Strategic Knowledge, IT Capabilities and Innovation Ambidexterity: Role of Business Process Performance

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Abstract

Purpose – The research aims to identify the impacts of strategic knowledge (SK) and information technologies (IT) capabilities on innovation ambidexterity (IAM) through business process performance (BPP).

Design/methodology/approach –The research framework is developed based on the theoretical grounding on resource orchestration (Strategic knowledge and IT Capabilities) impacts on innovation ambidexterity**.** The Structural Equation Modeling (SEM) technique was used to test the research framework on the sample of 441 responses from Brazilian firms.

Findings - The results suggest that strategic knowledge and IT capabilities facilitate business process performance, resulting in innovation ambidexterity. The findings also suggested differences in path coefficients in the strategic knowledge and IT capabilities of business value generation process framework under environmental turbulence. Finally, strong strategic knowledge of IT capabilities is especially important in enabling business process performance and innovation ambidexterity in specifically large-size firms. Another case of most manufacturing and service firms demonstrated both strategic knowledge and IT capabilities are essential to impact innovation ambidexterity by business process performance mediation.

Practical implications – The findings provide insight into how professionals can think and plan carefully to align strategic knowledge and IT capabilities for achieving balanced innovation and improving business process performance in the dynamic business environment.

Originality/value –The study establishes a relationship between strategic knowledge, IT capabilities, business process performance, and innovation ambidexterity. The study develop novel constructs of strategic knowledge and IT capabilities and tested them, which gives new insight and links among the constructs.

Keywords: *Strategic knowledge, IT Capabilities, Business process performance, Resource orchestration, innovation ambidexterity, environmental turbulence.*

1. Introduction

Today's business environment faces many challenges characterized by economic and political instability, competition, and natural uncertainties (Chan et al., 2019; Yoshikuni and Dwivedi, 2023). The contemporary challenges press firms to pursue multiple strategies with different degrees to enhance performance and gain competitive advantage (Galpin, 2023).

Due to the contemporary challenges to treat with the trade-offs, firms are developing different degrees of business strategies to enable business processes to leverage ambidextrous

innovation (Sahi et al., 2021), i.e., the simultaneous pursuit of both explorative and exploitative practices to be competitive (Vendrell-Herrero et al., 2023; Yoshikuni and Lucas, 2022).

The notion that firms create ambidexterity embraces combining two organizational capabilities to leverage exploitation (incremental innovation) and exploration (radical innovation) (O'Reilly and Tushman, 2013; Ramachandran et al., 2019). Previous studies have argued the role of ambidexterity and advocated firms' importance in achieving a balanced between exploration and exploitation (Alamayreh et al., 2019; Sahi et al., 2021) under higher uncertainty environment (Queiroz et al., 2018).

However, how firms can build operational capabilities to mitigate the trade-off between incremental and radical innovation is largely unknown (Benner and Tushman, 2015; Sahi et al., 2021). Moreover, according to Sahi and colleagues (Sahi et al., 2021) and Saleh and colleagues (Saleh et al., 2023), there is scarce literature describing how organizations can achieve a trade-off between pursuing exploration and exploitation, enabling practices related to resources, capabilities, competencies, processes, and technologies.

Benner and Tushman (2015) described that operational capabilities compete with the same scarce organizational resource to create innovation of exploration and exploitation. As a result, firms can be restricted to developing critical ambidextrous capabilities in business processes through organizational resources (tangible and intangible) to mitigate the trade-off of exploration and exploitation (Ardito et al., 2018; Xie et al., 2020).

Tallon and colleagues (2019) investigated that digital technologies are essential organizational resources for firms to build operational capabilities to mitigate the trade-off between explorative and exploitative innovation to attend environmental challenges. Recent studies of knowledge strategy (Yoshikuni and Dwivedi, 2023) demonstrated that to achieve a

high level of operational capabilities, strategic knowledge and digital technologies should be orchestrated through strategic information systems enabling business processes performance.

Business processes are considered core competencies (Kaplan and Norton, 2008; Porter, 1990; Teece, 2018) to firm build agility, flexibility, and speed when coping with environmental changes to gain innovation ambidexterity (Alamayreh et al., 2019). According to Queiroz and colleagues (Queiroz et al., 2018) and Yoshikuni and Lucas (Yoshikuni and Lucas, 2022), IT capabilities depend on strategic knowledge by aligning business strategy to build organizational agility through the business processes to create ambidexterity.

Hence, grounded in orchestration literature (Miao et al., 2017; Sirmon et al., 2011) , strategic knowledge (Bolisani and Bratianu, 2017; Bolisani and Scarso, 2015), and IT capability (Queiroz et al., 2018; Tallon et al., 2019). This study considers strategic knowledge as business value integrating rational and emergent strategic approaches (Yoshikuni and Dwivedi, 2023) and IT capability as the organization's ability to use IT-based resources (tangible and intangible) combined with complementary organizational resources and capabilities (Bharadwaj, 2000; Melville et al., 2004).

Thus, this empirical study based on the resource orchestration (Tikas, 2023) of strategic knowledge and IT capability enable the bricolage to attend to different types of strategies to balance explorative and exploitative operational activities to firms compete under a higher turbulence environment through ambidextrous innovation. Queiroz and colleagues (Queiroz et al., 2018) argue that it is essential to investigate if and how the effects of environmental uncertainty factors influence the orchestration resources of IT capabilities and strategic knowledge through different strategies to create ambidextrous to compete under uncertain turbulent environments. Hence, the article aims to attempt to fill the lags with current literature and address the issue by the following research question.

RQ1: How do resource orchestration of alignment between knowledge strategies and IT capabilities influences business process performance and result in innovation ambidexterity?

Several studies have examined the effects of environmental factors on the empirical model relationship through linear regression, and reported both significant and non-significant effects of moderation environmental factors (Lee et al., 2015; Wamba et al., 2020; Wilden et al., 2013; Yoshikuni and Lucas, 2022). According to Woodside and colleagues (Pappas and Woodside, 2021; Woodside, 2014), many empirical studies have not considered analyzing the contrarian cases. The contrarian cases assess if substantial cases display relationships that counter a negative (or positive) main effect between the variables, demonstrating that can be multiple paths that lead to the same outcome (Woodside, 2013).

Thus, based on the equifinality context that the multiple combinations of occurrences of environmental factors could be necessary to create business process performance and ambidextrous innovation. This study propose the second research question:

RQ2. Under equifinality of environmental turbulence conditions, are there different effects of the knowledge strategies, IT capabilities, and business process performance on innovation ambidexterity?

As a whole, the study contributes to ambidextrous innovation, knowledge strategies, and IT capability literature.

First, the resource orchestration of strategic knowledge and IT capabilities enables business process performance through different strategies to balance explorative and exploitative innovation to create ambidexterity under environmental factors, contributing to filling knowledge gaps mentioned by Queiroz and colleagues (Queiroz et al., 2018).

Second, this study examining the value of IT and complementary organizational resources (strategic knowledge) in the embedded processes, i.e., IT-business value creation process, is part of IS literature and widely promoted in the IS field (Kohli and Grover, 2008; Melville et al., 2004). To the best of the theoretical grounding work, the conceptualization of novel IT capabilities (ITC) constructs as stemming from the ITC by digital technologies (i.e. SMAC: social, mobile, analytics, and cloud computing), contributing to novel knowledge of information systems (IS).

Third, the study responds to the call for more investigation of how organizations develop innovation ambidexterity through organizational legacy and stewardship behavior (strategic knowledge), digital interdependence and technology sources (IT capabilities), organizational contexts and Institutional transformation (business process performance), and environmental readiness (environmental factors), as recommended by Saleh and colleagues, (Saleh et al., 2023) and Sahi and colleagues (Sahi et al., 2021).

Last, the study contributes to the equifinality literature when combining the techniques of structured equation modeling (SEM) and fuzzy-set qualitative comparative analysis (fsQCA) to identify the combination of environmental factors influencing innovation ambidexterity. Chatterjee and colleagues (Chatterjee et al., 2021) ask for future empirical research to examine if and how IT artifacts can promote a different ways to create business value outcomes. Moreover, Pappas and colleagues (Pappas and Woodside, 2021) also ask academics to adopt fsQCA to identify the equifinality through IT and organizational resource combination to leverage organizational outcomes.

2. Theoretical background and hypotheses

The research is based on the resource orchestration (RO) view, as an extension of the resource-based theory, whereby the incorporation of asset orchestration and resource management arguments (Miao et al., 2017; Sirmon et al., 2011; Tikas, 2023), which covers strategic accomplishment associated to the advance knowledge to realize the strategic planning alignment with IT capabilities throughout the firm to enhance business process performance (BPP) and innovation ambidexterity (IAM).

Hence, RO recognizes the combination of strategic knowledge (SK) resource action (Bolisani and Bratianu, 2017) and IT capabilities on multiple levels of management (Chan et al., 2019; Kim et al., 2011) to enable firm BPP, to react to different influences, perspectives and environmental turbulence (ET) pressures, to enhance outcomes performance, as stated by Sirmon and colleagues (Sirmon et al., 2011).

2.1 Knowledge-based view theory and IT business value model

The study contemplated the RO combined Knowledge-based view theory (RBT) as the most strategic resource to build organizational capabilities to leverage competitive advantage and superior performance through socially complex resources that are usually challenging to imitate (Soto-Acosta et al., 2018). The KBT is essentially an expansion of the Resource-Based View Theory (RBT), asserting that a firm's resources (tangibles and intangibles) can build organizational capabilities to enterprises enhance competitive advantage and superior corporate performance when organizational resources are valuable, rare, and difficult to imitate, and irreplaceable by other resources (Barney, 2001).

The IT-business value model, as expounded by Melville et al. (2004), provides a robust framework for examining the interrelationships between IT resources and other organizational assets to enable business processes to enhance proximate and distal performance outcomes under the domains of local firms, competitive environments, and the

broader macro environment. Previous empirical studies have applied KBV to theoretically analyze the competitive advantage implications through knowledge strategy and information technology, empirically assessing their complementarities (Soto-Acosta et al., 2018; Yoshikuni and Lucas, 2021).

Thus, RO literature, KBT, and the IT-business value model focus on combining strategic knowledge and IT resources/capabilities. Hence, the study presents an integrative management perspective through the balance required for the proposed research model of SK-IT business value.

Therefore, under RO the research discusses in the following subsections, the relationship between knowledge strategies, IT capabilities, and business process performance on innovation ambidexterity under equifinality of environmental turbulence.

2.2 Innovation ambidexterity

Ambidextrous innovation refers to radical innovation by exploiting opportunities and addressing today's business demands, although still adaptive enough to make explorative innovation to attend to changes in their business environment, that will be available around tomorrow (Bodwell and Chermack, 2010; Ceptureanu and Ceptureanu, 2019; Junni et al., 2013). In other words, Innovation ambidexterity refers to an organization's ability to simultaneously pursue both incremental and radical innovations (Sahi et al., 2021). Incremental innovations are small improvements to existing products or processes, while radical innovations are new and disruptive technologies or business models (Saleh et al., 2023). Organizations that can manage both types of innovation effectively are better able to adapt to changing market conditions and stay competitive in the long term (Ceptureanu and Ceptureanu, 2019; Yoshikuni and Dwivedi, 2022).

Exploitation is related to familiar things that refer to stable things, that can be used by selection, execution, competence, and efficiency (Sahi et al., 2021). Hence, acquainted gears include a map, monitoring, and improving business processes to ensure conformance with accepted standards (Alamayreh et al., 2019; Jansen et al., 2006).

Otherwise, unfamiliar things must be discovered by exploration of business processes to comprise search and investigation (Alamayreh et al., 2019; Jansen et al., 2009). Hence, exploration requires more resource investment with uncertain payoffs, and firms have to focus to seize, i.e., firms' ability to sense opportunities to create exploratory innovations (Bodwell and Chermack, 2010; Xie and Gao, 2018; Yoshikuni and Lucas, 2022).

In summary, exploratory innovation focuses to attend to emerging customers and markets, which is required to pursue new knowledge to back the formation of new products and services (Jansen et al., 2006; Zang and Li, 2017). Exploitative innovation refers to the ability to build on existing knowledge strategies (Ramachandran et al., 2019; Xie et al., 2020; Xie and Gao, 2018).

Therefore, in this study, innovation ambidexterity combines both exploitation and exploration activities (Bodwell and Chermack, 2010; Ceptureanu and Ceptureanu, 2019; Raisch et al., 2009), when organizations are skilled in concurrently exploiting present capabilities and discovering new chances and opportunities to create innovation (Alamayreh et al., 2019; Ardito et al., 2018; Chandrasekaran et al., 2012; Jansen et al., 2006; Yoshikuni and Lucas, 2022; Zang and Li, 2017).

2.3 Effects of resource orchestration on innovation ambidexterity through business process performance

According to Porter (1990) and Kaplan and Norton (2008) firm value chain is decomposed by business processes that work activities across time and space, with clearly identified inputs, transformation, and outputs, i.e., they are activities that reside in the black box of the value chain that transform inputs into outputs.

From the perspective of resource orchestration (RO) view, the organizational resources are combined to enable business processes on firm outcomes by direct resource exploitation (Aydiner et al., 2019a; Davenport et al., 2010). For example; business processes include innovation, operational, post-sale, and supporting activities (Kaplan and Norton, 2008).

Past studies have investigated the role of IT investment on organizational performance (Aral and Weill, 2007; Kohli and Grover, 2008). However, growing studies examining in detail how the business process may have the intermediate relationship between IT and performance as an outcome, such as dynamic capabilities (Kim et al., 2011), organizational agility (Lu and Ramamurthy, 2011; Mikalef and Pateli, 2017), strategy flexibility (Chen et al., 2017), decision-making performance (Yoshikuni and Dwivedi, 2023), and finally business process performance (Aydiner et al., 2019b; Tallon, 2011; Tallon et al., 2016).

In the same movement of investigation has occurred of knowledge management strategies, investigating how firms can develop knowledge strategies (Zack, 1999), and knowledge creation process capabilities (Nonaka, I., Toyama, R. and Konno, 2000; Nonaka, I. & Takeuchi, 1995; Nonaka and Takeuchi, 1991). Later studies, through the lens of knowledge-based theory (KBT), examine the impact of knowledge management strategies on organizational performance (Choi and Lee, 2003; Gold et al., 2001; Zack et al., 2009; Zaim et al., 2019). Recently, growing studies investigating how knowledge management strategies may impact organizational performance through mediation dimensions, such as; knowledge-

sharing practices (Ali et al., 2018), dynamic capabilities (Bamel and Bamel, 2018; Chan et al., 2016), and intellectual capital (Buenechea-Elberdin et al., 2018; Dey and Mukhopadhyay, 2018; Mehralian et al., 2018).

As stated, many studies have been dedicated to investigating the influence of IT capabilities or knowledge management strategies mediated by intermediate dimensions, but there are scarce studies that investigate through the lens of resource orchestration (RO) view alignment IT capabilities (ITC) and strategic knowledge (SK) resources on innovation ambidexterity by business process performance (BPP) mediation.

Hence, it would expect resource orchestration combining its two dimensions (SK and ITC) to impact BPP to leverage innovation ambidexterity. The two dimensions are complementary and enable the development of different strategies into operational capabilities creating balanced explorative and exploitative innovation. For instance, strategic knowledge integrates deliberate approaches through explicitly formulating goals, plans, and precise company vision (rational) and emergent approaches to a company's employees' daily practices and learning processes to make business strategy (Bolisani and Bratianu, 2017; Yoshikuni and Dwivedi, 2023; Yoshikuni and Lucas, 2022).

The firms build ITC improving by IT resource-based (tangible and intangible), thus enabling operational capabilities in the value chain and creating innovation ambidexterity (Queiroz et al., 2018). Thus, it proposes that organizational capability is essential to organizations executing types of strategy to lead explorative innovation that depends on market responsiveness to stay ahead of competitors and efficiency to operational routines to create incremental innovation.

As stated, the KBT (Soto-Acosta et al., 2018) and IT-business value model (Melville et al., 2004) argues that knowledge and IT resources enable business processes to leverage

proximate and distal outcomes under external factors. Accordingly, based on the SK-IT business value model, the study openg the black box among the direct influence of RO on ambidextrous innovation through business process performance, postulating the hypotheses below.

H1: Business process performance mediates the impact of IT capabilities on innovation ambidexterity.

H2: Business process performance mediates the impact of strategic knowledge on innovation ambidexterity.

2.*4 Alignment between knowledge strategies and IT capabilities*

The combination of knowledge-based view theory (KBT) and resource-based theory (RBT) can be the most influential approach that explanations of how an organization's internal resources provide a competitive advantage. Organizations may retain their advantages over longer periods. Organizations can build capabilities to guard against resource imitation, resource transfer, or resource substitution (Helfat and Raubitschek, 2018; Taher, 2012; Wade and Hulland, 2004). Furthermore, the way organizations combine these assets differs and creates truly distinctive competencies that lead to very superior performance outcomes (Teece et al., 2016).

Recent studies have demonstrated that alignment between knowledge resources and IT, to impact business processes to innovate products and services, are the key factors to a firm's success and long-term development (Chan et al., 2016, 2019; Yoshikuni and Dwivedi, 2023).. This study argues that to effectively organize and develop IT resources, organizations must be alignment their strategic knowledge with IT capabilities, as recommended through knowledge strategies and IT studies (Chan et al., 2019; Coltman et al., 2015; Li and Chan, 2019; Yoshikuni, 2021). Thus, this study postulates to amplify the RBT and KBT through the

lens of resource orchestration (RO) view, as recommended by Sirmon and colleagues (Sirmon et al., 2011) to examine how the integration of both strategic resources may be critically important to firms to enhance innovation ambidexterity (IAM) by business process performance (BPP).

IT capabilities, in this study, are considered as blends of computing, information, communication, networking, and connectivity technologies and amplified interconnections among services, processes, and products to enhance innovation (Li and Chan, 2019; Queiroz et al., 2018), including the advent of SMAC technologies [e.g. social, mobile, analytics and cloud computing (Chan et al., 2019)].

Firms learn and discover the value of customers' concerns and needs (El Sawy et al., 2016), i.e., social media-embedded devices are using technology to understand customer data better to create loyal customers (Teubner and Stockhinger, 2020). The mobile apps provide a workplace that is easy and accessible to disseminate strategic knowledge by employees, and offers an interactive digital experience to customers. Hence, IT capabilities by mobile apps can offer, sell and provide customer service experience through extensive digital channels (Gupta and Bose, 2018; Matt et al., 2015; Vial, 2019). From analytics/big data, firms identify and generate valuable insights from micro-marketing to increase customer digital engagement (Garrido et al., 2020; El Sawy et al., 2016). Thus, big data and analytics can enable firms to attend to their stakeholder' requests and can respond adequately (Aydiner et al., 2019a; Mikalef et al., 2020). IT capabilities through cloud computing deliver global connectivity (e.g., internet and mobile web) for firms to offer, sell and provide customer service experience through extensive digital channels (Gupta and Bose, 2018; Matt et al., 2015; Vial, 2019). The cloud provides new applications embedded in many business processes to promote the complexity reliever rather than just as a cost saver (Chan et al., 2019; Teubner

and Stockhinger, 2020). Therefore, cloud computing enables integration, mobility, flexibility, and scalability of the infrastructure to attend to business demand and market requirements.

Therefore, IT capabilities refer to the technical and organizational capabilities of an organization to manage and leverage information technology to support its business operations and goals. This includes hardware and software infrastructure, data management systems, and the personnel and processes needed to manage them.

As stated, IT capabilities through SMAC, provide IT-business value through social media from discovering things, mobile technologies create business value by adopting convenient apps; analytics promotes real-time insights and personalization of marketing and products, and cloud services create business value by reducing complexity.

Recent past studies have established that owning IT resources is not sufficient, and organizations also must develop superior IT capabilities in alignment with strategic knowledge capital. Hence, strategic knowledge can be seen to embody and build IT capabilities, which influence a firm's outcomes (Bamel and Bamel, 2018; Chan et al., 2016). In this paper, knowledge strategies refer to how a firm aligns its knowledge capabilities and resources to complementary organizational resources by the intellectual and collective requirements to making business strategy (Bolisani and Bratianu, 2017; Yoshikuni and Dwivedi, 2023; Zack, 1999).

In particular, this study concentrated to investigate how firms by strategic SECI [socialization, externalization, combination, and internalization (Nonaka, I., Toyama, R. and Konno, 2000)] use to create knowledge, attain knowledge, and share strategic knowledge for strategy formulation and strategic decision making (Ferreira et al., 2018; Ngoc-Tan and Gregar, 2019; Nguyen et al., 2019). Therefore, the explicit strategic knowledge is manipulated into the formal organizational language to share between individuals, including

processes and procedures by information, data, publications, texts, and documents codified; and the tacit strategic knowledge refers to individual strategic knowledge embedded in personal experience by subjective insights, collaborative participation, and skills (Bolisani and Bratianu, 2017; Shujahat et al., 2017; Yoshikuni and Dwivedi, 2023).

The RO among strategic knowledge and IT capabilities enable firms to exploit present ideas, plans, and resources, and discover evolving mechanisms to enhance the firm's objectives by making use of firm strategy (Marabelli and Galliers, 2017; Peppard et al., 2014; Yoshikuni and Dwivedi, 2023). Furthermore, knowledge strategies refer to planning for making strategic decisions of allocating, sharing, generation, guarding, and exploitation of the firm's resources at the strategic level (Cabrilo and Dahms, 2018), creating a knowledge-conducive organizational value to disseminate strategy-making at all levels of organization (Bolisani and Bratianu, 2017; Yoshikuni and Dwivedi, 2023). Therefore, Strategic knowledge refers to the knowledge and understanding of an organization's business environment, its competitive landscape, and the technologies and trends that are relevant to its industry. Organizations need to have strategic knowledge in order to make informed decisions and develop effective strategies.

Therefore, in this study based on SK-IT business value model (Melville et al., 2004; Soto-Acosta et al., 2018), a blend of IT capabilities and knowledge strategies represent firms' cognizant and intuitive, directional, and object-oriented endeavors to make, acquire, share, and practice strategic information and knowledge (Chan et al., 2016; Whittington, 2014; Yoshikuni and Dwivedi, 2023). Consequently, this effort provides firms with an understanding of applying current and creating new, IT capabilities in alignment with strategic knowledge capabilities to enhance performance outcomes (Yoshikuni and Dwivedi, 2023; Yoshikuni and Lucas, 2022). Based on this reason, it suspects that the more successful

strategic knowledge, the higher will be the IT capabilities that a firm is expected to attain. Therefore, the following hypothesis is:

H3: By resource orchestration view, the alignment of strategic knowledge and IT capabilities, increases the effective formation of business process performance and ultimately innovation ambidexterity.

2.5 The equifinality of environmental turbulence

The previous hypotheses assume that strategic knowledge and IT capabilities can effectuate innovation ambidexterity gains by increasing a firm's process performance. Hence, by developing an alignment among strategic knowledge and IT capabilities, organizations will promote a linear increase in their business process performance on innovation ambidexterity.

The idea that environmental factors can exercise a single optimal representation in the reality of the empirical model is prevalent in the IS field (Chatterjee et al., 2021). The concept of the optimal empirical model can be restricted, and its outcomes may be questioned. Previous studies have demonstrated that linear regression, and reported both significant and non- significant effects of moderation environmental factors (Lee et al., 2015; Wamba et al., 2020; Wilden et al., 2013; Yoshikuni and Lucas, 2022). However, various systems, methodologies, and techniques are available now, and computation science allows the investigation of moderation levels of empirical model complexity that reveal equifinality (Beven and Freer, 2001).

Equifinality refers to "certain results may be achieved with different initial conditions and in different ways."(Chatterjee et al., 2021). Previous IS studies, emphasize that evident relationships might not be 100% linear, and thus, relationship (correlation coefficients) cannot accurately capture the linear effects by the moderation of combined variables (Mikalef and Pateli, 2017; Tóth et al., 2015; Woodside, 2013).

Hence, this study investigated if there is a contrarian case in the influence of environmental factors in the empirical model, in line with previous IS field studies (Mikalef and Pateli, 2017; Yoshikuni and Albertin, 2018). The reality of such irregular conditions can be examined through a case-contrarian analysis (Woodside, 2014).

To verify if the sample has contrary cases, it was divided respondent cases into quantiles and cross-tabulating between dependent and independent variables, and the results recommend that contrarian cases exist in the sample (Appendix A). So, theory indicates that the influence of the alignment among strategic knowledge and IT capabilities on innovation ambidexterity mediated by business process performance can be conditioned by environmental turbulence essentials that exist non-linear and complex synergistic impacts.

According to Melville & colleagues (Melville et al., 2004), environmental turbulence by country and specific factors can shape firms' assets and may influence the improvement of outcomes performance. Hence, this study adopted the environmental turbulence, which has been characterized by technological uncertainty and competitive intensity, reflecting the effects of customers, technological, and strategic moves by aggressive competitors (Bolisani and Bratianu, 2017; Dost et al., 2019; Pavlou and El Sawy, 2010; Zhou et al., 2019). Technological turbulence is defined as speed and technological advancements, rate of technological changes, and technology assessment. Similarly, market turbulence is defined as assessing customer changes and preferences, marketplace forecasting and insight, changing customer basis, and the competitive turbulence index assessed the general degree of competition, the extent of promotion, and price wars (Wilden and Gudergan, 2014).

Therefore, this empirical study assumed that different configurations of environmental turbulence could be associated with promoting business process performance and innovation ambidexterity through the orchestration of strategic knowledge and IT capabilities. Thus, the

study proposes the hypothesis that equifinality can be studied under the lens of business environmental turbulence shapes that foster value assumption, contributing to literarure of equifinality in the IS field (Chatterjee et al., 2021; Woodside, 2014)

H4: Equifinality exemplifies positive organizational capabilities configurations, conditional on environmental turbulence.

The research study proposed model based on the SK-IT business value generation process shows the hypotheses and assumes that the alignment between IT capabilities and strategic knowledge influence business process performance on innovation ambidexterity under environmental turbulence (see Figure I).

Figure 1. Proposed Model

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Insert Figure I Here

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3. Methods

3.1. Scale

The constructs have been adopted with multi-item measures. All constructs have been previously validated from literature and developed new scale where no existing valid constructs are present. The research developed new scales instruments about IT capabilities (ITC) and strategic knowledge (SK) constructs based on empirical literature review and pre-tested with inputs from academicians and practitioners. The face validity and discriminant

validity of ITC were adapted from information systems studies (Chan et al., 2019; Li and Chan, 2019) and SK was adapted from knowledge strategies literature (Bolisani and Bratianu, 2017; Nonaka, I., Toyama, R. and Konno, 2000; Zack, 1999). The SK and ITC constructs were enhanced by the draft instrument with three rounds of card sorting carried out, as suggested by Moore and Benbasat (1991). First, the measures' items of both constructs were generated with help of two professors, three senior executive, and two students of professional master's in business administration (PMBA). Second, the content validity of the instrument was done through the panel of senior executives, who are students of PMBA to obtain their opinions on appropriate items for inclusion, then the items of constructs were valid. Third, a new scale measure for SK and ITC were mixed with other items into a random order and was given to the twelve academics and six senior executives. Thus, the judges separated the items by construct, and a debriefing session was conducted with the judges to understand why certain items were not grouped as expected, and so, they were modified or removed.

The constructs of business process performance (BPP) were adopted from Kaplan and Norton (2008) and operationalized by Yoshikuni and Albertin (Yoshikuni and Albertin, 2020), innovation ambidexterity (IAM) (combination of exploration and exploitation) was adopted by Jansen and colleagues (Jansen et al., 2006) and environmental turbulence (market, technological and competitor turbulence) was adopted by Wilden and Gudergan (2014) and MLMV - measured latent marker variable [formative (Almeida et al., 2022)].

Control variables were included by firm sector, firm size as suggested by previous knowledge strategies (Soto-Acosta et al., 2018) and IS studies (Kohli and Grover, 2008; Melville et al., 2004).

Moreover, as indicated by Morgado, Meireles, Neves, Amaral, and Ferreira (2018), it was assessed reliability and validity by conducting statistical analysis. All constructs were

operationalized, and respondents' inputs were gathered on 7 points Likert scale (from 1 = “strongly disagree” to 7= “strongly agree”). The pilot test in a small cycle with 45 organizations was tested to assess the statistical properties of the measures, as recommended by Malhotra (2010). The instrument was refined to make it friendlier, clearer, and more comprehensive, and instrument labels were adjusted. The questionnaire is available in Appendix B.

3.2 Sample

The sampling is based on nonprobabilistic sampling (convenience). The targeted respondents belonged to Brazilian organizations, senior executive and medium-level managers representing their organization at the strategic management level, from various industries and sectors. Hence, non-confirming research criteria respondents were eliminated from to sample data. As per PLS-PM literature, the sample size should not be less than 10 times of structural paths predicted in a given reflective construct (Hair et al., 2017) so that includes a minimum of 100 cases. Furthermore, as per the G*Power v.3.1.9.2 software (Faul et al., 2007), the minimum sample size with a median effect should be 118 cases based on [f^2] of 0.15 and statistical power of not less than 0.80. Hence, the research is based on a sample of 441 responses, and it satisfied the requirement for partial least squares path modeling (PLS-PM) (Henseler et al., 2016). The response consists of 42% senior or executives, and 58% middle and first-line managers, who have the power to make decisions within their respective organizations, business, or companies. The characteristics of the sample by firms’ sectors; are agribusiness (4%), commerce (15%), finance (12%), manufacturing (26%), services (41%), and government (3%). The firm size (SIZE) is characterized by employees’ numbers from small (17%, between 1 – 49), medium (21%, between 50 and 499), and large (62%, above 500). Thus, the sample consists of more service organizations and large firm sizes as compared to firms with other characteristics.

The research has controlled the common method bias (CMB) throughout the research design phase. no evidence was found for non-response bias in concern in this study. The study

compares the difference between with and without additional marker variables in all variance explanations (R^2), and the model with MLMV has more significant results than the original one (less than 1%), see Table II. Thus, the study does not reflect any non-response bias concern.

3.3 Measurement model

The study uses partial least squares method-based structural equation modeling to analyze and measure the hierarchical research model's validity and reliability. Because of PLS-SEM handling of (i) the complexity of the structural model, (ii), it allows flexibility related to the assumptions on multivariate normality, (iii) simultaneous estimation of multiple relationships among independent and dependent variables with reflective and formative measurement, (iv) the more strong assessment of formative constructs, (v) strong to estimate complex models with many latent variables and indicators with small sample sizes, (vi) treating unobserved heterogeneity with different sample size data analysis strategies, and (vii) it has the possible use as a predictive tool for theory building (Hair et al., 2017). Thus, the PLS-SEM demonstrated adequate performance compared to CB-SEM because of the context of high-complexity research within a small sample size of unobserved heterogeneity, robust theoretical framework, and limited exploratory conditions, as recommended by Akter and colleagues (Akter et al., 2017).

Reliability, convergent validity, and discriminant validity were assessed of first-order reflective latent variables. Reliability at the construct level, composite reliability, and Cronbach's alpha (CR) were checked and all values were acceptance level well above the threshold of 0.60. This indicates acceptable construct reliability as mentioned by Hair and colleagues (Hair et al., 2017).

It examined reliability at the item through construct-to-item loadings, remaining items have had loadings above 0.75 (items below the threshold of 0.70 being removed). However, item MT4 showed close to 0.5 factorial loads, and it was decided to maintain, it because the AVE value was not elevated with its elimination and had three items to measure the MT construct, thereby suggesting discriminant validity (Hair et al., 2017), see Appendix C. AVE helped to assess the convergent validity by examining above the lower limit of 0.50. The lowest AVE value was 0.558 (which exceeds the threshold), and each construct's AVE square root was greater than its highest correlation with any other construct (Fornell-Larcker criterion).

There are three ways to establish the discriminant validity: (i) If each constructs AVE square root was greater than its higher correlation with any other constructs (Fornell-Larcker criterion), (ii) if the outer loading of each indicator on its assigned construct were greater than its cross-loadings with other constructs, and (iii) the heterotrait-monotrait ratio (HTMT) measured the correlation between constructs, HTMT values below 0.85, confirming discriminant validity, as recommended by Hair et al. (2017) and Henseler et al (2015). Hence, we found reliable first-order reflective measures, and all items were appropriate indicators for the respective latent variables, see Table I and Appendix C.

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Insert Table I Here

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4. Empirical results

4.1. Structural model

The structural model (Figure II) was assessed by using PLS analysis and details are summarized in Table II: the effect size of path coefficients (f^2), path coefficients (β), bias-

corrected 95% confidence interval, coefficient of determination (R^2), and CMB. The bootstrap analysis is performed with 5000 resamples to the obtained significance of estimates (t-statistics).

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Insert Table II Here

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As shown in Table II, SK is found to have a strong and large effect on ITC (f^2 =0,668, β=0.633, t=21.748, p< 0.001), supporting the hypothesis H3. Moreover, ITC demonstrated a positive influence on BPP (f^2=0.220, β=0.443, t=9.463, p<0.001), and SK indicated a positive impact on BPP (f^2 =0,106, β=0.308, t=6.149, p< 0.001). Finally, BPP is found to have an impact that is positive on IAM (f^2 =0.237, β=0.452, t=9.065, p< 0.001).

To assess if the effect of ITC on IAM, and SK on IAM, are direct or mediated by BPP, the study uses a non-parametric resampling procedure that imposed no assumptions on the normality of sampling distribution through a bootstrapping approach. Hence, based on the guidelines of Hair and colleagues (Hair et al., 2017), The ITC has a significant total effect on IAM (β = 0.616, t= 18.521, p< 0.001) and SK on IAM (β = 0.558, t= 14.616, p< 0.001). When adding the BPP mediators (Table 2), ITC and SK have a decreased effect but still maintain a significant direct effect on IAM [(ITC→ IAM; β =0,235, t=4,373, p-value < 0.001) and (SK→ IAM, β =0,130, t=2.432, p-value < 0.01)]. Therefore, BPP has a significant mediating impact on the relationship of ITC on IAM, and SK on IAM, supporting hypotheses H1 and H2.

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Insert Figure II Here

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The PLS structural equation model explains 40.1% of the variance in SK (R^2 = 0.401), 46.4% of that in BPP (R^2 = 0.464), and 54.1% of that in IAM (R^2 =0.541). The effect size f^2 showed that all values are significant and above the threshold of 0.106, indicating that relationships have moderate to large effect sizes. It examined the influence of control variables on IAM and no relationships were found to be statistically significant (p-value>0.05).

The Q^2 value for all three endogenous constructs (Q^2: ITC=0.256, BPP=0.287, IAM =0.288) was considerably above zero, and provided clear support for the predictive model, indicating satisfactory predictive relevance (Hair et al., 2017). Also, the q^2 size effect demonstrated an adequate effect size of predictive relevance for BPP (above 0.05 and 0.10 respectively). Moreover, the composite-based standardized root means square residual (SRMR) was a value of 0.064, indicating the overall fit of the PLS path model [is below the threshold of 0.08 (Hair et al., 2017).

4.2. FIMIX-PLS, MGA-PLS, and unobserved heterogeneity

The study employed the finite mixture partial least squares (FIMIX-PLS) algorithm to determine the number of segments retained from data through the use of a stop criterion to run 10 times for g =2–5 segments, assessed by the Akaike Information Criterion (AIC), Modified AIC with Factor 3 (AIC3), Bayesian Information Criterion (BIC), Consistent AIC (CAIC), Hannan-Quinn Criterion (HQ), and the normed Entropy Statistic (EN) (Hair et al., 2018). Based on a minimum sample size of 118 cases, the criteria (see Table III) demonstrated the two-segment solution as the most appropriate, indicating that can be equifinality characterizes

certain configurations of environmental turbulence. The 1-segment has 248 cases and the 2-segment has 193 cases.

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Insert Table III Here

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4.2. Fuzzy-set qualitative comparative analysis.

The fsQCA analyses are used to inclusion of environmental turbulence factors to evaluate the existence of various segments and alternative solutions. FsQCA is considered an appropriate corresponding analysis to PLS-SEM to detect effects caused by unobserved heterogeneity, facilitating the verification of alternative causal influences, and explaining how variables combine into configuration (Gelhard et al., 2016; Mikalef and Pateli, 2017; Woodside et al., 2012).

To test hypothesis H4 the fsQCA analysis was assessed to verify the equifinality by the alternative of environmental turbulence attribute configurations can cause the same outcome (Fiss, 2011). The dependent and independent variables were calibrated into the fuzzy sets with values ranging from "0" or "1". Values of "0" indicate no set membership, and "1" denotes full set membership. Thus, values were measured on a continuous scale [0–1] through the calibration procedure introduced by Ragin (2008), indicating the level of membership to the variable considered.

The three anchors were defined to determine the degree of membership for each variable, denoting full membership (fuzzy score = 0.95), full non-membership (fuzzy score =

0.05), and the crossover point (fuzzy score = 0.50) (Woodside, 2013). To transform the constructs into fuzzy sets, this research used a 7-point Likert scale to quantify variables as the procedure described by Pappas and colleagues (Pappas and Woodside, 2021). Consequently, full membership thresholds are set to values above "6", crossover points to "4.5", and full non-membership scores below "2" (Mikalef and Pateli, 2017; Woodside, 2014).

Thus, applying the fsQCA algorithm, a truth table comprising 2^k rows is generated, where “k” represents the number of predictor elements, and each row represents a potential combination. The fsQCA algorithm of the truth table was applied to analyze if any of the three conditions of environmental turbulence can be regarded as necessary for influencing the relationships on SK, BPP, and IAM. It was examined whether a single condition is always present or absent in all cases for the outcome. Secondly, the fsQCA computes the Proportional Reduction in Inconsistency (PRI) to measure the consistency of subset relations in social research, exclusively applicable to fuzzy sets, thus enhancing reliability and robustness. Hence, the truth table was reduced to meaningful configurations that the independent variable was present in the outcome (Pappas and Woodside, 2021; Woodside, 2014). PRI consistency to raw consistency scores above 0.75 was used to avoid simultaneous subset relations of configurations in both the outcome and the absence of the outcome (i.e., negation), as consistency cut-off values are regarded as sufficient for the outcome (Mendel and Korjani, 2012; Ragin, 2008; Woodside, 2013). The Appendix D demonstrates the fsQCA analyses performed by relationships on ITC, BPP, and IAM.

The environmental turbulence combination of the fuzzy set analysis for two segments is presented in Table IV. The black circles (●) denote the presence of a condition, whereas the crossed-out circles (⊗) show the absence of one (Ragin, 2008). Hence, variables of a configuration are marked with large circles (prime implicants), peripheral variables with small ones and blank spaces indicate a “don't care” situation, this condition shows the causal

condition may be either present or absent (Mikalef and Pateli, 2017). No peripheral variables were present in this study.

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Insert Table IV Here

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Table IV shows in the two segments have different configurations of influence environmental turbulence in the relationship between exogenous on endogenous variables. In the model, all configurations account for above 88% of the membership in the relationships on the outcomes. The relationship between SK on ITC applies to firms who operate under conditions characterized by a presence of competitor turbulence for 1-segment, and they do not care situation (presence and absence) of the market, technological and competitor turbulence for 2-segment. The presence of technology turbulence was identified in the relationship between ITC on BPP for 1 segment, and market turbulence showed an absence for the 2-segment. In the relationship between SK and BPP only competitor, turbulence was present for the 1-segment, and for the 2-segment do not care situation of technological, market, and competitor turbulence. The last relationship between BPP on IAM demonstrated for the 1-segment that all turbulence conditions were present, and for the 2-segment were present market turbulence and competitor turbulence.

To check if subgroups distinguish through evaluating the measurement invariance/equivalence and if there are significant differences in path coefficients between segments. It was analyzed by applying the multi-group analysis partial least square (MGA-

PLS) algorithm for both segments. Table V shows the results of the multi-group analysis and the significance of the differences between the two subgroups' paths and determination coefficients. SK exerted a stronger impact on IT capabilities in the 2-segment ($\beta = 0.759$, $p < 0.001$) than in the 1-segment ($\beta = 0.512$, $p < 0.001$). Significant differences also appeared in the influence of IT capabilities on BPP with a total path difference of 0.446 and p-value < 0.001, related to higher the effect of the 2-segment. Finally, concerning the effect of BPP on innovation ambidexterity, it finds that the 2-segment demonstrated a greater ($\beta = 0.625$, $p < 0.001$), and statistically significant difference, compared to the 1-segment ($\beta = 0.273$, $p < 0.001$).

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Insert Table V Here

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The 2-segment demonstrated a higher coefficient of explanation of endogenous variables, and a higher difference of path coefficient in the relationship of SK on ITC, ITC on BPP, and ITC on BPP than global and 1-segment. The 2-segment was characterized by 70% of large-size firms. The 1-segment was influenced by the sector of service (43%) and manufacturing (25%) and other sectors. Then, based on fsQCA analysis and MGA-PLS was demonstrated that equifinality was present in the unobserved heterogeneity, supporting H4.

5. Discussion and conclusions

The research aimed to examine how resource orchestration functions, captured through the alignment of strategic knowledge and IT capabilities mediated by business process performance, and results in innovation ambidexterity. The theoretical grounding, argumentation, and associated hypotheses indicated the degree of alignment between SK-IT

capabilities, and the higher effect that has on the business process performance and innovation ambidexterity. It will be of augmented value under environmental turbulence conditions by technology, market, and competitor turbulence. Based on conceptualization, best of the authors' knowledge that strategic knowledge-based value as stemming from the strategic SECI to effectively align IT capabilities by SMAC technologies that had not been previously subjected to large-scale empirical testing. In sum, this research has six key finds;

First and foremost, research was conceptualized, operationalized, and measured both novel constructs: strategic knowledge through the underlying strategy-making routines described in the SECI knowledge process as a first-order construct; and IT capabilities to describe how SMAC technologies enable organizational processes to attend to market requirements to help achieve performance outcome. Therefore, the empirical research demonstrates the management's pivotal role in enhancing knowledge and capabilities through strategic management and aligning knowledge resources and IS strategies, enabling organizational capabilities to sustain value creation for small, medium, and large companies in developing and developed economies (Chan et al., 2019; Yoshikuni and Dwivedi, 2023). As a consequence, enterprises with clearly defined knowledge and IS strategies exhibit greater resilience in harnessing organizational capabilities and achieving higher levels of resource orchestration alignment, i.e., managers should actively participate in fostering organizational capabilities to create, deploy, and evaluate the value of strategic knowledge resources (Yoshikuni, 2022). Hence, this study contributes to both the IS and knowledge strategies literature, when strategic knowledge can build a better understanding of how IT investments result from SMAC technologies to enhance business process performance and innovation ambidexterity, as recommended as an area and scope of future research (Chan et al., 2019; Ferreira et al., 2018; Legner et al., 2017; Vial, 2019).

Second, the research contributes to amplifying the knowledge of resource orchestration literature by combining knowledge-based and resource-based concepts among knowledge strategies and IT into a model whereby SK-IT business value, as the framework by which resources are aligned to influence BPP and IAM, as mentioned by Sirmon and colleagues (Sirmon et al., 2011). The result demonstrates that SK-IT alignment accelerates the convergence of rational and emergent strategic knowledge approaches, enabling all employees to comprehend and engage in strategic planning to achieve organizational objectives. As a result, firms must invest in nurturing employees' skills and cognitive capacities' alignment with IS strategies to blend elements of rationality with creative insights derived from practical experience (Bolisani and Bratianu, 2017). Hence, this study incrementally modified the framework of IT-business value and proposed SK-IT business value generation process among the resource-based and knowledge resource-based views, which is applied in a specific context (IS and SK), incorporating multiple environmental turbulence factors as moderator's combination, contributing to IS literature (Kohli and Grover, 2008; (Melville et al., 2004) and knowledge strategies literature to improve strategy-making, as recommended by the researchers (Yoshikuni, 2022; Yoshikuni and Dwivedi, 2023).

Third, the findings empirically support the claim that strategic knowledge and IT capabilities facilitate the emergence of innovation ambidexterity by the mediation of business process performance, thus, confirming and accepting hypotheses H1 and H2. Thus, IT capabities by SMAC promoting collaboration and the accessibility of strategically stored knowledge enhances an organization's flexibility. As a result, an organization's leadership and culture, by strategic knowledge, prioritize continuous learning, experimentation, and the alignment of IT resources to enable business processes to neutralize and exploit various contingencies to leverage performance. Implies that departing from strategic knowledge and

IT resources by digital technologies effectively leverages a firm's employees' cooperative work in critical thinking, critical analyzing, and executing strategies, allowing organizations to enable business process performance that is critical for innovation ambidexterity gains, as was empirically demonstrated. So, the results contribute to the literature on knowledge strategies (Bolisani and Bratianu, 2017; Ferreira et al., 2018) and IT capabilities (Chan et al., 2019; Queiroz et al., 2018) to fill gaps, that business process performance can be a feasible substitute to firms through combining rational and emergent strategies to create innovation, opening the black box concerning the relationship between the SK-IT-related capabilities on innovation ambidexterity by setting BPP as the missing key, contributing to extend the knowledge of ambidexterity literature as recommended by Soto and colleagues (Soto-Acosta et al., 2018). Moreover, these results also answer Junni and colleagues (Junni et al., 2013), Saleh and colleagues, (Saleh et al., 2023) and Sahi and colleagues (Sahi et al., 2021) for the necessity of forthcoming studies to focus on many levels of how organizations at different levels contribute to enabling ambidexterity and performance outcomes.

Fourth, the results demonstrated that effective usage of knowledge, and the conception of firms' strategic capabilities to support IT capabilities, which can be a significant driving force for business process accomplishment, supporting hypothesis H3. Therefore, the findings show that senior executives highlight the imperative for their active involvement in nurturing organizational capabilities for the creation, deployment, and evaluation of the value derived from the alignment of IS strategies with strategic knowledge to influence organizational capabilities (i.e., business processes) to achieve innovation of exploration, exploitation, and ambidexterity. Hence, IT and strategic knowledge must evolve within the organization, being a key differentiator to enhance innovation ambidexterity. Thus, this study confirms previous studies on the role of strategic IT alignment to firm build organizational capabilities (Chan et

al., 2016; Li and Chan, 2019) and expand the novel knowledge of how strategic alignment can contribute to ambidexterity (Queiroz et al., 2018).

Fifth, by fsQCA analysis, the confluence of exogenous variables and environmental turbulence factors, demonstrated outlines of conditions that facilitate ITC, BPP, and IAM emergence. The fsQCA analysis provides interesting results combined with outcomes MGA-PLS that supported H4. The findings demonstrated that 1-segment has a balanced combination of SK and IT to influence innovation ambidexterity fully mediated by business process performance, mainly to service and manufacturing sectors for technological, market, and competitor turbulence. The 2-segment was characterized by large-size firms with strong IT capabilities to influence innovation ambidexterity partially mediated by business process performance. Environmental turbulence is the presence of market and competitor turbulence in the relationship between BPP on IAM. Moreover, the 2-segment has a strong strategic knowledge alignment with IT capabilities that can be realized in it does not care situation of presence or absence of a market, technological, and competitor turbulence. Thus, strategic knowledge has an important role to determine the effective use of IT to build organizational capabilities in the business processes to gain ambidexterity.

Hence, based on the fsQCA results, it is evident that all the relationships in the research model (SK → ITC, ITC → BPP, SK → BPP, and BPP → AMB) are influenced under different conditions of environmental turbulence. This finding suggests that the alignment between strategic knowledge and IT capabilities is influenced by various external factors in order to enhance business process performance and achieve ambidexterity. The literature on organizational capabilities posits that within moderately turbulent markets, organizations typically adhere to predictable and linear paths marked by stable industry structures and well-defined market boundaries (Eisenhardt and Martin, 2000). Therefore, this study demonstrates that the high turbulence of market, technological, and competitor changes

tend to be nonlinear and less foreseeable, as identified in past studies (Wamba et al., 2020; Wilden and Gudergan, 2014). Thus, these results contribute to novel knowledge of equifinality literature, since there is no research on how strategic knowledge and IT capabilities by SMAC, interact to contribute to innovation ambidexterity mediated by business process performance under equifinality of environmental turbulence. Hence, these results are empirically validated that suggest that the SK-IT business value generation process can be of value in many environmental conditions.

In the last, this study contributes from a methodological standpoint, combining PLS-SEM and fsQCA methods (Pappas and Woodside, 2021). The PLS-SEM demonstrated suitability to explain the causal paths through the resource orchestration of SK-IT ultimately impacting innovation ambidexterity by business process performance mediation, moreover, it identifies and compared unobserved heterogeneity segments by FIMIX-PLS and MGA-PLS. While fsQCA provides a deeper understanding of the complex, the non-linear, and synergistic influence of environmental turbulence in conditioning the SK-IT business value generation process framework. Hence, PLS-SEM outcomes show the general tendency, whereas fsQCA uncovers the multiple combinations of turbulence environments that exist in terms of each relationship of exogenous and endogenous variables of the proposed model, contributiong to extende the knowledge of equifinality literature in the IS field (Chatterjee et al., 2021) .

5.1 Managerial implications

The results of this study provide useful insights for managers. First, the findings encourage managers to think carefully about their investment to align strategic knowledge and IT capabilities to gain innovation ambidexterity. For business practitioners in large-size firms, the study suggests that IT capabilities by SMAC are strongly influenced by strategic knowledge to impact business process performance and innovation ambidexterity under

equifinality of turbulence environment. Strategic knowledge is the first step as firms define their targets and goals, and IT capabilities were adopted to support business processes to ultimately gain innovation ambidexterity.

Second, most firms of services and manufacturing have demonstrated that both resources of strategic knowledge and IT capabilities are necessary to build organizational capabilities to shape under environmental turbulence. Hence, this study reminds business practitioners of the need to make a balanced investment of IT and strategic knowledge, and firms need also be vigilantly watch their market, technological and competitor environments to be effective in their business processes.

In addition, as is common in employee turnover in the organization, firms must consider some programs to develop and maintain strategic knowledge, identifying important elements of how to retain the important knowledge and capabilities for their business processes and how to use digital technologies to effectively this valuable strategic knowledge.

5.2 Limitations and future research

The study evaluated the Brazilian business environment thus it is not cross-cultural and cross-country. Future studies should be conducted in more countries, mainly in developed economies to compare the different perspectives of emergent and developed countries. The model relied on cross-sectional data; thus, could be conducted a longitudinal study of the time-dependent differences in the strategic alignment of knowledge and IT adoption.

Ethics declarations

Conflict of interest

The author(s) declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article**.**

Ethical Approval

Not Applicable (The research is based on an anonymous survey).

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