history

Received date : 19-6-2026

Revised date : 20-6-2026

Accepted date : 25-7-2026

Published date : 1-8-2026

To cite this document:

Lichen, Z., Raja Abdullah, R. N., He, L., & Naseri, R. N. N. (2026). Theoretical integration of the "TOE" framework and organisational ambidexterity: A conceptual model and future prospects of multidimensional firm resilience. *International Journal of Accounting, Finance and Business (IJAFB)*, 11 (67), 116 - 129.

Abstract: *In an era characterised by environmental turbulence, technological disruption, and stringent institutional pressures, firm resilience has emerged as a fundamental capability for organisations to not only survive crises but also achieve sustainable strategic renewal. Despite its growing prominence, existing literature exhibits significant theoretical fragmentation. While the Technology-Organisation-Environment (TOE) framework is widely employed to identify the antecedents of innovation, it inherently focuses on static contextual determinants, thereby failing to capture the internal behavioural mechanisms required for dynamic adaptation. Concurrently, traditional resilience studies frequently confuse defensive recovery with proactive innovation, creating a critical theoretical gap between external contextual pressures and internal strategic responses. To bridge this divide, this paper proposes the integration of the TOE framework and organisational ambidexterity theory. By systematically embedding the dual behavioural logic of 'exploration' and 'exploitation' into the technological,*

organisational, and environmental dimensions, this study constructs a six-dimensional conceptual model of TOE-ambidextrous firm resilience. This multi-dimensional framework clarifies how firms can simultaneously manage the paradoxical demands of short-term operational stability and long-term transformation under complex constraints. Ultimately, this theoretical extension moves beyond the aggregated view of resilience, offering a granular analytical lens for understanding capability reconfiguration. The paper concludes by outlining avenues for future empirical research, particularly highlighting the framework's applicability in evaluating transition performance within industries constrained by physical asset lock-ins and high carbon emissions.

Keywords: *Green innovation; Hard-to-abate sectors; Green dynamic capabilities; Conceptual model; Technology-Organisation-Environment (TOE) framework*

Introduction

In today's business world, firms face unprecedented challenges driven by global macroeconomic shocks, rapid technological disruptions, and evolving institutional regulations. Globally, the frequency and severity of severe supply chain disruptions have increased dramatically. Recent data indicates that these disruptions now occur every 3.7 years on average and can cost businesses up to 45% of a year's profit over the course of a decade (McKinsey & Company, 2020). Furthermore, statistics consistently reveal that between 70% and 88% of traditional firms attempting digital transformation fail to achieve their strategic goals due to a lack of adaptive capabilities and cultural resistance, rather than just technological flaws (Bain & Company, 2024; McKinsey & Company, 2023). These stark percentages highlight a critical global scenario: the uncertainty that firms deal with is no longer about short-term or local problems. Instead, it has become a normal, long-term, and system-wide instability (Su & Junge, 2023). This new type of environment creates big problems for traditional ways of managing crises. In the past, risk management usually relied on having extra resources to defend the firm. The main goal was to achieve a passive "bounce-back", meaning the firm just wanted to survive the shock and quickly return to its original state.

But when instability becomes the normal situation, simply going back to normal is not enough for a firm to survive in the long run. Organisations now need the ability to reorganise their strategies and actively change during a crisis. This ability to "bounce-forward" and evolve is known as multidimensional firm resilience (Bürgele et al., 2023). So, understanding what causes firm resilience and how it is built has become a very important topic in strategic management. A simple example is how many small shops during the Covid-19 lockdowns had to learn online selling quickly, not just wait for the lockdown to end. Those that only tried to keep their old way of doing business often lost customers for good.

Although most researchers agree that firm resilience is important, the current literature still has some gaps when explaining how it is actually created. Many studies treat resilience as a single, isolated feature of an organisation. They often lack a systematic way to see how a firm's technology base, organisational structure, and external environment work together to shape its resilience (Ali et al., 2024). The traditional Technology-Organisation-Environment (TOE) framework is a classic theory used to understand why organisations adopt innovations. It gives a good overall view of different contexts. However, its basic logic mostly focuses on making a static list of factors. It struggles to explain how firms actively change their behaviour to

respond to outside pressures (Fang & Liu, 2024). This gap between the external environment and internal action creates a "behavioural black box". As a result, the TOE framework is limited when trying to explain how high-level dynamic capabilities are built.

At the same time, existing research often sees firm resilience as just one general variable. This approach ignores the fact that firms act in very different ways when facing a crisis. In reality, a firm's response to an unstable environment involves two different logics that often conflict. On one hand, the firm needs to keep its current core business running and maintain stability. On the other hand, it needs to quickly find new directions and take advantage of new, disruptive opportunities (March, 1991; Sardesai & Klingebiel, 2023). This contradictory need shows that building firm resilience is not just about developing a single skill. Instead, it is closely connected to the idea of organisational ambidexterity, which is the ability to manage these conflicting behaviours at the same time.

Based on these points, this study aims to solve the limitations of current fragmented research by combining the TOE framework with organisational ambidexterity theory. This paper takes the two behaviours of "exploration" and "exploitation" and places them into the three contexts of technology, organisation, and environment. By doing this, the study creates a new conceptual model of "TOE-ambidextrous" multidimensional firm resilience, which contains six specific dimensions.

The Evolution and Theoretical Limitations of the TOE Framework

The Fundamentals of the Technology-Organisation-Environment (TOE) Framework

The framework of TOE was originally developed by Tornatzky and Fleischer (1990). It states that a firm's decisions and behaviours are shaped by three different but connected contexts: technology, organisation, and environment. Scholars have consistently validated that these three elements must align for successful organizational adaptation (DePietro et al., 1990; Baker, 2011). The "technological context" includes all the internal and external technologies that are relevant to the firm. This does not just mean the equipment the firm is already using. It also includes new tools, software, and processes available in the market that the firm could adopt. This dimension shows the physical and digital limits of what a firm can actually do.

The "organisational context" refers to the internal characteristics of the firm. This includes the firm's size, its management structure, the amount of spare resources it has, and how its employees communicate. For example, a firm with a very strict, top-down management style will react to problems differently than a firm with a flat, flexible structure. This dimension explains the internal rules and human factors that drive or slow down change.

The "environmental context" covers everything outside the firm's control. This involves the industry the firm operates in, the actions of its competitors, and the demands of its customers. Importantly, it also includes government regulations and legal pressures. The main value of the basic TOE framework is that it treats the firm as an open system. It proves that a firm cannot build capabilities or make strategic choices based on technology alone. The internal organisation and the external market rules must all fit together.

The Evolution of the TOE Framework: From Technology Adoption to a Base for Capability Building

The TOE framework was first introduced by Tornatzky and Fleischer (1990). Its main purpose was to explain how firms decide to adopt new technologies by looking at three connected contexts. In this early "technology adoption phase", the framework was mainly used as a tool to predict whether a company would start using a specific new innovation, like a new software system.

However, the business world has been forced to change because of digital transformation and highly dynamic environments. Because of this, recent literature over the past two years has started to push the TOE framework in a new direction. It is changing from a model of "static adoption" into a basic foundation for building high-level organisational capabilities (Fang & Liu, 2024). This theoretical evolution is critical; modern academia now recognises that technology, organisation, and environment are not just outside limits placed on a firm. Instead, they act as the "contextual soil". This soil helps the firm to make quick internal changes, absorb new resources, and defend against major crises (Bürgel et al., 2023).

This shows a clear shift in how researchers use the framework today. For instance, a firm's ability to use cloud computing during a sudden market disruption depends not only on having the technology but also on its internal decision rules and outside competition. The TOE framework is now seen as a useful starting point to understand how resilience can be built.

Theoretical Limitations of the Traditional TOE Framework in Explaining High-Level Dynamic Capabilities

Even though the TOE framework is very useful for identifying the reasons behind firm actions, it still shows clear limits when it comes to explaining "firm resilience". The first major limitation is the "agency black box" caused by contextual determinism. This means that the traditional TOE model is good at describing the resources and rules in a firm's environment. However, it cannot show how the internal management team understands these factors and makes active strategic changes (Ali et al., 2024). It ignores the human element of decision-making. In simple terms, the TOE model can tell you what resources a firm has, but not why managers choose to use them in one way rather than another.

The second limitation is the lack of a mechanism to handle contradictory needs. Achieving high-level resilience requires an organisation to both "seek stability" and "seek change" at the exact same time (Su & Junge, 2023). The traditional TOE framework usually assumes a simple, one-way cause and effect. So it cannot accurately describe the two different behaviours of a firm when it is dealing with problems like being locked into old technology while the outside environment changes quickly. A firm may need to keep its old production line running (stability) and at the same time test a new product design (change). The TOE model alone does not tell us how to do both.

To fully unlock the TOE framework's ability to explain evolutionary changes, it is necessary to bring in the theory of organisational ambidexterity. Doing this will successfully combine the "context" of the TOE model with the "behaviour" of ambidexterity, leading to a much stronger theoretical approach.

Theoretical Comparison: The Advantages of the TOE Framework over RBV and Institutional Theory

Before we go further, it is useful to compare the TOE framework with two other popular theories to rigorously justify its selection for our model. Many researchers have used the Resource-Based View (RBV) or Institutional Theory to explain how firms survive and succeed. But when we apply these theories to resilience in highly unstable environments, both show clear limits.

The Resource-Based View (Barney, 1991) argues that a firm gets an advantage by controlling internal resources that are valuable, rare, and hard to copy. Many early studies used the RBV to explain resilience. They suggested that firms with more money, better assets, or extra inventory can survive crises easily. However, the RBV has a major weakness when dealing with uncertainty. It looks almost entirely inside the firm and assumes a relatively stable outside market. In a fast-changing world, old resources can suddenly become useless. Sometimes, having too many old assets can even create "core rigidities" (Leonard-Barton, 1992). This means that a firm's past successes and heavy physical assets can trap it and stop it from changing. The RBV fails to explain how sudden external shocks force a firm to update its technology or restructure its organisation.

On the other hand, Institutional Theory (DiMaggio & Powell, 1983) focuses heavily on the outside world. It argues that firms change their behaviour to follow rules, meet social expectations, and gain "legitimacy" in their industry. When studying crisis management, this theory helps explain why firms quickly obey new government policies or copy the survival methods of their competitors. But Institutional Theory also has a big problem. It makes the firm look completely passive. It largely ignores the firm's internal technology base and its active management decisions. It assumes that firms simply react to outside pressure to survive. It cannot explain why some firms actively use new digital tools to change the market during a crisis, while others just wait and follow the rules.

By comparing these theories, the advantages of the TOE framework become clear. The TOE framework does not look only inside like the RBV, and it does not look only outside like Institutional Theory. Instead, it offers a balanced bridge. The "Technology" and "Organisation" dimensions cover the internal resources, technical tools, and management structures. The "Environment" dimension covers the external market shocks, competitor actions, and rule changes. To build true dynamic resilience, a firm must connect its internal tools with external pressures. It cannot rely on just resources or just rule-following. Therefore, compared to the RBV and Institutional Theory, the TOE framework is a better and more complete theoretical base for studying how multidimensional resilience is created.

The Conceptual Evolution and Ambidextrous Requirements of Firm Resilience

The Fundamental Logic of Organisational Ambidexterity

To understand how firms deal with complex crises, we must first introduce the concept of organisational ambidexterity. While concepts of dual structures existed earlier (e.g., Duncan, 1976), the fundamental behavioral logic driving modern organizational learning theory was formalized by March (1991). He divided a firm's learning and behaviour into two broad categories: "exploitation" and "exploration".

"Exploitation" is about using and improving what the firm already knows and does. It involves words like refinement, efficiency, standardisation, and execution. When a firm focuses on exploitation, it wants to reduce mistakes, lower costs, and get predictable short-term results from its current business. It is a safe and defensive logic.

"Exploration", on the other hand, is about stepping into the unknown. It involves words like search, variation, risk-taking, and discovery. When a firm focuses on exploration, it tries to invent completely new products, enter new markets, or adopt unproven technologies. This logic is highly risky and often fails, but it is necessary for finding new ways to grow in the long term.

The core problem in management is that exploitation and exploration naturally fight against each other. They compete for the same limited resources, such as money, time, and management attention (Iborra et al., 2020). If a firm puts all its money into protecting its old business (exploitation), it will have nothing left to invest in the future. However, if a firm spends everything on risky new ideas (exploration), it might run out of cash and die before those ideas succeed. Therefore, "organisational ambidexterity" is defined as a firm's ability to do both things at the same time. An ambidextrous firm can be efficient and stable today, while also being innovative and flexible for tomorrow. This difficult balancing act is the true foundation of firm resilience.

The Evolution of Firm Resilience: From Engineering Defence to Evolutionary Reconfiguration

The word "resilience" originally came from the fields of materials science and ecology (Holling, 1973). It described how a physical system returns to its original stable state after facing outside pressure (Sutcliffe & Vogus, 2003). Over time, management researchers started using ideas from complex systems theory, and the definition of organisational resilience changed. It moved from a "static defence" view to a "dynamic evolutionary" view (Linnenluecke, 2017).

In early research on crisis management, resilience was often called "engineering resilience". This view is defensive. It means that a firm relies on having extra resources and clear business continuity plans so that it can achieve a passive "bounce-back" when a crisis happens. The main goal here is simply to survive and return to the way things were before the disaster.

However, because of recent global crises and fast changes in technology, researchers now realise that just going back to the old state is often not enough. If a market changes permanently after a shock, returning to the old ways means the firm will be left behind by its competitors (Su & Junge, 2023). Think of a hotel that empty during a travel ban. If it only waits to reopen with the same old services, it may lose customers to rivals that added new online experiences or changed their business model.

Therefore, recent studies over the past two years highlight a new concept called "evolutionary resilience". As Trieu et al. (2024) pointed out, modern resilience is not just about survival. It is an active ability that helps a firm turn a crisis into an opportunity and achieve a "bounce-forward" by changing its strategy. This shift from "recovery" to "transformation" means we must study resilience as a set of different, active abilities. A firm that only defends its old way

of doing business is not truly resilient in today's world. It also needs to learn and adapt for the long term.

The Introduction of Organisational Ambidexterity: The Paradox of Stability and Change

Once we accept that resilience includes both "defending against shocks" and "actively changing strategies", a theoretical problem appears. How can a firm manage these two conflicting goals at the same time when its resources are limited? To solve this problem, we need to bring organisational ambidexterity theory into the resilience literature (Sardesai & Klingebiel, 2023).

According to the classic work by March (1991), firms use two different types of logic when dealing with uncertainty: "exploitation" and "exploration". The logic of "exploitation" focuses on improving current knowledge, standardising processes, and increasing short-term efficiency. During a crisis, an exploitative firm will use strict controls and cut costs to protect its core business and keep its main cash flow coming in.

On the other hand, the logic of "exploration" focuses on breaking away from old habits. It involves trial and error, adopting completely new technologies, and investing in unknown areas to gain long-term advantages (O'Reilly & Tushman, 2013). During a crisis, an exploratory firm will use the unstable situation to stop old projects, drop dying assets, and quickly enter new markets.

Ambidexterity theory shows that managing an unstable environment is a "paradox". Exploitation and exploration require different resources, cultures, and structures, so they can easily conflict (Gibson & Birkinshaw, 2004). If a firm only focuses on exploitation, it may become too rigid and fail when the market changes permanently. If it only focuses on exploration, it may waste too many resources on experiments and go bankrupt (Trieu et al., 2024). Therefore, a firm cannot achieve full resilience if it uses only one side. These two conflicting behaviours must be connected to specific organisational contexts. A small manufacturer may need to keep its main product line running (exploitation) while also testing a small batch of a new green product (exploration). Doing both at the same time is hard, but that is exactly what resilience requires.

The Logic of Combining the TOE Framework and Ambidexterity

Combining organisational ambidexterity theory with the traditional TOE framework is an important step to fix the disconnected nature of current research. As mentioned before, the TOE framework provides a three-dimensional map—technology, organisation, and environment—to understand a firm's outside pressures and inside resources. However, it lacks a "behavioural direction". At the same time, ambidexterity theory gives the rules for action, but it lacks a clear "contextual base" to show where these actions take place (Ali et al., 2024).

The integration of these two theories makes sense because ambidextrous behaviours do not happen in empty space. A manager's decision to explore or exploit depends a lot on the firm's current technology tools (Technology), its internal communication setup (Organisation), and the government rules or market competition it faces (Environment). For example, a manager cannot explore new digital solutions if the firm does not have any basic technology

infrastructure in place. Similarly, a firm under strict new environmental rules may be forced to exploit compliance measures before it can explore clean technologies.

So, using "exploration and exploitation" as one dimension and "technology, organisation, and environment" as another dimension creates a useful and balanced way to study resilience. This logic leads us to build a six-dimensional model, which we present next.

The Preliminary Structure of the “TOE-Ambidexterity” Multidimensional Resilience Model

Based on the limitations of the TOE framework and the introduction of ambidextrous behaviours, this study proposes a new conceptual model of “TOE-ambidextrous” firm resilience. This model breaks away from the old view that treats resilience as a single, general variable. Instead, it divides resilience into different abilities based on different contexts. To show this integration clearly, Table 1 presents the 3×2 conceptual matrix of this framework. Each cell in the table represents one type of resilience. The columns show the two behavioural logics (exploitation and exploration). The rows show the three contextual dimensions (technology, organisation, and environment).

Table 1: The Contextual Matrix of “TOE-Ambidextrous” Firm Resilience

Contextual Dimension (TOE)	Behavioural Logic: Exploitation (focus on defence, stability, efficiency)	Behavioural Logic: Exploration (focus on change, disruption, strategic renewal)
Technological Dimension	Technological exploitative resilience: keeping current technology systems running and making small improvements to avoid breakdowns.	Technological exploratory resilience: trying new and possibly disruptive technologies to break old limits and open new possibilities.
Organisational Dimension	Organisational exploitative resilience: improving internal control, making resource use more efficient, and using centralised decisions for quick emergency response.	Organisational exploratory resilience: setting up flexible cross-department teams, breaking old habits, and building a culture that allows trial and error.
Environmental Dimension	Environmental exploitative resilience: following current government policies and industry rules, and strengthening compliance to get defensive support.	Environmental exploratory resilience: taking part in shaping new industry rules and rebuilding business networks to gain an advantage over competitors.

Source: Author's Elaboration

Table 1 outlines the different types of firm resilience in our study. To present this more clearly, Figure 1 illustrates the overall structure of our proposed model. It shows how the TOE framework and ambidexterity theory are combined. As shown in the figure, each of the three TOE contexts (Technology, Organisation, and Environment) is divided into two distinct behaviours: exploitation and exploration. Together, these six sub-dimensions build the foundation of firm resilience.

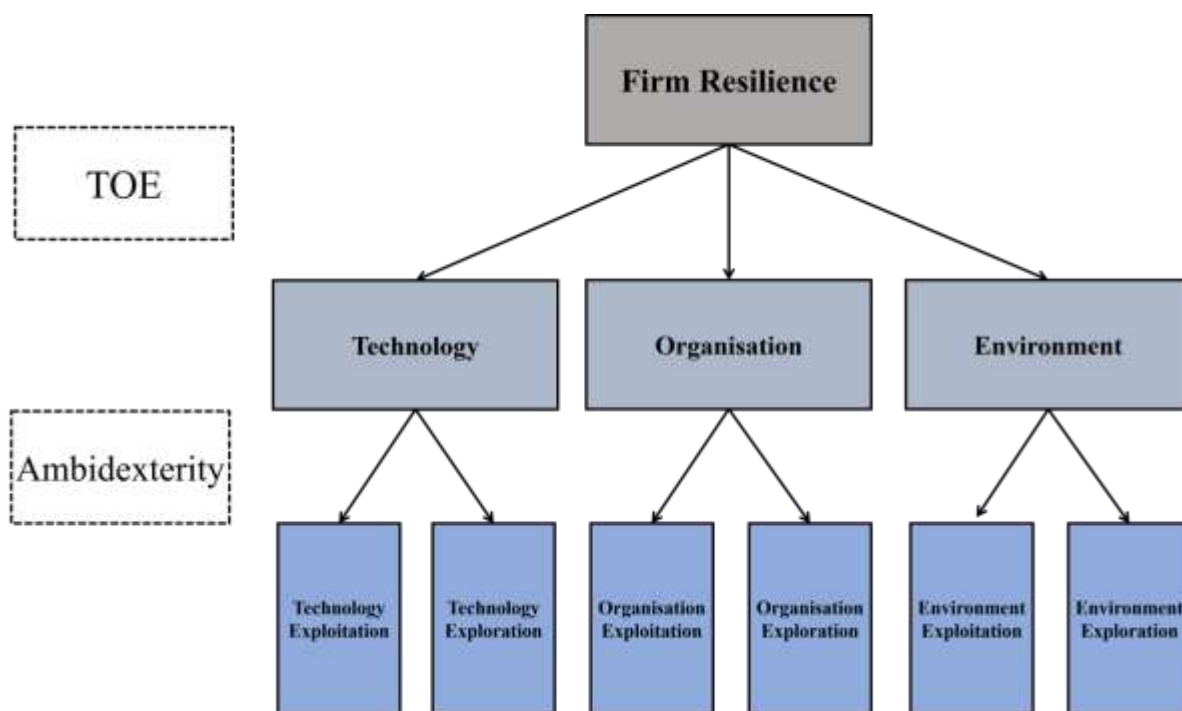


Figure 1: Conceptual Structure of TOE-Ambidextrous Firm Resilience

Source: Author's elaboration

In this framework, the six types of resilience are not isolated concepts. They represent active capability sets that operate under different contextual limits. Below, we explain each dimension in more detail, highlighting their core mechanisms, practical applications, and the internal tensions they create.

Technological Exploitative Resilience

This type focuses on keeping a firm's current physical and digital systems stable during a crisis. When an external shock happens, core operations must not stop. The main mechanism here is "redundancy" (Kaya & Yilmaz, 2025). This means having backup servers, alternative data centres, or secondary supply routes so that a single point of failure does not crash the whole business. This kind of resilience does not create new competitive advantages, but it protects the firm's basic cash flow and prevents system collapse. However, firms that rely too heavily on this defensive type may suffer from path dependence, where they become trapped by their old, expensive assets and ignore market changes.

Technological Exploratory Resilience

This type is about using a crisis as an opportunity to test new technical tools. Instead of just protecting old platforms, the firm actively looks for ways to upgrade its infrastructure. The core mechanism is "experimentation". Firms use small-scale pilot projects to test advanced technologies. If these low-cost tests are successful, the firm gains a new technical capability that rivals do not have. This creates a natural resource tension within the firm: maintaining old infrastructure is very expensive, which leaves less budget for testing new tools. To solve this, firms must adopt a "dual-mode" IT strategy to balance basic system stability with radical technological upgrades.

Organisational Exploitative Resilience

This type focuses on maintaining internal order and efficiency. When an unexpected shock hits, structural uncertainty increases, and employees need clear instructions. The core mechanism is "standardisation". Firms rely on strict standard operating procedures (SOPs) and centralised decision-making. Top managers issue direct commands to cut costs, control resources, and align all departments towards a single survival goal. This top-down control saves time and prevent internal chaos during the early stages of a disaster. Without this type of resilience, a firm can easily waste energy on internal disagreements.

Organisational Exploratory Resilience

This type is about changing the internal management structure to find new survival methods. In a prolonged crisis, strict rules can become a trap. The core mechanism is "flexibility". Firms must loosen administrative control and build agile, cross-departmental teams. By giving decision-making power to lower-level staff, the firm can quickly test new business models or pricing plans. This creates a clear management paradox: the firm needs strict discipline for daily efficiency, but it also needs rule-breaking behaviour for innovation. Good strategic leadership is required to switch between centralisation and decentralisation depending on the stage of the crisis.

Environmental Exploitative Resilience

This type means following external pressures to survive safely. When governments introduce sudden regulations, or when industry standards change, the firm must react quickly. The core mechanism is "compliance". The firm closely monitors new rules and adjusts its operations to meet the minimum legal or social requirements. This passive approach secures the firm's "legitimacy" and helps it avoid heavy fines or public backlash. For many firms, especially those with limited resources, this defensive strategy is the most practical choice to stay in the market and maintain relationships with stakeholders.

Environmental Exploratory Resilience

This type is about actively shaping the outside environment instead of just reacting to it. The core mechanism is "proactive influence". Rather than waiting for new rules to be forced upon them, firms act as institutional entrepreneurs. They join industry groups, communicate with regulators, and build new business alliances to help set the new standards. By doing this, they turn external pressures into a strategic advantage, acting as rule-makers rather than rule-takers. The tension here lies in risk management: fighting to change rules requires massive time and financial resources, which might be completely wasted if the broader market rejects the proposed changes.

Analysis and Discussion: How the Six Dimensions Work Together

To address the conceptual analysis of this theoretical model, it is crucial to discuss how these dimensions interact. A firm does not need to be equally strong in all six types of resilience at the same time. Because resources like capital and management attention are always limited, funding one type of resilience often takes money away from another. Different crises demand different capability combinations. For example, a major IT failure requires strong technological exploitative resilience (backup systems) and technological exploratory resilience (new security software). In contrast, a sudden shift in trade policies mainly targets the environmental dimension, requiring quick compliance (exploitative) and proactive alliance building

(exploratory). Analytically, this model highlights that resilience is a dynamic system. Strategic managers must accurately identify which dimension is under threat and allocate resources to the correct mix of exploration and exploitation.

In short, this six-dimensional framework explains how a firm can use its multi-layered environment to build both survival and growth abilities. The key idea is that a firm must manage the paradox of stability and change simultaneously. The framework provides researchers with a clearer and more structured way to study how firms actually allocate resources and behave in unstable conditions.

Methodological Implications and Empirical Operationalisation

While this paper adopts a conceptual and theory-building approach, addressing the methodological operationalisation of the proposed framework is crucial for its academic and practical application. To transition this theoretical model into an empirical methodology, future research should adopt a structured mixed-methods design. Quantitatively, researchers must first develop and validate specific multidimensional measurement scales for the six resilience dimensions outlined in our matrix, as existing resilience scales are predominantly unidimensional. Once valid scales are established, advanced statistical techniques such as Structural Equation Modelling (PLS-SEM) can be utilized to test the complex mediating and moderating relationships between TOE-ambidexterity, environmental turbulence, and firm performance. Qualitatively, longitudinal case studies are strongly recommended to observe how managers dynamically shift resource allocations between exploitation and exploration over time during real-world crises. By outlining these empirical pathways, this study provides a concrete methodological blueprint for researchers to test, validate, and refine the conceptual matrix in various industry settings.

Conclusion and Future Research Directions

Conclusions and Theoretical Contributions

In today's business world, market conditions change fast and technology rules shift quickly. Firm resilience has become a core capability. It is no longer just about traditional "crisis defence". Instead, it is a necessary ability for organisations to keep evolving and changing their strategy.

However, existing research has a major gap. The traditional TOE framework is good at describing static contexts, but it suffers from an "agency black box". At the same time, traditional resilience research often treats resilience as a single, general characteristic. This view mixes up the very different ways organisations react to outside shocks.

To bridge this gap, this study integrates the TOE model with organisational ambidexterity theory. By placing the two behavioural logics of "exploration" (focus on change) and "exploitation" (focus on stability) into the technology, organisation, and environment contexts, this study builds a six-dimensional conceptual framework of "TOE-ambidextrous" firm resilience.

The main conclusions are threefold. First, firm resilience is not one thing. It is a set of six different abilities. Second, the TOE framework becomes dynamic when we add ambidexterity.

Third, a firm must manage conflicting needs at the same time. It cannot just defend or just explore. It must do both across all three contexts.

The theoretical contributions are two. First, the study clarifies the confusion between passive recovery (“bounce-back”) and active transformation (“bounce-forward”). Second, it expands the TOE framework from a static checklist into a model that describes how firms choose actions and allocate resources.

Practical Implications for Managers

Managers can take three simple lessons from this paper. First, stop thinking of resilience as a single score. Instead, ask: are we weak in technology, organisation, or environment? And within each area, are we too focused on defence (exploitation) or too focused on change (exploration)?

Second, during a crisis, consider splitting the firm’s response into two teams. One team keeps daily business running. The other team looks for new ways to do business. They can report to the same top manager but work with different budgets.

Third, watch the external environment closely. New government rules or market changes can force a firm into pure exploitation or pure exploration. Neither is good by itself. The best response is to balance the two.

Future Empirical Research

To turn this conceptual model into a useful tool, future empirical studies should focus on several areas. First, develop measurement scales for the six dimensions. Existing resilience scales usually focus on only one area, such as supply chain recovery. Researchers should follow standard scale development procedures, including expert interviews, item generation, and factor analysis. A large-sample survey across multiple industries would test whether the six dimensions are statistically distinct.

Second, test mediating mechanisms. Building resilience is not the final goal. It helps the firm achieve better performance or transformation. Possible mediating variables include knowledge assimilation, resource bricolage, and dynamic reconfiguration. Without testing these paths, we cannot say how resilience creates value.

Third, test boundary conditions in different industries. Most current research focuses on high-tech or service firms. Future research should apply the framework to heavy industries, such as steel, cement, or car parts. These firms have large factories and fixed assets, which may make exploration harder. Comparing industries will help us understand the limits of the model.

Fourth, use qualitative case studies. Surveys can test whether the six dimensions exist, but they cannot show how managers make decisions under pressure. Case studies of firms that have gone through a real crisis (a natural disaster, a cyberattack, or a sudden market crash) would provide rich, detailed evidence. A longitudinal case study following a firm over several months would be especially valuable.

Acknowledgements

The authors would like to acknowledge and extend special gratitude to Universiti Pendidikan Sultan Idris and all supporting institutions that facilitated this theoretical exploration.

References

- Ali, M., Aslam, M., & Anwar, S. (2024). A systematic review of organizational resilience through digital technology adoption: Trends and insights in a decade. *Information Management and Business Review*, 16(3), 229–240. [https://doi.org/10.22610/imbr.v16i3\(I\)S.4123](https://doi.org/10.22610/imbr.v16i3(I)S.4123)
- Bain & Company. (2024). *The state of digital and business transformation*. Bain & Company Insights.
- Baker, J. (2011). The technology–organization–environment framework. In *Information systems theory: Explaining and predicting our digital society, Vol. 1* (pp. 231–245). Springer.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Bürgel, T. R., Hiebl, M. R. W., & Pielsticker, D. I. (2023). Digitalization and entrepreneurial firms' resilience to pandemic crises: Evidence from COVID-19 and the German Mittelstand. *Technological Forecasting and Social Change*, 186, 122159. <https://doi.org/10.1016/j.techfore.2022.122159>
- DePietro, R., Wiarda, E., & Fleischer, M. (1990). The context for change: Organization, technology and environment. In *The processes of technological innovation* (pp. 151–175). Lexington Books.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147–160. <https://doi.org/10.2307/2095101>
- Fang, X., & Liu, M. (2024). How does the digital transformation drive digital technology innovation of enterprises? Evidence from enterprise's digital patents. *Technological Forecasting and Social Change*, 204, 123445. <https://doi.org/10.1016/j.techfore.2024.123445>
- Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47(2), 209–226.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage publications.
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4(1), 1–23. <https://doi.org/10.1146/annurev.es.04.110173.000245>
- Iborra, M., Safón, V., & Dolz, C. (2020). What explains the resilience of SMEs? Ambidexterity capability and strategic consistency. *BRQ Business Research Quarterly*, 23(1), 39–54.
- Kaya, M., & Yilmaz, A. (2025). Revisiting the Technology–Organization–Environment framework: Disruptive technologies as catalysts of digital transformation. *Sustainability*, 17(23), 10787.
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, 13(S1), 111–125. <https://doi.org/10.1002/smj.4250131009>
- Linnenluecke, M. K. (2017). Resilience in business and management research: A review of influential publications and a research agenda. *International Journal of Management Reviews*, 19(1), 4–30. <https://doi.org/10.1111/ijmr.12076>

- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87. <https://doi.org/10.1287/orsc.2.1.71>
- O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, 27(4), 324–338. <https://doi.org/10.5465/amp.2013.0025>
- Sardesai, A., & Klingebiel, R. (2023). Dynamic capabilities through resilience and ambidexterity. In *Advances in Strategic Management* (Vol. 43, pp. 115–135). Emerald Publishing Limited.
- Su, W., & Junge, S. (2023). Unlocking the recipe for organizational resilience: A review and future research directions. *European Management Journal*, 41(6), 1086–1105. <https://doi.org/10.1016/j.emj.2022.12.007>
- Sutcliffe, K. M., & Vogus, T. J. (2003). Organizing for resilience. In K. S. Cameron, J. E. Dutton, & R. E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (pp. 94-110). Berrett-Koehler.
- Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation*. Lexington Books.
- Trieu, H. D., Nguyen, P. V., Tran, K. T., Vrontis, D., & Ahmed, Z. (2024). Organisational resilience, ambidexterity and performance: the roles of information technology competencies, digital transformation policies and paradoxical leadership. *International Journal of Organizational Analysis*, 32(7), 1302–1324. <https://doi.org/10.1108/IJOA-06-2023-3806>