

IT Ambidexterity, Board Diversity, and Firm Performance: A Configurational Approach

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Abstract

This study investigates the role of information technology (IT) ambidexterity and its interplay with board diversity and firm size in influencing firm performance. Using a rich data set and employing the fuzzy-set Qualitative Comparative Analysis (fsQCA) method, we unveil a range of distinct configurational strategies highlighting the multifaceted impact of IT ambidexterity on short- and long-term firm performance. Our findings suggest that the implications for IT ambidexterity are not uniform but vary depending on the diversity in board gender and tenure, as well as the size of the firm. This research contributes to the ongoing discourse of IT strategy and firm performance, offering fresh perspectives on how gender and tenure diversity can play different roles in a firm's leverage of IT resources to enhance its immediate and future performance.

Keywords: IT ambidexterity, board gender diversity, board tenure diversity, fsQCA, short- and long-term firm performance

1. Introduction

As information technology (IT) products and services continue to advance in leaps and bounds, a firm's ability to manage IT resources becomes fundamental to maintaining its competitive advantage (Lee et al. 2015; Jung and Wang 2022). Especially, information systems (IS) scholars have paid considerable attention to various IT ambidexterity topics to understand better how to manage IT resources in today's volatile business environments to facilitate IS alignment (e.g., Tai et al. 2019) and enable organizational agility (e.g., Lee et al. 2015; Liang et al. 2022). IT ambidexterity, traditionally, has been defined as a firm's ability to simultaneously explore IT resources and practices and exploit their current ones (Lee et al. 2015). IT exploration involves acquiring or experimenting with fresh IT resources and practices, while IT exploitation involves leveraging or refining

the firm's existing IT resources and practices (Lee et al. 2015).

However, this conceptualization implies that a firm has no resource limitations and posits a perfect balance between IT exploration and exploitation (i.e., equal level) (Liang et al. 2022). It also overlooks the firms' mindfulness in strategically adjusting under different environmental conditions (Liang et al. 2022). Therefore, IS scholars have called for research to revisit the traditional view of IT ambidexterity by segregating IT exploration and exploitation and examining their various combinations' distinct values under different business conditions (e.g., Liang et al. 2022).

Drawing upon the recent advancement of the concept, this study defines IT ambidexterity as a firm's ability to strategically balance its pursuit of IT exploration and exploitation based on its specific business context. This conceptualization implies that firms do not require simultaneously high levels or simultaneous pursuit of both activities to produce desired outcomes since the value of the IT exploration and exploitation is contingent on other organizational complementary and contextual factors (e.g., Liang et al. 2022). Although the current IS studies have documented the general effect of IT on firm performance (e.g., Jung and Wang 2022), there is a lack of research on how and under what conditions IT ambidexterity can enable firm performance.

This study explores how IT ambidexterity and organizational and contextual factors combine to produce firm performance. The ubiquity of information and digital technologies and their interdependencies with organizational elements have created a world characterized by multifaceted complexity (El Sawy et al. 2010; Yoo et al. 2012). Hence, the relationships between firms' IT capabilities and organizational and contextual factors are getting more complex and interdependent (Park and Mithas 2020). With this complexity, the role of IT exploration and exploitation, i.e., IT ambidexterity, becomes nuanced under the presence of different organizational and environmental contexts such as business

strategies, governance, and industries. Moreover, since these factors, including both IT and organizational factors, are interdependent to create desired outcomes like firm performance, their role should be understood from a holistic perspective, not from a traditional standpoint, highlighting the independent value of each factor (El Sawy et al. 2010; Park and Mithas 2020).

This study focuses on the corporate governance structure of a firm as an essential organizational element that complements IT ambidexterity. Due to the remarkable amount of IT investment, studies have suggested effective board-level governance to maximize IT value (Jewer and McKay 2012; Benaroch and Cheronbai 2017). The board of directors monitors strategic IT decisions (e.g., new IT investment or responding to the latest IT trends) and policies and procedures for controlling IT resources (Jewer and McKay 2012; Benaroch and Cheronbai 2017; Park et al. 2020).

This study focuses on board diversity as a specific dimension of board governance because it is believed to address more challenging issues and have more informed discussions (Srinidhi et al. 2011). Today's volatile and rapidly evolving business environment makes harnessing IT for competitive advantages even more challenging. We explore how two different aspects of board diversity, board gender and tenure diversity, may play a role in managing IT resources effectively for competitive advantages. Board gender diversity represents one of the demographic diversity attributes (Hillman and Cannella 2007), whereas tenure diversity belongs to cognitive ones (Hafsi and Turgut 2013). As corporate boards function as a team, the current study, therefore, attempts to explore how and which features and attributes of the individual board members integrate into managing IT resources more effectively. Exploring how board-level variation may interdepend with manager-level decision-making is consistent with prior studies exploring how board guidance impacts managerial decisions such as resource allocation (e.g., Dong et al. 2021). In addition, firm size significantly impacts organizational capabilities and performance (Park et al. 2020) and is an essential contextual factor for the diversity-performance relationship (e.g., Li and Chen 2018). Thus, we consider firm size a critical context definer (e.g., Park et al. 2020).

We also believe that it is critical to understand the immediate and sustained impact of IT ambidexterity and the interplay between organizational and contextual factors on firm performance. Evaluating short-term performance allows us to assess immediate returns and the effectiveness of strategic decisions, while examining long-term or future performance

helps gauge such strategies' sustainable compatibility and potential to drive consistent growth over time.

However, the current literature offers limited insights into how these different organizational elements combine with a firm's ability to manage IT resources to produce firm performance under different contexts. Therefore, in this study, we answer this overarching research question: How can firms enhance performance by leveraging IT ambidexterity and organizational elements in the form of board gender and tenure diversity under different conditions?

To answer this question, we adopt a configurational theory approach to explore how IT ambidexterity, board diversity, and organizational context interdependently produce short- and long-term firm performance. Accordingly, we leverage a corresponding method – fuzzy-set Qualitative Comparative Analysis (fsQCA) – to handle the statistical intransigence of holistic interdependency among IT ambidexterity and organizational and contextual factors (Fiss 2011; Ragin 2008). This theoretical and methodological approach has been discussed appealing to understanding the complexity of interdependent relationships among various organizational factors within the given data contexts (Burton-Jones et al. 2015; Park et al. 2020).

We focus specifically on IT-producing firms in the current study because such firms work in hyper-competitive markets (Lee et al. 2010) with strong winner-take-all dynamics (McAfee and Brynjofsson 2008). In the IT industry, fast-moving technological progress and enhanced product market competition also increase firms' incentives to manage their IT resources for competitive advantages (Kim et al. 2016). Using the combined data from three sources, the Computer Intelligence technology database (CI) for IT ambidexterity, Institutional Shareholder Services (ISS) for board information, and Compustat for firm performance-related data, we have discovered several distinct configurational solutions for the desired outcomes. They suggest that a balance between IT exploration and exploitation (i.e., IT ambidexterity) plays a significant, multifaceted role in achieving short- and long-term firm performance. Furthermore, our findings indicate that the impact of IT ambidexterity varies depending on board gender configurations and tenure diversity, as well as between large and small firms.

This study contributes to the IS strategy and ambidexterity literature by demonstrating that IT exploration and exploitation do not need to be equally strong to achieve high firm performance. Instead of measuring IT ambidexterity as a single aggregated construct while holding all other factors constant, we

shed light on how a balance between IT exploration and exploitation and board diversity combine into multiple configurations in different ways to achieve short- and long-term firm performance. Understanding two aspects of board diversity (gender and tenure) and showing their distinct roles also respond to recent IS scholars' calls by investigating the implications of diversity in the IS field (e.g., Gorbacheva et al. 2019; Langer et al. 2020).

2. Theoretical Background

2.1. Ambidexterity and Firm Performance

IT ambidexterity is derived from organizational ambidexterity, defined as a firm's ability to reconcile the contradictory forces of exploration and exploitation (O'Reilly and Tushman 2013). Although management studies have argued that engaging in both explorative and exploitative processes is crucial for achieving short- and long-term success in a competitive marketplace (Gibson and Birkinshaw 2004), the empirical evidence regarding the effects of organizational ambidexterity on firm performance is mixed (Junni et al. 2013). Some studies have documented a positive relationship (e.g., Gibson and Birkinshaw 2004). In contrast, others suggested a negative association (e.g., Athushene-Gima 2005) or contingent effect (e.g., Lin et al. 2007), suggesting that more nuanced investigations are still needed to understand the performance implications of organizational ambidexterity.

Although organizational ambidexterity has resulted in a large body of literature, research on IT ambidexterity is just burgeoning to explore diverse IS phenomena (Liang et al. 2022). For example, Vessey and Ward (2013) explain exploitation and exploration in IT project management. Other studies explore how firms achieve alignment and adaptability simultaneously in IS governance and management (e.g., Ramesh et al. 2012). Lee et al. (2015) study how IT ambidexterity impacts organizational agility, whereas Gregory et al. (2015) examine paradoxes and the nature of ambidexterity in IT transformation programs. Tai et al. (2019) examine the effect of IS ambidexterity on IS alignment. More recently, Liang et al. (2022) propose a proportional balance view of IT ambidexterity to study such a proportional view that would maximize organizational agility under different business contexts.

Although the existing IS studies have provided insights about various IT ambidexterity topics, our understanding of the effect of IT ambidexterity on both short- and long-term performance is limited. Drawing upon recent trends of IT ambidexterity (e.g.,

Gregory et al. 2015; Liang et al. 2022), the current study contributes to the existing literature by showing how the value of a firm's ability to balance IT exploration and exploitation on short- and long-term firm performance is contingent on contextual factors. This approach also shows the importance of considering the complex interdependencies between IT and organizational aspects in today's fused digitized world (El Sawy et al. 2010; Park et al. 2020).

2.2. Board Diversity and Firm Performance

The board of directors has two different roles: monitoring (control role) and service (advisory role) (Benaroch and Cheronbai 2017). The monitoring function of the board is rooted in agency theory to monitor and audit managers on behalf of shareholders (Fama and Jensen 1983). In contrast, the service function is rooted in resource dependency theory to provide firms with counseling and legitimacy through various board committees and establish links for the firms to connect with other organizations (Hillman and Dalziel 2003). Prior board diversity research suggests that diverse boards often bring a fresh perspective on complex issues and tend to be more knowledgeable about the marketplace, which can help correct information biases in strategy formulation and lead to better firm performance (Baker et al. 2020). Following the premises of these two theories, a significant amount of research has documented a positive association between board diversity and firm performance (e.g., Kim and Starks 2016). However, several scholars also documented a negative link (e.g., Adams and Ferreira 2009) or no effect between board diversity and firm performance (e.g., Carter et al. 2010).

Board diversity research is typically assessed in two dimensions, demographic and cognitive, with much of the existing literature focusing on directors' readily measurable attributes (i.e., demographic attributes). Demographic diversity attributes include gender, race, and age (Hillman and Cannella 2007), while cognitive ones emphasize attributes such as tenure, education, expertise, and personal characteristics of board members (Hafsi and Turgut 2013). Among demographic diversity, board gender diversity has attracted considerable attention by documenting that female board members add experience sets and values dissimilar to those of their male colleagues. (Hafsi and Turgut 2013). Moreover, female board members are typically better motivated than males and more risk averse than males (Dezsö and Ross 2012).

On the other hand, cognitive diversity, such as tenure diversity as an under-researched area, involves

different mechanisms in corporate decision-making. Some recent studies have begun to focus on board tenure diversity issues because it signifies a director's commitment, experience, and competence in understanding firm-specific issues (Ji et al. 2021). Boards with long-tenured directors are subject to alignment with the management but are entrenched and indifferent to shareholder concerns (Huang and Hilary 2018). Long-tenured directors are also more likely to be problematic due to the friendship between the CEO and directors (Ji et al. 2021). In contrast, a short-tenured board may diminish the effectiveness of its monitoring and advising due to a less comprehensive understanding of corporate business and history (Huang and Hilary 2018). As a result, board tenure diversity may benefit the firm by providing knowledge continuity and independence, which are essential for high-quality corporate decision-making (Ji et al. 2021).

Although IS scholars have highlighted the importance of board-level governance for activities such as the formulation of IT strategy and the effectiveness of IT investment against firm strategy (e.g., Jewer and McKay 2012; Benaroch and Cheronbai 2017), our understanding of the role of board diversity for managing IT resources to enable firm performance is scarce with few exceptions (e.g., Dong et al. 2021; Jung and Wang 2022). Notably, although board diversity is believed to address more challenging issues (e.g., managing IT for competitive advantages), it is often deemed a double-edged sword. Since corporate boards function as a team, the current study, therefore, attempts to bring two aspects of board diversity to explore how, and which features and attributes of the individuals integrate into managing IT resources more effectively.

In response to a recent call from board diversity research (e.g., Li and Chen 2018), we also consider firm size a contingency factor to examine how IT ambidexterity and board diversity in the form of gender and tenure is interdependent to enable short- and long-term firm performance depending on their size. Because the influence of board diversity on both long-term and short-term performance can be subject to variations contingent upon a firm's size (Li and Chen 2018), these variations stem from the intricate interplay of factors, encompassing the firm's resource endowment, governance framework, strategic orientation, and execution mechanisms. As the size of a firm often begets distinct complexities and nuances in its operations, these inherent differences contribute to divergent outcomes concerning the impact of board diversity on performance metrics. An in-depth examination of these multifaceted dynamics is essential for a comprehensive understanding of how

board diversity interacts with performance in different organizational contexts.

Our theoretical discussion allows us to arrive at our overarching theoretical framework (see Figure 1). This framework illustrates the configuration paradigm used to build a context-specific middle-range theory that explains complex simultaneous interactions between IT ambidexterity and organizational elements to produce short- and long-term firm performance depending on specific business contexts.

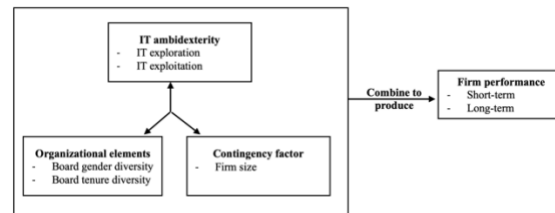


Figure 1. Nomological network of configurations producing firm performance

3. Research Methodology

3.1. Data Collection and Sample

We constructed a dataset of U.S. public IT firms from three primary sources: CI, Compustat, and ISS. We followed Kim et al. (2016) to define IT firms using SIC 4 codes. Given the fast-moving technological progress in IT firms, we used the year 2019 samples to allow us to focus on the more recent IT trends. It is well-known that the COVID-19 pandemic that occurred globally in 2020 has had an unprecedented impact on all industries. We, therefore, focused on the year before 2020 in the current study. Our final sample contains 166 IT firms and varies in firm size.

3.2. Measurement Development

To measure our research variables, we used objective indicators provided by the above databases, either directly or through transformations as guided in the literature or based on their conceptual foundations.

Following Liang et al. (2022), we measured IT exploration and IT exploitation measurements as separate dimensions rather than poles on a continuum. Each year, the CI database provides a wide list of software for a company to indicate the ones currently employed by a company (the presence/absence in a binary 1/0 fashion). There are 25 presence/absence software variables in the dataset, such as business intelligence, data management, ERP, and CRM (a complete list of 25 software is available to be requested). To construct IT exploration and IT

exploitation for a firm, we followed Steelman et al. (2019) to examine these software variables for both years 2018 and 2019 to determine which software was newly adopted (i.e., 0 to 1 from 2018 to 2019) or continued to utilize (i.e., 1 to 1 from 2018 to 2019). Thus, IT exploration is operationalized as the ratio of the total of newly adopted cases to total IT software. In contrast, IT exploitation refers to the ratio of the total of continued utilization cases.

Board gender diversity is the proportion of female board members (Wowak et al. 2021). In contrast, board tenure diversity is the coefficient of variation (the standard deviation over the mean) of board member tenure lengths (Ji et al. 2021). A firm's size is measured by the firm's total assets (Liu and Ravichandran 2015). Organizational ambidexterity is argued for short- and long-term survival and success (Gibson and Birkinshaw 2004). We leveraged sales turnover as the proxy for short-term performance, which is the value of a firm's total sales provided to customers during a year generated only from daily operations (excluding non-operating revenue). In contrast, we used Tobin's Q as the proxy for long-term performance because it is a forward-looking and risk-adjusted measure of firm performance that is less vulnerable to different accounting practices (Steelman et al. 2019). Descriptive statistics for our variables are summarized in Table 1.

Table 1. Descriptive Statistics

Variables	Mean	Standard Deviation	Min	Max	Percentile		
					10%	50%	90%
IT Exploration (ITER)	0.13	0.98	0.00	0.32	0.04	0.12	0.24
IT Exploitation (ITEI)	0.60	0.79	0.16	1.00	0.34	0.60	0.88
Gender Diversity (GDIV)	0.21	1.05	0.00	0.46	0.10	0.22	0.33
Tenure Diversity (TDIV)	6.96	0.79	0.58	20.59	3.51	6.29	10.94
Firm Size (FS)*	24,155.90	65,437.71	43.05	551,669	684.94	3,883.10	52,006.50
Sales Turnover (ST)*	11,924.45	31,916.24	29.52	260,174	442.48	2,312.99	23,001.50
Tobin's Q (TQ)	2.91	2.22	0.84	14.21	1.16	2.32	5.35

* The figures are million USD.

3.3. Data Analysis

To empirically investigate the interdependent relationships among IT ambidexterity (IT exploration and exploitation), organizational elements (board gender and tenure diversity), and the contextual condition (firm size), we adopted fsQCA, which allows us to investigate how these factors combine simultaneously into configurations to generate desired outcomes, i.e., the financial performances in our case (sales turnover and Tobin's Q). We followed the key steps of fsQCA guided in the literature (e.g., Fiss 2011; Misangyi et al. 2017; Ragin 2008), which are briefly discussed in the following.

Calibration is a process to transform the value of each variable for a case into a set membership score

that ranges from 0 to 1 (0=full non-membership, 0.5=cross-over point, 1=full membership). By following the practices for secondary objective data (e.g., Böhm et al. 2017, Campbell et al. 2016), particularly, we used values corresponding to 90th, 50th, and 10th percentiles as the three anchors for the full membership, cross-over point, and full non-membership, respectively, of all variables (please see Table 1 for the calibration anchors for each variable).

After calibration, we conducted necessary condition tests for all behavioral elements and their negations, which shows whether each of the individual elements or their negation is a necessary condition for sales turnover or Tobin's Q. According to our calculation results, the consistency scores of all elements were below 0.9, indicating no necessary condition for the two performance outcomes (Ragin 2008).

The next step is to apply the truth-table algorithm, which identifies sufficient solutions of multiple configurations that consistently produce high outcomes of interest (i.e., sale turnover and Tobin's Q). Following the suggestion of extant QCA research, we first set the minimum acceptable frequency of cases at three (e.g., Greckhamer et al. 2013). With this frequency cutoff, 82% of our data for each outcome were covered for the next step. Second, for the sales turnover outcome, we set 0.8 as the cutoff for raw consistency and 0.67 for the proportional reduction in inconsistency (PRI), which have been used as acceptable thresholds in IS studies that adopted fsQCA (e.g., Iannacci et al. 2023, Mattke et al. 2022, Schneider and Wagemann, 2012). While we applied the same cutoff for raw consistency for Tobin's Q outcome, we could not apply the same threshold for PRI due to the overall lower PRI scores for this outcome. Since PRI scores below 0.5 indicate significant inconsistency (Greckhamer et al. 2018), we used 0.5 as an alternative PRI threshold for Tobin's Q, which has also been used in similar data contexts, e.g., using objective industry data (e.g., Yin 2023). Next, for the assumptions for easy counterfactual analysis, we considered the relevant literature and industrial practices. In particular, since the IS literature explains that IT strategies vary by firms (e.g., Lee et al. 2015, Liang et al. 2022) and board diversity is also a firm's strategic decision (e.g., Li and Chen 2018), it is more plausible to assume the factors to be either present or absent. Hence, we applied the 'present or absent' assumption for the causal factors.

4. Results

Our fsQCA results are presented in Table 2 as Boolean expressions, where + means logical OR, &

means AND, and ~ means negation. The results reveal multiple configurations, and each configuration in the intermediate solution includes both core elements having a stronger causal relationship with the outcome and peripheral elements having a weaker relationship with the outcome compared with a core element (Fiss 2011).¹

Table 2. Configurations Sufficient for High Sales Turnover and High Tobin's Q

Outcome	Parsimonious Solution	Intermediate Solution
High Sales Turnover	~ITER*FS + ITEI*FS + TDIV*FS	ITEI*~ITER*FS + ITEI*GDIV*TDIV*FS + ~ITEI*ITER*~GDIV*TDIV*FS
High Tobin's Q	ITER*GDIV + ITER*TDIV*FS	~ITEI*ITER*GDIV*~FS + ~ITEI*ITER*~GDIV*TDIV*FS + ITEI*ITER*GDIV*TDIV*FS

*Notation: & = logical AND operation, + = OR, and ~ = negation.
Bold font elements in intermediate solutions represent parsimonious solutions, meaning core elements with a stronger causal relationship with the outcomes.*

Figure 2 graphically depicts the above results (Fiss 2011). In each configuration (e.g., ST1, ST2), large circles represent core elements, small circles represent peripheral elements, full circles represent 'presence' of the elements, crossed-out circles represent 'absence' of the elements, and blank spaces represent 'do not care' (either present or absent).

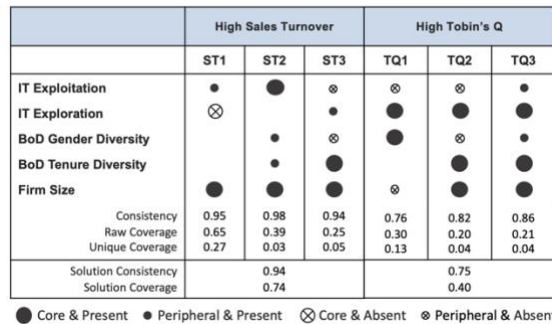


Figure 2. Configurations of High Sales Turnover and Tobin's Q

There are three configurations for high sales turnover, i.e., short-term financial performance. All of them are greater than 0.94 for their consistency, meaning that they produce the outcome very consistently (Ragin 2008). Also, the overall solution coverage is 0.74, which is high enough to cover cases having high sales turnover. On the other hand, there are three configurations for high Tobin's Q, i.e., long-term financial performance. Their consistency scores

are over 0.75 and the overall solution coverage is 0.40, much lower than sales turnover.²

First, all three configurations for high sales turnover (ST1-3) are the solutions for large-sized firms, meaning that there is no configurational solution for the short-term performance for SMEs in our cases. Moreover, the firm size is a core factor, i.e., a strong factor (Fiss 2011). This indicates that the firm size is strongly related to the high sales turnover. Among the three configurations, ST1 is considered a more general solution with the largest raw and unique coverages.

ST1 shows that IT exploitation should be present to generate high sales turnover (i.e., short-term financial performance) of large-sized firms, while IT exploration should be absent. On the other hand, ST2 and ST3 are mutated solutions with low unique coverages, while their factorial logic to generate high sales turnover is distinctive. ST2 shows that the board diversity in gender and tenure and IT exploitation in a large-sized firm interdependently generate its high sales turnover. At the same time, IT exploration is either present or absent (i.e., don't care). However, according to ST3, tenure diversity and IT exploration interdependently generate high sales turnover, while gender diversity and IT exploitation should be absent. Therefore, ST3 can be seen as a configurational solution focusing on tenure diversity and IT exploration, where the two factors complement each other to generate high sales turnover of a large-sized firm (Park et al. 2020). Contrastingly, ST2 can be considered a solution that focuses more on gender diversity and IT exploitation, although tenure diversity is still present and IT exploration is either present or absent (i.e., don't care).

Second, among the three configurations for high Tobin's Q, TQ1 is a configurational solution for small to medium enterprises SMEs, while two others (TQ2 and TQ3) are for large-sized firms. Also, unlike the configurations for high sales turnover, IT exploration is the core factor of all three configurations for high Tobin's Q, meaning that IT exploration is a strong factor in generating the long-term performance of firms regardless of their sizes. Especially, TQ1 shows that gender diversity has a complementing relationship with IT exploration for Tobin's Q of SMEs. In contrast, gender diversity complements IT exploitation for large-sized firms' sales turnover (ST2). Also, TQ1 indicates that SMEs have a more long-term orientation for their performance.

¹ We did a sensitivity analysis with different percentiles for the calibration anchors (e.g., 95-50-5 percentiles and 75-50-25 percentiles) and found almost identical configurations with little differences in consistency and coverage values.

² While 0.80 is recommended as the threshold of a raw consistency in general, lower than 0.75 is considered as "the existence of substantial inconsistency" (Ragin 2008, p. 136). Hence, TQ1 was kept as a configurational solution to be discussed, especially when considering the importance of TQ1 as the only solution for SMEs.

On the other hand, TQ2 and TQ3 are configurational solutions for large-sized firms. While TQ2 shows a similar solution to high sales turnover (ST3), TQ3 is considered a unique solution for the long-term performance of large-sized firms. Especially compared with TQ2 focusing on tenure diversity and IT exploitation, TQ3 focuses on both types of board diversity (gender and tenure) and IT strategies (IT exploration and exploitation). This configurational outcome indicates that for the future-oriented performance of large-sized firms, both IT exploration and exploitation are essential, and they should be complemented by both board diversity factors (gender and tenure). Moreover, combined with the results of high sales turnover, TQ2 and TQ3 further support the specific complementing relationships between the type of board diversity and IT strategies, i.e., the complementing relationships between gender diversity and IT exploitation and between tenure diversity and IT exploration.

5. Configurational Propositions

Through this study, we investigate the interdependent relationships among IT ambidexterity (IT exploration and exploitation), organizational elements (board gender and tenure diversity), and the contextual condition (firm size), seeking to understand how these factors simultaneously form configurations leading to desired outcomes, specifically financial performance (sales turnover and Tobin's Q).

Our findings, based on fsQCA, suggest that board diversity is crucial for optimizing the positive effect of IT ambidexterity on firm performance. Thus, while we expect board diversity to facilitate IT ambidexterity effectively, our research reveals dual, opposing effects of board gender and tenure diversity, contingent on firm size. By integrating our empirical findings with theoretical logic, we present the three propositions as configurational recipes for companies aiming to foster IT ambidexterity within a structure of diverse corporate governance.

5.1. The Role of Diversity

Board diversity plays a crucial role in shaping the distinct implications for various IT strategies (Jung and Wang 2023), particularly the interactions with IT ambidexterity. Our empirical analysis unveils a complex interdependence between the components of diversity and IT strategies. This intricate interplay becomes especially apparent when different facets of diversity, such as gender and tenure, interact divergently with IT exploration and exploitation. Furthermore, the influence of the interrelation between

IT ambidexterity and board diversity components on a firm's performance is contingent upon the size of the firm.

Firm size is a key condition that may facilitate or constrain the gender-diverse board's transformation and implementation of firm creativity (Gong et al. 2013). It has been discussed that women on boards tend to make less risky decisions related to IT strategies (i.e., risk-averse attitudes) (e.g., Harjoto et al. 2018). This cautious approach is one of the reasons why gender-diverse boards in large companies might prefer IT exploitation – these are known strategies with lower risk and more predictable outcomes. In addition, larger firms tend to have more layers, more tasks, and continuously compete for gender-diverse board's attention (Li and Chen 2018). Therefore, larger firm size is likely to impede the board's attention and thus limit the potential of managers' explorative ideas to manage IT resources to benefit firm performance (e.g., Gong et al. 2013).

In contrast, diversity in board tenure brings together a blend of experience and novel viewpoints. Such diversity may benefit from both knowledge continuity and independence, which are essential to high-quality corporate decision-making (Ji et al. 2021). Board directors with long tenures typically provide institutional knowledge and expertise that effectively guide exploratory activities. They have seen market shifts and company evolution over time and are subject to alignment with the management (Ji et al. 2021), offering deep insights into strategic decision-making. Meanwhile, newer board members inject fresh perspectives. This combination may shift the focus more toward IT exploration. Consequently, diversity in board tenure can foster a stronger inclination toward IT exploration.

Unlike large firms, for SMEs, the empirical findings show that gender diversity is complementarily associated with IT exploration. It implies that SMEs with higher gender diversity can more effectively harness new IT opportunities. The smaller scale of these businesses may allow for more efficient integration of diverse perspectives into their IT exploration processes. Furthermore, SMEs need to be more innovative and adaptable due to the highly competitive nature of their markets. In addition, SMEs are more likely and quicker to implement creativity and innovation (i.e., exploration orientation), and ultimately promote decision-making and problem-solving (Gon et al. 2013; Tripsas and Gavetti 2000). Therefore, a gender-diverse board in small firms may be more inclined to encourage and pursue IT exploration. This is likely because the diverse perspectives and inclusive decision-making often associated with gender diversity can lead to more

innovative and exploratory decisions. Drawing on the empirical findings and our theoretical understanding, we suggest the following propositions:

Proposition 1. *The board diversity components have nuanced interdependent relationships with IT ambidexterity.*

Proposition 1.1: *For large-sized firms' short and long-term performance, gender diversity has a complementing relationship with IT exploitation, while tenure diversity has a complementing relationship with IT exploration.*

Proposition 1.2: *For SMEs' long-term performance, there exists a complementary relationship between gender diversity and IT exploration.*

5.2. The Role of IT Ambidexterity

Our results demonstrate the differential focus of IT strategies in large firms and SMEs. Large-sized firms seem to prioritize IT exploitation to achieve short-term performance gains, as evidenced by their complementation with gender diversity. On the other hand, SMEs with a higher degree of gender diversity, appear more invested in IT exploration to secure long-term performance. However, the finding suggests that large-sized firms are not entirely focused on short-term performance. They can also achieve long-term performance by chasing both IT exploration and exploitation, with a relatively balanced emphasis on them. This approach is complemented by both gender and tenure diversity, which, when combined, might provide a broader spectrum of insights and ideas for both exploiting existing IT resources and exploring new IT opportunities. Gender diversity introduces various perspectives, encouraging risk mitigation decisions (exploitation) and innovative ones (exploration), thereby contributing to a firm's long-term value. Tenure diversity, the mix of new and long-serving board members, also promotes a balance between fresh insights and deep institutional knowledge, fostering an environment that supports both exploration and exploitation strategies. Our empirical results are consistent with the recent view of IT ambidexterity (e.g., Liang et al. 2022) by showing that the value of the firm's ability to balance its pursuit of IT exploration and exploitation is contingent on contextual factors. IT exploration and exploitation do not require simultaneously high levels or simultaneous pursuit of both activities to produce benefits. Hence, we suggest the following proposition:

Proposition 2. *Large-sized firms focus more on IT exploitation for short-term performance, while SMEs focus on IT exploration by having higher gender diversity for long-term performance. However, large-sized firms can also achieve long-term performance by exerting both IT exploration and exploitation complemented by gender and tenure diversity.*

6. Discussion

This study investigates the interdependent relationships among IT ambidexterity (IT exploration and exploitation), organizational diversity elements (board gender and tenure diversity), and the contextual condition (firm size), seeking to understand how these factors simultaneously form configurations leading to desired outcomes, specifically firm's financial performance (sales turnover and Tobin's Q).

Our findings suggest that board diversity is crucial for optimizing the positive effect of IT ambidexterity on firm performance. Thus, while we expect board diversity to facilitate effective IT ambidexterity, our research reveals dual, opposing effects of board gender and tenure diversity, contingent on firm size. In large firms, our results indicate that gender diversity within the board often leads to a preference for IT exploitation. This risk-averse approach, potentially fueled by the broader perspectives introduced by gender diversity, is more aligned with established processes and short-term performance objectives. Meanwhile, we observed that tenure diversity within these firms often promotes IT exploration, with long-tenured members leveraging their institutional knowledge and expertise, while newer members introduce fresh insights. In contrast, in SMEs, our findings suggest that gender diversity stimulates IT exploration, contributing to the innovative decisions necessary for long-term performance in these smaller, competitive environments. Interestingly, this finding diverges from the common assumption that gender diversity primarily drives risk aversion. These findings not only affirm but also expand our understanding of IT ambidexterity within diverse corporate governance structures. Our research bridges the gap between theories of organizational ambidexterity and corporate governance, offering a nuanced perspective on how board diversity can influence a firm's IT strategy.

The implications of these findings are profound and extensive. For practitioners, especially those in larger firms, encouraging a balanced board in terms of gender and tenure diversity may be beneficial in achieving both short-term and long-term performance goals. For smaller firms, fostering gender diversity within the board could be a strategic move towards

innovative IT exploration, thus ensuring sustainability and long-term competitiveness.

Future research could explore the dynamics of these relationships in more depth, potentially considering other forms of diversity. Furthermore, the impact of these elements on IT strategy in different industrial contexts or across various geographic locations may provide more generalizable conclusions. Regarding the research approach, conducting other research or statistical methods such as SEM and MANOVA and comparing their outcomes with the current fsQCA outcomes would also provide extra insights, which may help increase the generalizability of our findings (Burton-Jones et al. 2015).

In sum, our research underscores the critical role of board diversity in shaping a firm's IT strategy and highlights the complex interplay of these elements with firm size. These findings contribute to our theoretical understanding of IT ambidexterity and offer practical insights for firms striving to optimize their performance.

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