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Antecedents of Business Model Innovation and Their Impact on Firm Performance in Chinese Small and Medium-Sized Enterprises

LEI Pigui

Doctor of Management

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Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

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Abstract

Small and medium-sized enterprises (SMEs) are crucial drivers of economic growth, job creation, and innovation, contributing significantly to industries' diversification and competition. Business model innovation (BMI) is essential for SMEs to stay relevant, adapt to a dynamic business environment, and differentiate themselves. By rethinking and redesigning fundamental business components, SMEs can identify new revenue streams, explore untapped markets, and optimize resource allocation for long-term success in a rapidly evolving business landscape.

This study explores the factors influencing BMI in SMEs in China and their impact on firm performance. There is a lack of comprehensive understanding of the antecedents of BMI and its effects on firm performance in SMEs. To bridge this gap, we systematically reviewed the literature, identifying internal and external antecedents influencing BMI and examining its relationship with firm performance.

This thesis reveals the relationship between antecedents, BMI, and firm performance in SMEs. Several antecedents include proactive market orientation, strategic agility, dynamic capabilities, technological openness, technological turbulence, innovativeness, and market turbulence, which positively influence BMI. Responsive market orientation and organizational agility indirectly affect BMI. Technological turbulence imposes a significant positive moderating effect on technological openness, innovativeness, strategic agility, and dynamic capabilities in BMI.

This research enhances our comprehension of the key drivers behind successful BMI in SMEs, offering valuable insights for theoretical contributions, practical implications, and identified research gaps.

Keywords: Business model innovation; Small and medium-sized enterprises; Antecedents; Firm performance; Chinese context

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Resumo

As pequenas e médias empresas (PMEs) são impulsionadoras cruciais do crescimento económico, criação de emprego e inovação, contribuindo significativamente para a diversificação e competitividade industrial. A inovação de modelo de negócio (IMN) é essencial para que as PMEs se mantenham relevantes, se adaptem a um ambiente de negócios dinâmico e se diferenciem. Ao repensar e redesenhar componentes fundamentais do negócio, as PMEs podem identificar novas fontes de receita, explorar mercados inexplorados e otimizar a alocação de recursos para o sucesso de longo prazo num contexto em constante evolução.

Este estudo explora os fatores que influenciam a IMN nas PMEs na China e o seu impacto no desempenho das mesmas. Identificámos uma falta de conhecimento sobre os antecedentes da IMN e seus efeitos no desempenho das empresas. Para preencher esta lacuna, realizámos uma revisão sistemática da literatura identificando antecedentes internos e externos.

Esta tese revela a relação entre antecedentes, IMN e desempenho das empresas nas PMEs. Vários antecedentes, incluindo orientação pró-ativa de mercado, agilidade estratégica, capacidades dinâmicas, abertura tecnológica, turbulência tecnológica, inovação e turbulência de mercado, influenciam positivamente a IMN. A orientação de mercado reativa e a agilidade organizacional afetam indiretamente a IMN. A turbulência tecnológica impõe um efeito moderador positivo e significativo à abertura tecnológica, inovação, agilidade estratégica e capacidades dinâmicas das IMN.

Esta pesquisa aprimora a nossa compreensão sobre os principais fatores por trás do sucesso da IMN nas PMEs, oferecendo informações valiosas para contribuições teóricas, implicações práticas e lacunas de pesquisa identificadas.

Palavras-Chave: Modelo de negócios inovação; Pequenas e médias empresas; Antecedentes; O desempenho da empresa; Contexto chinês

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摘要

中小企业是经济增长、创造就业和创新的重要驱动力，对行业多元化和竞争做出了重大贡献。商业模式创新对于中小企业保持相关性、适应动态商业环境和脱颖而出至关重要。通过重新思考和设计基本业务组成部分，中小企业可以识别新的收入来源，探索未开发的市场，并优化资源配置，以便在快速发展的商业环境中取得长期成功。

本研究探讨了影响中国中小企业商业模式创新的因素及其对企业绩效的影响。对于中小企业商业模式创新的前因及其对企业绩效的影响缺乏全面的了解。为了弥补这一差距，我们系统地回顾了文献，确定了影响商业模式创新的内部和外部因素，并研究了其与公司绩效的关系。

本文揭示了中小企业的前因、商业模式创新和企业绩效之间的关系。一些先决因素包括积极的市场导向、战略敏捷性、动态能力、技术开放性、技术动荡、创新性和市场动荡，这些因素对商业模式创新产生积极影响。响应市场导向和组织敏捷性间接影响商业模式创新。技术动荡对商业模式创新的技术开放性、创新性、战略敏捷性和动态能力产生显着的正向调节作用。

这项研究增强了我们对中小企业成功商业模式创新背后关键驱动因素的理解，为理论贡献、实际意义和确定的研究差距提供了宝贵的见解。

关键词：商业模式创新；中小型企业；前因；公司业绩；中国情景

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Chapter 1: Introduction

A summary of the thesis is provided in chapter 1. First, introduce a research background, encompassing both theoretical and practical perspectives, to establish the groundwork for our research. Second, propose and define the research problem, which revolves around identifying the specific factors that drive BMI and understanding their impact on firm performance. Third, it outlines the research's purpose and the anticipated contributions it strives to make to the current reservoir of knowledge. Lastly, we present the research method and thesis structure that will guide our investigation throughout the thesis.

1.1 Research background

In recent years, research on macro-management has focused more on the ideas of BM and BMI (Foss & Saebi, 2016; Spieth et al., 2014). The subject of BMI holds a significant position in the fields of both science and management (Wirtz & Daiser, 2018).

Particularly due to its recognition as an effective and efficient mode of innovation (Wirtz, 2016), BMI addresses novel approaches to organizing businesses, directly tied to the potential for sustainable competitive advantage when executed successfully (Casadesus-Masanell & Zhu, 2013; Wirtz & Daiser, 2018). Moreover, BMI offers companies the agility to swiftly adapt to market fluctuations, enabling them to not only survive but also thrive in today's dynamic and fiercely competitive business landscape (Visnjic Kastalli & Van Looy, 2013). A key benefit of BMI, which involves either revising an existing BM or creating and implementing a new one (Massa et al., 2017), lies in its capacity to illuminate the discovery of fresh value propositions that lead to revenue generation and the exploration of innovative methods for value creation and capture among stakeholders (Teece, 2010).

Despite the considerable scholarly and practical significance of this subject, our comprehension of BMI remains constrained (Foss & Saebi, 2016; Wirtz et al., 2016), and business leaders lack adequate frameworks and tools that facilitate their pursuits in BMI (Taran et al., 2016; Weking et al., 2020). Therefore, the primary objective is to develop a comprehensive framework that can aid management in effectively implementing BMI activities and further enrich empirical research in the field of BMI.

1.1.1 Practical background

In terms of achieving enterprise success, BMI is gaining even greater significance than traditional product, service, or process innovation (Amit & Zott, 2012). However, practical guidance for designing innovative BM remains limited (Foss & Saebi, 2016; Teece, 2018). This scarcity of guidance is particularly notable for SMEs; they are crucial to native economies, regional and even national innovation processes, and technological advancement (S. M. Lee et al., 2012). Consequently, recent international policies underscore the imperative for SMEs to redefine their BM to enhance and sustain their competitiveness (Codini et al., 2022). From this standpoint, BMI emerges as a potentially powerful tool for SMEs to reconcile the trade-off between the costs and benefits of innovation, facilitating their ability to conceive, deliver, and capture novel value (Codini et al., 2022).

While existing research has underscored the potential of BMI to generate advantages over rivals and improve overall enterprise performance, a significant challenge emerges in the context of SMEs (Latifi et al., 2021). Despite the acknowledged benefits, many SMEs struggle to realize the anticipated outcomes when embarking on BMI endeavors (Latifi et al., 2021). It is essential to recognize that BMI entails substantial modifications to critical facets of a company's BM, bringing about irreversible changes. This inherent nature of BMI is accompanied by elevated levels of risk, ambiguity, and uncertainty. These elements collectively contribute to the complexity of BMI implementation and underscore the necessity for SMEs to approach such initiatives with a thorough awareness of the difficulties and complexities present (Latifi et al., 2021).

Therefore, from a practical and management perspective, the significance of conducting research into BMI within the context of SMEs is important. In the subsequent sections, specifically within Chapters 1.1.1.1 through 1.1.1.6, the significance of SMEs in the economy has been discussed. Furthermore, the potential advantages SMEs can obtain through engaging in BMI are elaborated upon.

1.1.1.1 SMEs play a vital role in the economy

SMEs hold significant importance for our economy due to their multifaceted contributions. They are not only key drivers of economic growth but also play pivotal roles in employment generation, fostering innovation, and promoting entrepreneurship. Despite their relatively smaller size compared to large corporations, SMEs collectively have a substantial influence on a wide range of sectors and themes in the economic community. The European Commission (2020) categorized the characteristics of SMEs as below: Medium-sized enterprises are

characterized by having a workforce of less than 250, yearly earnings not going over €50 million, or a balance report total not surpassing €43 million. In contrast, small-sized enterprises are defined by having less than 50 workers, yearly earnings not going over €10 million, or a statement of assets and liabilities not surpassing €10 million. The classification standards for SMEs vary across different industries in China (Chinese Government, 2011), as detailed below: (a) Factory: SMEs are those with fewer than 1000 workforces or annual business income below 40 million RMB. (b) Construction: SMEs are businesses with a revenue below 80 million or total assets below 80 million RMB. (c) IT services: SMEs are those with fewer than 300 employees or annual income less than 100 million RMB. (d) Information transmission: SMEs are those with fewer than 2000 workforces or annual income below 1 million RMB. (e) Transportation: SMEs have fewer than 1000 employees or an annual income of fewer than 300 million RMB. (f) Other industries are not specified, but SMEs in those industries are those with fewer than 300 employees.

In 2020, the European Commission (2023) furnished statistical data for enterprises in the non-financial business economy, encompassing small, medium, and large-sized categories delineated by their workforce size. The detailed information is as follows:

First, the majority of EU businesses, specifically 99.0%, fell under the category of micro or small enterprises, employing fewer than 50 individuals. However, their economic significance was comparatively lower in terms of both employment contribution and value added. Micro and small enterprises constituted roughly 48.5% of the overall workforce within the EU's non-financial business economy and contributed around 35.4% of the overall value added.

Second, medium-sized enterprises (employing 50–249 people) constituted a mere 0.9% of the total number of enterprises. Despite their limited presence in numbers, their economic impact was substantially greater. Large enterprises, on the other hand, employed over one third (15.7%) of the entire workforce in the non-financial business economy of the EU and played a more significant role in wealth generation, contributing 17.1% of the total value added.

Third, a notable count of 42,000 large enterprises, each employing 250 or more individuals, accounted for a mere 0.2% of the total enterprises. Nonetheless, their economic influence was significantly greater. These large enterprises were responsible for employing more than one third (35.7%) of the total workforce in the EU's non-monetary corporate sector and were even more instrumental in generating wealth, contributing a substantial 47.5% of the total value added.

Similarly, in China, drawing from the statistical data outlined by Xu (2023), the comprehensive information regarding SMEs is as follows:

Firstly, in terms of quantity, the scale of SMEs is experiencing rapid expansion. As of the conclusion of 2022, the Chinese SMEs count exceeded 52 million, marking a 51% increase compared to the figure at the end of 2018. On average, 23,800 new enterprises are established daily, which is 1.3 times higher than the rate observed in 2018. This swift proliferation of SMEs positions them as the largest and most dynamically growing segment of companies, playing a crucial role in China's economic and social advancement.

Secondly, regarding quality, high-quality SMEs continue to emerge. The Ministry of Industry and Information Technology has nurtured nearly 9,000 specialized and innovative "hidden champion" enterprises, driving the development of over 80,000 provincial-level specialized and innovative SMEs. Among these "hidden champion" enterprises, the focus on expertise, strong industry support, and innovative strategies results in an average research and development (R&D) investment ratio of 8.9% and an average R&D personnel ratio of 28%. They have been actively involved in shaping and updating over 6,000 national standards and have received authorization for more than 140,000 patented inventions. In recent years, more than 70 "hidden champion" enterprises have been honored with national science and technology awards, and over 1,500 have undertaken major national scientific and technological projects. The rapid development of specialized and innovative SMEs showcases their robust innovative vitality and positions them as an important source of innovation.

Thirdly, in terms of contribution, SMEs hold a pivotal position in both economic and social development. Widely distributed across various sectors and specializing in different segments of the industrial chain, SMEs act as the link that promotes coordination between large, medium, and small enterprises and drives collaboration between academia, industry, and research. This collaborative approach aids in building a complete industrial ecosystem, ensuring the stability and competitiveness of industrial and supply chains. SMEs not only provide a significant amount of material products and services directly to the public but also serve as vital reservoirs for absorbing and regulating employment. Regions with well-developed SMEs typically exhibit higher levels of employment, stronger economic activity, and improved living standards.

Fourthly, in China, the recently formulated long-range strategy (2006–2020), known as the SciTech Guideline, emphasizes the significance of innovation, specifically innovation driven by technology and focused on domestic markets, as a means to achieve sustainable economic growth (Petti et al., 2017). The plan aims to boost high-value-added production in the economy, with the business sector playing a crucial role in driving this transformation. The SciTech

Guideline outlines various measures to create an innovation-friendly environment, which encompasses the advancement of national intangible assets and the strengthening of their safeguarding, implementing financial inducements and government procurement strategies targeted at encouraging investment in developments, bolstering social risk capital that invests in creative enterprises, and attracting as well as retaining top-tier skilled individuals. Successive 5-year strategies, including the 11th (2006–2010), 12th (2011–2015), and 13th (2016–2020), have consistently reinforced this strategy by pinpointing key sectors, initiatives, and emerging technologies and by setting precise targets for advancements in these areas (Petti et al., 2017).

SMEs hold a pivotal position within economies due to their multifaceted contributions, as underscored by the European Innovation Scoreboard and Market Economy Status Monitor Report (EISMEA, 2021). Their significance transcends mere numerical representation; rather, it encompasses their substantial role in three critical dimensions: employment, innovation, and economic growth. Existing literature highlights the inherent flexibility of SMEs in adapting to changes, although they may face resource and capability constraints when it comes to expanding their business nationally or internationally (European Commission, 2020; S. Lee et al., 2010). On the other hand, the findings indicate that SMEs demonstrated a higher level of objectivity and effectiveness in utilizing their resources and capabilities during the crisis (Dias et al., 2021). While SMEs make up nearly 99% of businesses globally (Robu, 2013) and contribute to 60–70% of employment in OECD countries (OECD, 2018), research endeavors that incorporate strategic management, innovation management, and BM often concentrate predominantly on large enterprises (Hartmann et al., 2013). SMEs and large-scale organizations exhibit notable disparities in their value creation processes and foundational strategic structures (Deschryvere, 2014), implying that BM innovation approaches tailored for big enterprises might not immediately translate to SMEs.

1.1.1.2 BMI helps SMEs gain a competitive advantage

BMI enables SMEs to distinguish themselves in the market and secure a competitive edge. Through the creation of novel and distinctive BM, SMEs can present unique value propositions, attract customers, and secure their position in the market (Chesbrough, 2010).

The advancement of IT and the internet has driven the merging of digitization and informatization; it brings equipment, individuals, and enterprises together. This integration has given rise to the network's economic and operational framework. Researchers have recognized BMI as a pivotal driver for attaining sustainable competitive advantages (Tallman et al., 2018). Many research investigations have underscored the pivotal importance of BMI in bolstering

competitiveness and attaining exceptional performance (Carayannis et al., 2014; Kim & Min, 2015). The emergence of information technology applications (for example, e-business, fast-speed wireless communication, Industry 4.0, and machine learning) has created a novel market space, intensified competition, and fundamentally reshaped the survival environment for enterprises (Åström et al., 2022; J. Lee et al., 2019). This convergence of the consumer internet and the industrial internet is expected to completely disrupt enterprise BM and reshape industry competition rules (Burmeister et al., 2016). In the new economy, characterized by information technology and the Internet, enterprises have given birth to new business and profit models. Noteworthy examples, including Dell, Wal-Mart, Uber, and Southwest, have demonstrated innovative BM that have significantly impacted their respective industries and influenced firm performance (Latifi et al., 2021). It is worth noting that new market players and disruptive start-ups often introduce alternative BM, challenging established incumbents (Dushnitsky & Lenox, 2005; Zott & Amit, 2007).

BMI plays a pivotal role in enabling SMEs to distinguish themselves from competitors and secure an advantage in the marketplace (Garzella et al., 2021). By developing unique and innovative BM, SMEs can create distinct value propositions that set them apart from their rivals. Research supports the notion that BMI contributes to a competitive advantage for SMEs. Chesbrough (2010) emphasizes that by leveraging innovative BM, SMEs can create new market spaces, redefine industry boundaries, and offer unique value propositions. This ability to differentiate themselves enables SMEs to attract customers who are seeking novel solutions.

The study by Zott et al. (2011) highlights that BMI allows SMEs to design their value proposition in a way that aligns closely with customer needs and preferences. By understanding the changing demands of the market and incorporating customer insights into their BM, SMEs can tailor their offerings to address specific customer pain points and deliver superior value.

Yoo et al. (2012) suggest that through BMI, SMEs can tap into emerging technologies and digital advancements. By integrating technology into their BM, SMEs can enhance their value propositions, offer unique experiences to customers, and differentiate themselves in the market.

Overall, by implementing BMI, SMEs could differentiate themselves from other companies by providing unique value propositions, attracting customers who seek innovative solutions, and securing a significant market share.

1.1.1.3 BMI helps SMEs adapt to a dynamic environment

Business environments are characterized by constant change and disruption. SMEs need to adapt their BM to respond effectively to market shifts, evolving customer needs, and emerging

trends (Zott et al., 2011). The digital transformation has disrupted traditional industries and created a highly competitive market environment. Companies that were once dominant have faltered, while new players have emerged as industry leaders. For instance, Apple's rapid rise from near bankruptcy to becoming the world's largest company showcases the power of BMI. Scholars and practitioners have studied the factors behind the success of firms like Apple, which innovate their BM, while others struggle and lose market share, for example, Kodak. Research suggests that successful firms achieve dominance by innovating specific components or even their entire BM (Clauss et al., 2020).

Research underscores the significance of SMEs adapting their BM in response to evolving market conditions. Osterwalder and Pigneur (2010) emphasize that businesses must continuously update and modify their BM to remain competitive and address evolving customer demands. This adaptability allows SMEs to seize emerging opportunities and navigate challenges effectively.

The study by Teece (2018) highlights the notion of DC, pertaining to an organization's capability to detect and react to shifts in the business situation. Dynamic capabilities are particularly relevant for SMEs, as they enable these firms to adjust their BM swiftly and effectively in the face of uncertainty. By embracing dynamic capabilities, SMEs can proactively identify market shifts, adapt their value propositions, and capitalize on emerging trends.

M. W. Johnson et al. (2008) research underscores the significance of being agile when confronting disruptive forces. SMEs that demonstrate organizational agility can quickly sense changes in the market, make strategic decisions, and modify their BM accordingly. This flexibility allows SMEs to stay ahead of the curve and seize competitive advantages.

In summary, the constantly changing and disruptive nature of business environments necessitates that SMEs adapt their BM to respond effectively to market shifts, evolving customer needs, and emerging trends.

1.1.1.4 BMI helps SMEs exploit new opportunities

BMI empowers SMEs to leverage the possibilities offered by technological advancements. By integrating technology into their BM, SMEs can enhance operational efficiency, generate fresh revenue sources, and elevate customer experiences (Yoo et al., 2012). The Internet and global trading system have increased customer choices and provided transparent solutions to meet their diverse needs. This has led to a greater focus on customer-centricity and acquiring stable customer relationships. Advances in information technology have made it easier for companies to access cost-effective information and solutions. However, according to Christensen et al.

(2016), numerous BMI initiatives fail to attain anticipated results, underscoring the importance of effective management and execution (Chesbrough, 2010; Sjödin et al., 2020). Conversely, companies that successfully blaze new trails tend to witness favorable performance outcomes (Cucculelli & Bettinelli, 2015). BMI is a value-creation process that has evolved over time. Traditional commerce, with its production-agent-retail-customer model, has faced challenges like limited understanding of customer experiences, leading to delays, inventory issues, increased costs, and cash flow disruptions (Chesbrough, 2010; Sjödin et al., 2020).

Research conducted by Brynjolfsson and McAfee (2014) suggests the transformative influence of technology on enterprise operations. The integration of technology allows SMEs to streamline their operations, automate processes, and reduce costs. Through digital tools and platforms, SMEs can optimize their supply chain, inventory management, and production processes, leading to increased efficiency and productivity.

The study by Chesbrough (2010) highlights how technology integration can enable SMEs to create new revenue streams. By adopting innovative BM that capitalize on technological advancements, SMEs can develop and offer digital products, online services, or software-as-a-service (SaaS) solutions. These new revenue streams not only diversify SMEs' income sources but also provide opportunities for scaling their businesses and reaching a wider customer base. Notable examples include Airbnb, which has emerged as the largest accommodation provider globally despite not owning any rooms; Uber, the leading cab company that does not possess a single cab; and Alibaba, a prominent retailer that operates without maintaining physical stock (Alexander, 2016). These companies have successfully devised novel approaches to deliver, generate, and capitalize on value, inspiring numerous others to follow suit.

Technology integration within BM allows SMEs to enhance customer experiences. The research by Zhu and Kraemer (2005) highlights the beneficial influence of technology-enabled services on enhancing customer delight and fostering trust. SMEs can leverage technologies including mobile apps, e-commerce platforms, and personalized digital experiences to offer convenient, personalized, and seamless interactions with customers.

BMI enables SMEs to extend their product or service offerings. The study by Chesbrough (2010) emphasizes the importance of BMI in creating new value propositions and capturing new market opportunities. By reconfiguring their existing BM or introducing entirely new models, SMEs can diversify their product portfolios or expand their service offerings. This enables them to meet evolving customer needs, address emerging market trends, and stay ahead of competitors.

In summary, BMI enables SMEs to harness the potential of technological advancements to their advantage. By integrating technology into their businesses, SMEs have the potential to enhance operational efficiency, generate novel revenue streams, and elevate customer experiences. Embracing technology-driven BM allows SMEs to stay competitive in the digital era and take advantage of growth opportunities.

1.1.1.5 BMI helps SMEs enter and expand new markets

BMI can facilitate SMEs' entry into new markets or the expansion of their existing market reach. By exploring novel BM, SMEs can tap into unexplored customer segments, enter different geographic regions, and extend their product or service offerings (Zott et al., 2011). BMI has emerged as a pivotal catalyst for SMEs performance and growth, enabling them to seize new market opportunities, create value for customers, and differentiate themselves from competitors (Kraus et al., 2020; Teece, 2010). BMI not only generates new value and avenues for profit growth but has also emerged as a critical form of innovation alongside product, technology, organization, and process innovation (Zott et al., 2011). High-tech companies often prioritize technological advancements, product innovation, and service enhancements, sometimes overlooking the importance of concurrent BMI. CEO-level surveys conducted by early IBM SVP Rometty (2006) reveal that BMI is a vital power for maintaining value generation, even surpassing fresh goods and services as a potential driver of foreseeable advantage in the market (Economist Intelligence Unit, 2005).

BMI plays a crucial role in facilitating SMEs' entry into new markets or expanding their existing market reach. By exploring novel BM, SMEs can tap into unexplored customer segments, enter different geographic regions, and extend their product or service offerings. This strategic approach allows SMEs to seize new opportunities and drive growth.

Research by Amit and Zott (2012) emphasizes the significance of BMI in expanding market reach. By developing innovative BM, SMEs can identify and target previously untapped customer segments. This enables them to cater to specific customer needs, preferences, and demands that may have been overlooked by traditional BM. By tailoring their offerings to these new customer segments, SMEs can capture additional market share and increase their customer base.

Furthermore, the study by Teece (2010) highlights how BMI can facilitate SMEs' entry into different geographic regions. Through the exploration of new BM, SMEs can adapt their strategies and operations to local market conditions, cultural nuances, and regulatory

frameworks. This adaptability allows SMEs to successfully penetrate new markets and establish a presence in diverse regions, thereby expanding their market reach.

In summary, BMI can facilitate SMEs' entry into new markets or the expansion of their existing market reach. By exploring novel BM, SMEs can tap into unexplored customer segments, enter different geographic regions, and extend their product or service offerings.

1.1.1.6 BMI helps SMEs optimize their resources

Through BMI, SMEs can optimize resource allocation and utilization, leading to improved cost efficiency and productivity. By reconfiguring their BM, SMEs can streamline operations, reduce waste, and optimize resource allocation (Zott et al., 2011). Strong leadership, with a clear vision and strategic direction, can stimulate the embrace of innovative BM (Kraus et al., 2020; Osterwalder & Pigneur, 2010).

Through BMI, SMEs can optimize resource allocation and utilization, leading to improved cost efficiency and productivity. By reconfiguring their BM, SMEs can streamline operations, reduce waste, and optimize resource allocation. This enables them to make better use of their limited resources and enhance their overall performance.

Research by Zott et al. (2011) emphasizes the function of BMI in optimizing resource allocation. By rethinking and redesigning their BM, SMEs can identify inefficiencies and allocate resources more effectively. This includes optimizing the allocation of financial resources, human capital, technology, and other key assets. Through strategic resource allocation, SMEs can minimize costs, enhance productivity, and achieve better overall financial performance.

The study conducted by Massa et al. (2017) highlights how BMI can lead to improved cost efficiency. By reconfiguring their BM, SMEs can identify cost-saving opportunities and implement measures to reduce expenses. This can involve adopting more efficient processes, leveraging technology, or exploring alternative supply chain arrangements. Through these cost optimization efforts, SMEs can improve their cost structures and achieve higher profitability.

Furthermore, the study by Afuah and Tucci (2012) emphasizes the importance of BMI in streamlining operations. By rethinking their value chain and business processes, SMEs can identify bottlenecks, eliminate redundant activities, and enhance operational efficiency. This streamlining of operations leads to reduced waste, improved productivity, and better resource utilization. SMEs can achieve higher output with the same or even fewer resources, resulting in enhanced performance.

In summary, BMI allows SMEs to optimize resource allocation and utilization, leading to improved cost efficiency and productivity. By reconfiguring their BM, SMEs can streamline operations, reduce waste, and optimize resource allocation. This strategic approach enables SMEs to make the most of their limited resources and enhance their overall performance.

1.1.2 Theoretical background

The concept of BMI has garnered growing interest among scholars in the realm of micromanagement research (Bashir et al., 2020; Foss & Saebi, 2016). Well-regarded journals in strategic management have published special issues on BMI (Bashir et al., 2020). Moreover, prominent seminars such as the Academy of Management conference have witnessed an increase in the quantity of agenda focused on delving into BMI (Bashir et al., 2020). With the growing interest from academia, there has been an intensification of critical examination and discussion regarding issues related to BMI. In the following parts of Chapters 1.1.2.1 and 1.1.2.2, we have delved into the importance of research trends. Additionally, we have outlined the pertinent theories related to BMI research.

1.1.2.1 Research trend

The concept of a BM has appeared in scholarly literature for more than six decades. It initially surfaced in literature focusing on the development of a revenue model for business games used in training (Bellman et al., 1957; Vukanović, 2016). The terminology of BM emerges from the original statement: “And many more problems arise to plague us in the construction of these BM than ever confronted an engineer” (Bellman et al., 1957). The early usage of the term was quite unspecific (Jones, 1960; McGuire, 1965), and it was initially associated with information and procedure modeling (Dottore, 1977; Konczal, 1975). Konczal (1975) suggested the potential use of BM as a management tool. In the subsequent years, BM was primarily seen as an operative activity for system modeling, focusing on functional aspects. Nevertheless, as technology advanced and electronic commerce became more prevalent, the BM concept assumed greater importance. It evolved from being a simple blueprint for building information systems into a comprehensive representation of a company's structure, facilitating informed managerial decision-making. Wirtz et al. (2016) conducted a literature review from 1975 to 2013 and identified different research fields within the BM domain, including technologically oriented, strategy-oriented, and organization-oriented perspectives.

As new technologies and product inventions emerged, the need for enhanced and more focused BM became evident, incorporating innovation as a key element of their operations. In

response to this demand, the term BMI was coined (Kraus et al., 2020). BMI has emerged as a prominent research stream within the broader field of innovation, providing valuable insights into the execution of innovative practices. It explores the processes and strategies involved in driving organizational innovation through the transformation and optimization of BM. By studying BMI, researchers aim to understand how organizations effectively implement and leverage innovation to achieve competitive advantage and long-term success.

The literature on BM and BMI has exhibited an upward trend over the years. Data from Scopus, a reputable scholarly database covering the period from 1980 to 2022, indicates a substantial volume of publications within these domains. The term "business model" (BM) alone has amassed 16,654 hits, indicating a substantial body of research and discussion on the topic. Moreover, the combined hits for "business model innovation" (BMI) or "business model design" amount to 2,264, suggesting an increasing interest in exploring innovative approaches to BM. These statistics highlight the growing attention and importance placed on understanding and advancing the field of BM and its innovative applications, as detailed below in Figure 1.1, showing the literature counts yearly.

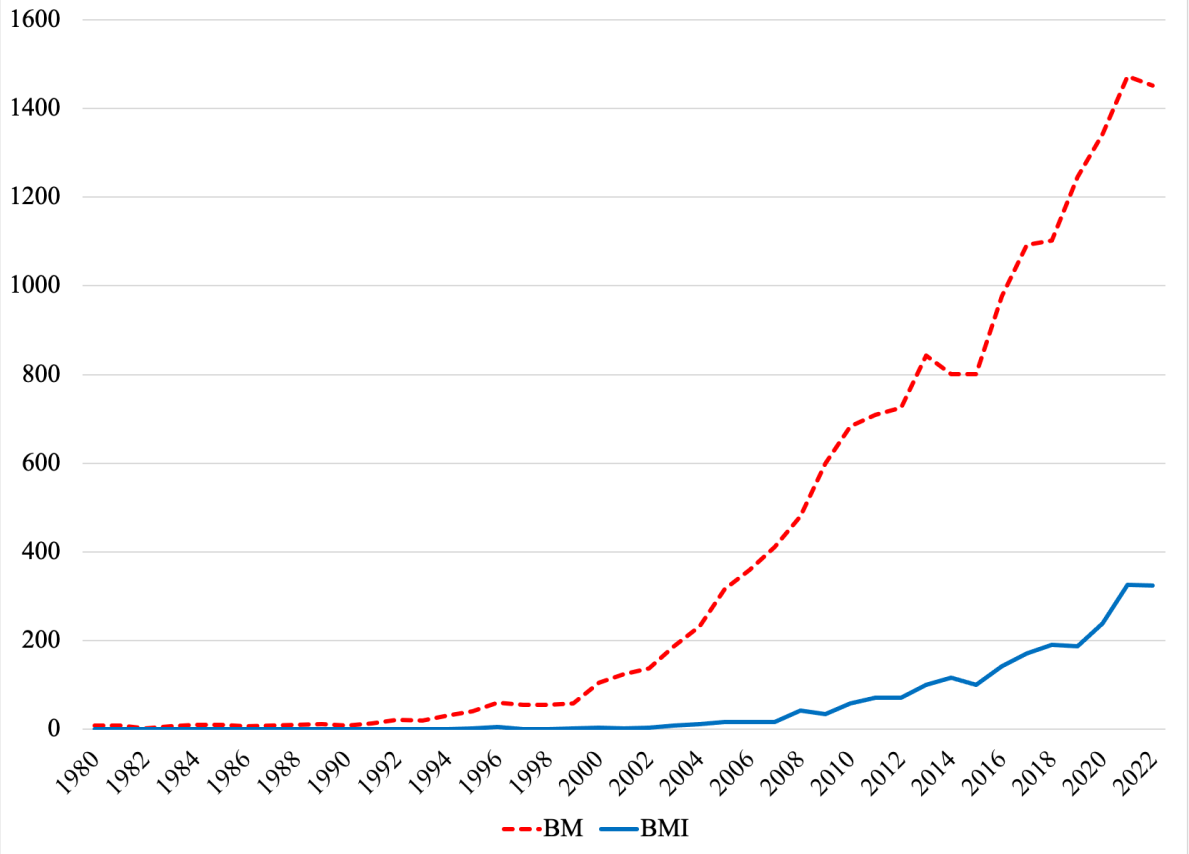

Figure 1.1 BM and BMI research trend

Source: Scopus, 1980–2022. “Business model” (BM), 16,654 hits; “business model innovation” (BMI) or “business model design”, 2,264 hits.

1.1.2.2 Relevant theories

In the context of managerial research, conventional wisdom suggests that theory typically requires the delineation of multiple components (Foss & Saebi, 2016). The details are as below: (1) It entails the identification and definition of the constructs or variables under investigation; (2) It entails establishing congruence, which refers to the governing rules or mechanisms governing the relationships among these constructs or variables. (3) Theory involves defining the limits or parameters within which these rules or mechanisms are anticipated to function; (4) Theory involves crafting contingency or moderation hypotheses that preserve the system's integrity while accommodating varying conditions (Torraco, 1997).

Put simply, theory delineates the underlying cause-and-effect relationships among two or more variables under specific sets of constraints (Foss & Saebi, 2016). Theory can be defined as a holistic depiction of the inherent and causal links among multiple concepts, all within the confines of specific boundary constraints. It serves as an explanatory framework that sheds light on the fundamental relationships between these conceptual elements, elucidating the mechanisms by which they influence one another. This understanding of theory emphasizes the essential role it plays in providing a structured understanding of the complex dynamics that govern the phenomena under investigation. By discerning and articulating the constitutive and causal linkages between concepts, theory facilitates the exploration and comprehension of the underlying mechanisms that drive observable phenomena.

While exploring potential avenues for addressing and resolving the voids present pertaining to the BMI study, Foss and Saebi (2016) propose the incorporation of pertinent theoretical perspectives. These include complexity theory (Levinthal, 1997), which emphasizes the intricate nature of organizational phenomena; complementarity theory (Ennen & Richter, 2010), which underscores the synergistic interactions between different organizational elements; innovation theory (Henderson & Clark, 1990), which focuses on the generation and implementation of novel ideas; DC theory (Teece et al., 1997), which emphasizes the capacity to adjust and restructure resources; and open innovation theory (Chesbrough, 2010), which promotes the exchange and collaboration of ideas across organizational boundaries. Using these theories, researchers can better understand the complex aspects of BMI and how it impacts a company's performance.

1.2 Research problem and question

1.2.1 Research problem

BMI is pivotal for the competitive success of SMEs (Hossain, 2017). To offer practical implications for SMEs owners and managers, empowering them to make well-informed choices and develop effective strategies for BMI. There exists a deficiency in achieving a comprehensive understanding regarding the specific factors that drive BMI as well as its implications for firm performance (Foss & Saebi, 2016) in the context of SMEs. To address part of the research gaps proposed by Foss and Saebi (2016), we are focusing on several reasons, as follows:

First, SMEs often face resource constraints (Codini et al., 2022) and are more vulnerable to market disruptions, making BMI an essential strategy for adaptation and growth.

Second, comprehending the factors that precede BMI can inform managers and entrepreneurs about the necessary conditions and strategies for fostering innovation in SMEs.

Third, investigating the connection between BMI and enterprise performance is critical for assessing the effectiveness and impact of these innovative efforts. By examining this relationship, the study can offer valuable perspectives on the potential benefits and outcomes of BMI for SMEs, including increased competitiveness, revenue growth, and improved market position.

Thus, SMEs suffered from the dilemma that not all business model innovation could enhance overall company performance. They need to identify the specific factors that drive BMI and understand their impact on firm performance.

1.2.2 Research question

The dilemma of "that not all business model innovation could enhance overall company performance". This dilemma arises due to the complexity and multifaceted nature of BMI, as well as the varying contexts and characteristics of SMEs. The study is directed at these questions:

(1) What are the primary antecedents that drive the adoption and implementation of BMI in SMEs?

(2) How does BMI contribute to the performance of SMEs?

(3) What are the factors that intervene in and influence the relationship among antecedents, BMI, and SMEs performance?

(4) How can we provide a model for management to measure BMI and the outcome?

(5) What recommendations could be offered to management to enhance firm performance using BMI?

1.3 Research goal and contribution expectation

1.3.1 Research goal

Our primary objective is to investigate the connection among antecedents, BMI, and performance for SMEs. This study seeks to pinpoint the factors that drive BMI among SMEs and examine how these innovations contribute to firm performance outcomes. By exploring the precursors and consequences of BMI, the research seeks to enhance our understanding of the mechanisms through which SMEs can achieve sustainable competitive advantages and thrive in dynamic and competitive business environments. The goal is to provide valuable insights and recommendations that can inform strategic decision-making, support the growth and success of SMEs, and add to the wider pool of knowledge concerning BMI and its influence on FMP. Our specific research objectives include:

(1) To pinpoint the primary factors that affect the adoption and execution of BMI in SMEs.

(2) To investigate the correlation between these precursors and the degree of BMI in SMEs.

(3) To evaluate how BMI affects firm performance, including measures including financial performance, market share, and competitive advantage.

(4) To study what and how factors such as company organizational characteristics, technology conditions, and market conditions impact the link between antecedents, BMI, and firm performance.

(5) To provide practical recommendations and guidelines for SMEs on how to effectively leverage BMI to enhance their competitiveness and achieve sustainable growth.

(6) To add to the current knowledge base on BMI in the context of SMEs by filling gaps in the literature and advancing theoretical understanding in this area.

(7) To highlight the consequences of the research findings on practitioners, policymakers, and other stakeholders and to stimulate further research and discussion on the topic.

1.3.2 Contribution expectation

This thesis expects to provide potential significance and the practical and theoretical implications arising from the research outcomes, which include:

First, in relation to theoretical achievements, we intend to enhance the current wisdom by providing a greater comprehension of the linkage between antecedents, BMI, and FMP in SMEs. By exploring the factors that drive BMI and how they influence a FMP, the research fills a void in the previously published studies by offering insights into the unique challenges and opportunities faced by SMEs in this domain.

Second, this research has practical implications for businesses and practitioners. The results provide insight into the importance of factors including market orientations, strategic agility, dynamic capabilities, organizational agility, and technology in driving BMI. Understanding these antecedents can guide organizations in developing strategies to foster innovation and adaptability, leading to enhanced firm performance. The research also highlights the potential benefits of embracing BMI, including improved competitiveness, increased customer value, and sustainable growth.

Overall, this study expects to enhance existing wisdom by bridging the gap in understanding the connection between antecedents, BMI, and FMP in SMEs. The insights gained from the study's conclusions hold realistic significance for management, empowering them to make well-informed choices and implement strategies that drive innovation, enhance performance, and contribute to the broader economic landscape.

1.4 Research framework

1.4.1 List of acronyms

This thesis defined the terms and constructs as acronyms and abbreviations, in detail as below:

(1) BM: business model.

(2) BMI: business model innovation, which includes value offering innovation (VOI), value architecture innovation (VAI), and revenue model innovation (RMI).

(3) DC: dynamic capabilities (DC) include sensing (SEN), seizing (SEZ), and transforming (TRN).

(4) EMT: environmental turbulence, which includes TCT and MKT in this thesis.

(5) FMP: firm performance. Note that “FM” comes from the word “firm”, and “P” comes from the word “performance”.

(6) INV: innovativeness.

(7) MKT: market turbulence. Note that “MK” comes from the word “market”, and “T” comes from the word “turbulence”.

(8) MO: market orientations, which include responsive market orientations (RMO) and proactive market orientations (PMO).

(9) ORA: organizational agility. Note that “OR” comes from the word “organizational”, and “A” comes from the word “agility”.

(10) SMEs: small and medium-sized enterprises (plural).

(11) STA: Strategic agility, which includes strategic sensitivity (STS), leadership unity (SLD), and resource fluidity (SRF). Note that “S” is the first letter of the word "strategic".

(12) TCO: technological openness. Note that “TC” comes from the word “technological”, and “O” comes from the word “openness”.

(13) TCT: technological turbulence. Note that “TC” comes from the word “technological”, and “T” comes from the word “turbulence”.

1.4.2 Research process

To investigate the research problem of identifying the key antecedents of BMI in SMEs and their effect on the company’s performance, this thesis adopts an empirical research method to implement the study. Adopt a quantitative research design to gather empirical data and analyze relationships between variables. The following is an outline of the overall research method in a step-by-step sequence:

First, conduct a comprehensive literature review. This step seeks to discover prior research theories, findings, and gaps in knowledge regarding the fundamental factors influencing and results of BMI within SMEs. This thesis gathered pertinent literature from various databases, including Elsevier Science, Emerald, Springer-Link, ProQuest, EBSCO, Google Scholar, and CNKI. The gathered literature is managed by Mendeley Desktop with version 1.19.8.

Second, identify theoretical frameworks or models that have been previously developed and applied in similar research areas. Identify the key variables relevant to the research problem. Develop clear and testable hypotheses concerning the connections among the identified variables. Determine potential variables that could act as mediators and moderators, influencing the relationships between the primary variables. Using the identified variables and hypotheses, create a visual model showing the relationships between them.

Third, develop a questionnaire to capture relevant data that includes measurement scale development to assess each variable. Determine the sample size based on statistical considerations, ensuring adequate power and precision.

Fourth, utilize appropriate statistical techniques, such as PLS-SEM, to investigate the connections among variables. Conduct hypothesis testing to determine the importance and

positive or negative aspects of the relationships. Summarize the significance of each antecedent and its relative influence on BMI and the company's performance.

Fifth, summarize the key discoveries of this study. Provide management and theory implications and recommendations for SME managers based on the research findings. Discuss potential strategies and interventions to foster BMI and enhance firm performance in the SME context. Recognize study limitations and suggest avenues for future research.

1.4.3 Thesis structure

The thesis research on BMI includes antecedents, measures of BMI, and firm performance for SMEs. There are six chapters in this thesis, the architecture as shown in Figure 1.2, and the details as below:

Chapter 1: This chapter serves as an introduction to the topic of the thesis research, providing an overall introduction for the development. First, presenting the background, providing the necessary context, and highlighting the significance of the topic Second, it identifies the research problems and questions that the study aims to address, setting the stage for subsequent investigations. Third, it outlines the object and contribution expectations. Fourth, introduce the research method that the research will implement. Finally, it described an architecture for research. Overall, it builds the framework and overview for the entire research work.

Chapter 2: This chapter serves as a thorough examination of the current literature on BMI, antecedents of BMI, moderation, and mediation. First, it offers a synopsis of the fundamental concepts and theories related to BM and BMI. Second, we reviewed the antecedents, measuring BMI, and performance from current literature. Third, it concludes with a synthesis pertaining to the principal discoveries and insights from the literature review, identifying research gaps and unanswered questions that provide a foundation for the subsequent research tasks.

Chapter 3: We focus on the development of hypotheses and the conceptual blueprint that will guide this empirical research. First, providing a systematic framework for examining the antecedents and consequences of BMI requires a theoretical framework. Second, it explores the antecedents of BMI in detail, investigating the internal and external factors that act as drivers for organizations to engage in BMI. Third, it delves into the influence of moderating and mediating factors in the association between the precursors and BMI. Last, this chapter constructs a visual conceptual model for the study. The conceptual model illustrates the relationships between the various constructs and variables and describes hypothesized pathways through which antecedents, moderators, and mediators influence the outcomes of BMI.

Chapter 4: In it, the research method used in this thesis is examined, outlining the research approach, creating instruments, and gathering data. First, focus on the research design and list out six steps of quantitative research for this thesis. Second, describing the survey design used to gather relevant data for the research Third, it introduces the questionnaires developed for this thesis. It presents the questionnaire for capturing the antecedents of BMI, which include constructs including market orientations, strategic agility, dynamic capabilities, organizational agility, technology, and innovativeness. Presents the BMI questionnaire designed to measure BMI dimensions. Also included is the firm performance questionnaire, which aims to measure the performance outcomes associated with BMI and assesses various dimensions of firm performance. Fourth, detail the procedures for selecting the sample and gathering data, as well as identify suitable participants to ensure a representative sample that reflects the target population. It also elaborates on the data collection procedures, including the methods used to conduct the questionnaires, such as online surveys.

Chapter 5: This chapter provides an empirical analysis conducted for this thesis. First, using SPSS for conducting descriptive statistical analysis that helps to summarize and describe the key characteristics of the constructs under investigation, and then implementing common method biases and no response bias validation for the data Second, we introduced the method, criteria, and procedure of PLS-SEM used in structure model analysis, which include reflective measurement models, formative measurement models, and disjoint two-stage approaches for high-order structure model assessment methods. Third, implement the first stage for lower-order structure model assessment and focus on reliability and validity, which are assessed through loadings, reliability, and extracted variance. Fourth, implement the second stage for higher-order structural model assessment. It involves examining the relationships between the constructs and testing the hypothesis through path coefficient, moderation, and mediation analysis.

Chapter 6: It includes a comprehensive summary of important conclusions of the study, theoretical achievements, management propositions, and identified gaps. It highlights the significance of the study in advancing our understanding of BMI and its antecedents while also outlining potential avenues for future research. This chapter provides a solid conclusion to the thesis and a proposal for further academic inquiry in the field.

As described above, this thesis explores BMI in SMEs, including influencing factors, the measurement of BMI, and enterprise performance, as shown in Figure 1.2.

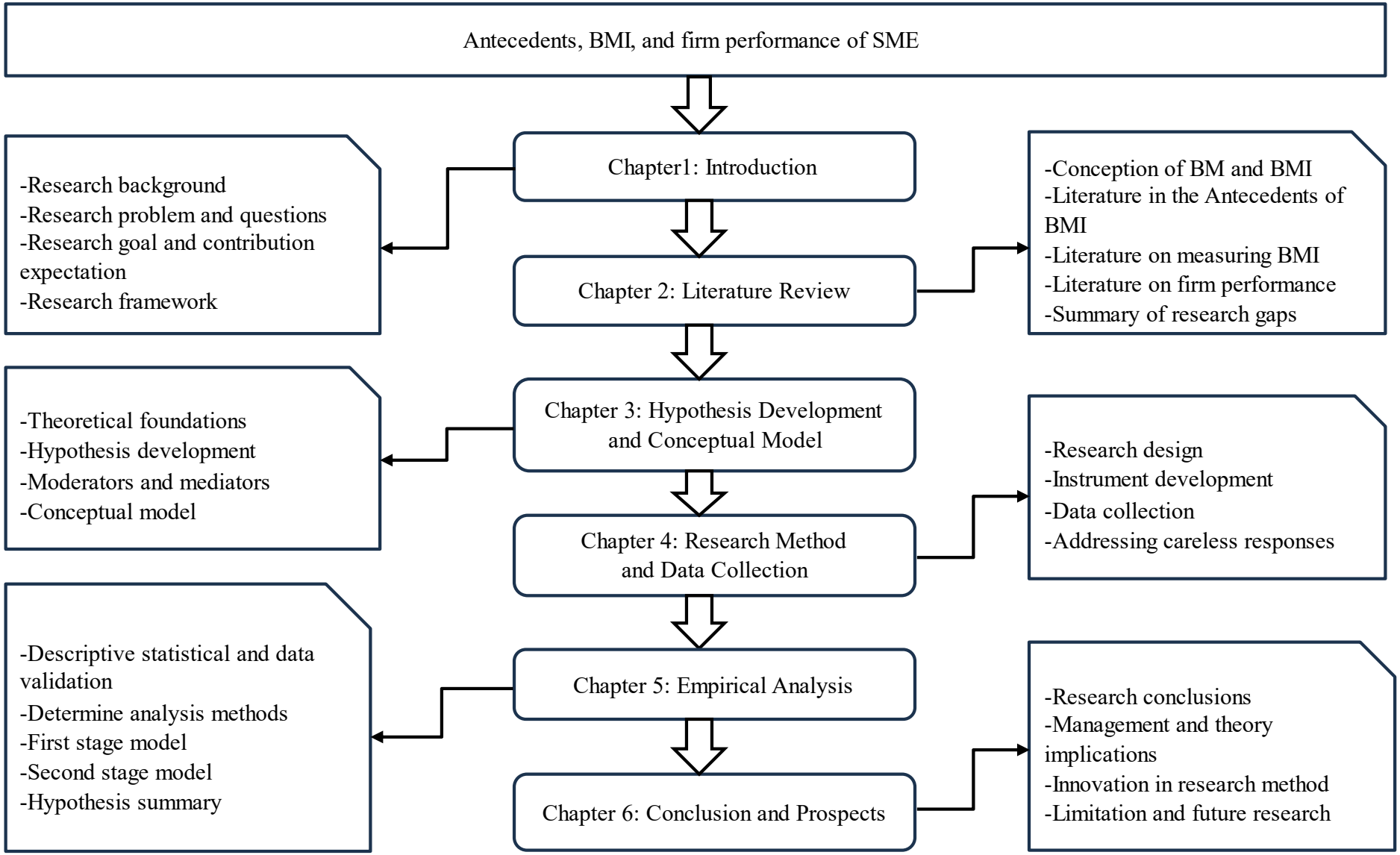

Figure 1.2 The research architecture

Chapter 2: Literature Review

An extensive analysis of prior studies is conducted to thoroughly comprehend the fundamental antecedents that drive BMI within the context of SMEs. This review also seeks to gauge the substantial influence of BMI on performance and the measurement of BMI, thereby providing a solid basis for further research initiatives. Through a meticulous analysis of existing knowledge, the goal of this chapter is to create a thorough comprehension of the intricate relationship among antecedents, BMI, and performance in SMEs, setting the stage for the upcoming phases of research.

2.1 Introduction of BM and BMI

In the swiftly evolving contemporary business milieu, the notion of BM has emerged as a central focus for scholars, entrepreneurs, and organizations alike, all driven by the pursuit of sustainable success and competitive advantage (Miller et al., 2021). Fundamentally, a BM can be delineated as a structural framework that outlines an organization's method for value generation, delivery, and acquisition across a spectrum of stakeholders, including customers, partners, and investors (Wirtz et al., 2016).

Within this dynamic landscape, the concept of BMI has attracted a lot of interest. BMI, as an evolutionary process, entails the creation of novel and enhanced BMs or the strategic reconfiguration of existing ones to effectively respond to emergent challenges and leverage nascent opportunities (Foss & Saebi, 2016). In the crucible of BMI, conventional norms are questioned, innovative value propositions are explored, and the very essence of how a company imparts value to its customers is envisaged anew, often in ways that are distinctive and differentiated (Snihur et al., 2021).

This introductory section establishes the critical underpinnings of BM and the consequential concept of BMI. By shedding light on these foundational aspects, we initiate an exploration into the comprehensive landscape of literature that underpins these pivotal concepts. The subsequent segments will embark on a more intricate dissection of the multifaceted dimensions intrinsic to BM and BMI.

2.1.1 Conception of BM

The subsequent sections will delve deeper into the original conception, components, definition, and research perspective of BM.

2.1.1.1 Early developed conception of BM

The concept of a BM has been a topic of academic interest for over twenty years (Wirtz et al., 2016). Its evolution can be traced through various stages, starting with its initial use in a general sense, evolving into a more strategic approach, and leading to a converging understanding in recent times (Wirtz et al., 2016). This section aims to give a structured overview of the BM concept's evolution, including its history and the difficulties in defining it fully.

(1) Early conceptualization and usage: The term "business model" first appeared in academic discussions in 1957 from Bellman et al. (1957) research (Osterwalder et al., 2005). In this context, the term "business models" emerged with a statement highlighting the challenges faced in their construction, highlighting that the process of constructing these BM brings forth a multitude of challenges, surpassing those typically encountered by an engineer (Bellman et al., 1957). Early usage, particularly in literature from the 1960s, was unspecific and lacked a clear definition (Jones, 1960; McGuire, 1965). Notably, early mentions of BM were discovered within the realms of data and process estimation, with suggestions of their potential as management tools (Dottore, 1977; Konczal, 1975). BM were primarily viewed as operational tools for system modeling, with a focus on functional aspects.

(2) BM and information technology: During the rise of information technology, the BM gained significance beyond operational planning, transforming into an integrated portrayal of a company's organization (Al-Debei et al., 2008). The focus shifted towards contributing to management decision-making and supporting the company's success.

(3) Strategic perspective on BM: From the early 2000s, an expanding body of research emphasized the strategic perspective of BM, analyzing competitive structures and enabling strategic decision-making (Hamel, 2001). Researchers started classifying BM approaches, attempting to develop a clear and independent concept (Chesbrough & Rosenbloom, 2002; Pateli & Giaglis, 2005).

(4) Criticisms and refinements: Amid the new economy's growth, the phrase "business model" was frequently used in business newspapers but also faced criticisms, including those from Porter (2001). Scholars attempted to address these criticisms and develop a more coherent BM concept, setting it apart from established ideas like strategy and organizational theory (Casadesus-Masanell & Ricart, 2010; Ghezzi et al., 2015).

(5) Increasing interest and fragmentation: Since 2004, there has been a surge in publications exploring BM from both practical and academic perspectives (Afuah & Tucci, 2003; Osterwalder & Pigneur, 2010; Wirtz, 2011). However, because of its historical evolution and diverse viewpoints, the literature remained fragmented, hindering clarity in defining the purpose and role of the BM concept.

(6) Convergence of perspectives: Despite earlier research silos, recent years have witnessed a convergence of BM perspectives (Zott et al., 2011). Scholars from different backgrounds now commonly refer to the fundamental aspects of technology, organization, and strategy when discussing BM (Amit & Zott, 2001; Chesbrough & Crowther, 2006; Osterwalder et al., 2005).

(7) Differentiating BM and strategy: The literature increasingly recognizes the distinction between BM and strategy, with the former representing a means to implement the latter (Casadesus-Masanell & Ricart, 2010). A BM outlines the company's value creation logic in a more aggregated form, serving as a link between strategic planning and operational implementation (Dahan et al., 2010).

In summary, the early BM concept has evolved from an ambiguous, operationally focused notion to a more strategic and coherent understanding (Wirtz et al., 2016). The convergence of perspectives has contributed to a broader consensus on its definition and purpose. However, challenges remain because of the inconsistent use of the term, calling for a systematic analysis of definitions and viewpoints to clarify and establish a comprehensive understanding of the BM concept.

2.1.1.2 Definition of BM

One of the challenges when reviewing studies on the BM is the lack of clear definitions (Foss & Saebi, 2018). The academic literature spanning the years 1995 to 2013 offers a rich collection of scholarly BM definitions, characterized by a framework for a comprehensive, comparative, and analytical study (Vukanović, 2016). This definition of taxonomy provides a comprehensive and systematic approach to understanding the various conceptualizations of BM within academic discourse. Researchers have employed diverse perspectives and methods to delineate the key elements and dimensions of BM, shedding light on their theoretical underpinnings and practical implications. They have established a solid foundation for further exploration and refinement of BM concepts, ensuring the continued growth and development of this important area of study. The detailed definitions of BM are below.

Timmers (1998) highlighted the primary constructs of the BM, including the design of product, service, and information structures, as well as the roles, benefits, and revenue sources

of different contributors to the business. Amit and Zott (2001) emphasized an architectural configuration of transactions in e-BM, comprising content, structure, and governance. Chesbrough and Rosenbloom (2002) viewed the BM as an intermediary framework linking technological elements and business value. Magretta (2002) stressed the importance of telling a coherent story about customers, their values, and the delivery of value at an appropriate cost. Chesbrough (2003) proposed a definition of the BM, encompassing multiple dimensions including the value offering, target market, value chain configuration, cost arrangement, the firm's position inside the value chain, and the productive approach. Osterwalder et al. (2005) positioned the BM as an interface linking business strategy and processes, especially IT systems. Lastly, Morris et al. (2005) defined the six core elements of a BM: value proposition, customer, inner capabilities, outer positioning, business structure, and individual or capital considerations. Osterwalder and Pigneur (2010) presented a series of elements that constitute a BM, including the value offering, operations, assets, partnerships, distribution channels, expense arrangement, and revenue strategy. Teece (2010) described the BM as management's hypothesis about customer needs, value generation, and the capture of economic value.

In a different vein, Wirtz et al. (2016) provide their own definition of a BM. They characterize it as a simplified and condensed depiction of a company's significant operations, encompassing the generation of information, products, and services with market appeal, enriched by value-added elements. Additionally, strategic considerations and factors related to customers and the market are put into consideration to attain the overarching target of creating and maintaining an aggressive edge.

These definitions provide different viewpoints on the nature and elements of BM, contributing to our understanding of their essential elements and functions.

2.1.1.3 Components of BM

The term "business model" encompasses various definitions and perspectives, leading to a multitude of interpretations. Understanding the concept's components is vital to gaining clarity about the BM’s essence. Shafer et al. (2005) propose that a BM comprises strategic choices, value creation mechanisms, cost acquisition considerations, and the generation of internet-based value. Osterwalder and Pigneur (2012) propose a three-component structure for the BM, encompassing the value proposition (including products, services, and customer needs) and geographical considerations. Gordijn and Akkermans (2001) categorize the elements of an enterprise BM into three main categories: value elements (value points, value provision, value interfaces, value activities, and value exchanges), community elements (stakeholder networks

and participants), and market segmentation considerations. These perspectives illuminate the diverse and intricate aspects of BM, capturing the dynamics between enterprises, stakeholders, and value creation processes. Betz (2002) suggests that a BM consists of four fundamental elements: capital, resources, sales, and profit. The research introduces a distinct approach to BM composition, placing primary emphasis on the client value proposition, income statement, core assets, and core procedures as central factors (M. W. Johnson et al., 2008). Donath et al. (1999) emphasize five constituent elements of the BM: the governing body, consumer understanding, sales, the abilities of external connections, and internal communication. Eight criteria are used to examine the parts of a BM, including features of marketing (customer segmentation, channels), strategy (strategic goals, worth proposition, key competencies, success indicators, and IT equipment), and income sources (Zott et al., 2011). From a system cognition standpoint, significant theories encompass Viscio and Pasternack (1996) five-factor composition theory and Budler et al. (2021) categorization of seven model elements.

According to the above description, extensive scholarly literature reveals an absence of agreement within the academic community about the precise definition of the BM, leading to varying perspectives on its constituent elements. Thus, through a literature review, Wirtz et al. (2016) proposed that the BM is composed of three primary elements: strategic, value creation, and customer market elements, as described in detail below:

(1) Strategy as a Core Component: Strategy is a fundamental component of BM, influencing its development and guiding its direction. Hamel (2001) identifies the concept of a kernel strategy as a central element within a BM. Other researchers, including Hedman and Kalling (2003), as well as Tikkanen et al. (2005), also emphasize the importance of strategy and its representation as an independent interface component. Corporate strategy shapes a company's mission, vision, and possible strategic development paths, making it an essential part of the BM (Spieth et al., 2016).

(2) Value creation components: Material and immaterial resources are crucial components that influence a firm’s ability to execute its BM successfully. These resources include both real (including machinery and physical infrastructure) and invisible (including patents and brand recognition) assets. Demil and Lecocq (2010) highlight the significance of resources from both within and outside the organization and competencies in shaping a BM. The resource model outlines the essential capabilities required by a company and the vital assets that form the foundation of the BM, summarizing all essential tangible and intangible inputs (Lestari et al., 2020). In the contemporary business landscape, networks and partnerships have a crucial role in the method of value production for a firm. As emphasized by Al-Debei et al. (2008), Hamel

(2001), and Voelpel et al. (2004), the networked model incorporates different external engagements that impact value distribution and joint value production. In this scenario, the network model functions as a method for management to monitor and create regulatory value in collaboration with external partners (Aagaard et al., 2018).

(3) Customers and market components: Customers hold a central position in the BM. Many researchers stress the significance of considering customers and designing effective customer interfaces (Hedman & Kalling, 2003; Lehoux et al., 2014). The client model outlines the merchandise and services offered to clientele groups. This model allows businesses to tailor their offerings, either through a traditional channel or via co-creation through various channels (Magretta, 2002). The market significantly influences a company's BM, and several authors argue for alignment between the market structure and the BM (Amit & Zott, 2001; Massa et al., 2017; Tikkanen et al., 2005). This market model integrates consideration of competitors and the overall market structure where the company operates, providing insights into competitive positioning and market dynamics (Ademi et al., 2021).

In conclusion, an integrated and thorough approach to BM is recommended, taking into account sales, strategic, and value-creation elements (Wirtz et al., 2016). The BM acts as a theoretical structure to coordinate value creation and guarantee profitability, considering both internal and external factors.

2.1.1.4 Research perspectives of BM

Despite the notable surge in interest surrounding BM as a topic, it is worth noting that the research domain is in its nascent phase, with numerous fundamental inquiries yet to be fully addressed. The literature remains considerably nebulous, particularly concerning the rationale and legitimacy of the BM approach's existence as well as its juxtaposition with established concepts. The complexity of resolving these pivotal queries can be attributed to the literature's fragmented nature, stemming from historical evolution and authors' diverse viewpoints. Research highlights that over time, select publications in BM research have been categorized within the overarching contexts of technology, organization, and strategy, representing three fundamental perspectives (Wirtz et al., 2016), which are described in detail below.

Firstly, from a technologically oriented standpoint: During the early 2000s, the landscape of BM literature witnessed a predominant focus on technologically oriented perspectives, particularly within the realm of electronic business. Chesbrough and Rosenbloom (2002) highlighted these crucial duties of the BM as a foundational framework that facilitates collaboration between technology and profit models, ultimately generating economic value.

This perspective underscores the significance of bridging the gap between technological potential and market outcomes through effective BM design. The advent of internet, mobile, and information technologies had a transformative impact on businesses, leading to a redefinition of roles within the converging domains of telecommunications and information systems (Walravens, 2015). Notably, from an information management standpoint, BM traditionally served as representations of various processes, tasks, data, and communication links within a firm, forming the basis for constructing information systems that support daily operations (Vukanović, 2016). The proliferation of affordable and easily accessible information technology blurred the boundaries between industries, prompting a shift from industry-centric analysis to the BM concept (Osterwalder et al., 2005). In this context, there has emerged a strong focus on innovation and technological administration concerning BM (Zott et al., 2011). Case studies, especially among domains like the internet, smartphones, IoT, and information technologies, gained widespread utilization within BM research (Al-Debei et al., 2015). This period witnessed a dynamic exploration of how technology and innovative approaches reshaped traditional business paradigms, further advancing the comprehension of BM in relation to technology-driven environments.

Secondly, from an organization-oriented standpoint: While the academic discourse on BM encompassed various perspectives, the organizationally oriented standpoint, although present, remained relatively subordinate compared to other currents. Some researchers perceive the BM through the lens of organizational structure, viewing it as a form of organizational design (Baden-Fuller & Morgan, 2010; Velu, 2015). Expanding on this perspective, George and Bock (2011) emphasized that BM serve as structural designs purposefully crafted to capitalize on prevailing business opportunities. Casadesus-Masanell and Ricart (2010) proposed that a BM represents a collection of managerial decisions governing an organization's operations, including aspects including compensation practices, procurement contracts, and resource utilization. These choices lead to specific outcomes, including cost efficiency and a culture of resourcefulness, thereby defining the inherent "logic of the firm." Despite their significance, organizationally oriented views on BM were overshadowed by other dominant currents in the scholarly discourse during the period under consideration (Casadesus-Masanell & Ricart, 2010).

Thirdly, from a strategy-oriented standpoint: From 2002 on, a noticeable shift occurred in the academic literature, with an increasing number of publications adopting a strategy-oriented approach to studying BM. Scholars within the realm of strategic analysis perceive the BM as a distinct operational construct that aligns with demand positioning. It emphasizes that the BM integrates operational, profit, and strategic positioning models (Zott et al., 2011). One study

views the BM as a fundamental core logic and strategic decision-making framework that encapsulates an organization's value creation and acquisition within the broader value network (Shafer et al., 2005). The scholar conducted the initial research on how the power structure influences the decision-making process for channel selection and pricing (X. Chen & Wang, 2015). While some argue against simplistically categorizing the BM solely as a strategy, they acknowledge that the value proposition embedded within the BM manifests the enterprise's strategic vision and direction (Magretta, 2002). The emphasis on strategy in relation to firms' performance and value creation highlights the dynamic interplay among elements or components within BM (Casadesus-Masanell & Ricart, 2010). Notably, they analyzed the case of Ryanair and identified liberalization, internationalization, and advancements in internet technology as drivers of BMI (Casadesus-Masanell & Ricart, 2010). Their analysis extended beyond technology-driven forms of BMI, recognizing the emergence of socially oriented enterprises targeting the base of the pyramid segment. This strategic orientation and its influence on macromanagement research have been evident in recent literature (Spieth et al., 2014).

Additionally, from a management practice standpoint, the BM canvas (BMC), a popular framework developed by Osterwalder and Pigneur (2010), contributes significantly to enabling the design and communication of BM. In the realm of BM design, various representation frameworks have been proposed to capture the strategic and organizational structure of a firm, as well as its value creation processes (Osterwalder & Pigneur, 2010). One prominent framework in this regard is the BMC, introduced by Osterwalder and Pigneur (2010). The BMC stands out for its lean and agile structure, making it well-suited for SMEs given their inherent attributes (Cosenz & Noto, 2018). It offers a standardized method for designing BM, presenting the company model and its framework for generating revenue in a lean, flexible, and meaningful way (Osterwalder & Pigneur, 2010). Comprising nine building blocks that capture critical elements of a BM, the BMC is widely regarded as an effective tool for describing various organizations (Osterwalder & Pigneur, 2010). The qualitative nature of the BMC overlooks the quantification of causal relationships among BM elements, impeding a comprehensive understanding of business operations and the ability to experiment with potential outcomes arising from BMI (Cosenz & Noto, 2018). Wrigley and Straker (2016) further emphasize the need for novel insights, rapid experimentation, and evolutionary learning in uncertain and fast-paced environments, which are crucial for designing BM. Considering the strengths of the BMC, it is essential for SMEs to leverage their inherent adaptability and the ability to respond to contextualized modifications using a sophisticated lean BM design method. This method

enables the introduction and experimentation of interventions oriented toward innovation as a strategic ability for securing advantages in competition (Andries et al., 2013). By augmenting the BMC with such capabilities, SMEs can better navigate the complexities of their operating environment and enhance their BM design process accordingly.

By delineating BM research from these distinct perspectives, scholars and practitioners can explore the multifaceted nature of BM comprehensively. Each perspective provides valuable insights into different aspects of BM, enabling a deeper understanding of how organizations create value, achieve competitive advantage, and adapt to the dynamic business environment. This categorization facilitates targeted investigations, allowing researchers to explore specific dimensions of BM while considering their interrelatedness and overall implications for business performance and success.

2.1.2 Conception of BMI

The notion of BMI has attracted considerable interest from both industry professionals and scholars in the micro-management research field (Foss & Saebi, 2016). It has emerged as a viable strategy for organizations to adapt to evolving sources of value generation in dynamic environmental conditions (Pohle & Chapman, 2006). This approach recognizes the importance of identifying and leveraging new opportunities arising from shifts in the business landscape. By proactively reconfiguring their BM, firms can align their operations, resources, and value propositions to address the challenges posed by high environmental volatility, ensuring long-term sustainability and growth (Pohle & Chapman, 2006).

In recent decades, advancements in technology have transformed the business landscape, leading to notable innovations in various dimensions of the BM (Hock-Doepgen et al., 2021). These innovations include the emergence of e-commerce platforms and new marketplaces that facilitate value offerings. In response to these changes and the need for improved BM that incorporates innovation, the concept of BMI has gained prominence (Kraus et al., 2020). BMI has become a focal point within the broader field of innovation, focusing on the execution of innovative practices and the reconfiguration of fundamental elements within a firm's BM (Foss & Saebi, 2016; Hock-Doepgen et al., 2021).

While earlier studies have predominantly concentrated on developing coherence within the BM, examining case examples, or investigating performance implications (Hock-Doepgen et al., 2021), recent studies have begun to explore internal capabilities that enable proactive changes in the BM. The understanding of a firm's BM revolves around three major aspects: value generation, proposition, and acquisition (Baden-Fuller & Haefliger, 2013). The aspect of

value generation encompasses the methods and mechanisms through which firms generate value throughout the value network, utilizing inside and outside abilities and resources (Achtenhagen et al., 2013). The value proposition aspect involves the set of methods provided to buyers as well as their behavior presented (M. W. Johnson et al., 2008). Lastly, value acquisition focuses on translating value propositions into revenue streams to achieve sustainable profitability (Teece, 2010).

Though there is increasing interest in BMI, there is a need for more comprehensive and dynamic research approaches that explore internal capabilities and proactive management of BM changes (Hock-Doepgen et al., 2021). The literature has often exhibited a descriptive nature, emphasizing coherence, retrospective case examples, or performance implications, and more recent studies aim to address this gap by investigating the drivers and enablers of proactive BMI (Hock-Doepgen et al., 2021). By understanding the mechanisms and capabilities that underpin successful BMI, organizations can navigate the evolving business landscape and achieve sustained competitive advantage.

The subsequent sections aim to provide an overview of BMI by examining its definitions, mechanisms, recent research emergence, and research streams in this domain.

2.1.2.1 Definition of BMI

Definitions of BMI encompass various perspectives and conceptualizations put forth by scholars and practitioners, highlighting its dynamic nature. This lack of consensus is primarily due to the diverse range of BMI categories and descriptions found in the existing documents, highlighting the need for further investigation and clarification (Bashir & Verma, 2019). The following are typical definitions:

D. W. Mitchell and Bruckner Coles (2004) suggest BMI is an improvement over current BM with novel ones that offer previously unavailable products or services. Markides (2006) describes BMI as the identification of completely unique BM within established businesses. Spieth et al. (2014) view BMI as the rearranging of activities within an existing BM, targeting new product or service markets. Aspara et al. (2010) characterize BMI as actions aimed at creating and generating new value by posing particular challenges to the industry, roles, and relationships in specific area marketplaces. Gambardella and McGahan (2010) suggest that BMI takes place when a company selects a new method of looking to promote its core resources. Yunus et al. (2010) define BMI as the generation of new profit sources through the identification of novel combinations of value propositions and value constellations. Sorescu et al. (2011) describe BMI as a transformation that extends beyond existing practices in one or

several aspects of a retailing BM, including structure, actions, and administration, thus reshaping the retailer's approach to creating and capturing value. Amit and Zott (2012) propose BMI as the innovation of a BM through the redefinition of properties (adding new activities), architecture (altering activity linkages), and managerial approach (changing the parties involved in operation). Bucherer et al. (2012) define BMI as a deliberate technique that modifies the essential components and business logic of a firm. Abdelkafi et al. (2013) state that a BMI occurs when a firm makes not less than one change or improvement dimension of value. Aspara et al. (2013) describe company BM evolution as a shift in the logic of value perception creation among a corporation's portfolio of businesses over time. Berglund and Sandström (2013) consider BMI to be the launch of a new BM with the goal of adding value commercially. Casadesus-Masanell and Zhu (2013) view BMI as the pursuit of novel logics for the company and novel ways to generate revenue and define value propositions for those involved. Khanagha et al. (2014) suggest that activities related to BMI can span from minor adjustments in individual elements of BM to the implementation of parallel models or even disruptive changes that replace the current model with a fundamentally distinct one. Foss and Saebi (2016) suggest BMI as deliberate, substantial alterations to critical components of a company's BM or the framework connecting these components. Schaller and Vatananan-Thesenvitz (2019) conceptualize BM as the logic of a company, with a focus on value generation, delivery, and retention centered around the customer value proposition. Clauss et al. (2020), and Clauss and Kesting (2017) view BM as an architecture comprising three interconnected core components: value proposition, value generation, and value acquisition.

These various definitions contribute to a comprehensive understanding of BMI and its ramifications for companies aiming to innovate and improve their BM.

2.1.2.2 The mechanisms of BMI

Through a comprehensive examination of prominent scholarly works in the field, Loon and Quan (2021) have discerned six distinct mechanisms that are exclusive to the phenomenon of BMI. The six mechanisms include external cognitive processes, a holistic systems outlook, flexible ambidexterity, modularization for restructuring and adaptation, the application of paradoxical problem-solving approaches, and the formation of cooperative mutuality alliances (Loon & Quan, 2021). By identifying these unique mechanisms, the research brings to light the multifaceted nature of BMI and its underlying processes. For identifying the fundamental questions of BMI, which are why and how BMI occurs (Cloutier & Langley, 2020), the six distinct mechanisms provided one explanation.

Among the various mechanisms driving BMI, dynamic ambidexterity stands out as a crucial factor in maintaining firm performance during periods of change. This capability allows firms to leverage near-term earnings generated by the current BM to facilitate the medium-term growth of new BMI initiatives (Wei et al., 2014). Additionally, they emphasize the significance of addressing contradictions, which is often overlooked as a key success factor. Using paradoxical problem-solving approaches, companies can effectively navigate ambiguity, tensions, and contradictions, thus facilitating the implementation and impact of radical and innovative BM (Ricciardi et al., 2016). By adopting a paradoxical mindset and employing strategies that embrace conflicting elements, firms can achieve breakthroughs in their BMI efforts.

2.1.2.3 Newly research emergence

Over the past few years, there has been an increasing acknowledgment of the concept of BMI as well as its ability to offer perceptions on the evolution of BM in specific industries and specific micro-level characteristics.

First, scholars have started directing their attention towards investigating BMI in various sectors, including the newspaper industry (Karimi & Walter, 2016), the video game industry (Lantano et al., 2022), and the medical industry (Oderanti et al., 2021). By focusing on specific industries, researchers can acquire a deeper comprehension of the intricacies and nuances associated with BMI, enabling them to provide more targeted and context-specific recommendations for practitioners.

Second, scholars have started shifting their focus to more specific micro-level characteristics, including the age and scale of enterprises, to analyze different types of BMI more effectively. For instance, Trapp et al. (2018) examined the process of BMI in both established companies and start-ups, using enterprise age as a classification criterion. Amit and Zott (2020) conducted a detailed analysis of the obstacles and countermeasures faced during the implementation of BMI. Moreover, enterprise size is recognized as a key variable influencing BMI. Müller et al. (2021) found that in the era of Industry 4.0, SMEs should focus on the novelty aspect of BMI, while large enterprises should emphasize the exploration of cross-functional and cross-border potential. Some studies have specifically focused on SMEs to investigate their unique BMI process. Cosenz and Bivona (2021) discussed the alignment between dynamic BM construction methods and the characteristics of SMEs, using real enterprise cases to explore how innovative BM can be designed as lean strategy tools. Ferreras-Méndez et al. (2021) analyzed the specific processes and considerations involved in BMI for

SMEs and highlighted the intermediary role played by BMI between entrepreneurial orientation and new product development performance.

2.1.2.4 Research streams on BMI

The research stream on BMI encompasses a wide range of research concentrated on recognizing and advancing the field of BMI. The research stream aims to explore various aspects of BMI, including its conceptualization, processes, outcomes, and implications for organizations. The BMI research stream plays a vital role in advancing the field by providing insights, frameworks, and practical implications for organizations seeking to innovate and adapt their BM in dynamic and competitive environments. Foss and Saebi (2016) offer an extensive overview of the research landscape on BMI. Drawing from a multitude of studies, they identify and categorize four distinct research streams within the field. The four research streams for BMI are below:

(1) The first stream focuses on the conceptualization and classification of BMI, aiming to establish a clear understanding of its fundamental nature and components. This research stream centers on the exploration and elucidation of the phenomenon of BMI. Scholars strive to provide clear definitions and conceptualizations of BMI, aiming to provide a strong basis for understanding the concept (Amit & Zott, 2012; Teece, 2010). These efforts delve into crucial aspects, including determining the essential definition of BMI and identifying the various factors through which companies can develop their BM (Sorescu et al., 2011). This research stream aims to create systematic frameworks and classification schemes. However, as evidenced in the literature, multiple definitions exist, displaying significant variations and occasional ambiguity (Foss & Saebi, 2016).

(2) The second stream explores BMI as a dynamic procedure, delving into the significance of competencies, leadership, and education mechanisms in driving successful BMI initiatives. Within this research stream, significant attention is placed on the crucial elements of competencies, leadership, and education mechanisms that contribute to the achievement of successful BMI. Scholars in this area highlight the dynamic nature of BMI by examining the various stages involved in the process (Bocken & Geradts, 2020; De Reuver et al., 2013; Frankenberger et al., 2013). Moreover, they emphasize the capacities of organizations and processes necessary to assist this transformative journey (Achtenhagen et al., 2013; Demil & Lecocq, 2010), as well as the significance of studying and experimenting (Andries et al., 2013). Moreover, this stream also puts forth practical tools and frameworks that can aid practitioners in effectively managing the BMI process (Evans & Johnson, 2013).

(3) The third stream investigates BMI as a result. The research stream examines the

outcomes of organizational change, specifically the emergence of new and innovative BM that are often contextualized within specific industries or markets. This stream delves into the exploration of new BM in various sectors, including electric mobility (Abdelkafi et al., 2013), tourism (Souto, 2015), and aviation (Schneider et al., 2013). Additionally, studies in this stream focus on specific types of new BM, including those targeting low-income markets (Sánchez & Ricart, 2010) and service industries (Visnjic Kastalli & Van Looy, 2013). Interestingly, this research section does not heavily rely on the conceptualization and classification discussions of the first research stream. Instead, it primarily focuses on descriptive accounts of specific types of BM changes, often claiming novelty without providing explicit criteria for evaluating such claims. Research conducted by Zhang et al. (2021) employs a meta-analytic approach to examine the connections among BMI, its precursors, and performance. This rigorous examination incorporates a comprehensive collection of 87 empirical studies, comprising both internal and external sources. By synthesizing the findings across these diverse studies, the research aims to uncover causal links and effects within the realm of BMI. This meta-analysis contributes to an enhanced insight into the factors that propel successful BMI and the subsequent impact on firm performance.

(4) The fourth research stream within the field of BMI literature focuses on examining the impacts of BMI on firm performance. Within this stream, two distinct approaches can be identified. The first approach investigates the link between the process of BMI and its outcomes, exploring whether innovative changes in the current BM led to exceptional outcome results. For instance, studies by Aspara et al. (2010) and Giesen et al. (2007) assess the financial performance effects of BMI in comparison to replication and find varying results. Aspara et al. (2010) examine the financial outcome differences between BMI and imitation, while Giesen et al. (2007) explore the impact of BMI aimed at industry disruption chains, income models, or company limits on economic achievement. The second approach focuses on examining the impacts of various forms of BM on performance. Researchers, including H. C. Huang et al. (2013) and Zott and Amit (2007, 2008), investigate the connection between different types of BM and performance. For example, Cucculelli and Bettinelli (2015) discover that companies that modify their BM in a novel manner over time experience a beneficial impact on business performance, particularly in the context of entrepreneurial firms.

Additionally, the process phase of BMI entails a series of interconnected activities, including opportunity identification, idea generation, evaluation and selection, implementation, and continuous monitoring and adaptation. Several scholars have conducted research to understand the process of BMI, and their work can be divided into distinct stages. They have

provided valuable insights regarding different phases of BMI (Wirtz & Daiser, 2018). Teece (2010) highlights the significance of strategic analysis and outlines four stages necessary for achieving a sustainable BM. These stages involve market segmentation, creating tailored value propositions for every section, creating mechanisms for value capture, and executing barriers to imitation to deter imitation and disintermediation. Frankenberger et al. (2013) conducted a study involving 14 cases to develop a framework for BMI. Their framework includes four stages: commencement, brainstorming, integration, and execution. Wirtz and Daiser (2018) provide a comprehensive examination of various BMI processes. They recognize seven general process stages: evaluation, idea generation, viability assessment, prototype development, deciding, execution, and continuity. Each item plays a crucial role in the overall BMI process.

2.1.3 Research BMI in SMEs context

The unique challenges encountered by SMEs in the realm of BMI stem from their constrained resources and capabilities when compared to larger enterprises (Lopez-Nicolas et al., 2020). Prior studies have investigated how limitations in resources, flexibility, and agility impact the formulation, adoption, and adaptation of BMI in SMEs, underscoring the necessity to address these challenges (Cosenz & Bivona, 2021; Ferreras-Méndez et al., 2021). This facilitates the development of effective BMI strategies tailored to the distinctive attributes of SMEs (Pucci et al., 2017). This paragraph focuses on this review of existing literature centered around BMI, specifically in the background of SMEs.

2.1.3.1 Characteristics of the BM in SMEs

In SMEs, strategic planning is frequently casual and guided by the entrepreneur's knowledge and gut feelings. BM in SMEs is implicit and emerges from the thinking patterns and mental models of firm leaders. Formalizing and structuring BM within frameworks can simplify entrepreneurial cognition, facilitate innovation, and provide practical tools for strategy design (Bouwman, Heikkilä, et al., 2018).

Understanding SMEs' strategic capabilities, organizational structure, and size is vital for effective BMI and value generation processes. SMEs often compete by specializing in specific technical or handcrafted capabilities, which provide competitive advantages (Pucci et al., 2017). These capabilities encompass various aspects, including products, markets, customers, pricing, expenses, and production expertise (Cagliano et al., 2001). SMEs place significant emphasis on various aspects, which include quality and fast delivery of their operations to achieve and surpass customer prospects (Cagliano et al., 2001).

In order to react to rivals and market changes, SMEs utilize flat organizational structures featuring minimal management layers (S. Lee et al., 2010). While SMEs are flexible in adapting to changes, they may lack resources and capabilities for innovation and expansion (S. Lee et al., 2010). The size of a firm, whether SMEs or large, influences its approach to BMI and value generation processes (Amit & Zott, 2012). Large firms face the challenge of reducing organizational inertia, while SMEs need to enhance their cooperative capacity to overcome resource limitations (Hockerts & Wüstenhagen, 2010). SMEs can adapt their BM faster due to closer managerial involvement, dynamic decision-making, and flexible organizational routines (Widya-Hasuti et al., 2018), leading to the enhancement of strategic capabilities (Aguilar-Fernández & Otegi-Olaso, 2018).

Competitive pressure plays a significant role in driving BMI, especially in growing industries. In highly competitive environments, enterprises recognize the need for product differentiation or a cost advantage through BMI to maintain a competitive edge (Anwar, 2018). The degree of competition influences the impact of the connection between ownership and owner-managers, as well as the extent of BMI (Velu & Jacob, 2016).

The traditional application of BM for strategic planning and innovation objectives can provide valuable insights into the relevance of utilizing BM tools for SME expansion and sustainability (Neely et al., 1995). However, SMEs face greater challenges due to market competition and uncertainty, necessitating the adoption of supportive strategy tools (Cosenz & Noto, 2018). An efficient approach to BM development and creativity within SMEs, combining structured and flexible perspectives, can be effective (Balocco et al., 2019).

2.1.3.2 Research status of BMI in SMEs

Despite this recognition of the importance of SMEs in the economic landscape, there is not enough research exploring the characteristics of BMI in SMEs (Filser et al., 2021). Several scholars have highlighted a similar research gap (Bouwman et al., 2019; Müller, 2019). As a result, there is a growing trend in the existing studies to focus on BMI research, specifically in the context of SMEs. A small portion of documents, approximately 6.25% (Filser et al., 2021), directly contribute to this topic by examining digitalization, online courses, entrepreneurial orientation and international performance, open innovation, and organizational agility, as well as the drivers and outcomes of BMI (Müller, 2019; Pucihar et al., 2019; Reuver et al., 2019). Among these documents, a few studies conducted empirical studies to examine the theoretical consequences of BMI on SMEs. Some studies focused on hypotheses found in foundational academic works, including performance, experimentation, entrepreneurship, the environment,

and technological innovation. However, open innovation as well as firm competencies, which are based on distinct theories, were also explored. Approximately half of these investigations addressed the research voids spotted by Foss and Saebi (2016), who advocated for additional empirical studies and specific investigations into topics like open innovation.

The findings from these documents suggest that most hypotheses can be verified (Filser et al., 2021). For instance, BMI was discovered to exhibit a positive effect on the operational effectiveness of SMEs. However, there were a few exceptions. One study conducted on Slovenian innovative businesses did not identify information technology as a pivotal instrument for BMI, despite its prominence in the literature. Moreover, a pair of documents emphasized the significance of acquiring and adapting BMI techniques for SME managers (Pucihar et al., 2019). Consequently, Reuver et al. (2019) provided some online courses designed according to 6 principles to assist executives of SMEs in overcoming challenges and innovating their current BM. These investigations illuminated the relationship between BMI and SMEs, suggesting avenues for further research and providing observations for managers aiming to strengthen their capacity for innovation.

2.1.3.3 Technological influences on BMI in SMEs

The interconnectivity facilitated by the IT system, often referred to as the Industrial IoT, has triggered remarkable technological advancements across various domains, including science and technology, production, logistics, and supply chain administration (Kagermann et al., 2013). In China, strategic initiatives like online extra have integrated current IT application trends like cloud computing to propel state-of-the-art manufacturing capabilities (Kang et al., 2016; Müller et al., 2018). Likewise, South Korea has introduced the production innovation 3.0 strategic approach to similarly embrace and leverage technological advancements (Kang et al., 2016; Müller et al., 2018). These initiatives underscore the pivotal function that technology performs in reshaping the industrial landscape and driving economic growth.

Digital transformation is revolutionizing how SMEs generate and seize value (Bharadwaj et al., 2013; Lucas Henry C. et al., 2013). This transformation, driven by factors like social media, big data, and information technology, affects customer interactions, service delivery, and IT integration for SMEs (Loebbecke & Picot, 2015). To adapt to digital transformation, SMEs must go beyond optimizing internal processes or adopting new technologies and instead fundamentally change their BM (Loebbecke & Picot, 2015). The abundance of digitalization opportunities requires SMEs to reassess their current BM and strategies to identify new avenues for growth and innovation (Arnold et al., 2016).

Although most research on BMI focuses on large companies, it is crucial to understand how digitalization impacts SMEs' BM (Bouwman et al., 2019). However, due to the variety of SMEs regarding industry, size, maturity phase, and ownership, generalizing findings is challenging (Bouwman et al., 2019). Research on BMI in SMEs is limited, primarily qualitative, and lacks a focus on the influence of digitalization on their BM (Heikkilä et al., 2018). Furthermore, quantitative studies on this topic primarily fall within the strategic and innovation management domains (Gruber, 2019). Factors including SMEs' specific focus, limited resources, gradual adoption approach, and financial constraints slow down digital transformation in SMEs (Gruber, 2019). Müller et al. (2018), continuing the thread of empirical research on technology's influence on BM, adopt a multiple case study approach and provide perspectives into the diverse ways emerging technologies lead to the creation, capture, and offering of value in the context of SMEs. By analyzing a range of real-world cases, the research seeks to illuminate the multifaceted impacts of technological advancements on BMI.

In conclusion, understanding this impact of technology on SMEs' BM, their unique characteristics, and the role of competition can guide effective BMI and value generation processes. Adopting a supportive approach, such as BMI, can help SMEs navigate the challenges and uncertainties of the market and enhance their competitive advantages.

2.2 Antecedents of BMI

From a theoretical and literature review perspective, Foss and Saebi (2016) revealed significant challenges in identifying internal and external antecedents. Both internal and external aspects of enterprises have been extensively explored to identify the driving factors of BMI, encompassing factors including economic crises, technological changes, and managers' cognitive thinking (Snihur et al., 2021). The scholars have highlighted the impact of industry life cycles, shifting demographics, and regulatory oversight on BMI (Sabatier et al., 2012).

For internal factors, Bashir and Verma (2019) have provided insights into the importance of organizational structure, culture, inertia, and leadership in driving BMI. In their next-step research, Bashir et al. (2020) separate antecedents into three main themes that are related to the triggers, enablers, and barriers of BMI. Bhatti et al. (2021) seek to examine the influence of aptitude for absorbing information, operational flexibility, and executive-level mindfulness on the BMI, given their inherent contributions to organizational transformations in BM. Through a rigorous analysis of these antecedents, a comprehensive understanding of how aptitude for absorbing information, operational flexibility, and executive-level mindfulness shape and drive

the BMI can be attained (Bhatti et al., 2021).

For external factors, Foss and Saebi (2016) proposed that they could include environmental factors, new technology, and competition. First, Rakesh Kumar et al. (2018) empirical results bring about a nuanced comprehension of the complex interplay between environmental factors, BMI characteristics, and organizational performance. The influence of environmental dynamism was observed to exhibit a positive moderated impact on the association between BMI novelty and SMEs outcomes, whereas it demonstrated a negative moderated impact on the link between BMI efficiency and SMEs outcomes, also indicating that environmental munificence did not moderate the connection between BMI and SMEs outcomes (Rakesh Kumar et al., 2018). Second, Dymitrowski and Mielcarek (2021) highlight the positive relationship between BMI driven by new technologies and the attainment of a competitive edge within the marketplace. By leveraging emerging technological advancements, companies are able to enhance their value proposition, optimize operational efficiency, and differentiate themselves from competitors (Dymitrowski & Mielcarek, 2021). Third, another study shows that competition within the industry has been identified as a key external driver of BMI (M. W. Johnson et al., 2008).

From an empirical research overview perspective in their meta-analysis research, Zhang et al. (2021) summarized a total of 87 empirical studies, including 45 for external and 42 for internal antecedents, and 42 examined relationships from BMI to FMP. Zhang et al. (2021) categorized external variables as market opportunities, environmental variables, value networks, and technological advancements, all of which play a crucial function in driving BMI. As opposed to that, Zhang et al. (2021) categorized internal variables as cognitive management, internally available assets and capacities, and organizational properties.

This section reviews related empirical studies that contribute to our comprehension of the factors that precede BMI, including both elements influencing both the inside and outside BMI, and offers a thorough review of the predecessors of BMI. A detailed description of the predecessors of BMI can be found in chapters 2.2.1 for internal antecedents and 2.2.2 for external antecedents.

2.2.1 Internal Antecedents

For internal antecedents that impact BMI, we reviewed several empirical studies that have explored each factor: Yang et al. (2020) delved into RMO and PMO; Clauss et al. (2019) examined strategic agility encompassing strategic responsiveness, unified leadership, and fluid allocation of resources; Kump et al. (2019) investigated DC focusing on sensing, seizing, and

transforming; Cegarra-Navarro et al. (2016) analyzed organizational agility; Additionally, Pucihar et al. (2019) highlighted enterprise innovativeness as a crucial antecedent, finding a direct positive effect on BMI. The detailed literature review is as follows: chapter 2.2.1.1 for market orientations; chapter 2.2.1.2 for strategic agility; chapter 2.2.1.3 for dynamic capabilities; chapter 2.2.1.4 for organizational agility; and chapter 2.2.1.5 for innovativeness.

2.2.1.1 Market orientations

Characterizing BM in the background of SMEs, Randhawa et al. (2021) distinguish between market-driving, market-driven, and ambidextrous models. Randhawa et al. (2021) highlight the DC processes required to shift a BM from market-driving to market-driven and eventually achieve an ambidextrous market orientation. Zott and Amit (2008) find that BM is centered around novelty. When coupled with goods market goals that prioritize distinction, cost reduction, or entering the market early, these capabilities can improve the company's outcome. When enterprises from developed countries enter developing markets, it is crucial to consider the similarities and differences in the needs of multi-level consumers (Sinkovics et al., 2014). The COVID-19 epidemic has also resulted in the evolution of consumer needs and the emergence of new BM (Markovic et al., 2021). Amit and Zott (2020) stress that when partners engage in technological advancements, or BMI, the focal enterprise must adapt its value proposition and BM to maintain the stability of the cooperative network. The characteristics of market orientation and the similarities and differences between RMO and PMO descriptions are as follows:

(1) Common ground for RMO and PMO: Market orientation (MO) includes both RMO and PMO. RMO refers to a company's capacity to react effectively to customer needs and market changes, while PMO focuses on a firm's proactive efforts to shape and create market opportunities (Jaworski & Kohli, 1993; Slater & Narver, 1994).

RMO emphasizes the company's capacity to gather and respond to customer feedback as well as market information (Lamore et al., 2013). It involves being customer-focused and adaptive, continuously monitoring customer needs and preferences, and aligning the firm's strategies and actions accordingly. RMO involves listening to customers, understanding their requirements, and tailoring products, services, and marketing efforts to meet their expectations. This orientation helps firms be responsive to changes in the market and maintain strong customer relationships.

Proactive market orientation (PMO), on the other hand, involves a forward-thinking and proactive approach to identifying and creating market opportunities (Lamore et al., 2013). It

focuses on actively seeking out new customer needs, market trends, and emerging technologies. Proactive firms engage in market research, trend analysis, and innovation activities to proactively shape and create market demand. They are willing to take risks, explore new possibilities, and lead market changes rather than simply responding to them.

(2) Different for RMO and PMO: advanced research in the MO literature has unpacked it into two distinct aspects: RMO and PMO (Yang et al., 2020). RMO enables companies to comprehend stated unfulfilled requirements, while PMO assists businesses in uncovering potential unfulfilled demands (Narver et al., 2004). These aspects vary in their focus on strategic questions and solutions (Lamore et al., 2013).

Firstly, RMO and PMO vary in their focus on a client's requirements. RMO gives more attention to existing customers as well as threats and possibilities in the current market segment. (Lamore et al., 2013). It focuses on addressing the requirements of current customers as well as staying attuned to the current market landscape. On the other hand, PMO with a future-oriented perspective focus more on aspects like upcoming competition and emerging market potential (Lamore et al., 2013). PMO seeks to identify emerging market trends and anticipate future customer needs.

Secondly, RMO and PMO differ regarding the pattern of resource distribution for addressing customer requirements. RMO encourages firms to adapt their existing BM to better serve existing customers. It involves refining and optimizing existing products, services, and customer experiences based on feedback and insights from current buyers. In contrast, companies with a PMO strive to distribute additional resources to strategic initiatives beyond their current market segment. PMO encourages firms to engage in exploratory activities, experiments, and discoveries to facilitate innovation and identify new growth opportunities (Yannopoulos et al., 2012).

(3) Overall, both RMO and PMO are important for firms to succeed in competitive markets. By combining RMO and PMO, firms can effectively address current customer needs while also anticipating and shaping future market trends and opportunities. This distinction between RMO and PMO highlights their unique roles in client-centricity as well as future market exploration. RMO emphasizes the importance of understanding and addressing current customer needs effectively, while PMO focuses on being forward-thinking and seeking out new market opportunities (Yang et al., 2020). Both RMO and PMO are valuable for firms to maintain competitiveness and drive innovation in dynamic market environments. Yang et al. (2020) suggest which RMO and PMO positively impact BMI.

2.2.1.2 Strategics agility

Strategic agility has a significant impact on BMI, allowing firms to adapt and transform continuously while maintaining flexibility and efficiency (Clauss et al., 2019). It is characterized by a company's capacity to rejuvenate itself and implement changes within its product, process, and service structures without compromising efficiency (Doz & Kosonen, 2010). The successful progression of BMI relies on managers' comprehensive understanding, as their predictive abilities, integrative capacities, and absorptive capabilities shape the design and implementation processes (Amit & Zott, 2020).

Strategic agility empowers organizations to aggressively transform their internal systems as a deliberate part of their strategy (Teece et al., 1997). It empowers the company to participate in initiatives for renewing itself and a strategic shift independent of external circumstance alterations; its proactive nature distinguishes strategic agility (Doz & Kosonen, 2010). Strategic agility enables firms to navigate the complexities of BMI by facilitating rapid changes and maintaining momentum (Clauss et al., 2019). It empowers firms to proactively shape their BM and drive strategic change without being solely reactive to external forces. In the realm of BM, strategic agility is considered essential for transforming and renewing BM. Doz and Kosonen (2010) identified three key abilities that underlie the groundwork for strategic agility: STS, SLD, and SRF. Detail as below:

(1) Strategic sensitivity involves the capability to perceive and analyze modifications and trends in business circumstances. Strategic sensitivity is a crucial aspect of strategic agility, representing a firm's ability to comprehend circumstances, anticipate future threats and opportunities, and maintain a heightened awareness of strategic developments (Doz & Kosonen, 2010). It involves practices including scenario planning, forecasting, critically evaluating the current BM, and seeking external perspectives.

(2) Leadership unity refers to the alignment and coordination of leadership actions and decisions. Leadership unity emphasizes the need for managerial responsiveness and decisive decision-making, supported by a cohesive top management team that minimizes individual power struggles. In rapidly changing environments, timely and bold actions are essential, requiring effective communication, alignment of roles, and a shared commitment to new and risky projects (Doz & Kosonen, 2010). Drawing from a sample of eight Japanese manufacturing SMEs, Colovic (2021) presents a theoretical framework that highlights two distinct patterns concerning the relationship between CEO leadership style and BMI. Given their influential position within the organization, the personal attributes, cognitive abilities, and behaviors of

enterprise executives play a pivotal role in initiating and implementing systematic changes associated with BMI (Colovic, 2021). On one hand, managers may employ continuous analogical reasoning and concept combination during the decision-making process (Martins et al., 2015), analyze the current situation, leverage past experiences to identify potential opportunities, overcome organizational inertia (Chesbrough, 2010), and drive proactive or reactive BMI. Through a thorough examination of 111 new firms that introduced online transaction systems (representing BMIs) in the US and European bond markets between 1995 and 2004, it was revealed that the involvement of entrepreneurial executives has a positive impact on innovation, particularly in markets with lower levels of competition (Velu & Jacob, 2016).

(3) Resource fluidity entails the effective allocation and reallocation of resources to support strategic initiatives. Resource fluidity speaks of the capability of reconfiguring as well as restructuring assets, wisdom, and abilities to enable the creation of new value propositions (Doz & Kosonen, 2010). It involves the ability to restructure operational capabilities in the short term and enhance the flexibility of the capacities of structures by decoupling, as well as restructuring roles and responsibilities significantly ingrained in the organizational structure (Doz & Kosonen, 2010). Resource fluidity enables the exploration of novel pairings of resources and enables real shifts within the facets of the BM.

As some examples in the following: Clauss et al. (2019) identify BMI as a significant mediating mechanism through which STA influences a company's efficiency. Evidence from 432 German electronics companies enhances our understanding of STA in BMI by examining the connections between the dimensions of STA (STS, SLD, and SRF) and different dimensions of BMI. Additionally, in a comprehensive longitudinal multiple-case study, Snihur and Zott (2020) identified three practices through which entrepreneurs' mental models and actions influence BMI: searching across industries, utilizing advanced system analysis, and employing robust centralization of make-choice. These practices highlight the ways in which entrepreneurs play a significant role in driving and shaping BMI. Svejenova et al. (2010) conducted an exploration of individual BM, investigating how the individuals use a variety of strategies, organizational ideas, and tools to generate and seize value while following their interests and goals.

2.2.1.3 Dynamic capabilities

Ever since the term DC was introduced by Teece et al. (1997), it has become a significant concept in management scholarship, with the capacity to assimilate, construct, and adapt

abilities both inside and outside the company to tackle swiftly evolving circumstances (Teece et al., 1997; Wilden et al., 2016). Another study suggests employing dynamic flexibility as a valuable capability for addressing the longitudinal aspects of strategic entrepreneurship (Renato & Naguib, 2016). DC are responsible for modifying a company's current resource pool intentionally and in alignment using strategy suppositions, leading to the creation of a fresh collection or arrangement of company assets (Ambrosini & Bowman, 2009). A theoretical foundation for assessing this aggressive BMI procedure has been made available by the dynamic capacity architecture (Foss & Saebi, 2018; Teece, 2018). DC, as opposed to conventional abilities, are in charge of identifying creative possibilities, capturing them, and modifying the firm's BM (Teece et al., 1997; Teece, 2018).

Teece (2007) further refined the idea of DC by introducing the generic capacities of detecting, seizing, and changing, which should align tightly into an organization's strategy (Teece, 2014). Firstly, sensing encompasses various aspects, including identifying, developing, codeveloping, and assessing the relationship between technical possibilities and client requirements (Teece, 2014). Sensing relates to the capacity of a company to continually evaluate surrounding conditions (Makkonen et al., 2014; Teece, 2014). Secondly, seizing involves mobilizing assets to take advantage of possibilities, meet requirements, and create value (Teece, 2014). Seizing involves creating and choosing business chances that align with the company's surroundings, strengths, and shortcomings (Teece, 2007). Thirdly, transforming, on the other hand, refers to the ongoing renewal of the firm (Teece, 2014). Transforming, as described by Teece (2007), encompasses maximizing, integrating, safeguarding, and restructuring the invisible and physical assets of the business enterprise to avoid path dependencies and inertia.

Differentiating dynamic capabilities from ordinary capabilities, dynamic capabilities expand, alter, and develop custom abilities rather than solely generating value for a firm (Teece, 2014). While dynamic capabilities can help in creating an edge over rivals, they alone are insufficient for long-term business efficiency (Schilke et al., 2018). Various theoretical debates have occurred within the field, particularly between the streams of study based on Teece et al. (1997) definition as well as those relying on Eisenhardt and Martin (2000) view (Wilden et al., 2016). However, these perspectives can be combined under certain circumstances, leading to conceptual convergence in the field (Schilke et al., 2018).

For the measurement of DC, researchers need to specify which perspective they adopt. The Teece et al. (1997) method offers a broad and general conceptualization, focusing on the capacity of the company to integrate, construct, and restructure competences and specifying

generic micro-foundations (Augier & Teece, 2007; Teece et al., 1997). In contrast, another piece of research provides examples of specific routines and abilities associated with dynamic capabilities, including procedures for assigning resources and creating new goods (Eisenhardt & Martin, 2000). In this scale development study, Teece et al. (1997) conceptualization was chosen to measure the general dynamic capabilities of a firm, as it encompasses sensing, seizing, and transforming capacities without being tied to specific functional domains (Schilke et al., 2018). Reliance on the Teece et al. (1997) perspective for scale development is justified both theoretically, as it captures general dynamic capabilities, and practically, given its widespread use in empirical studies (Schilke et al., 2018).

To address the lack of a scale used for evaluating DC, Kump et al. (2019) formulated a 14-item instrument depending on Teece (2007) dynamic capability framework. The scale aims to evaluate the sensing, seizing, and transforming abilities of firms. The developed scale demonstrates good credibility and dependability, and it serves as a robust predictor for inventiveness and company achievement (Kump et al., 2019).

According to an empirical study on dynamic capability, Heider et al. (2021) carried out an investigation on SMEs in Germany (n = 285) to examine the connection between BMI and DC. The findings highlight the importance of specific dynamic capabilities for different aspects of BMI. Medium-sized firms benefit from engaging with external stakeholders while maintaining a balance between adaptability and effectiveness. It is proposed that small businesses concentrate on changing their asset arrangements to accommodate BMI (Heider et al., 2021).

2.2.1.4 Organizational agility

Enterprises are influenced by various internal factors that can drive BMI; these factors encompass organizational structure and management reform, changes in the profit model, and adjustments in business scope and corporate mission (Demil & Lecocq, 2010; Hartmann et al., 2013; Martins et al., 2015). Hartmann et al. (2013) conducted an analysis to help managers comprehend the performance effects of BMI, considering factors including firm size, prior experience, and the level of renewal strength. In the background of SMEs, H. C. Huang et al. (2013) conducted empirical research involving 141 firms, and their findings reveal that organizational inertia poses a significant hindrance to the implementation of BMI because organizations often tend to cling to past successful experiences and practices, which can impede their willingness to embrace innovation.

Organizational agility encompasses several key aspects that enable a company to react and adjust effectively to modifications in its surroundings. It involves the rapid and innovative

responses of the organization to deal with the difficulties and chances brought about by dynamic business conditions. Organizational agility requires the close coordination and integration of various elements within and outside the organization, including business processes, stakeholders, and environmental factors (Van Oosterhout et al., 2006). This coordination facilitates the organization's capacity to react promptly and purposefully to constantly evolving situations.

One important dimension of organizational agility is the management of knowledge. Knowledge plays a critical role in helping organizations navigate and cope with inconsistency and uncertainty in market conditions (Van Oosterhout et al., 2006). A study showing the link between the sharing of knowledge initiatives and innovative actions is even more robust (De Clercq & Pereira, 2020). This involves effectively developing and utilizing the organization's wisdom frameworks for effective competition in changing and uncertain environments. By leveraging their wisdom assets, organizations can enhance their understanding of the market, identify emerging trends and opportunities, and make informed decisions to adapt their strategies and operations accordingly.

The connection between organizational agility and performance has garnered considerable attention in the documents. Organizational agility has been found to positively impact organizational performance outcomes. It enables organizations to react to changing circumstances with intention, leading to improved performance (Alegre & Sard, 2015; Shahrabi, 2012). By embracing agility, organizations can enhance their responsiveness, customer focus, and adaptability, which in turn can assist in the innovation and delivery of high-quality products that meet evolving clients' demands as well as preferences.

For example, Cegarra-Navarro et al. (2016) aim to investigate the connection between organizational agility and a company’s performance and employ the PLS-SEM approach to examine these relationships empirically. The empirical findings underscore the significance of effectively applying knowledge within organizations and highlight organizational agility's mediation role in translating wisdom application into improved enterprise performance (Cegarra-Navarro et al., 2016). The assessment of organizational agility is grounded in items adapted from the work of Lu and Ramamurthy (2011). The selected items capture the company's ability to effectively manage as well as adapt to modifications originating from commercial circumstances. By employing quick and creative solutions, organizations can proactively address emerging challenges, seize new opportunities, and maintain a competitive edge in the marketplace.

2.2.1.5 Innovativeness

(Drucker, 1995) was among the early proponents who emphasized the significance of innovativeness, highlighting its insufficient attention in organizational research. While a considerable body of bolstered business innovation capacity can be discovered in the research on innovativeness (Rogers, 2014), scholars argue that innovation is essential for firms to thrive in a tumultuous situation (J. D. Johnson et al., 1997).

Hurt et al. (1977) define innovativeness as the extent to which a person, compared to others in the societal structure, is an early adopter of a novel concept. However, this description primarily prioritizes the person rather than the organization itself. In contrast, Hurley and Hult (1998) describe corporate innovation from a collective viewpoint, considering it a facet of an organization's culture characterized by receptivity to new concepts.

The conceptualization of company innovation can be approached from two perspectives. Firstly, it can be viewed as a psychosocial factor, reflecting the speed of innovation adoption by the company. Secondly, it can be seen as the adaptability of the entity (Hurt et al., 1977).

Overall, Drucker's early insights, combined with the literature on innovation diffusion, emphasize the importance of innovativeness for firms to survive in dynamic environments. Different perspectives on innovativeness, whether focusing on individuals or organizations, contribute to understanding the role of firm culture and behavioral factors in driving innovation.

Empirical research has consistently shown a positive association between firm innovativeness and various measurements of firm achievement, together with profit growth, sales growth, market proportion, and return on investment. Calantone et al. (2004) discovered a positive association between firm innovativeness and enterprise performance. Their study provides evidence that firms with a greater level of innovation tend to achieve better performance outcomes.

The findings of Pucihar et al. (2019) show that both business innovativeness and the situation positively impact the extent of BMI practices within entities. Pucihar et al. (2019) suggest that firms that exhibit higher levels of innovativeness, along with a favorable business environment, are more likely to engage in BMI initiatives.

2.2.2 External antecedents

The primary focus of this thesis lies on market turbulence, technological turbulence, and technological openness as external antecedents. Here is the overall conception of these external antecedents.

(1) According to Jaworski and Kohli (1993), market turbulence (MKT) and technological turbulence (TCT), which belong to environmental turbulence (EMT), act as moderators in the correlation between antecedents and enterprise performance. EMT refers to the unpredictable nature and economic uncertainty of the industrial situation (Haleblian & Finkelstein, 1993). It encompasses factors including market turbulence, representing the size and unpredictable nature of shifts and fluctuations in market conditions, and competitive intensity, reflecting the level of competition faced by firms (Brown & Eisenhardt, 2003; Chong et al., 2016). For example, research can confirm existing theories and highlight that there is much room for improvement in connecting government actions with entrepreneurial development (Pereira & Maia, 2019). Technological turbulence captures the rapid changes and advancements in technology affecting the industry (Chong et al., 2016).

In turbulent environments characterized by continuous innovation, challenges in product differentiation, and rapid changes in customer preferences and technology (Chong et al., 2016; Haleblian & Finkelstein, 1993), firms face constant pressure to respond quickly and adapt their strategies. In such contexts, the BM becomes crucial for effectively responding to market changes.

Through a firm's capability to detect shifts in stressful circumstances and rapidly deploy a company's assets in turbulent environments, firms are better positioned to quickly react to market shifts, anticipate future trends, and then adapt through the adoption of BMIs (Clauss et al., 2019). Moreover, as turbulent environments demand increased information processing, firms can leverage their capabilities to profit from evolving market dynamics.

Hence, it is plausible to anticipate that the level of uncertainty in the conditions, encompassing MKT, competitive intensity, and TCT, increases the strength of the correlation between firm-level antecedents, including strategic adaptive capacity impacts on BMI implementation (Clauss et al., 2019). This EMT creates an urgent mindset and challenges companies to effectively use their strategic flexibility, adapt to their environments, and drive innovation through the adoption of BMI.

Witschel et al. (2022) focused on examining the significance of DC, organizational factors, and EMT in the context of BMI within manufacturing firms and revealed that environmental turbulence has a direct effect on BMI degree within manufacturing firms. Witschel et al. (2022) shed light on the significance of environmental turbulence as a critical factor impacting BMI and highlighted that, in the context of digitalization, manufacturing firms face an increasingly turbulent environment characterized by rapid changes, uncertainties, and disruptions.

(2) Technological innovation and BMI are closely intertwined and mutually influential

(Rayna & Striukova, 2016). Neglecting BM evolution alongside technological revolutions can hinder enterprise development. Recent technologies like artificial intelligence, virtual reality, and blockchain have disrupted traditional processes, prompting enterprises to integrate them into their BM (Bastug et al., 2017). Technological innovation's vital role in driving BMI has been highlighted in various industries (Pateli & Giaglis, 2005). The interaction between BMI, technological innovation, and product innovation significantly impacts enterprise performance. Combining BMI and technological innovation improves long-term performance, although short-term sacrifices may be necessary (Visnjic et al., 2016). BMI plays a crucial role in commercializing new technologies and core products, surpassing the value of technology alone (Chesbrough, 2007; Vidal & Mitchell, 2013). Start-ups benefit from BMI to leverage their technologies, seek market opportunities, and stimulate new demand (Gambardella & McGahan, 2010).

Technology and BM interact, mutually reinforcing each other (Baden-Fuller & Haefliger, 2013). Technology's characteristics influence subsequent BMI and emphasize the need for suitable BM to accompany technological advancements (M. W. Johnson & Lafley, 2010). BMI, in turn, promotes the development of new technologies by enterprises. Specifically, internet technology has driven BMI in e-commerce enterprises (Amit & Zott, 2001). Some research has focused on analyzing BMI and format change in specific industries, including the newspaper industry (Karimi & Walter, 2016), the video game industry (Lantano et al., 2022), and the medical industry (Oderanti et al., 2021).

Overall, for external antecedents that impact BMI, we reviewed several empirical studies that have explored each factor: Guo et al. (2020) explored technological openness as a moderator, positively influencing the correlation between BMI and firm sales increases. Jaworski and Kohli (1993) developed the scale for EMT: MKT, competitive intensity, and TCT; Clauss et al. (2019) adopted this scale to assess environmental turbulence as a variable within their research framework. The detailed literature review is as follows: chapter 2.2.2.1 for market turbulence, chapter 2.2.2.2 for technological turbulence, and chapter 2.2.2.3 for technological openness.

2.2.2.1 Market turbulence

MKT refers to the rapid as well as unpredictable alterations in the demographics and flavors of the customer base. It represents the dynamic nature of the market, where customer segments shift and their preferences evolve at a fast pace (Jaworski & Kohli, 1993). Market turbulence, defined as the instability and unpredictability of market conditions, was examined for its role

in shaping the connection between service creativity and the quality of new products (K. H. Chen et al., 2016).

K. H. Chen et al. (2016) engage in exploring the relationship between service innovation, the abilities of linking marketplaces, MKT, and new product quality, aiming to understand how market turbulence influences the impact of service development on fresh product quality and how market-linking capabilities moderate this relationship. K. H. Chen et al. (2016) reveal that the synergy between strong abilities to link markets and high MKT enhances the efficiency of new product design and highlight that the highest new product performance occurs when there is sophistication in service development, market connections, and MKT.

Senbeto and Hon (2020) focus on investigating the connection between MKT and service innovation in the hospitality sector. The dynamic and unpredictable nature of the market, characteristic of frequent alterations in consumer interests, competitive pressures, and rapid technological innovation, poses challenges to the development and implementation of innovative services. Hence, Senbeto and Hon (2020) indicated that MKT has a remarkable adverse effect on service innovation in the hospitality industry.

One study focused on examining the correlation between ecosystem innovation, long-term business success, and the moderator's position of MKT in emerging economies and revealed that eco-innovation positively contributes to sustainable business performance in emerging economies (Larbi-Siaw et al., 2022). In highly volatile market conditions, the positive impact of eco-innovation on sustainable business performance was found to be diminished (Larbi-Siaw et al., 2022).

2.2.2.2 Technological turbulence

TCT, which pertains to the speed at which technology is evolving, is proposed as the third environmental factor to serve as a moderating component in the correlation between marketplace focus and business achievement (Jaworski & Kohli, 1993). Guo et al. (2016) included technological turbulence as a control variable, considering its influence on antecedents to BMI.

Molina-Castillo et al. (2022) highlight that in environments characterized by high technological turbulence, SMEs face challenges in adapting their BM to keep pace with technological developments. Early entrants may have an advantage in terms of access to resources, knowledge, and networks, enabling them to navigate and exploit technological turbulence more effectively; late entrants may face greater challenges in catching up and incorporating new technologies into their BM. Molina-Castillo et al. (2022) underscore the

significance of technological turbulence in shaping SMEs' BMI performance; effectively managing technological turbulence is essential for SMEs to remain competitive and enhance their innovation capabilities in technologically driven markets. Technological turbulence affects the effectiveness of BM design in driving innovation performance, with higher levels of turbulence requiring firms to have stronger product innovation capabilities (Molina-Castillo et al., 2022).

Jin et al. (2022) examined the connection between BM design, product development capability, technological turbulence, and advancement performance using data from 282 Chinese high-tech firms and conducted a multi-level regression assessment to explore the moderator role of TCT. Furthermore, the role of technological turbulence was examined, highlighting its potential moderating effect on the connection between BM design, product development capability, and advancement performance (Jin et al., 2022).

2.2.2.3 Technological openness

The new digital world differs from the traditional business environment in that it is less predetermined and constrained (Nambisan, 2017). Specifically, technology-related aspects of these digital situations are distinguished by openness and accessibility (Richter et al., 2017). The rise of the sharing economy has facilitated a greater exchange of information, knowledge, and data among individuals (Richter et al., 2017). Within this digital age, concepts like freely inventive, commons of knowledge, peer output, and collaborative development have gained prominence, particularly within the sharing economy (Richter et al., 2017).

As a result, establishing and maintaining permanent technological barriers has become challenging for firms (H. W. Chesbrough & Appleyard, 2007). Instead, firms are adopting an open strategy by either creating or leveraging open-source technologies (Hautz et al., 2017). Technological openness refers to an environment where information pertaining to technology, wisdom, and assets can be readily obtained, interchanged, or given at minimal expenses (Guo et al., 2020).

One proposes that technological openness has a substitutive effect on the achievement of online startups (Guo et al., 2020). In a transparent science and technology situation, beginning can readily utilize outside advanced technologies, including the use of open-source software and technical expertise. However, depending on the perspective of resources, this abundance of resources is unlikely to turn into sources of competitive advantage for a company (Barney et al., 2001). This presents a challenge for start-ups to establish a strong competitive position through investment in the commercialization and utilization of technical solutions (Chesbrough

& Appleyard, 2007). In essence, TCO creates a highly productive technological circumstance but also increases the risk associated with a start-up's investment in technologies.

2.3 Measurement of BMI

2.3.1 Introduction of measuring BMI

Numerous researchers have explored the concept of BMI from different perspectives, leading to varied definitions and dimensions of BMI (Bashir et al., 2020). Some researchers perceive BMI as alterations in any aspect of a BM (Bashir & Verma, 2019; Teece, 2010), while others view it as a procedure entailing inquiry, experimenting, and modification (Foss & Saebi, 2016). Additionally, some researchers consider BMI a key factor contributing to firm performance (Zott & Amit, 2007, 2010), while others see it as a unit of innovation potential (Bashir & Verma, 2019; Zott et al., 2011).

The existing literature lacks a unified definition and clarity regarding the dimensions of BMI (Bashir et al., 2020). Previous studies exploring the components of BMI have mostly taken an exploratory approach, recommending architectures, delivering proposals, and creating hypotheses originating from exploratory studies (Schneider & Spieth, 2013). As a result, empirical research validating these findings is scarce, leading to insufficient empirical evidence to strengthen the alleged conclusions from this research.

Among the various dimensions of BMI, the value statement is widely acknowledged and perceived as an essential component of the overall BMI procedure (Bashir et al., 2020; Osterwalder, 2004). Value capture is another frequently mentioned component, referring to how a company generates revenue, covers expenses, and maintains long-term viability (Chesbrough & Rosenbloom, 2002; Dubosson-Torbay et al., 2001). Value capture can be further divided into smaller parts, including operational enhancement, volume emphasis, revenue model, and pricing flexibility (Schneider & Spieth, 2013).

Other components discussed in the literature include company assets, collaborations, vital connections, core operations, and client interactions (Amit & Zott, 2001; Osterwalder & Pigneur, 2010). Aspects including customer interaction, fulfillment and assistance, and data transmission have also been mentioned (Amit & Zott, 2001). Matzler et al. (2013) identified nine main components of BMI, including innovative positioning, cohesive product and service strategy, value creation structure, sales and marketing approach, and a profitable pattern.

Bashir et al. (2020) reveal that these BMI measurements can primarily be examined in relation to four factors: value proposition, value creation, value capture, and value delivery. Researchers have explored these dimensions in various ways, and any alteration to one or more dimensions validates BMI (Teece, 2010). Similarly, Spieth and Schneider (2016) create a precise definition of BMI as well as offer a measurement scale to assess it, which includes three aspects: value proposition, value structure, and revenue strategy.

Bock et al. (2012) evaluated BMI as the proportion of innovation efforts made by firms. Brea-Solís et al. (2015) focused on measuring BMI through indicators including activity performance, technology change, and operational efficiency. Zott and Amit (2017) evaluated the impact of BMI using the framework of novelty, locking, complementarity, and efficiency. Frankenberger and Zott (2018) established a method to measure the level of innovation in the BM of young Internet-listed companies in Europe and the United States, combining qualitative analysis. Subsequent studies have also employed selected items to evaluate the novelty of BMI in established companies.

Additionally, Trapp et al. (2018) have devised a tool for identifying BMI, which was validated through the participation of senior managers from four prominent European corporations. This tool serves to operationalize BMI and provides clear criteria and indicators that aid both researchers and practitioners in facilitating the implementation of BMI within established firms. Snihur and Zott (2020) developed a qualitative evaluation model that involved various methods, including interviews, e-mail follow-ups, participation in large-scale enterprise activities, and access to enterprise documents and archival data. Amit and Zott (2020) emphasized that qualitative measurement, although more challenging and requiring a deep understanding of the BM of enterprises, aligns better with the essence of BMI. In practice, qualitative measurement is often conducted as a preliminary step preceding quantitative evaluation. Rometty (2006) conducted an analysis of archived data from the Global CEO Survey, in which CEOs were asked to allocate 100 points across various varieties of innovation, including goods, services, and markets innovation, BMI, and process and operational innovation. One study employed secondary data to measure BMI, focusing on activity effects, technological change, and operational efficiency (Brea-Solís et al., 2015).

Overall, the literature discussed above provides valuable insights and guidance to enhance our understanding and measurement of BMI. In conducting a literature review on measurement methods for measuring BMI, it is important to explore the various approaches and techniques that researchers have used in this domain. Here are some common approaches that researchers

have employed: instruments that typically include items including value creation, proposition, and capture (chapter 2.3.2) and novelty and efficiency (chapter 2.3.3).

2.3.2 Three dimensions approach

While BMI has garnered significant attention in academia and business practice, there is a lack of a validated measurement scale. Clauss (2016) addresses this gap by employing a systematic method for developing a robust scale to create a new scale for measuring BMI. To guarantee validity and consistency, Clauss (2016) gathered data from two extensive samples consisting of 126 and 232 firms. Through this process, a hierarchical three-level scale with 41 reflective items was established for assessing ten sub-variables at the first level and three dimensions at the second stage. Finally, these three constructs collectively form the meta-concept of BMI at the third level. It enables researchers to assess and compare BMI across different firms and industries, facilitating more generalizable and empirically grounded investigations. By providing a validated scale, the study enhances the ability to measure and study BMI for various purposes, advancing our understanding of this critical area of innovation in business. As applied to the above-described scale, Clauss et al. (2019) use the scale to examine the connection between company-level strategic agility and company achievement through the BMI mediation role using information from 432 Deutschland companies in the electronics sector. The findings suggest a positive association between agility in strategy and BMI acceptance, with this connection being influenced by the level of environmental turbulence. This reveals that value proposition and value creation BMIs have a positive impact on company achievement, while value capture innovation shows a negative relationship.

Similarly, Spieth and Schneider (2016) create a precise definition of BMI and offer a measurement scale to assess it. The scale includes three constructs—VOI, VAI, and RMI—and nine indicators, according to a survey of 200 German companies to validate the measurement model. This scale comprises nine items that assess the extent of BMI across three dimensions: VOI (three indicators), VAI (four indicators), and RMI (two indicators).

Although substantial interest from scholars has been directed towards BMI most recently, the evolution of validated measurement scales has been relatively recent (Clauss, 2016). Existing BMI measurement models typically encompass three primary dimensions, focusing on the innovation aspects of value creation or architecture, value proposition or offering, and value capture or revenue models (Clauss, 2016; Spieth & Schneider, 2016). While the measurement approaches share consistency in terms of their core focus, they differ significantly in length. In this study, we have chosen to adopt a concise and brief measure, considering that lengthy

surveys tend to result in reduced rates of reactions (Burchell & Marsh, 1992), which can significantly impact the reliability of the data. Thus, Miroshnychenko et al. (2021) have utilized the BMI measurement tool created by Spieth and Schneider (2016) to analyze the relationship between absorptive ability and strategic adaptability as well as its effect on BMI. Heider et al. (2021) explored the function of dynamic abilities in driving BMI within a sample of 285 respondents from German SMEs and also adopted the measurement scale developed by Spieth and Schneider (2016) to measure BMI.

2.3.3 Efficiency and novelty approach

Zott and Amit (2007) contributed significantly to the field of BMI by introducing the concept of differentiating BMI into two distinct aspects: efficiency-centered and novelty-centered. Both aspects of BMI comprise indicators totaling 13 survey items. This scale has since been widely utilized in academic studies and has contributed to increasing our comprehension of the effects and implications of BMI in various contexts. Below is a list of the applications on this scale.

Zott and Amit (2008) discover that firms with novelty-centered BM, combined with a goods business long-term plan that focuses on distinctions, cost management, and earlier sales launches, tend to experience enhanced firm performance. The findings offer practical implications for firms in aligning their product business strategies and BM to gain a competitive edge and improve overall outcomes in dynamic market environments.

Through empirical analysis, Rakesh Kumar et al. (2018) provide evidence on the interplay between BMI and performance outcomes in SMEs operating in an emerging economy. It assesses how different dimensions of BMI, including efficiency and novelty centered elements, contribute to company outcomes under varying external and internal conditions. It considers external contingencies, including industry dynamics, market turbulence, and competitive intensity, as well as internal contingencies, including firm size, managerial capabilities, and resource availability.

X. Yin (2020) explores the connection between BMI and the outcomes of enterprises. By supplying solid proof on the connection between BMI and enterprise outcomes, this investigation reveals that: Firstly, the long-term market performance of enterprises demonstrates that both efficiency-centered and novelty-centered BMI have a positive influence on outcomes; Secondly, in terms of short-term financial performance, efficiency-centered BMI significantly improves the financial performance of enterprises. As opposed to that, novel BMI has a reverse side effect on short-term financial performance.

2.4 Firm performance

BMI entails a systematic reconstruction of the operational framework adopted by enterprises in the market. As such, its impact extends beyond the individual firm and has the potential to influence the industry and market in which the enterprise operates. Scholars have endeavored to develop diverse methods to assess the effects of BMI, with a particular emphasis on its influence on the capabilities, performance, and industry and market structure of the enterprises involved (Bashir et al., 2020; Foss & Saebi, 2016). This section will introduce the outcome of BMI as chapter 2.4.1, overall conceptional firm performance as chapter 2.4.2, and the BMI effect on firm performance as chapter 2.4.3.

2.4.1 Introduction of BMI outcome

The existing literature has identified several significant outcomes associated with BMI. Bashir et al. (2020) proposed that BMI includes three main outcomes: firm performance, competitive advantage, and innovation. It highlights the significance of BMI in driving superior performance, creating a sustainable competitive advantage, and fostering innovation in enterprises.

First, firm performance is identified as a significant outcome of BMI (Bashir & Verma, 2019; Foss & Saebi, 2016; Zott et al., 2011). BMI has a significant influence on a company's performance, as it enables companies to offer better value to customers and generate profits (Afuah & Tucci, 2003). It has been observed that novel BM can lead to superior value creation and disrupt traditional business practices (Morris et al., 2005). Additionally, studies have examined the results of BM design on a FMP, with the recognition that the environment can moderate this relationship (Zott & Amit, 2007). Successful start-ups, including Uber, Airbnb, and Xiaomi, are instances of businesses that have achieved competitive advantages through innovative BM (Bashir & Verma, 2017). Furthermore, practitioners have also acknowledged the link between BMI and outperforming rivals (IBM, as cited in the study).

Second, competitive advantage is a commonly mentioned outcome of BMI (Bashir & Verma, 2019; Teece, 2010). In the face of a turbulent and evolving business environment, BMI provides companies with the power of competitiveness in the marketplace (Amit & Zott, 2012; Bashir & Verma, 2017). Changes in how value is created, delivered, and captured through innovation can generate greater value than competitors, leading to a sustainable advantage over competitors (Peteraf & Barney, 2003).

Third, BMI is viewed as a catalyst for creativity (D. Mitchell & Coles, 2003). Open innovation, in particular, emphasizes the function of BM in generating and grabbing value by leveraging ideas from both within and outside the organization (Chesbrough, 2003). The collaboration and sharing of information and knowledge through BMI can give rise to collaborative entrepreneurship and the creation of economic value (Rezazadeh, 2017).

It is important to note that BMI may also have some adverse outcomes, such as customer resistance to radical changes in the BM (van der Panne et al., 2003). Additionally, a change in the BM may impact the company's capacity to optimize its capabilities, capacities, and assets, potentially leading to suboptimal market results (Ambrosini & Bowman, 2009). In conclusion, the documents discussed above offer valuable insights and guidance to deepen our understanding and explore the outcomes of BMI.

2.4.2 Conception of firm performance

The evaluation of business performance has undergone significant development, resulting in various approaches, frameworks, and indicators (Ravelomanantsoa et al., 2019). Scholars and practitioners have contributed to this field, drawing from different theoretical foundations and expertise (Ravelomanantsoa et al., 2019). Noteworthy approaches contain the balanced scorecard (Kaplan & Norton, 1998), the prism of performing (Neely et al., 2001), ECOGRAI (Ducq & Vallespir, 2005), IPMS (Bititci et al., 1997), a framework for performance measurement systems (Medori & Steeple, 2000), and DPMS (Ghalayini et al., 1997). These approaches aim to design and implement tools for measuring and enhancing firm performance (Ravelomanantsoa et al., 2019).

Researchers have developed alternative methods for evaluating enterprise performance, such as the BCVR approach, which measures performance across four dimensions: benefits, cost, value, and risk (Li et al., 2018). Intellectual capital measures and visualization methods have also gained attention (Wudhikarn et al., 2018). Additionally, the balanced scorecard (Kaplan & Norton, 1992) provides a systematic business perspective by integrating operational metrics related to consumer contentment, interior procedures, and creativity (Ravelomanantsoa et al., 2019). It aims to align efforts toward achieving sustainable financial success by defining indicators across finance, client, interior procedures, and study and expansion views. To provide a comprehensive view of firm performance, scholars emphasize considering both financial performance and growth performance (Wiklund & Shepherd, 2005).

In the context of SMEs, firm performance extends beyond financial metrics and includes dimensions like profit, sale price, expansion, client and staff satisfaction, social conscience, and

environmental awareness (Santos & Brito, 2012). Collecting objective indicators for SMEs presents challenges due to limited financial data accessibility and potential biases (Khan et al., 2014). Subjective indicators derived from perceptions offer a way to capture the multidimensionality of performance (Santos & Brito, 2012). Perception-based measures benchmark firm performance against predetermined objectives, key players, and sector averages (De Luca et al., 2010).

In conclusion, companies' performance measurement has evolved through various approaches and frameworks. The balanced scorecard, financial indicators, subjective evaluation, and multidimensional evaluation are prominent methods. For SMEs performance, it is important to include non-financial indicators and alternative measurement approaches to account for unique challenges and contexts. Researchers and practitioners should select appropriate methods that align with enterprise objectives and characteristics.

2.4.3 BMI effect on Firm Performance

BMI is recognized as a way to unlock value and generate innovative BM, leading to the discovery of new sources of value creation (Martins et al., 2015). It has been linked to improved enterprise performance by fostering creativity and strategic flexibility (Bock et al., 2012; Souto, 2015). Firms that prioritize BMI experience higher average profitable growth compared to those that do not (Aspara et al., 2010). Profit-oriented or growth-oriented strategies implemented through BMI influence overall firm performance (Latifi et al., 2021).

Research emphasizes the role of the nature and configuration of the BM in achieving high-performance outcomes (Cucculelli & Peruzzi, 2018; Marino et al., 2015; Tavassoli & Bengtsson, 2018). Integrating product, process, and organizational innovation within the BM enhances performance (Djaja & Arief, 2015). Efficient and novel BMI can have different impacts on enterprise performance (Zott & Amit, 2007), and practical BMI is crucial for enhancing performance (Rhoads et al., 2011). Exploitative and exploratory innovation have varying impacts on firm expansion, and the design of efficiency-centered or novelty-centered BM influences these effects (Wei, Yang, et al., 2014).

To acquire a thorough comprehension of the influence of BMI on company achievement, it is important to pinpoint the responsible structure underlying the relationship. Case study research and a reference model have been developed to explore this relationship, taking into account potential moderating and mediating effects (Heikkilä et al., 2018). Latifi and Bouwman (2018) suggested a reference model that provides a thorough comprehension of the connection between BMI and FMP.

2.5 Research gap

As stated in the above section of Chapter 2, we reviewed the current literature about antecedents, BMI, and outcomes. Then we summarized the three research gaps as below: First, although more and more studies are being conducted to investigate the causes of BMI and how it affects business achievement, there are few empirical studies that implement BMI that involve a set of multiple antecedents (present in Chapter 2.5.1). Second, Spieth and Schneider (2016) introduced a framework consisting of a three-dimensional scale for measuring BMI. However, there is limited literature that utilizes this scale to evaluate BMI's impact on enterprise performance and the impact of a set of antecedents on BMI (present in Chapter 2.5.2). Third, further research is needed to explore potential mediation and moderation effects to obtain a thorough understanding of how these antecedents interact and have an impact on the outcomes of BMI (present in Chapter 2.5.3).

2.5.1 Antecedents of BMI

The literature review reveals that there is limited systematic theorizing on the antecedents of BMI; it requires investigation to bridge this gap and establish a more thorough comprehension of the antecedents that drive BMI (Foss & Saebi, 2016). Zhang et al. (2021) implement meta-analysis from empirical literature (total 87, internal 42, and external 45) to study the cause and effect among BMI, the antecedents, and the firm's performance. There are some typical empirical studies listed below:

Several studies have examined the individual internal antecedents of BMI and provided detailed insights into each of them. Yang et al. (2020) conducted empirical research on RMO and PMO as antecedents of BMI. Clauss et al. (2019) investigated STA, which encompassed three constructs: STS, SLD, and SRF. Kump et al. (2019) analyzed DC, which included the constructs of sensing, seizing, and transforming. Cegarra-Navarro et al. (2016) examined organizational agility as an antecedent of BMI. Pucihar et al. (2019) focused on enterprise innovativeness as an antecedent, finding a positive direct effect on BMI.

In terms of external antecedents, specific research has been conducted for each factor. Guo et al. (2020) investigated technological openness as a moderator that positively influences the connection between BMI and company sales increases. Jaworski and Kohli (1993) proposed three constructs that capture the firm's environmental context: MKT, competitive intensity, and TCT. Clauss et al. (2019) employed environmental turbulence to operationalize the variable of

environmental turbulence.

Overall, although more and more studies are being conducted to investigate the predecessors and the outcome of BMI on company achievement, there are few empirical studies that implement BMI that involve a set of multiple antecedents. While some antecedents have been proposed, their specific effects on BMI remain unexplored. Additionally, the existing studies primarily adopt a retrospective and case-based approach, hindering the development of predictive and theoretical frameworks for understanding the relationship between antecedents and BMI.

2.5.2 Evaluation antecedents impact firm performance through BMI

A research gap identified by Foss and Saebi (2016) pertains to the dimensionalities of BMI. This suggests a requirement for additional research to develop a more complete comprehension of the different dimensions or aspects of BMI. The review highlights that the measurement dimensions of BMI can be divided into two main types.

Firstly, Zott and Amit (2007) identified efficiency and novelty as two dimensions of BMI measurement. These dimensions highlight the focus on improving operational efficiency and introducing new and innovative elements in the BM.

Secondly, Spieth and Schneider (2016) proposed three dimensions for BMI measurement: VOI, VAI, and RMI. These dimensions emphasize the assessment of the innovative value created, the ability to appropriate value from the innovation, and the successful realization and execution of the new BM. Similarly, Clauss (2016) suggests an alternative approach to measuring BMI by utilizing the aspects of value creation, proposition, and capture. These dimensions focus on evaluating the building of value for customers, the unique value proposition offered by the BM, and the capability to capture value in terms of financial results and profitability.

Heider et al. (2021) and Miroshnychenko et al. (2021) used Spieth and Schneider (2016) proposed scales for VOI, VAI, and RMI to implement their research. Heider et al. (2021) conducted an investigation on a sample of 285 SMEs in Germany and found that specific dynamic capabilities are necessary to facilitate different aspects of BMI. Miroshnychenko et al. (2021) analyze data from 282 SMEs in Italy; the findings support the connection between realized absorbing ability and BMI and highlight the importance of absorbing ability and strategic flexibility for driving BMI.

Overall, Spieth and Schneider (2016) introduced a framework consisting of a three-dimensional scale for measuring BMI. However, there is limited literature that utilizes this scale

to evaluate the results of BMI on enterprise performance and the impact of a set of antecedents on BMI. Therefore, there is a need for further study to evaluate the impact of different antecedents on BMI and their subsequent impact on firm performance.

2.5.3 Mediation and moderation mechanism

One research gap that exists is the lack of empirical assessment of the relationship among the various antecedents, including responsive market orientation, proactive market orientation, strategic agility, dynamic capabilities, organizational agility, innovativeness, technological openness, market turbulence, and technological turbulence, considering the mediation and moderation mechanisms. The reviewed literature contents are detailed below:

Clauss et al. (2019) conducted a study that examined the function of environmental turbulence as a moderator in influencing the connection only between strategic ability and BMI and did not examine other antecedents, including technological openness, innovativeness, strategic agility, or dynamic capabilities.

Yang et al. (2020) conducted empirical research to explore the effects of RMO and PMO as antecedents of BMI but did not investigate the relationship between RMO and PMO.

Guo et al. (2020) conducted research that explored the function of TCO as a moderator, positively influencing the connection between BMI and an increase in firm sales, but did not explore the indirect path coefficient with other antecedents.

Kump et al. (2019) conducted an analysis of DC, specifically focusing on the constructs of sensing, seizing, and transforming in relation to BMI, but did not analyze dynamic capabilities as mediator roles for other antecedents.

Cegarra-Navarro et al. (2016) examined organizational agility as an antecedent of BMI but did not explore the indirect path coefficient with other antecedents.

Pucihar et al. (2019) investigated the impact of enterprise innovativeness as an antecedent of BMI, finding a positive direct effect, but did not investigate the mediation and moderation mechanisms with other antecedents.

Overall, future research would be beneficial to explore potential mediation and moderation effects to obtain a thorough understanding of how these variables interact and have an impact on the outcomes of BMI. By filling this research gap and conducting further empirical assessments, scholars can improve our comprehension of the intricate relationships among these antecedents and their impact on BMI.

2.6 Chapter summary

Chapter 2 conducts a review of existing studies to comprehend the major antecedents of BMI in SMEs and its influence on FMP in detail, as below:

(1) The chapter starts with a summary of the concepts of BM and BMI and provides a comprehensive view of their history, definition, components, characteristics, and research perspectives in the context of SMEs.

(2) We identify several internal antecedents that include responsive market orientation, proactive market orientation, strategic agility, dynamic capabilities, organizational agility, and innovativeness for BMI in SMEs. The review also identifies technological openness, market turbulence, and technological turbulence as key external factors that influence the implementation success of BMI in SMEs.

(3) In terms of measurement, the review delves into the existing approaches and methods used to measure BMI. It discusses various measurement techniques that capture the extent and impact of BMI within SMEs.

(4) Additionally, this chapter provides insights into the scales used to measure firm performance, which serves as the outcome variable in the context of BMI research.

(5) Research gaps identified in the literature review include: first, there are few empirical studies that implement BMI that involve a set of multiple antecedents; second, there is limited literature that utilizes Spieth and Schneider (2016), who created measures to assess how BMI affected FMP and how a group of antecedents affected BMI. And third, further study is needed to assess potential mediation and moderation effects to acquire a comprehensive understanding of how these precedent drivers influence the outcomes of BMI.

In summary, this literature review focuses on the key antecedents, BMI, and their effect on company achievement in SMEs. It provides an overview of BM conception, identifies internal and external antecedents, discusses measurement approaches for BMI, and presents scales for measuring firm performance. The identified research gaps highlight areas that require further research in the field of BMI in SMEs.

Chapter 3: Hypothesis Development and Conceptual Model

We formulate hypotheses and a conceptual blueprint intended to investigate the precise drivers of BMI and its subsequent influence on FMP. The conceptual model encompasses antecedents, moderators, mediators, and BMI outcomes, thereby offering a comprehensive framework to comprehend the intricate mechanisms underlying BMI. This paves the way for the forthcoming research stages of gathering and analyzing data.

3.1 Research model for BMI from literatures

Foss and Saebi (2016) propose a comprehensive research model to explore the realm of future BMI research. This model encompasses four main elements, namely antecedents, BMI, moderators, and outcomes. While providing a preliminary framework for understanding the relationships among these elements, Foss and Saebi (2016) acknowledge the need to draw upon relevant literature to support and refine each component. In response to the call made by Foss and Saebi (2016) for further elaboration on the BMI model by including factors that come before, after, and those that influence the relationship, Zhang et al. (2021) conducted a meta-analysis. By conducting this meta-analysis, Zhang et al. (2021) contribute to refining our understanding of BMI by revealing the diverse influences and underlying mechanisms at play. Figure 3.1 illustrates this research model, offering a visual representation of the interplay among antecedents, BMI, moderators, and outcomes.

Foss and Saebi (2016) delve into the antecedents of BMI and identify two distinct categories. The first category consists of four external antecedents: market potential, environmental variables, the value chain, and innovative technologies. The second category comprises three internal antecedents, specifically knowledge of management, internal resources and abilities, and organizational characteristics. These antecedents can include external forces, including shifts in competitive dynamics, technological advancements, network positioning, and stakeholder expectations, as well as internal factors, including dynamic capabilities and changes in strategy. The effectiveness of these antecedents can be further influenced by various moderators at the macro, firm, and micro levels. These moderate factors can include competition laws, regulations, informal social norms, organizational values, structural devise, corporate culture, executive management group attributes, leadership qualities, authorization,

managerial mindset, aversion to loss, open-mindedness, and resistance to change. Ultimately, the outcomes of BM change and innovation can be seen in financial performance, innovativeness, and cost reduction. Understanding the interplay between these antecedents, moderators, and outcomes is crucial for organizations seeking to drive successful BM transformations and achieve sustainable competitive advantages. For details, which are illustrated in Figure 3.1.

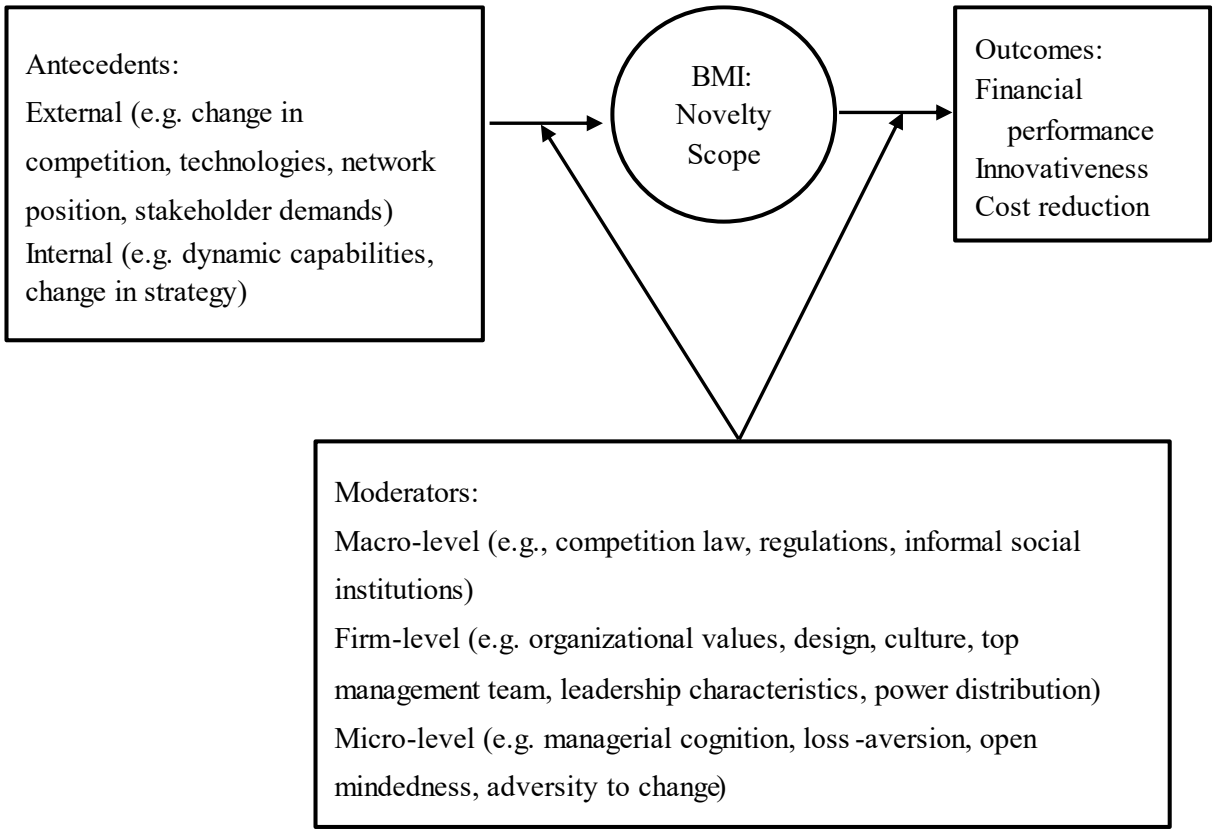

Figure 3.1 Research model for BMI

Source: Foss and Saebi (2016)

As Figure 3.1 illustrates, this comprehensive overview sheds light on the multifaceted nature of the factors that influence BMI. By considering both external and internal antecedents, along with various levels of moderators, organizations can better navigate the complex landscape of BM dynamics. The BMI research model proposed by Foss and Saebi (2016) provides a well-organized structure that allows us to delve into the fundamental factors preceding BMI within SMEs and examine their repercussions on firm performance. As a result, we have made the decision to utilize this research model as the foundational framework for conducting our thesis inquiry.

3.2 Antecedents effect on BMI

Based on the Chapter 2 description, the subsequent sections of this thesis explicitly outline the anticipated relationships that connect BMI with its various antecedents. These antecedents include responsive market orientation, proactive market orientation, strategic agility, dynamic capabilities, organizational agility, technological openness, technological turbulence, innovativeness, and market turbulence.

3.2.1 Market orientation

Market orientation plays a crucial role in driving BMI by focusing on meeting customer needs and creating a new value proposition (Wei et al., 2014). The development of a new, strong value suggestion is essential for BMI, as it provides the foundation for creating innovative BM (Wei et al., 2014). There are three ways in which market orientation influences BMI.

Firstly, RMO facilitates the identification of new value propositions by learning from current customers (March, 1991). By deeply understanding the needs of existing customers, firms can uncover unmet needs and generate ideas to update or modify their value proposition (Wei et al., 2014).

Secondly, PMO helps firms identify latent customer needs and create new value propositions due to exploratory learning and the search for fresh information and knowledge (March, 1991). PMO goes beyond the firm's current knowledge and experience, inspiring the redefinition of customer needs and promoting the exploration of innovative value propositions (Wu et al., 2013).

Thirdly, market orientation influences the innovation of BM elements and activities by directing executives' involvement to possible value-added elements and operations (Wei et al., 2014). The market orientation focuses on generating customer and competitor intelligence, which informs the experimentation and redesign of BM elements including content, structure, and activities (Sosna et al., 2010).

Based on these observations, we propose the following hypotheses:

Hypothesis H1a: RMO has a positive effect on BMI in the context of SMEs.

Hypothesis H1b: PMO has a positive effect on BMI in the context of SMEs.

3.2.2 Strategic agility

Strategic agility, encompassing STS, SLD, and SRF, is a powerful enabler of BMI and a core

element in a firm's capacity to thrive in a rapidly altering market environment. Understanding and nurturing these dimensions is essential for firms seeking to enhance their responsiveness and competitiveness and achieve sustainable success in the dynamic business world.

Strategic sensitivity is a crucial capability for firms, as it allows them to gather insights from their environment, detect market opportunities, and understand their internal strengths and constraints concerning market circumstances, rivalry, and strategic initiatives (Lewis et al., 2014). With enhanced STA, the company becomes more cognizant of the new procedures, techniques, and abilities necessary to produce novel customer value propositions or deliver existing ones in innovative ways. By increasing its strategic sensitivity, a firm can identify unmet needs in the current market landscape and adapt to environmental changes, thereby articulating fresh value propositions to customers (Bucherer et al., 2012; Weber & Tarba, 2014). Overall, strategic sensitivity enables continual reinvention of value propositions, pursuit of undiscovered market potential, and responsiveness to evolving consumer demands and preferences, making it a critical determinant of BMI selection.

The second facet of strategic agility is leadership unity, referring to the extension of management dedication within a company to continuously adapt to external environmental changes (Teece, 2007). Upon detecting a new opportunity, management choices are necessary to integrate adding fresh data to a current or new BM. SLD is vital for the feasibility of new value recommendations, as timely and collaborative managerial choices facilitate modifications in structure and operations related to value generation procedures (Doz & Kosonen, 2010). Achieving the senior leadership of the company with a shared commitment becomes an essential component in managing changes within the procedures that generate value (Achtenhagen et al., 2013). SLD plays a crucial role in overcoming challenges to domestic affairs, supporting novel cost and profit structures, and fostering a culture of embracing new BMIs.

Resource fluidity constitutes the last component of strategic flexibility and is crucial for portfolio innovation for a firm's goods and services (Bock et al., 2012). The capability to rebalance and distribute assets becomes essential in pursuing new developments and offerings (Achtenhagen et al., 2013). As BM becomes more flexible and more willing to make changes and reinventions while enhancing resource flexibility, firms gain increased adaptability in resource reallocation and reorganization to bolster fresh strategic agendas or adapt to changing market demands (Doz & Kosonen, 2010). SRF performs an instrumental role in assisting the business's reassessment of value statements, especially in resource-constrained environments. It also enables the separation or modularization of internal and external resources by the

company, reconfiguration and combination of present assets with new ones, and revision of its cost-revenue structure based on strategic shifts (Casadesus-Masanell & Ricart, 2010).

By developing and leveraging STS, SLD, and SRF, a firm can foster a culture of innovation, proactively identify new market opportunities, and continuously adapt its BM to meet evolving customer needs. Ultimately, these capabilities enable a company to keep up with the competition and drive BMI and growth. Considering the previous discussions, the following hypothesis is proposed:

Hypothesis H2: STA has a positive effect on BMI in the context of SMEs.

3.2.3 Dynamic capabilities

DC is closely connected to the achievement and failure of BMI (Teece et al., 1997). These capabilities are the power of a company to adjust, redesign, and transform its BM to successfully adapt to shifting market circumstances and uncertainties (Teece, 2018). They encompass various competences, including the ability to identify, assess, and take advantage of chances and build value from them, and to reconfigure assets that are both physical and abstract to maintain competitiveness (Helfat & Peteraf, 2015).

Among the dynamic capabilities, the most crucial for BMI are the abilities to sense, seize, and transform (Aagaard et al., 2018; Teece, 2018). Strong DC provides organizations with the knowledge and skills to identify and capitalize on emerging opportunities ahead of competitors (Zahra et al., 2006). The capability of sensing entails firms recognizing emerging issues with sustainable development and perceiving them as potential business possibilities (McWilliams & Siegel, 2011). Seizing capability refers to deploying resources to take advantage of new sustainability possibilities and capturing value by pursuing them through the translation of these opportunities into BMI initiatives (Teece, 2018). Transforming capability focuses on the conscious and constant improvement of a company's abilities towards becoming a sustainable business. In essence, SEN, SEZ, and TRN capabilities are not only crucial for BMI but also play a crucial role in achieving sustainability-oriented business objectives (Pieroni et al., 2019).

BMI can be regarded as a process of crafting the initial state of a BM that simultaneously describes a potentially implemented BM practice and operates a newly described BM. It is a naturally sequenced process involving the pre-implementation design of various BM options, their evaluation, and the eventual realization of a completely constructed and evaluated BM (Sniukas, 2015). This process can be decomposed into five stages, including interactions with stakeholders to meet customer needs, perceiving and observing deep problems and possibilities, generating multiple potential BM options, consolidating these options into alternative

approaches, and conducting evaluations before final implementation (Santa-Maria et al., 2022).

In fact, BMI is a decision-making and execution process that enterprises undertake based on their understanding of the market environment and customer needs, combined with internal and external resources (Andreini et al., 2022). This method involves the creation of mechanisms for coordinating, learning, and deploying business processes within the enterprise. These mechanisms facilitate value creation, exchange, and acquisition, which aligns closely with the fundamental role of DC in enabling firms to respond to alterations to the outside situation, thereby driving innovative BM outcomes (Loon & Quan, 2021).

Organizational dynamic capabilities constitute a crucial element in enabling the BM revolution (Achtenhagen et al., 2013). Dynamic capabilities are achieved through various activities and capabilities processes, including perceiving opportunities and threats, identifying and learning new knowledge, coordinating organizational systems, and reconfiguring existing internal and external resources. A study proposed strategic flexibility through dynamic adaptation capabilities to mitigate the risks associated with over-reliance on fixed flexibility (Renato & Naguib, 2016). The complementarity and alignment of these activities and capabilities facilitate BM transformation. For enterprises to cope with external environmental changes and engage in BMI activities, they must receive information from the market environment, including but not limited to the competitive landscape, cooperation partners, and customers. Through their cognitive ability and decision-making mechanisms, enterprises can assess opportunities and threats and internalize newly acquired information or knowledge through learning mechanisms, leading to improvements in the internal wisdom structure and the construction of new knowledge systems. This, in turn, guides decision-making and subsequent implementation after evaluation and consideration. The functionalities of dynamic capabilities, including identifying opportunities and needs, formulating response measures, implementing actions, overall planning of the innovation process, and their fundamental learning and deployment mechanisms, can profoundly propel BMI.

In conclusion, dynamic abilities play a fundamental role in the success of BMI. Organizations that possess strong dynamic capabilities are better positioned to sense, seize, and transform their BM to fit dynamic market circumstances and capitalize on new opportunities. As the business environment is still changing, the development and cultivation of dynamic capabilities remain essential for fostering innovation and business growth. Considering the debate above, the following hypothesis is proposed:

Hypothesis H3: DC has a positive effect on BMI in the context of SMEs.

3.2.4 Organizational agility

In the realm of business, agility is considered a film's ability to harness and leverage its wisdom acquisition, aiming to obtain an advanced edge within a complicated and ever-changing digital market landscape (Van Oosterhout et al., 2006). This multifaceted capability encompasses attributes including flexibility, learning, and efficient responsiveness to shifts in the surrounding circumstances (Lu & Ramamurthy, 2011b).

For ORA, a delicate balance should be struck between two seemingly opposing forces—stability and flexibility. This equilibrium is essential for not only surviving but also thriving in the face of technological advancements and environmental uncertainties. It is imperative to avoid an overemphasis on flexibility, as this can potentially lead to chaos (Lu & Ramamurthy, 2011a). A growing body of literature has established a noteworthy connection between organizational agility and firm performance (Tallon & Pinsonneault, 2011). This relationship is characterized by several key insights:

Enhanced Firm Performance: The agility of organizations is consistently linked to improved overall performance (Alegre & Sard, 2015). Such organizations demonstrate a heightened ability to effectively navigate dynamic market conditions, adapt to technological disruptions, and respond to competitive pressures. Agile organizations possess a distinct advantage in their ability to react to technical and market changes with precision (Alegre & Sard, 2015). Their responsiveness is strategic, allowing them to sharpen their competitiveness.

Research, exemplified by Ghezzi and Cavallo (2020), underscores the application of agile methods to bolster BMI, particularly in the context of digital startups. Additionally, agile organizations are more adept at enduring and flourishing amidst complexity (Rialti et al., 2019). It possesses the capacity to modify their existing BM or craft entirely new ones, ensuring their relevance and prosperity.

Considering the constraints associated with rigid conventional BM, experts advocate for businesses to prioritize agility as a pivotal strategic imperative. By doing so, organizations can more effectively confront the challenges posed by a dynamically evolving business landscape—be it emerging technologies, shifting customer preferences, or fluctuating market dynamics (Cegarra-Navarro et al., 2016). This agility empowers them to explore innovative BM, adjust to change, and ultimately enhance their performance.

In conclusion, organizational agility represents a critical capability that empowers businesses to thrive in the digital age. Its positive influence on firm performance, including its role in driving effective BM innovation, underscores its significance as a fundamental driver of

success in today's rapidly shifting business environment (Doz & Kosonen, 2010). Therefore, the below hypotheses are suggested:

Hypothesis H4: Organizational agility has a positive effect on BMI in the context of SMEs.

3.2.5 Technology openness and turbulence

The ability to innovate technologically plays a critical role in expediting BMI activities (Teece, 2010). Technological innovation generates demand for new technological advancements in the market and presents possibilities to satisfy possible customer needs. In recent times, game-changing technologies, including advanced data analytics, innovative hardware, and intelligent applications, have garnered significant attention regarding their incorporation into BM to optimize the generation of value (Alberti-Alhtaybat et al., 2019). The process of making new technology market-ready and commercially viable should be complemented by suitable BM, which, in turn, encourages the creation of new BM. Many instances of BMI directly emerge from technological creativity. It does not mean that implementing new technological innovations would always require a BMI; nonetheless, when a business debuts technological creativity in a wide range of corporate operations and procedures, the likelihood of success through these advances increases substantially. Empirical study results also demonstrated a strong positive correlation between BMI and technological inventiveness (Sousa-Zomer & Cauchick-Miguel, 2019).

Technological innovation often necessitates the development of corresponding BM, as it both necessitates the bringing of innovations to market and offers the chance to meet unfulfilled customer requirements (Teece, 2010). Many groundbreaking technological achievements have failed commercially because insufficient attention was devoted to designing a BM that could properly put them in the marketplace. This is an aspect that can and should be remedied. BM is instrumental in capturing value from technological innovation (Teece, 2010). One study used technological openness and technological turbulence to evaluate the technology's influence on BMI (Guo et al., 2020). We will follow up on this practice. Therefore, the below hypotheses are made:

Hypothesis H5a: Technological openness has a positive effect on BMI in the context of SMEs.

Hypothesis H5b: Technological turbulence has a positive effect on BMI in the context of SMEs.

3.2.6 Innovativeness

BMI is centered around the capacity of an organization to leverage its inner assets and abilities to bring about transformative changes in its BM (Carayannis et al., 2015). Innovation, in this context, refers to the enterprise's capacity to introduce novel processes, products, or services within its operations (Hult et al., 2004). This ability to innovate serves as a driving force that stimulates SMEs to explore different approaches to their BM.

When SMEs exhibit the perfect level of innovativeness, they are more willing to participate in BMI efforts. The correlation between innovation activity and BMI experimentation has been well documented in prior research (Bouwman, Nikou, et al., 2018). Innovative SMEs are more inclined to seek out new opportunities and adapt their BM accordingly. They are willing to challenge existing practices, explore new market segments, and adopt emerging technologies to enhance their value proposition and stay ahead in the dynamic business landscape.

The process of BMI often involves creative thinking, risk-taking, and a willingness to break away from conventional practices. Innovative SMEs are better positioned to embrace these challenges and adapt their BM to meet evolving customer needs and market demands. Their propensity for innovation enables them to experiment with different revenue streams, value propositions, and customer engagement strategies to discover new sources of advantage over rivals.

Therefore, due to the evidence from prior research, we suggest the following hypothesis:

Hypothesis H6: Innovativeness has a positive effect on BMI in the context of SMEs.

3.2.7 Market turbulence

Market turbulence encompasses shifts in the demographics and tastes of customers (Jaworski & Kohli, 1993). Another study proposed that MKT describes the intensity of competition (Bodlaj et al., 2012). A significant change in competition represents a notable external antecedent in BMI (Foss & Saebi, 2016). Thus, we have adopted market turbulence as one of the antecedents of BMI.

In these circumstances, companies continually face the challenge of not just reacting swiftly to evolving market dynamics but also proactively foreseeing and adjusting their strategies (Chong et al., 2016). Elevated market turbulence enhances the effectiveness of new product designs (K. H. Chen et al., 2016). In turbulent environments with prevalent alterations in consumer preferences, technological advancements, competitor activity, and strategically agile firms are better positioned to embrace BMIs effectively. The empirical analysis results strongly

show that the level of EMT amplifies the association between STA and the adoption of BMI (Clauss et al., 2019).

Therefore, in such turbulent environments, businesses often face intensified competitive pressures and the need for continuous adaptation to remain relevant and competitive. This heightened competitive intensity acts as a catalyst, driving organizations to seek innovative ways to differentiate themselves, capture market opportunities, and respond proactively to market disruptions. Consequently, market turbulence serves as a motivating factor for firms to invest in BMI initiatives. On the basis of the debate above, we suggest the following:

Hypothesis H7: MKT has a positive effect on BMI in the context of SMEs.

3.3 BMI effect on firm performance

BM have been recognized by scholars for their significant role in company achievement and creating an advantage over rivals (Chesbrough, 2010; Zott et al., 2011). To establish a long-lasting competitive edge, companies must both strengthen their existing BM and continuously update them (Achtenhagen et al., 2013; Karimi & Walter, 2016). BMI enables firms to monetize their ideas, assets, and goods through innovative strategic, practical, and efficiency approaches (Chesbrough, 2010). Some studies have specifically examined two primary BM design patterns: efficiency-focused and novelty-focused BM. Efficiency-focused BM focuses on minimizing transient unpredictability, intricacy, and data inequalities among involved parties, while novelty-focused BM involves recombining or reinventing existing BM components to enhance value creation and capture through innovative actions and transaction mechanisms (Balboni et al., 2019; Zott & Amit, 2007). Both types of BM significantly influence firm performance (Zhang et al., 2021). Furthermore, value proposition and value creation innovations, which extend portfolios of goods and services to target new market needs and make them more effective, have proven instrumental in enhancing firm performance (Heij et al., 2014). Value catching creativity contributes to new revenue streams and the substitution of less profitable ones, leading to improved cost structures and reduced inefficiencies, thereby enhancing the prospects of future returns (Sjödin et al., 2020). For BMI and firm performance relationships, previous literature provides the bases as below:

Firstly, Foss and Saebi (2016) proposed that future research gaps include defining and scaling BMI constructs and then evaluating the outcome of BMI. For defining dimensions and developing scale to measure BMI, Clauss (2016) proposed using value creation, value proposition, and value capture to measure; Spieth and Schneider (2016) proposed using VAI,

VOI, and RMI to measure BMI.

Secondly, following these measuring methods, Heider et al. (2021) and Miroshnychenko et al. (2021) used Spieth and Schneider (2016) proposed methods and scales to assess BMI. Clauss et al. (2019) conducted empirical research that indicated that value proposition and value creation in BMI exhibit positive relationships with company outcomes, but value capture shows a negative association with company outcomes. Zhang et al. (2021) employ a meta-analysis and indicate that BMI has a positive effect on company outcomes. Other empirical studies have also shown a positive connection between BMI and company outcomes. (Cucculelli & Bettinelli, 2015; Guo et al., 2017).

We suggest the below hypothesis, considering the debate above:

Hypothesis H8: BMI has a positive effect on firm performance in the context of SMEs.

Hypothesis H8a: VOI of BMI has a positive effect on firm performance in the context of SMEs.

Hypothesis H8b: VAI in BMI has a positive effect on firm performance in the context of SMEs.

Hypothesis H8c: RMI in BMI has a positive effect on firm performance in the context of SMEs.

3.4 Mediation mechanism

In today's rapidly changing business landscape, organizations are faced with the challenge of adapting to dynamic environments and driving innovation to remain competitive. The concepts of dynamic capabilities (DC), strategic agility (STA), organizational agility (ORA), technological openness (TCO), market turbulence (TCP), proactive market orientations (PMO), and responsive market orientations (RMO) have emerged as important factors influencing an organization's ability to achieve BMI. This introduction will explore the mediating relationships between these constructs and BMI in SMEs, shedding light on the mechanisms that facilitate successful innovation in a dynamic marketplace.

Understanding the mediating relationships between dynamic capabilities, strategic agility, organizational agility, technological openness, market turbulence, market orientations, and BMI provides valuable insights for organizations seeking to navigate changing landscapes and drive successful innovation in their BM. These findings highlight the key factors and mechanisms that organizations can leverage to adapt, respond, and innovate in dynamic and uncertain business environments.

3.4.1 DC mediate between STA and BMI

Dynamic capabilities (DC) mediate the connection between STA and BMI in organizations. DC, characterized by organizational flexibility and responsiveness to changing environments, plays a vital role in mediating the connection between STA (the ability to swiftly adjust strategic direction) and BMI. These capabilities enable organizations to identify and seize opportunities for innovation, driving the development of their BM.

Based upon the notion of DC (Eisenhardt & Martin, 2000), it is proposed that DC plays a mediating function in the connection between STA and BMI. STA describes a film's ability to respond and adjust swiftly to external changes and uncertainties (Clauss et al., 2021), while BMI involves the rethinking and reconfiguration of the organization's value creation, delivery, and capture frameworks (Teece, 2010). DC, in contrast, relates to the organization's capacity to combine, create, and reorganize both inside and outside capabilities to adapt to quickly evolving situations (Teece et al., 1997).

Numerous studies have emphasized the significance of DC in facilitating strategic agility (Teece, 2007) and driving BMI (Teece, 2010). Enhancing strategic agility is contingent upon the organization's capacity to enhance its other dynamic capabilities (Vagnoni & Khoddami, 2016). However, as far as we know, there is limited empirical proof exploring the possibility of a mediating effect of DC on the connection between STA and BMI. Therefore, this thesis seeks to fill this research void and enhance our comprehension of the mechanisms that enable organizations to achieve BMI through strategic agility, facilitated by dynamic capabilities. Thus, based on the evidence from prior studies, the hypothesis is as below:

Hypothesis 9a: DC mediates the relationship between strategic agility and BMI in the context of SMEs.

3.4.2 DC mediate between ORA and BMI

Dynamic capabilities mediate the connection between ORA and BMI in organizations. ORA, encompassing the company's capacity to quickly react and adapt to external changes, is an important predictor of BMI. Dynamic capabilities serve as a mediating mechanism, enabling organizations to leverage their agility to drive innovation and transform their BM to align with evolving market dynamics.

ORA, on the other hand, encompasses a company's capacity to swiftly react and adapt to external changes and uncertainties (Tallon & Pinsonneault, 2011). Robust DC are essential for cultivating the required ORA to tackle profound unpredictability (Teece et al., 2016). Thus, this

study aims to investigate whether dynamic capabilities act as a mediating mechanism between organizational agility and BMI, providing a deeper understanding of how organizations achieve BMI through their agility and dynamic capabilities. Thus, based on the evidence from prior studies, the hypothesis proposed is as below:

Hypothesis 9b: DC mediates the relationship between organizational agility and BMI in the context of SMEs.

3.4.3 INV mediate between TCO and BMI

INV mediates the connection between TCO and BMI in organizations. TCO, defined as a circumstance where accessible resources, data, and expertise in the field of technology are shared, has a direct impact on BMI. Innovativeness, serving as a mediating factor, facilitates the transformation of technological openness into tangible BMIs by fostering the generation and implementation of novel ideas and processes.

This study seeks to examine whether innovativeness acts as a mediating mechanism between technological openness and BMI, contributing to a deeper understanding of the dynamics that enable organizations to achieve BMI through technological openness and innovativeness. Guo et al. (2020) defined technological openness as an environment characterized by easy access, exchange, and sharing of technology-related information, knowledge, and resources with minimal costs involved.

Latifi et al. (2021) study focused on entrepreneurial orientation, innovativeness, and organizational culture, but it is important to acknowledge that there are other capabilities that could serve as mediators in the connection between BMI and outcome. Subsequent research has the potential to explore various organizational capabilities as mediators (Latifi et al., 2021). Thus, drawing from previous research findings, we posit the following hypothesis:

Hypothesis 9c: Innovativeness mediates the relationship between technological openness and BMI in the context of SMEs.

3.4.4 MKT mediate between TCT and BMI

MKT mediates the connection between TCT and BMI in organizations. Technological turbulence, reflecting rapid changes in technology, influences an organization's ability to innovate its BM. Market turbulence, encompassing the uncertainties and dynamism in the external market, acts as a mediating factor, shaping the impact of technological turbulence on BMI. Organizations must navigate and respond to market turbulence to effectively leverage

technological advancements for innovative BM.

TCT refers to the rapid changes and advancements in technology that organizations encounter (Jaworski & Kohli, 1993). Market turbulence, on the other hand, represents the uncertainty and dynamism in the external market, including factors including shifts in customer preferences, competitive dynamics, and market disruptions (Jaworski & Kohli, 1993). The Guo et al. (2020) study offers significant implications that both technology and market pull are beneficial for BMI in the digital economy. When a new technology alters the manner in which value is generated and delivered to consumers, the use of a new BM can enhance the organization's ability to catch a proportion of the value made as a result and then induce market turbulence (Waldner et al., 2015).

Earlier research has indicated that technology turbulence directly influences BM experimentation (Marolt et al., 2016). The development of new technologies is recognized as a significant factor in facilitating successful business operations, driving BM transformation and innovation, and even serving as a catalyst for the growth of disruptive new BM (Pucihar et al., 2019).

Therefore, this study aims to examine whether market turbulence acts as a mediating mechanism between technological turbulence and BMI, providing a greater comprehension of how organizations achieve BMI in the context of technological turbulence and market dynamics.

Hypothesis 9d: Market turbulence mediates the relationship between technological turbulence and BMI in the context of SMEs.

3.4.5 PMO mediate between RMO and BMI

Proactive market orientations mediate the relationship between responsive market orientations and BMI in organizations. Responsive market orientations, focusing on adapting to existing market demands, and proactive market orientations, emphasizing forward-thinking and anticipating future market trends, are both relevant for driving BMI. Proactive market orientations mediate the relationship between responsive market orientations and BMI, offering insights into the importance of balancing responsiveness and forward-looking strategies to foster innovation in BM design.

RMO describes a company’s ability to adapt and react to existing market demands and customer needs (Jaworski & Kohli, 1993). PMO, on the other hand, entails an organization's forward-thinking approach, anticipating future market trends, and creating innovative solutions ahead of customer demands (Jaworski & Kohli, 1993). BMI involves the reconfiguration and adaptation of an organization's fundamental value-building, delivery, and catch framework

(Teece, 2010).

Prior research has examined the direct connection between RMO and BMI, as well as PMO and BMI. The Yang et al. (2020) study reveals that both RMO and PMO positively influence BMI. In the Randhawa et al. (2021) study, the SMEs context is used to characterize market-driving, market-oriented, and flexible approaches to BM. Yang et al. (2020) suggest future investigations can explore the interaction by which RMO and PMO facilitate BMI.

Hence, this study aims to research whether PMO act as a mediating mechanism between responsive market orientations and BMI, offering deeper insights into the mechanisms through which organizations achieve BMI by combining responsiveness with forward-looking, proactive strategies.

Hypothesis 9e: Proactive market orientations mediate the relationship between responsive market orientations and BMI in the context of SMEs.

3.5 Moderation mechanism

According to Jaworski and Kohli (1993), EMT included MKT and TCT. The connection between strategic agility and BMI is positively correlated, which is further amplified by the level of environmental turbulence (Clauss et al., 2019). Firms running in turbulent circumstances face constant difficulties in product diversification and ongoing innovation to stay competitive (Haleblian & Finkelstein, 1993). Such environments present always-present market possibilities and catastrophes, driving firms to adapt swiftly to shifting market circumstances and learn to proactively expect and adjust their approaches appropriately (Chong et al., 2016; Haleblian & Finkelstein, 1993). Thus, this section explores the moderating effects of technological turbulence on key factors, including technological openness, innovativeness, strategic agility, and dynamic capabilities, in relation to BMI. Understanding these moderating effects sheds light on how organizations can leverage technological turbulence to enhance their ability to innovate and transform their BM.

(1) When organizations operate in a technologically turbulent environment, the openness to access, exchange, and share technology-related information and resources becomes even more critical for driving successful BMI. Based on the debate above, we suggest the following:

Hypothesis 10a: Technological turbulence imposes a positive moderating effect on technological openness and BMI in SMEs.

(2) In a rapidly changing technological landscape, organizations that demonstrate a high level of innovativeness are better equipped to adapt and leverage emerging technologies,

leading to more innovative BM. Based on the above discussion, we propose the following:

Hypothesis 10b: TCT imposes a positive moderating effect on innovativeness and BMI in the context of SMEs.

(3) As organizations navigate technological disruptions and advancements, their ability to swiftly adjust their strategic direction becomes crucial for effectively incorporating new technologies and innovating their BM. Based on the debate above, we suggest the following:

Hypothesis 10c: Technological turbulence imposes a significant positive moderating effect on strategic agility and BMI in SMEs.

(4) Organizations that possess strong dynamic capabilities, characterized by their capacity to assimilate, and adapt both inside and outside resources, are better positioned to seize opportunities arising from technological turbulence and drive BMI. Based on the debate above, we suggest the following:

Hypothesis 10d: TCT imposes a significant positive moderating effect on dynamic capabilities and BMI in the context of SMEs.

In summary, TCT serves as a powerful moderator in the connection between key factors (technological openness, innovativeness, strategic agility, and dynamic capabilities) and BMI. Understanding the dynamics of this moderation provides insights into how organizations can harness the challenges and opportunities posed by technological turbulence to foster innovation and transform their BM.

3.6 Conceptual model

This thesis conceptual model adopts Foss and Saebi (2016) suggested a study prototype as a framework for BMI research. Zhang et al. (2021) identify four external antecedents and three internal antecedents. Spieth and Schneider (2016) provide a hierarchical scale for measuring BMI. Adopt the model suggested by Venkatraman and Ramanujam (1986) to evaluate overall enterprise performance. Thus, we developed this thesis conceptual model, which is shown below in Figure 3.2. To achieve BMI, SMEs need to consider various antecedents that influence their ability to adapt, respond, and innovate. This conceptual model explores the effects of antecedents that include responsive market orientation, proactive market orientation, strategic agility, dynamic capabilities, organizational agility, technological openness, technological turbulence, innovativeness, and market turbulence on BMI. The detailed description is as below:

(1) According to the above chapter 3.2 description, we hypothesize that antecedents, which include responsive market orientation, proactive market orientation, strategic agility, dynamic

capabilities, organizational agility, technological openness, technological turbulence, innovativeness, and market turbulence, suggest a positive effect on BMI for SMEs.

(2) According to the above chapter 3.3 description, we conjecture that BMI has an important impact on firm achievements in the context of SMEs. Additionally, we hypothesize that the three dimensions of BMI, including VOI, VAI, and revenue model, have a significant impact on FMP for SMEs.

(3) As stated by the above chapter 3.4 description, in the context of SMEs, we hypothesize that: DC mediates the connection between STA and BMI; DC mediates the connection between ORA and BMI; INV mediates the connection between TCO and BMI; MKT mediates the connection between TCT and BMI; and PMO mediates the connection between RMO and BMI.

(4) According to the above chapter 3.5 description, in the context of SMEs, we hypothesize that: (a) TCT exerts a significant moderating impact on TCO and BMI. (b) TCT exerts a significant moderating impact on INV and BMI. (c) TCT exerts a significant moderating impact on STA and BMI. (d) TCT exerts a significant moderating impact on DC and BMI.

By developing this conceptual model that encompasses the antecedents, moderators, mediators, and BMI results, this section offers a comprehensive framework for comprehension of the research logic to assess the specific factors that drive BMI and evaluate their impact on FMP. The conceptual model of this thesis is presented in Figure 3.2.

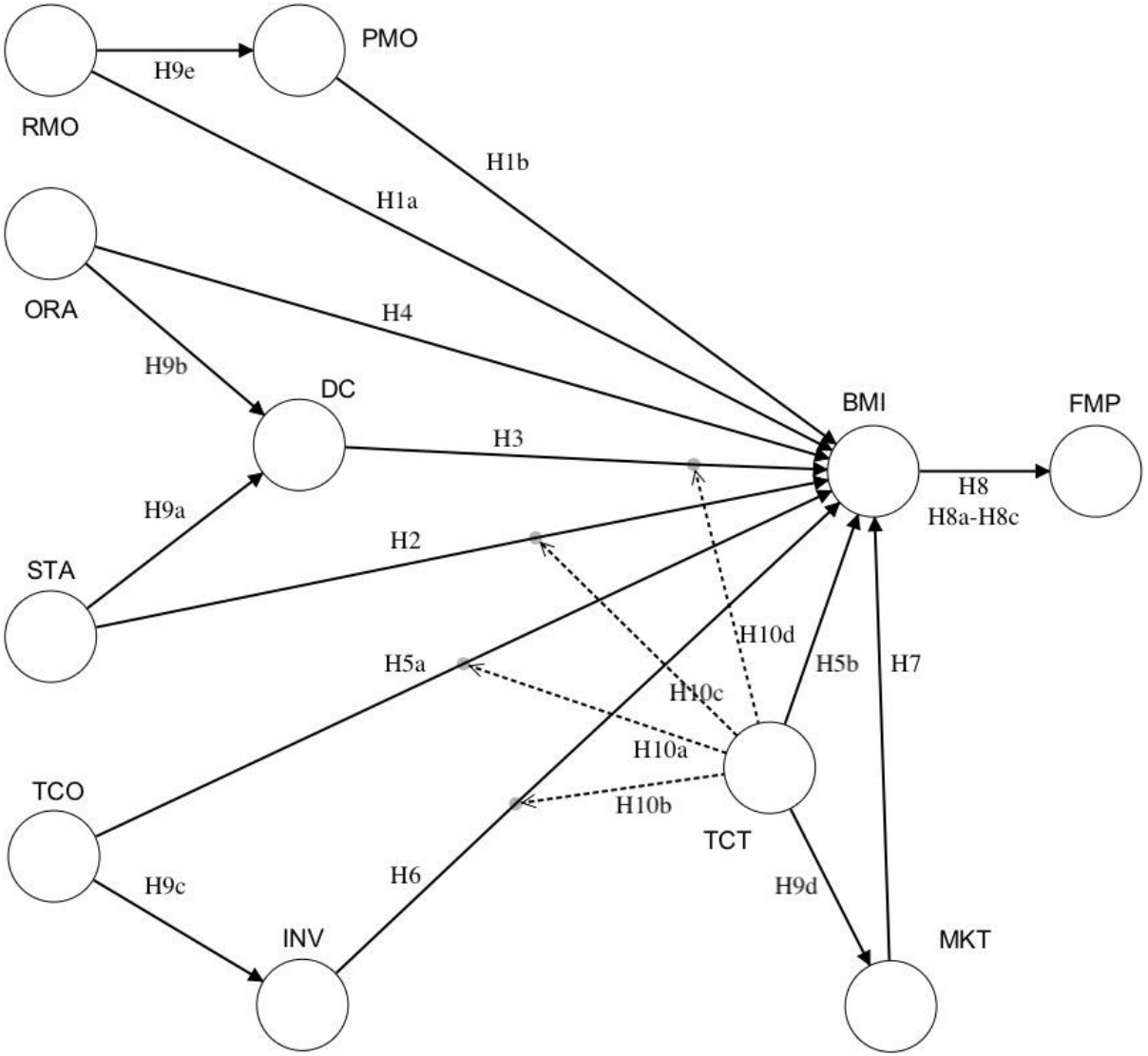

Figure 3.2 Conceptual model

3.7 Chapter summary

Shifts focus on the development of hypotheses and the conceptual model that will guide the empirical investigation of BMI. This chapter lays the foundation for understanding the key antecedents and relationships involved in the process of BMI and its outcomes.

Firstly, the chapter begins by presenting the theoretical foundation for this thesis, providing a theoretical framework from previous literature. It identifies the key theory that will be used in the next step of research.

Secondly, the chapter explores the antecedents of BMI in detail, investigating the internal and external factors that act as drivers for organizations to engage in BMI. These factors may include technological advancements, market disruptions, competitive pressures, and managerial motivations.

Thirdly, the chapter discusses the anticipated results of BMI and their effect on organizational outcomes, competitiveness, and sustainability. It highlights the potential benefits that organizations can derive from successful BMI, including increased revenue, improved customer satisfaction, and enhanced market position.

Fourthly, the chapter discusses the function of moderators and mediators in the connection between the antecedents and BMI. It explores how contextual factors, and individual or organizational characteristics can influence the strength and direction of relationships. Moreover, it investigates the potential mediating mechanisms through which certain variables may influence the relationship between antecedents and BMI.

Fifthly, to provide a visual representation of the theoretical framework, a conceptual model for BMI is developed in this chapter. The conceptual model demonstrates the connection between the various construct, depicting the hypothesized pathways through which antecedents, moderators, and mediators influence the outcomes of BMI.

By developing hypotheses and a conceptual model that encompasses the antecedents, moderators, mediators, BMI, and FMP, this chapter offers a comprehensive framework for recognizing the complex dynamics of BMI.

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Chapter 4: Research Method and Data Collection

The research approach is described in this section, which includes: (1) introducing the research design. (2) introduce the instrument development to evaluate the antecedents, BMI, and enterprise performance. (3) Outline the selection of the sample and the procedures for data collection. Through the utilization of rigorous and comprehensive research methods, this chapter establishes the foundation for subsequent data analysis and interpretation in the following chapters.

4.1 Research design

4.1.1 Research approach and procedure

Sensory knowledge is commonly accepted as truth because it offers evidence that can be tested and questioned, making it classified as empirical or a posteriori knowledge (Williams, 2007). The theoretical foundations of quantitative research approaches are anchored in the fundamental principles of a posteriori and a priori knowledge (Williams, 2007). Leedy and Ormrod (2001) proposed that the research method is the general approach that a researcher adopts in conducting their research project. Quantitative research involves the systematic collection, analysis, interpretation, and reporting of data (Creswell, 2012). Quantitative research utilizes strategies like experiments and questionnaires through pretested scales to provide statistical information (Creswell, 2012). A research design functions as an architectural outline to provide a framework for the study and guide the gathering and analysis of data in accordance with the research objectives (R. K. Yin, 2011). It specifies the chosen research methods, target sampling object, sample size, measurement, and data evaluation process. The type of research design is initiated by the object of the study (Ahmadin, 2022; Djamba & Neuman, 2002). Based on the conceptual model described in Chapter 3, this thesis adopts an empirical approach to using quantitative methods to test hypotheses and establish causal relationships. According to Ahmadin (2022), who proposed the research step to conduct the research work, the next research step working outline is as below:

(1) Determine measurement bias prevention methods and data analysis methods and tools. Details are in Chapters 4.1.2 and 4.1.3.

(2) Development instruments to collect the data must carefully design questionnaires to ensure that they capture the relevant information accurately. Detail as in Chapter 4.2.

(3) Determine the data collection method, including sample size and target sampling object, and conduct data collection activities. Detail as in Chapter 4.3.

(4) Addressing the careless responses in the survey, as described in Chapter 4.4.

(5) Determine the data analysis process and method. It defines the statistical methods to be used to analyze the data, draw conclusions, and respond to the research inquiries effectively. This step of research work is implemented in Chapter 5.

(6) Make conclusions and discuss the implications of the study's findings. This step of research work is implemented in Chapter 6.

This well-structured research design is crucial for the success of this research work. It provides a clear roadmap for conducting the research, ensuring that the goals of the study and the conclusions are valid, reliable, and meaningful.

4.1.2 Measurement bias preventing

To reduce measurement bias, this thesis implements measures to address common method variance, non-response bias, and careless responding in the research process. A detailed outline is provided below:

(1) Addressing common method variance Questionnaire data from the same source will induce common method variance, and it will induce the effectiveness of the research result (Podsakoff et al., 2003; Podsakoff & Organ, 1986). For this thesis research, adopt Tehseen et al. (2017) suggestion to improve the method biases, with two stages separated: the data collection period using procedure control and the data collection period using statistical control. Tehseen et al. (2017) summarized that Podsakoff et al. (2003) suggested several procedural remedies for common method bias control, as below: minimizing the evaluation apprehension, keeping the anonymity of the respondents, counterbalancing the order of measurement, and keeping scale questions specific and simple.

According to this procedural remedy guideline, this thesis implemented the following actions: First, inform respondents that survey results are only used for thesis research. Second, the survey is anonymous and excludes any sensitive information about personal or company matters. Third, use a random sequence for each indicator of scale. Fourth, based on the pre-stage survey feedback from respondents, we optimized the scale item expression, reduced the ambiguity, and made the scale question descriptions clearer and more accurate. Additionally, this thesis also uses statistical control to address common method variance, as detailed in

Chapter 5.1.3.

(2) Addressing non-response bias The common non-response bias means that those who did not respond to the questionnaire survey may have some bias towards the acquired data (Armstrong et al., 1977). The survey has faced criticism for nonresponse bias, as the responses may not accurately represent the entire sample if those who respond differ significantly from those who do not, making generalization to the entire population challenging (Armstrong et al., 1977). Address non-response bias as described in Chapter 5.1.4.

(3) Addressing careless responses Since 1999, survey research has witnessed a significant shift towards online data collection, driven by the numerous advantages it offers, including cost-effectiveness, improved precision, and the capability to mandate answers, among other benefits (Ward & Meade, 2023). However, a notable drawback of online surveys is their susceptibility to careless responses (Ward & Meade, 2023). Careless responding is characterized by respondents not thoroughly reading or paying sufficient attention to the content of survey items, leading to potentially inaccurate data that represents their actual amounts of the measured variables (Meade & Craig, 2012). There are various types of careless reactions, resulting in diverse manifestations in survey data, making it challenging to prevent and identify them. To address careless responses in detail, refer to Chapter 4.4.

4.1.3 Data analysis method

There has been a significant rise in PLS-SEM usage in the recent past, particularly in the social sciences (Sarstedt et al., 2021, 2022). Additionally, PLS-SEM has found application in various other scientific fields, including agricultural science, engineering, environmental science, and medicine (Sarstedt et al., 2022). This trend signifies its increasing popularity and widespread adoption across diverse domains of research. PLS-SEM has grown quickly in the past decade (Hair et al., 2021). Hair et al. (2019) suggest selecting PLS-SEM if scholars have the below research conditions:

(1) PLS-SEM can manage intricate models involving numerous constructs; this thesis included 17 constructs and 80 indicators, and the relationship between constructs is complex as well.

(2) Path models contain one or more formative constructs; in this thesis, lower-order constructs VOI, VAI, and RMI are formative constructs, and higher-order constructs STA, DC, and BMI are formative constructs.

(3) If we need latent variable scores to conduct next-step analysis, this thesis uses higher-order constructs in path mode, so we need latent variables to measure higher-order constructs.

(4) PLS-SEM is suitable for theoretical extensions of established theories; this thesis has integrated many theories about BMI, enrich antecedent construct, BMI, and firm performance relationships.

(5) PLS-SEM can work with both small and large sample sizes, so this thesis data assessment can be implemented by PLS-SEM.

According to the description above, this thesis adopted the PLS-SEM approach for data assessment, so Smart PLS 4.0 was selected for structural equation modeling and IBM SPSS V26.0 for descriptive statistics.

4.1.4 Variables list of acronyms

As a follow-up to the Chapter 1.4.1 description, this thesis defined the variables (or constructs) as acronyms as below (presented in Annex A, Table A1) with each indicator, providing a more detailed description of each variable as shown in Chapter 4.2.

Market orientations include RMO and PMO. RMO include RMO1, RMO2, RMO3, RMO4, RMO5, and RMO6. PMO include PMO1, PMO2, PMO3, PMO4, PMO5, PMO6, PMO7, and PMO8.

Higher-order construct strategic agility (STA) included STS, SLD, and SRF as three lower-order constructs. Strategic sensitivity (STS) included STS1, STS2, and STS3; leadership unity (SLD) included SLD1, SLD2, and SLD3; and resource fluidity (SRF) included SRF1, SRF2, and SRF3.

Higher-order construct dynamic capabilities (DC) include SEN, SEZ, and TRN as three lower-order constructs. Sensing (SEN) includes SEN1, SEN2, SEN3, SEN4, SEN5, and SEN6; Seizing (SEZ) includes SEZ1, SEZ2, SEZ3, and SEZ4; Transforming (TRN) includes TRN1, TRN2, TRN3, TRN4, TRN5, and TRN6.

Organizational agility (ORA) included ORA1, ORA2, ORA3, ORA4, and ORA5.

Technological openness (TCO) included TCO1, TCO2, TCO3, TCO4, and TCO5 indicators.

Technological turbulence (TCT) included TCT1, TCT2, TCT3, TCT4, and TCT5 indicators.

Innovativeness (INV) includes INV1, INV2, INV3, INV4, INV5, and INV6 indicators.

Higher-order construct business model innovation (BMI) includes VOI, VAI, and RMI as three constructs. Value offering innovation (VOI) includes VOI1, VOI2, and VOI3 indicators; value architecture innovation (VAI) includes VAI1, VAI2, VAI3, and VAI4 indicators; and revenue model innovation (RMI) includes RMI and RMI2 indicators.

Market turbulence (MKT) includes MKT1, MKT2, MKT3, MKT4, MKT5, and MKT6

indicators.

Firm performance (FMP) includes FMP1, FMP2, FMP3, FMP4, and FMP5 indicators.

4.2 Instrument development

Scales are employed in research to capture latent concepts that are not directly observable by utilizing a set of concrete statements (Carpenter, 2018). These scales aim to expose underlying levels of theoretical variables that may not be easily observed through direct means (DeVellis & Thorpe, 2021). While researchers cannot directly observe the relationship among individual items, they can assess the extent of intercorrelation between them (DeVellis & Thorpe, 2021). To ensure content validity and capture the true essence of an abstract scientific construct, subscales within a scale should consist of at least three variables (Carpenter, 2018). Including multiple empirical items in the scale safeguards against the influence of cultural biases (Morrison, 2009).

The formulation of measurement items for variables in this study stems from a thorough literature review. By extensively reviewing existing literature on BMI within the realm of SMEs, the questionnaire items were meticulously chosen to align with the research objectives. Preference was given to items previously validated by prior research, as well as those demonstrating high levels of reliability and validity, for inclusion in the scale. Building upon this foundation, the requisite measurement scale for this study was developed. These indicators were thoroughly assessed and analyzed using a Likert scale with five different levels.

The questionnaire was distributed in Chinese. To ensure accuracy after translating Chinese with the original English description, first, individuals proficient in both Chinese and English were invited to translate the relevant content. Second, a reverse translation process (Brislin, 1970) was conducted to guarantee a high degree of similarity between the measurement items in both languages, enabling effective analysis and evaluation of the same construct.

For a comprehensive explanation of the instrument used in this study, please consult the sections titled "Instrument of Antecedents" (Chapter 4.2.1), "Instrument of BMI" (Chapter 4.2.2), "Instrument of Firm Performance" (Chapter 4.2.3), and "Instrument of Mediators and Moderators" (Chapter 4.2.4).

4.2.1 Instrument of Antecedents

Zhang et al. (2021) classified the antecedents of BMI into two primary types: external and internal factors. External antecedents encompass elements like market opportunity situational

factors, value network technology innovation, and changes in the external environment, including evolving stakeholder demands (Ferreira et al., 2013), shifts in the rivalrous landscape (Reuver et al., 2009), and the emergence of new information and communication technologies (Pateli & Giaglis, 2005; Wirtz et al., 2010). Internal antecedents, on the other hand, revolve around elements within the organization. These include managerial cognition (Bergman et al., 2015), internal resources and capabilities (Kindström & Kowalkowski, 2014), organizational characteristics (Dunlap et al., 2016), DC (Teece, 2007; Teece et al., 1997), and open innovation (Minatogawa et al., 2022). Additionally, there is a strong link between BMI and open innovation, where particular types of free creativity practices necessitate corresponding adjustments to the BM (Saebi & Foss, 2015).

For internal antecedent measurement, there are several empirical studies that explore each antecedent: Yang et al. (2020) delved into RMO and PMO; Clauss et al. (2019) examined STA, encompassing STS, SLD, and SRF; Kump et al. (2019) investigated DC, focusing on sensing, seizing, and transforming; Cegarra-Navarro et al. (2016) analyzed organizational agility; Additionally, Pucihar et al. (2019) highlighted enterprise innovativeness as a crucial antecedent, finding a direct positive effect on BMI.

For external antecedent measurement, there have been several empirical studies that have explored each factor: Guo et al. (2020) explored technological openness as a moderator, positively influencing the association between BMI and FMP increases. Jaworski and Kohli (1993) developed the scale for EMT, including MKT, competitive intensity, and TCT; Clauss et al. (2019) adopted this scale to assess environmental turbulence as a variable within their research framework.

4.2.1.1 Market orientations

The concept of MO encompasses two dimensions: RMO, which focuses on meeting the explicit demand of customers, and PMO, which aims to recognize and resolve the latent needs of customers and possibilities for buyer value that customers may not be aware of (Narver et al., 2004). Leveraging data collected from a diverse range of technology-oriented businesses, Narver et al. (2004) introduce a novel measure for PMO while refining the existing approach for RMO. They also investigate the connection between a business's RMO and PMO and its success in introducing new products.

Yannopoulos et al. (2012) adopted the measurement instrument from Narver et al. (2004) to assess the extent of RMO and PMO. Drawing from the studies carried out by Yang et al. (2020), which build upon the studies conducted by Lamore et al. (2013), it was found that both

RMO and PMO positively impact BMI. This thesis will follow up on Yang et al. (2020) adoption of a scale to measure RMO and PMO (presented in Annex A, Table A2 scale for market orientations).

4.2.1.2 Strategic agility

In our study, we put our model into practice by selecting measuring scales from existing studies that have demonstrated reliability and validity. Specifically, for assessing STA, we adopted a scale from Hock et al. (2016), who have previously developed and validated measurement indicators that come from propositions by Doz and Kosonen (2010).

To assess STA, Hock et al. (2016) utilized three dimensions: STS, SLD, and SRF. These dimensions were originally proposed by Doz and Kosonen (2010) as key components of STA. Strategic sensitivity denotes the ability of a business to detect and interpret conditional changes and market opportunities. Leadership unity reflects the extent to which leaders share a common strategic vision and work collaboratively. Resource fluidity assesses the company's capacity to quickly redistribute resources to respond to emerging challenges and opportunities.

In our study, we adopted the dimensions of STS, SLD, and SRF to assess STA, based on the guidelines proposed by Doz and Kosonen (2010).

STS is clarity of perception, intensity of recognition, and a focus on strategic improvement within the organization. It involves the ability to detect and interpret shifts in the external situation, including market trends, technological and scientific advancements, and competitive dynamics. Organizations with higher strategic sensitivity are more adept at identifying emerging opportunities and threats, enabling them to respond effectively.

SLD reflects the cohesion and alignment among the top management team when making bold and rapid decisions. It implies the ability to overcome internal conflicts and political obstacles that may hinder effective decision-making processes. By fostering a collaborative and unified leadership approach, organizations can streamline decision-making, promote agility, and ensure timely responses to external challenges and opportunities.

SRF captures the inner ability of an organization to rebuild its capabilities and rapidly redistribute resources. It involves the flexibility and agility of reallocating resources across different projects, initiatives, or business units in response to changing circumstances. Organizations with high resource fluidity can quickly adapt to evolving market demands, optimize resource utilization, and seize new opportunities.

By incorporating these dimensions into our measurement model, we aimed to capture the multidimensional nature of STA and its effect on the dependent variable, such as BMI.

According to data collected from 432 German firms running in the electronics sector, Clauss et al. (2019) discovered a positive correlation between STA and BMI. The study revealed that this correlation is reinforced by the level of EMT experienced by these firms.

To create a comprehensive measurement of strategic agility, we aggregated the items from the three dimensions into a second-order measure. This approach allows us to capture the overall construct of strategic agility and assess its impact on BMI.

This thesis will follow up on Hock et al. (2016) development and Clauss et al. (2019) application of a scale to measure STA (presented in Annex A, Table A3).

4.2.1.3 Dynamic capabilities

Different methods of measuring DC, including activity-based questionnaires (Wilden et al., 2013), proxy-based evaluations (Girod & Whittington, 2017; Stadler et al., 2013), and outcome-oriented surveys, each have their own advantages and limitations (Kump et al., 2019). It should be noted that this method can provide a comprehensive solution for measuring DC. Instead, a mixed-methods approach, as proposed by Schilke et al. (2018), should be employed. This approach involves combining different methods, including agency-based research, survey-based measurement, and other approaches, to leverage the strengths of each method while mitigating their limitations.

The contribution of Kump et al. (2019) to the field of dynamic capabilities (DC) research lies in their development of an initial edition of a DC scale. This scale is due to the Teece (2007) model, which encompasses the dimensions of SEN, SEZ, and TRN, with a specific focus on capturing the results of latent capacities.

In their study, Heider et al. (2021) assessed DC by employing a multidimensional instrument that was initially created by Kump et al. (2019). To validate the questionnaire in their sample, Heider et al. (2021) conducted an exploratory factor analysis following the research method outlined by Gerbing and Hamilton (1996). Their findings indicate that distinct DC are required to address different facets of BMI. The Heider et al. (2021) study shows that medium-sized companies can benefit from increased participation with external partners while maintaining a balance between effectiveness and adaptability, and small companies are recommended to focus on changing the arrangements of their resources.

This thesis will follow up on Kump et al. (2019) development and Heider et al. (2021) application of a scale to measure DC (presented in Annex A, Table A4).

4.2.1.4 Organizational agility

Organizational agility relates to the capacity of a company to adequately navigate and thrive in

a competitive environment characterized by rapid, relentless, and uncertain changes (Dove, 2002). Similarly, ORA relates to the company's capacity to effectively navigate and react to modifications originating from business circumstances (Cegarra-Navarro et al., 2016). It involves the capacity to react and respond swiftly to an evolving environment and seize new possibilities that emerge unpredictably (Lu & Ramamurthy, 2011a). By embracing agility, organizations can proactively and flexibly adjust their strategies, processes, and resources to remain competitive and achieve sustainable success in dynamic and turbulent business landscapes. In the Lu and Ramamurthy (2011) study, two forms of ORA are considered: market capitalization quick and operational adjustment quick.

Firstly, market capitalization agility emphasizes the wisdom of management and the intellectual capability of a firm to identify and act upon relevant opportunities (Dove, 2002). This form of agility entails the collection and processing of vast and diverse data to anticipate and respond to outside alterations. It also involves constantly observing and enhancing the product or service offerings to effectively resolve customer demands.

Secondly, operational enhancement agility focuses on a company's capacity to swiftly adapt. The company adjusts its internal corporate procedures to accommodate shifts in the market or demand (Sambamurthy et al., 2003). This form of flexibility primarily contains routine maneuvering to ensure rapid responses to external changes. It is mainly directed at operational activities and has a reactive nature (Volberda, 1997).

These two dimensions of organizational agility aim to gain insights into how firms strategically respond to external changes and efficiently adapt their internal processes to remain competitive in dynamic business environments. Cegarra-Navarro et al. (2016) proposed an instrument to measure ORA. These indicators were originally derived from the study performed by Lu and Ramamurthy (2011). The measurement scale consisted of 6 items that captured different dimensions of organizational agility. Each respondent was asked to rate their degree of concurrence with each indicator on a Likert scale with five points. One on the scale meant "strongly disagree," while five on the scale meant "strongly agree." This scale provided a continuum for respondents to express their perceptions of the organization's agility.

Bhatti et al. (2021) measured organizational agility (OA) using the scale suggested by Cegarra-Navarro et al. (2016). The outcome of the research demonstrates a notable relationship between BMI and ORA. Our thesis follows this practice to measure ORA (presented in Annex A, Table A5).

4.2.1.5 Technological Openness

Technological openness is defined as an environment characterized by the free accessibility, exchange, or sharing of technology-related information, knowledge, and resources with minimal costs involved (Guo et al., 2020). It emphasizes the availability and ease of accessing technological insights, expertise, and resources, enabling organizations to tap into external knowledge and leverage it for innovation and competitive advantage. Technological openness fosters collaboration, knowledge sharing, and the integration of external resources to help the development and use of technological advancements.

Guo et al. (2020) developed the scales for technological openness and drew upon existing literature that explored the digital environment in Nambisan (2017) on the technology side. To generate a sample set of items, Guo et al. (2020) relied on measures and concepts from various areas of research, including digital entrepreneurship, electronic innovation, and the corporate environment (Nambisan, 2017; Richter et al., 2017). Through an exploratory factor analysis, Guo et al. (2020) identified that the TCO scale consisted of five items; all items exhibited high loadings (above 0.7) on their constructs, and the confirmatory factor analysis results indicated that the reliability and validity of the scales were satisfactory (α values exceeded 0.6, chi-square value is 77.000, degrees of freedom are 19, chi-square/degrees of freedom ratio is 4.053, goodness and fit value is 0.933, normed fit value is 0.911, and comparative fit value is 0.931).

Thus, this thesis follows this practice to measure TCO (presented in Annex A, Table A6).

4.2.1.6 Innovativeness

Drucker (1954) was among the pioneers who emphasized the significance of INV and highlighted its being overlooked in organizational studies. The literature on INV, as found in the works of Rogers (2010), encompasses a lot of the discussion on company innovation capacity. Scholars in this field assert that innovation is essential for a firm's survival in an unstable and uncertain circumstance (J. D. Johnson et al., 1997).

While some scholars, including Hurt et al. (1977), define innovativeness as the extent to which a person, compared to other members of the social structure, adopts something new at an early stage, it primarily focuses on the individual rather than the organization itself. In contrast, Hurley and Hult (1998) define company INV from a group viewpoint, considering it a component of a company's culture that reflects its receptivity to new concepts. The concept of firm innovativeness can be approached from two perspectives: as a behavioral element, representing the speed at which innovation is adopted by the company, and as an indicator of the firm's tendency to embrace a shift (Hurt et al., 1977).

In summary, Drucker (1954) and subsequent scholars have shed light on the significance of innovativeness for companies, highlighting its importance in adapting to a volatile environment. Definitions of innovativeness vary, with some focusing on individual adoption and others emphasizing the collective perspective and organizational culture. Understanding firm innovativeness from both behavioral and willingness-to-change viewpoints provides a comprehensive perspective on its significance for organizational success.

Pucihar et al. (2019) used 13 items to measure the innovativeness construct in their study, which were adapted from previous studies (Atuahene-Gima & Ko, 2001; Hult et al., 2004; Naman & Slevin, 1993; Subramanian, 1996). By drawing upon established scales from these studies, the measurement of innovativeness in the current research benefits from the extensive validation and reliability of these items in capturing the essential dimensions of firm innovativeness.

To measure firm innovativeness, Calantone et al. (2002) employed a six-item scale with a high Cronbach's alpha of 0.89. This measuring tool was utilized in the works of Hurt et al. (1977) and Hollenstein (1996) and has been validated by numerous subsequent studies. The items included in the scale capture various facets of firm innovation and have demonstrated reliability and validity across different contexts. The use of this established scale ensures the robustness and reliability of measuring firm innovation in the current study.

In order to optimize response rates, we chose to utilize a short and concise measurement approach, as research has shown that lengthy surveys tend to result in lower response rates (Burchell & Marsh, 1992). By keeping the survey brief and focused, we aimed to encourage higher participation and engagement from respondents, ensuring the quality and reliability of the data collected.

Thus, this thesis follows this practice to measure INV (presented in Annex A, Table A7).

4.2.1.7 Environmental turbulence

Jaworski and Kohli (1993) developed scales for MKT consisting of 6 items and technological turbulence consisting of 5 items. The items in the MKT scale measured the degree to which the demographics and tastes of the target market within an organization underwent changes over time. For instance, an item inquired about the occurrence of client demand for goods and services that they had not previously acquired. On the other hand, the items in the TCT questionnaire assessed which technology within the industry was undergoing significant change. For example, one item gauged the rapidity of technological changes within the industry.

These scales, which were created by Jaworski and Kohli (1993), were widely used to

measure business environmental factors. Clauss et al. (2019) used it to assess environmental turbulence as a moderator and reveal a positive moderating impact on EMT on the relationship between STA and each dimension of BMI. Pucihar et al. (2019) use it to assess the business environment, as external drivers directly influence and positively impact the level of BMI.

Thus, this thesis follows these practices and adopts two constructs, which are market turbulence and technological turbulence of environment turbulence, developed by Jaworski and Kohli (1993), to assess MKT and TCT as external antecedents with an effect on BMI (presented in Annex A, Table A8 for MKT, Table A6 for TCT).

4.2.2 Instrument of BMI

Latifi and Bouwman (2018) have formulated a model to investigate the influence of BMI on enterprise performance by considering mediating and moderating factors. Through a systematic literature review, they identified twenty moderating factors, grouped into four categories: company attributes, industry attributes, BM execution, and BM exercises. Additionally, they recognized 10 mediation variables, classified into three sub-groups: revenue increase, efficiency increase, and strengthening organizational capacity.

In most studies, the Zott and Amit (2007, 2008) measure is employed to assess BMI, which was initially designed with 26 indicators to evaluate two types of BMI: efficiency-centered and novelty-centered.

Clauss (2016) introduced a hierarchical, three-level scale for assessing BMI. At the first level, 41 reflective indicators assess ten subconstructs of BMI. Building upon the second-level measurement scale, Clauss et al. (2019) empirically examined data from 432 German firms in the electronics industry. The research concluded a positive relationship between strategic agility and BMI, with the degree of EMT strengthening this correlation.

Spieth and Schneider (2016) have significantly contributed to the field of BMI by offering a well-defined conceptualization of BMI and developing a measurement scale to evaluate it. Their scale incorporates three essential dimensions: VOI, VAI, and RMI, and comprises nine indicators. To validate the measurement model, they conducted a survey involving 200 German firms. The BMI measurement scale consists of nine items, systematically assessing the extent of BMI across the three aspects: (1) VOI (three items): This dimension evaluates the innovation in the value proposition and the offerings provided to customers. (2) VAI (four items): This dimension pertains to the innovative changes made to the company's internal processes, assets, and ability to support the new value proposition. (3) RMI (two items): This dimension focuses on the novel approaches and strategies implemented to generate revenue from the value

proposition and business activities.

By establishing a clear definition and providing a robust measurement scale, Spieth and Schneider (2016) have enabled researchers and practitioners to comprehensively assess and analyze the effect of BMI on various aspects. Miroshnychenko et al. (2021) have utilized the BMI scale built by Spieth and Schneider (2016) to analyze the relationship between absorptive ability and STA and its effect on BMI. Heider et al. (2021) explored the function of DC in driving BMI within a sample of 285 respondents from German SMEs and also adopted the measurement scale developed by Spieth and Schneider (2016) to measure BMI.

In this study, we have chosen to adopt a concise and brief measure, considering that lengthy surveys tend to result in lower response rates (Burchell & Marsh, 1992), which can significantly impact the reliability of the data. Thus, we adopted Spieth and Schneider (2016) developed scale to measure BMI (presented in Annex A, Table A9).

4.2.3 Instrument of Firm performance

Dawes (1999) noted that while subjective performance measures have their preponderance, companies may be hesitant to reveal their factual performance information, and realistic challenges may arise when collecting subjective evaluations included in a comprehensive survey. In this study, an objective measure was employed to assess overall firm performance, following the model suggested by Venkatraman and Ramanujam (1986). The usage of subjective performance evaluation as a valid proxy for value-free assessment has been supported by previous research (Dess & Robinson, 1984; McDermott & Prajogo, 2012; Venkatraman & Ramanujam, 1986).

To measure the company's general performance across the past two years, five items were utilized for financial result measures and three market outcome measures. This approach allowed for the assessment of firm performance from a subjective perspective, considering a range of financial and market-based indicators. The use of subjective assessment provided a practical and reliable means of capturing overall firm performance within the research context.

Latifi et al. (2021) constructed a theoretical research structure model by conducting a comprehensive literature overview of 37 empirical publications that explored potential moderating and mediating elements between BMI and enterprise performance, which measurement instrument adopted from Venkatraman and Ramanujam (1986) developed scale. The framework was then used on a special survey sample comprising 563 SMEs from Europe. The primary objective was to investigate the relationship by which BMI affects enterprise performance within this context. Thus, this thesis follows this practice to measure firm

performance (presented in Annex A, Table A10).

4.2.4 Instrument mediators and moderators

As described in chapter 3.4, DC mediates between STA and BMI; DC mediates between ORA and BMI; INV mediates between TCO and BMI; MKT mediates between TCT and BMI; PMO mediates between RMO and BMI; and the instrument details are presented in chapter 4.2.1.

As chapter 3.5 describes, technological turbulence will be the moderator to moderate the relationship from antecedents to BMI, and the instrument will use Jaworski and Kohli (1993) scales, which are described in detail in chapter 4.2.1.5.

4.3 Data collection

4.3.1 Add supplementary items in questionnaire

To obtain the profile of questionnaire participants, this thesis added supplementary items to the questionnaire, as outlined below:

(1) The position of the questionnaire respondent was categorized into the following options: chairman or general manager, vice general manager, director or department manager, other technical or management position, and first-line employees.

(2) The number of employees for the questionnaire respondent was categorized into the following options: fewer than 10 workers, from 10 to 49 workers, from 50 to 249 workers, from 250 to 2000 workers, and above 2000 workers.

(3) The years of firm establishment of the questionnaire respondent were categorized into the following options: under three years, between three and six years, between six and ten years, and above ten years.

(4) The firm annual revenue of the questionnaire respondent was categorized into the following options: below 10 million RMB, from 10 to 50 million CNY, from 50 to 100 million CNY, from 100 million to 1 billion CNY, and above 1 billion CNY.

(5) Whether the firm has a research and development function or not, questionnaire respondents

(6) Add self-report items, such as "Please rate your confidence in answering this questionnaire," to ask the participant's level of attentiveness and engagement during the survey process (Ward & Meade, 2023).

4.3.2 Determine sample size

A commonly followed guideline for reliable PLS-SEM estimations, proposed by Barclay et al. (1995), recommends a required sample volume equivalent to ten times the highest quantity of paths directed towards any construct in the external model as well as the internal model (Hair et al., 2012). It offers a rough calculation for the required sample volume. This research follows up on this guideline. For the outer model (indicators to construct), the path number is 80 based on Figure 5.1, and for the inner model (relationships between constructs), the path number is 10 based on Figure 5.2. Thus, for this research, the minimum sample size is 900; actually, we collected 967 validated samples.

4.3.3 Conduct data collection

China's economic growth surged following its entry into the World Trade Organization (Pereira, 2020), and SMEs in China have a significant role as the backbone of the economy, as widely recognized by researchers (Muller et al., 2017). Additionally, SMEs are recognized as important contributors to innovation (Miroshnychenko et al., 2021). SMEs are increasingly recognized for their crucial role in economic growth and make up the majority of companies in China (Petti et al., 2017; Tommaso et al., 2012). Hence, this thesis focuses on SMEs in China to assess the antecedents, BMI, and outcomes.

Pilot test and improve the questionnaire. In this thesis, an initial test was performed to assess the effectiveness of the main contents of the scale. Additionally, an analysis was performed to evaluate the relevance, comprehensibility, and logic of the questionnaire. During the pilot test, we received 60 samples from the participant. We have received five questionnaire items for sentence improvement advice. And we also received advice to add self-report items, such as "Please rate your confidence in answering this questionnaire," to ask the participant's self-confidence level about the questionnaire response (Ward & Meade, 2023). Following the modifications made to the preliminary survey based on the findings from the initial test result, all the advice was adopted, and the related items in the questionnaire were improved. Then we developed the final version of the web-based scale using the Questionnaire Star platform.

Following adjustments according to the findings of the pilot test's original questionnaire, the completed web survey was designed using the Questionnaire Star platform. To attain our study objectives, the research data for our work was primarily acquired via the below sources:

(1) EMBA student and graduate, because most EMBA students and graduates take on top management roles and have good knowledge and managerial practice. Thus, they can provide

an exact response to the questionnaire from top executives. We are the selected EMBA association for the Xuanzang Road Gobi Challenge to distribute the questionnaire. The Xuanzang Road Gobi Challenge is a segmented multi-day cross-country long-distance race game (four days with a total of 121 kilometers) with famous business schools and brand companies as the main participants (Xuanzang Road Organizing Committee, 2023). In the past 18 years, the association has attracted 83 top Chinese business schools in the world, a total of 170 participating teams, and more than 30,000 top managers (Xuanzang Road Organizing Committee, 2023).

(2) MBA students and graduates, because most MBA students and graduates take middle-level management roles and have good knowledge and managerial practice. Thus, they can provide an exact response to the questionnaire from a middle-level management point of view. We have been selected by MBA China Southwest Alliance to distribute the questionnaire.

(3) Doctoral of Management students and graduates, because most of the students and graduates take on top management roles and have good knowledge and managerial practice. Thus, they can provide an exact response to the questionnaire from the point of view of top management. We have been given the questionnaire.

(4) Recommendations from familiar entrepreneurs made the sample range gradually expand, and the response percentage increased.

(5) From the email and instant messaging channels to distribute the questionnaire, between January 1 and April 30, 2023, a total of 1778 surveys were issued through the above-mentioned channels, resulting in the collection of 1352 samples with a response rate of 76.04%.

4.4 Addressing careless responses

Careless responses in questionnaire data could give rise to various psychological challenges. They can introduce inside group inaccuracy and declining reliability, leading to potential attenuation or strengthening of relationships (J. L. Huang et al., 2014). Furthermore, careless responses may strengthen the dangers of making type one or type two mistakes when testing hypotheses and adversely affect the effectiveness of factor analysis results (J. L. Huang et al., 2014). Notably, careless responding is widespread in surveys and assessments (Bowling et al., 2016; Meade & Craig, 2012). This issue holds the possibility of impacting the outcome of this study because it relies on questionnaires and assessments provided by individuals themselves, especially those conducted online (Ward & Meade, 2023).

In their recent work, Ward and Meade (2023) provided a comprehensive summary of

various typologies of methods aimed at identifying careless responses in survey data. The most common approach for dealing with careless responders, once identified, is to exclude them from the sample (Ward & Meade, 2023). We adopted invariability, fast responses, inconsistency, self-report, and outlier analysis to deal with careless responses, with details as below:

(1) Invariability: To identify invariable responses, one can employ various indices that assess invariability, such as the long string index or examining the repetition of selecting each indicator option (Ward & Meade, 2023). These indices help in detecting patterns of unchanging or repeated responses, which may indicate careless responses in the survey data. Survey responses with a frequency of each response value exceeding 80% were removed, resulting in the exclusion of 163 survey responses.

(2) Fast responses and careless responses may be associated with exceptionally fast survey response times. Respondents who provide responses at an extraordinarily rapid pace often face challenges in thoroughly reading, comprehending, and accurately answering the survey items (Ward & Meade, 2023). Employing a lower threshold of two seconds per item has proven to yield more accurate and reliable outcomes in recognizing careless reactions (Bowling et al., 2016). The questionnaire star platform can, by default, capture the total response time for all questionnaire items. Each item's average response time can be obtained by dividing the total response time by the total number of items in our survey. This thesis removed 72 careless participants whose average response time for each item was below 2 seconds in the survey.

(3) Inconsistency: the data on inconsistent careless responses do not align with the patterns one would expect built on a foundation of theory or logic, as well as the trends observed in the data (Ward & Meade, 2023). For example, if two factors are virtually the same or very similarly correlated, one would rationally anticipate very similar responses from all participants. However, inconsistent, careless responders tend to produce responses that do not meet the expected level of consistency in such situations. This thesis removed 36 careless participants survey data for inconsistency.

(4) Self-report: Additional items are used to ask the respondent’s level of attentiveness and engagement during the response activity, often accompanied by confidence that any study reward promised will be provided (Ward & Meade, 2023). These items can be single-item questions (e.g., "Were you careful in answering the survey?"). This thesis removed 35 survey data points for self-reporting.

(5) Outlier analysis: The Mahalanobis distance is a multidimensional outlier analysis approach that evaluates how much response data deviates from the sample in a multivariate space (De Maesschalck et al., 2000; Ward & Meade, 2023). The Mahalanobis distance can also

be effective in identifying various forms of careless responses. This includes cases where respondents may provide mid-range responses to avoid drawing attention, and such respondents may still be considered outliers for specific items when the majority of the sample has provided extreme responses (Ward & Meade, 2023). Mahalanobis distance is easy to calculate in most applications and can be computed for the survey result information, so this thesis uses IBM SPSS 26 to calculate the Mahalanobis distance by using the "linear regression" function and selecting the Mahalanobis option. Then we used the formula "1 - cdf.chisq (Mahalanobis distance, 80)" to calculate the chi-squared cumulative probability figure distributions with 80 proportions of freedom (80 scale items). This thesis adopted 0.001 cumulative probability as the threshold and removed 79 outlier surveys.

Summary: Out of a total of 1352 survey responses, 385 surveys were removed during the validation of the careless survey data. These exclusions were categorized as follows: 163 surveys were removed due to invariability in responses; 72 surveys were removed for fast response times; 36 surveys were removed due to inconsistencies in the responses; 35 surveys were removed based on self-report measures; and 79 surveys were removed through outlier analysis. After these exclusions, the final dataset consisted of 967 valid survey responses.

4.5 Chapter summary

This part delves into the research method conducted, outlining the survey design, data collection, and addressing careless responses in detail as below:

First, it presents the questionnaire for capturing the antecedents of BMI. This comprehensive questionnaire includes dimensions including RMO, PMO, STA, DC, TCO, TCT, ORA, INV, and MKT.

Second, the chapter presents the BMI questionnaire designed to capture data related to the actual BMI practices of the participating organizations.

Third, the chapter includes the firm performance questionnaire, which aims to measure the performance outcomes associated with BMI, including financial performance, market share, customer satisfaction, and competitive advantage.

Fourth, this chapter also discusses the process of sample determination and survey collection. It explains the criteria used to identify and select suitable participants, ensuring a representative sample that reflects the target population.

Fifth, for addressing careless responses, we adopted invariability, fast responses, inconsistency, self-report, and outlier analysis to deal with careless responses.

Chapter 5: Empirical Analysis

We introduce a comprehensive general view of the statistical assessment and examination that will be conducted. It includes a data analysis approach and tools, the use of SPSS for common statistical analysis, and the application of PLS-SEM for structural modeling. By employing these rigorous analytical techniques, the chapter facilitates the examination of relationships, mediation effects, and moderation effects among the variables, leading to valuable insights and findings.

5.1 Descriptive statistical and data validation

5.1.1 Data demographic characteristics

A total of 967 samples were obtained from Chinese-based SMEs through the questionnaire star platform, and the sample distribution was by positions, employee quantity, years of establishment, annual revenue, and research and development function in five categories (presented in Annex A, Table A11). Based on the responses to the survey, the details are as below:

(1) Here is the number of respondents by their respective positions: chairman or general manager has 199 respondents (20.58%), vice general manager has 105 respondents (10.86%), director or department manager has 208 respondents (21.51%), other technical or management positions have 217 respondents (22.44%), and first-line employees have 238 respondents (24.61%).

(2) Here is the number of respondents by their firm's respective employee quantity: less than 10 employees have 114 respondents (11.79%), from 10 to 49 employees have 266 respondents (27.51%), from 50 to 249 employees have 229 respondents (23.68%), from 250 to 2000 employees have 285 respondents (29.47%), and above 2000 employees have 73 respondents (7.55%). (3) Here is the number of respondents by their firm's respective years of establishment: less than 3 years have respondents 178 (18.41%), from 3 to 6 years have respondents 213 (22.03%), from 6 to 10 years have respondents 156 (16.13%), and above 10 years have respondents 420 (43.43%).

(4) Here is the number of respondents by their firm's respective annual revenue: below 10

million RMB have respondents 294 (30.40%), from 10 to 50 million RMB have respondents 215 (22.23%), from 50 to 100 million RMB have respondents 96 (9.93%), from 100 million to 1 billion RMB have respondents 276 (28.54%), and above 1 billion RMB have respondents 86 (8.89%).

(5) Here is the number of respondents by firm. Firms that have a research and development function have respondents of 686 (70.94%); firms that do not have a research and development function have respondents of 281 (29.06%).

Based on the responses to the survey, here are the top 10 provinces from which respondents came, which are Sichuan has 472 (48.81%) respondents, Guangdong has 235 (24.30%) respondents, Chongqing has 33 (3.41%) respondents, Shanghai has 31 (3.21%) respondents, Beijing has 26 (2.69%) respondents, Zhejiang has 23 (2.38%) respondents, Jiangxi has 18 (1.86%) respondents, Shaanxi has 15 (1.55%) respondents, Henan has 13 (1.34%) respondents, and Hunan has 13 (1.34%) respondents (presented in Annex A, Table A12).

5.1.2 Descriptive statistics of variables

We conducted descriptive statistics analysis for all variables in our PLS-SEM model with IBM SPSS 26.0. The analysis summaries are displayed in Table 5.1. That reports the descriptive statistics of each indicator, which include the following: (a) The total number of samples is 967; (b) Min and Max are 1 and 5; (c) the mean value and standard deviation value; and (d) the skewness and kurtosis values of each indicator fall into the interval from -1 to +1. If skewness or kurtosis values belong to the interval from -1 to +1, then they are indicative of normal data (Hair et al., 2021), so this sample dataset distribution is normal.

Table 5.1 Descriptive statistics of variables

Variables	Item	N	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
RMO	RMO1	967	1	5	3.790	0.822	-0.315	-0.168
	RMO2	967	1	5	3.840	0.840	-0.387	-0.082
	RMO3	967	1	5	3.690	0.945	-0.284	-0.490
	RMO4	967	1	5	3.920	0.870	-0.555	0.064
	RMO5	967	1	5	3.780	0.874	-0.439	-0.031
	RMO6	967	1	5	3.710	0.894	-0.435	-0.068
PMO	PMO1	967	1	5	3.780	0.857	-0.311	-0.288
	PMO2	967	1	5	3.690	0.849	-0.165	-0.452
	PMO3	967	1	5	3.750	0.864	-0.305	-0.262
	PMO4	967	1	5	3.710	0.830	-0.235	-0.312
	PMO5	967	1	5	3.730	0.820	-0.230	-0.284
	PMO6	967	1	5	3.740	0.926	-0.388	-0.279
	PMO7	967	1	5	3.620	0.916	-0.264	-0.375
	PMO8	967	1	5	3.670	0.858	-0.168	-0.468
STS	STS1	967	1	5	3.800	0.870	-0.388	-0.209
	STS2	967	1	5	3.760	0.872	-0.351	-0.121

	STS3	967	1	5	3.810	0.897	-0.409	-0.168
SLD	SLD1	967	1	5	3.770	0.866	-0.381	-0.101
	SLD2	967	1	5	3.820	0.856	-0.324	-0.383
	SLD3	967	1	5	3.790	0.892	-0.465	-0.014
SRF	SRF1	967	1	5	3.760	0.859	-0.324	-0.267
	SRF2	967	1	5	3.560	0.931	-0.158	-0.401
	SRF3	967	1	5	3.760	0.867	-0.449	0.026
SEN	SEN1	967	1	5	3.780	0.839	-0.163	-0.602
	SEN2	967	1	5	3.850	0.837	-0.459	0.101
	SEN3	967	1	5	3.730	0.874	-0.280	-0.371
	SEN4	967	1	5	3.920	0.796	-0.386	-0.096
	SEN5	967	1	5	3.880	0.864	-0.499	-0.017
	SEN6	967	1	5	3.780	0.843	-0.388	0.037
SEZ	SEZ1	967	1	5	3.780	0.847	-0.333	-0.259
	SEZ2	967	1	5	3.840	0.829	-0.396	-0.059
	SEZ3	967	1	5	3.780	0.917	-0.359	-0.354
	SEZ4	967	1	5	3.720	0.865	-0.471	0.229
TRN	TRN1	967	1	5	3.720	0.858	-0.245	-0.425
	TRN2	967	1	5	3.670	0.866	-0.290	-0.185
	TRN3	967	1	5	3.740	0.849	-0.394	0.159
	TRN4	967	1	5	3.690	0.858	-0.298	-0.228
	TRN5	967	1	5	3.770	0.871	-0.372	-0.184
	TRN6	967	1	5	3.720	0.842	-0.241	-0.308
ORA	ORA1	967	1	5	3.810	0.850	-0.430	0.046
	ORA2	967	1	5	3.750	0.830	-0.290	-0.267
	ORA3	967	1	5	3.800	0.865	-0.415	-0.063
	ORA4	967	1	5	3.830	0.920	-0.447	-0.246
	ORA5	967	1	5	3.750	0.822	-0.279	-0.134
TCO	TCO1	967	1	5	3.470	0.967	-0.255	-0.424
	TCO2	967	1	5	3.700	0.861	-0.231	-0.440
	TCO3	967	1	5	3.730	0.897	-0.365	-0.192
	TCO4	967	1	5	3.730	0.877	-0.293	-0.371
	TCO5	967	1	5	3.910	0.810	-0.287	-0.488
TCT	TCT1	967	1	5	3.790	0.848	-0.332	-0.168
	TCT2	967	1	5	3.780	0.870	-0.354	-0.207
	TCT3	967	1	5	3.850	0.816	-0.237	-0.443
	TCT4	967	1	5	3.760	0.883	-0.297	-0.366
	TCT5	967	1	5	3.640	0.772	-0.091	-0.169
INV	INV1	967	1	5	3.820	0.917	-0.462	-0.273
	INV2	967	1	5	3.800	0.855	-0.403	-0.110
	INV3	967	1	5	3.670	0.896	-0.377	-0.066
	INV4	967	1	5	3.560	0.936	-0.308	-0.195
	INV5	967	1	5	3.680	0.775	-0.121	-0.243
	INV6	967	1	5	3.740	0.886	-0.379	-0.160
VOI	VOI1	967	1	5	3.690	0.841	-0.257	-0.229
	VOI2	967	1	5	3.700	0.876	-0.335	-0.110
	VOI3	967	1	5	3.750	0.861	-0.364	-0.045
VAI	VAI1	967	1	5	3.740	0.819	-0.292	-0.213
	VAI2	967	1	5	3.820	0.895	-0.452	-0.217
	VAI3	967	1	5	3.760	0.855	-0.346	-0.081
	VAI4	967	1	5	3.690	0.884	-0.343	-0.146
RMI	RMI1	967	1	5	3.740	0.847	-0.372	-0.050
	RMI2	967	1	5	3.790	0.784	-0.138	-0.359
MKT	MKT1	967	1	5	3.740	0.853	-0.391	0.080
	MKT2	967	1	5	3.700	0.862	-0.290	-0.299

	MKT3	967	1	5	3.710	0.892	-0.419	-0.034
	MKT4	967	1	5	3.760	0.883	-0.409	-0.027
	MKT5	967	1	5	3.780	0.833	-0.395	0.154
	MKT6	967	1	5	3.730	0.823	-0.132	-0.521
	FMP1	967	1	5	3.680	0.865	-0.210	-0.377
	FMP2	967	1	5	3.620	0.926	-0.319	-0.253
FMP	FMP3	967	1	5	3.640	0.909	-0.211	-0.333
	FMP4	967	1	5	3.660	0.887	-0.395	0.029
	FMP5	967	1	5	3.730	0.910	-0.456	-0.058

5.1.3 Deal with common method bias

To improve the impact of common method bias (Podsakoff et al., 2003; Podsakoff & Organ, 1986) on research results, the thesis adopts Tehseen et al. (2017) suggestion for procedure control, already described in Chapter 4.1.2. This section describes using statistical control to reduce common-method bias after data gathering.

Harman's single-factor verification is the most widely adopted method, which is utilized to assess the common-method bias in research works by scholars (Tehseen et al., 2017). The method is a post-data collection procedure that is used to verify if a single factor is responsible for variations in the dataset or not (Chang et al., 2010). To conduct this assessment approach, all indicators from each latent variable are entered into factor analysis software to calculate whether a single variable manifests itself or results in the predominance of the covariance among the measurements. If the consequences do not reveal a single variable that predominantly explains the covariance, it suggests that the common method bias issue is likely infrequent in the research. (Chang et al., 2010). This thesis for a single factor test is conducted with principal component analysis in SPSS 26. The detailed steps are as below:

First, input all items of indicators of all latent constructs into the SPSS factor analysis function and execute the principal component analysis with the rotation (none) option in SPSS.

Second, check the generated output result, which revealed 10 distinct variables accounting for 60.336% of the total variance. The first unrotated factor achieved only 40.313% of the variance in the dataset. Details are in Table 5.2 (Extraction method: Principal component analysis.). The total variance explained shows The result meets two recommendations, which are that no single variable will be present from the factor analysis or that no special variable could explain most of the covariance (Chang et al., 2010). The findings demonstrated that common method bias values meet our research requirements.

Table 5.2 Total variance explained

Comp-onent	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	32.25	40.313	40.313	32.25	40.313	40.313
2	2.945	3.681	43.994	2.945	3.681	43.994
3	2.278	2.848	46.842	2.278	2.848	46.842
4	1.861	2.326	49.168	1.861	2.326	49.168
5	1.672	2.09	51.258	1.672	2.09	51.258
6	1.626	2.033	53.291	1.626	2.033	53.291
7	1.534	1.917	55.208	1.534	1.917	55.208
8	1.435	1.793	57.001	1.435	1.793	57.001
9	1.371	1.713	58.715	1.371	1.713	58.715
10	1.297	1.622	60.336	1.297	1.622	60.336
11	1.227	1.534	61.87	1.227	1.534	61.87
12	1.142	1.427	63.297	1.142	1.427	63.297
13	1.081	1.351	64.648	1.081	1.351	64.648
14	1.022	1.278	65.926	1.022	1.278	65.926
15	0.994	1.243	67.169			
16	0.908	1.134	68.303			
17	0.865	1.081	69.385			
18	0.812	1.015	70.399			
19	0.785	0.981	71.38			
20	0.741	0.926	72.307			

5.1.4 Deal with no response bias

To resolve the potential issue of non-response deviation, this research undertook a rigorous approach by meticulously comparing the demographic characteristics, specifically “position” and “R&D” (the product and service development function of the companies), of respondents who engaged with the survey in its early stages to those who participated later. This analytical method was chosen based on the recommendations of Armstrong and Overton (1977), who assert that individuals who respond to surveys at a later time might exhibit similarities to those who do not respond, in contrast to those who participate early. Shiau and Luo (2012) used this approach to conduct a non-response assessment in their research.

According to Shiau and Luo (2012), 60% of responses are early and 40% are late-stage responses based on response time sequence. Therefore, the participant pool was divided into two segments: 580 respondents who completed the survey during its initial phase were categorized as the early respondents (from 2023/1/22 to 2023/3/16), while 387 respondents who completed it during a subsequent phase were categorized as the later respondents (from 2023/3/17 to 2023/4/2). To ascertain the statistical importance of any distinctions between these two groups, a chi-square assessment was conducted. This assessment aimed to determine whether the distributions of “position” and “R&D” between the early and late respondents were significantly different. For the “position” chi-square statistic test, the asymptotic significance

(2-sided) p value is 0.183; for the "R&D" chi-square statistic test, the asymptotic significance (2-sided) p value is 0.281.

The outcome of the chi-square test revealed that there were no remarkable variations ($p > 0.05$) in terms of "position" and "R&D" between the two respondent groups. This result led to the reassuring conclusion that the responses both early and late remained significantly the same in these distribution aspects. Consequently, the probability of non-response to bias is effectively minor and acceptable (Garrison & Arbaugh, 2007). This analysis activity added credibility to the research by reinforcing confidence in the data's representativeness and minimizing the influence of non-response bias.

5.2 Determine method for PLS-SEM analysis

As a follow-up to Chapter 4.1.3, which describes the data analysis method for PLS-SEM, this section focuses on determining the specific analysis method, including the higher-order construct model analysis approach and the category of measurement model for each construct. The step provides a framework for using PLS-SEM to analyze the collected data.

5.2.1 Higher order construct for PLS-SEM

Higher-order construct models (Sarstedt et al., 2019) or hierarchical component models (Lohmöller, 2013) enrich PLS-SEM, which provide a research method for scholars to create a construct on an abstraction conception (higher-order latent variables) and its more specific conception (lower-order latent variables) (Sarstedt et al., 2019). To implement higher-order constructs, researchers should handle the following three approaches:

(1) To implement a higher-order latent variable in PLS-SEM, scholars should decide on two items: one is to specify the low-order latent variable measurement model, and another is to specify the higher-order latent variable measurement model (also known as the connection from the higher-order to its lower-order latent variables) (Wetzels et al., 2009). Each of these could be reflective or formative, according to the properties of the latent variables. Thus, scholars have proposed four types of higher-order construct models: reflective to reflective, reflective to formative, formative to reflective, and formative to formative (Becker et al., 2012; Sarstedt et al., 2019).

(2) Choose a type of method to identify the higher-order latent variables, including the repeated indicator method and the two-stage method (Hair et al., 2017). The two-stage method proposes two types: one is an embedded two-stage method (Ringle et al., 2012), and another is

a disjoint two-stage method (Becker et al., 2012).

In stage one of the disjoint two-stage approach, only implement the lower-order latent variable and its indicators in the structural model, which are directly linked to all other latent variables that the higher-order latent variable is logically connected to (Sarstedt et al., 2019). Then run the PLS-SEM algorithm for stage one structure mode and create a new dataset with original components (also called indicators) and latent variables; the latent variables could be higher-order constructs' indicators that could be used to measure the higher-order latent variables. In stage two of the disjoint two-stage approach, some lower-order latent variables will become higher-order constructs' components (called latent components), and other remainder lower-order constructs will keep their lower-order status in the new structure model, so in the new structure model, lower-order constructs are combined with higher-order constructs (Sarstedt et al., 2019).

It should be noted that in the PLS-SEM, the terms component and indicator, latent variable, and construct all have the same meaning.

(3) Conduct both lower- and higher-order latent variable measurement and model quality evaluation (Sarstedt et al., 2019).

This thesis adopted a disjointed two-stage approach and will follow up on the above-mentioned suggestion for following PLS-SEM analysis.

5.2.2 Determine measurement model

5.2.2.1 Using criteria to determine measurement model

Currently, there are two fundamental measurement models available to researchers for assessing latent variables in PLS-SEM: reflective and formative measurement models (Sarstedt et al., 2021). Depending on the specifications of the PLS-SEM measurement model, researchers could use an approach that is either reflective, formative, or a combination of both (Sarstedt et al., 2022). Hanafiah et al. (2020) have provided criteria for determining the appropriate measurement model for each construct, as presented in Annex A, Table A13. These criteria are outlined for both reflective and formative models as follows:

(1) Determine Criteria 1: cause-and-effect direction. Reflective model: The causal relationship direction is from the construct to its indicators; Formative model: The causal relationship direction is from the indicators to the construct.

Determine Criteria 1a: indicator-construct relationship. Reflective model: indicators reflect the construct; Formative model: indicators define different aspects of the construct.

Determine Criteria 1b: induced construct change, reflective model: changes in indicators will not induce an alteration in the latent variable; formative model: an alteration in indicators will induce an alteration in the latent variable.

Determine Criteria 1c: induced indicator change, reflective model: an alteration in the latent variable will induce an alteration in the indicators; formative model: an alteration in the latent variable will not induce an alteration in the indicators.

(2) Determine Criteria 2: indicator interchangeability. Reflective: indicators can be exchangeable; Formative model: indicators do not need to be interchangeable.

Determine Criteria 2a: indicator content and theme. Reflective model: indicators share some similar content and a common thread. Formative indicators do not require similar content or a common theme.

Determine Criteria 2b: impact of indicator deletion. Reflective model: Deleting one indicator will not impact the construct definition; Formative model: Deleting one indicator will impact the construct definition.

(3) Determine Criteria 3: indicator correlation. Reflective model: indicators should exhibit high correlation; Formative model: Indicators do not need to exhibit correlation.

Determine Criteria 3a: indicator interdependence; reflective model: changing an indicator will lead to modifications in others; formative model: changing an indicator will not induce modifications in other indicators.

(4) Determine Criteria 4: nomological theory and causality. Reflective model: indicators need to exhibit the same cause-and-effect relationships; Formative model: indicators do not need to exhibit the same cause-and-effect relationships.

These criteria aid researchers in selecting the appropriate measurement model for each construct within the PLS-SEM framework.

5.2.2.2 Using CTA to determine measurement model

The confirmatory tetrad analysis in PLS-SEM offers a statistical assessment for validating the selection of the measurement model (Sarstedt et al., 2022). They suggested a guideline for using confirmatory tetrad analysis results (CI index) to determine the measurement model. These details are: (1) if all values of CI Low adjust and CI Up adjust from negative to negative, or from positive to positive, can be determined as a formative measurement model; (2) if one or more values of CI Low adjust and CI Up adjust from negative to positive, or from positive to negative, can be determined as a reflective measurement model (Kono et al., 2021). This thesis used criteria, CTA, and literature to select each construct-measure model.

First, we have run CTA for constructs whose count of indicators equals or exceeds 4, including RMO, PMO, SEN, SEZ, TRN, ORA, TCO, INV, MKT, TCT, and FMP constructs that meet the reflective model guideline (presented in Annex A, Table A14).

Second, three constructs, VOI, VAI, and RMI, which belong to the higher-order construct of BMI, were defined as formative by Spieth and Schneider (2016), so this thesis follows this determination. Third, all 17 lower-order latent variables and three higher-order latent variables used criteria to define the measurement model.

Additionally, this thesis has been conducted to determine measurement model tasks for higher-order constructs DC (latent indicators are SEN, SEZ, and TRN) and STA (latent indicators are STS, SLD, and SRF) based on criteria described in Chapter 5.2.2.1. All the higher-order constructs DC, STA, and BMI determine measurement models as formative. As a summary, measurement determination consequences are displayed in Table 5.3.

Table 5.3 Determination of lower order measurement models

Constructs	By CTA	By Criteria	By Literature	Results
RMO	Yes	Yes		Reflective
PMO	Yes	Yes		Reflective
STS		Yes		Reflective
SLD		Yes		Reflective
SRF		Yes		Reflective
SEN	Yes	Yes		Reflective
SEZ	Yes	Yes		Reflective
TRN	Yes	Yes		Reflective
ORA	Yes	Yes		Reflective
TCO	Yes	Yes		Reflective
INV	Yes	Yes		Reflective
VOI		Yes	Yes	Formative
VAI		Yes	Yes	Formative
RMI		Yes	Yes	Formative
MKT	Yes	Yes		Reflective
TCT	Yes	Yes		Reflective
FMP	Yes	Yes		Reflective
DC		Yes		Formative
STA		Yes		Formative
BMI		Yes	Yes	Formative

5.3 First stage for lower order structure model

As a follow-up disjoint two-stage method for higher-order latent variables in PLS-SEM, stage one will implement lower-order component assessment according to the structure model, which draws direct connections from 13 antecedents to 3 constructs of BMI and from 3 constructs of BMI to FMP. Note that higher-order constructs were not presented in this stage-path model. Thus, this section does the following tasks:

(1) Crate stage one PLS path model, implement PLS-SEM algorithm calculation, create a new dataset, and detail as in chapters 5.3.1.

(2) Conduct a reflective measurement model evaluation, as detailed in chapters 5.3.2.

(3) Conduct a formative measurement model evaluation in detail, as described in chapters 5.3.3.

(3) Conduct a structural model evaluation for the BMI effect on firm performance in chapters 5.3.4.

5.3.1 Implement algorithm and bootstrap of PLS-SEM

As chapter 5.2 describes, this thesis adopted a disjointed two-stage method. In the first stage, we will conduct a measurement model evaluation for all lower-order constructs and their indicators. Table 5.3 shows the latent variable measurement models.

Latent variables RMO, PMO, STS, SLD, SRF, SEN, SEZ, TRN, ORA, TCO, INV, MKT, TCT, and FMP are set as reflective measurement models. Latent variables VOI, VAI, and RMI are set as formative measurement models. Implement the idea that lower-order latent variables are connected to the remaining other latent variables that the higher-order latent variables are logically connected to (Sarstedt et al., 2019). According to the provided conceptional model in Chapter 3, each latent variable (RMO, PMO, STS, SLD, SRF, SEN, SEZ, TRN, ORA, TCO, INV, MKT, and TCT) directly links to each BMI construct (VOI, VAI, and RMI), and each BMI construct (VOI, VAI, and RMI) links to FMP.

As shown below in Figure 5.1, the antecedents of BMI represent the latent variables RMO, PMO, STS, SLD, SRF, SEN, SEZ, TRN, ORA, TCO, INV, MKT, and TCT. These latent variables, whose direction of the arrow points to each of their indicators, set the measurement model as reflective. Same with FMP; the direction of the arrow points to each of its indicators, which is also reflective. BMI has three constructs: VOI, VAI, and RMI; each indicator's direction of arrow points to its construct, meaning it sets the measurement model as formative.

We have implemented the PLS-SEM algorithm calculation function through Smart PLS 4, with the following condition settings: weighting scheme is path, type of results is standardized, and initial weight is default. In this algorithm result, we have created a new dataset with original component data and new latent variable data. The new latent variable will be used for components in higher-order constructs.

To establish confidence intervals for parameter loadings, weights, and AVE, we employed the bootstrapping calculation function within Smart PLS 4. The configuration parameters for this process were as follows: 5000 subsamples, complete result aggregation, percentile

bootstrapping for confidence intervals, two-tailed test type, significance level set at 0.05, and a fixed seed for the random number generator.

The lower-order structure model chart is displayed in Figure 5.1.

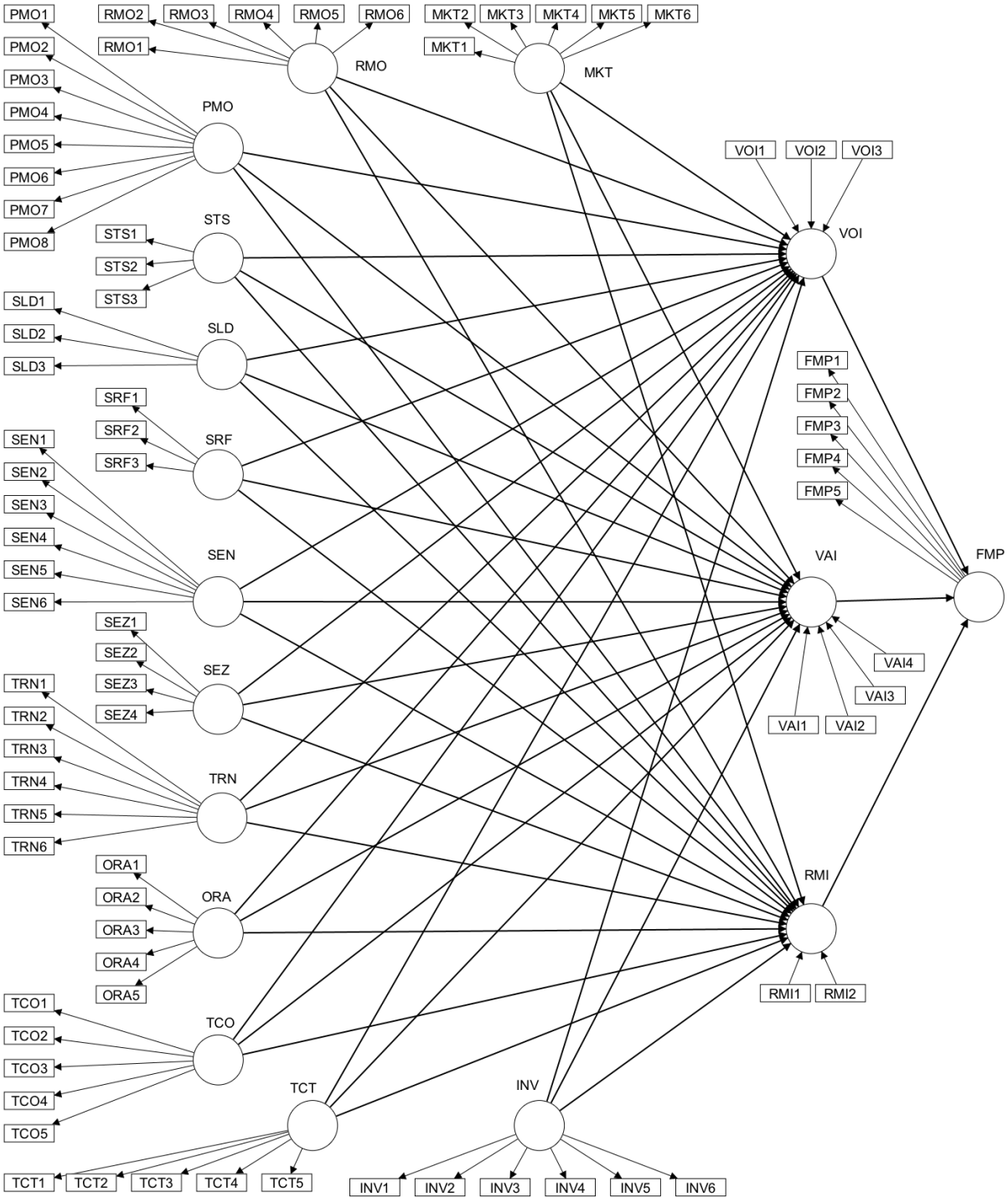

Figure 5.1 Original model for BMI in first stage

5.3.2 Reflective measurement models assessment

Reflective measurement model evaluation will follow Hair et al. (2019) proposed methods, which include: (1) reflective indicator loadings, detailed in chapter 5.3.2.1; (2) internal consistency reliability, detailed in chapter 5.3.2.2; (3) convergence validity, detailed in chapter 5.3.2.3; and (4) discriminant validity. detail as in chapter 5.3.2.4.

5.3.2.1 Reflective Indicator loadings

The indicator loadings presented in Table 5.4 all exceed 0.708, meeting the threshold summarized by Hair et al. (2019). This criterion suggests that the latent variables, or constructs, account for over 50 percent of the variance in the components, thereby indicating satisfactory reliability.

Table 5.4 Indicator loadings

Variables	Indicators	Loadings	Mean	STDEV	T Value	95% confidence intervals
FMP	FMP1	0.797	0.797	0.016	50.463	[0.765, 0.826]
	FMP2	0.854	0.854	0.010	85.327	[0.833, 0.872]
	FMP3	0.858	0.858	0.010	89.817	[0.838, 0.876]
	FMP4	0.827	0.828	0.012	70.294	[0.804, 0.850]
	FMP5	0.839	0.839	0.011	79.090	[0.818, 0.859]
INV	INV1	0.793	0.792	0.016	49.863	[0.759, 0.822]
	INV2	0.827	0.827	0.011	72.315	[0.803, 0.848]
	INV3	0.809	0.808	0.012	66.904	[0.784, 0.832]
	INV4	0.770	0.770	0.014	53.513	[0.741, 0.796]
	INV5	0.881	0.881	0.008	116.846	[0.866, 0.895]
	INV6	0.777	0.776	0.015	52.036	[0.746, 0.804]
MKT	MKT1	0.820	0.820	0.012	70.555	[0.796, 0.842]
	MKT2	0.759	0.759	0.015	49.816	[0.727, 0.787]
	MKT3	0.734	0.733	0.019	39.408	[0.694, 0.768]
	MKT4	0.750	0.750	0.020	37.227	[0.708, 0.788]
	MKT5	0.794	0.794	0.014	57.115	[0.765, 0.820]
	MKT6	0.752	0.752	0.018	40.935	[0.714, 0.786]
ORA	ORA1	0.820	0.820	0.013	64.491	[0.793, 0.844]
	ORA2	0.830	0.830	0.012	70.457	[0.806, 0.853]
	ORA3	0.779	0.779	0.014	54.931	[0.75, 0.8050]
	ORA4	0.740	0.740	0.018	40.721	[0.702, 0.773]
	ORA5	0.830	0.830	0.011	74.082	[0.807, 0.851]
PMO	PMO1	0.778	0.778	0.014	55.910	[0.750, 0.804]
	PMO2	0.782	0.781	0.014	55.825	[0.752, 0.808]
	PMO3	0.799	0.799	0.013	60.961	[0.772, 0.823]
	PMO4	0.791	0.791	0.012	63.531	[0.765, 0.814]
	PMO5	0.801	0.800	0.013	59.357	[0.773, 0.825]
	PMO6	0.736	0.736	0.016	47.114	[0.703, 0.766]
	PMO7	0.721	0.721	0.017	43.104	[0.687, 0.753]
	PMO8	0.811	0.811	0.012	68.952	[0.787, 0.833]
RMI	RMI1	0.890	0.889	0.019	48.073	[0.851, 0.922]

	RMI2	0.911	0.910	0.018	50.677	[0.872, 0.943]
	RMO1	0.792	0.792	0.014	57.911	[0.765, 0.817]
	RMO2	0.796	0.797	0.014	58.743	[0.769, 0.822]
RMO	RMO3	0.715	0.715	0.019	37.494	[0.676, 0.751]
	RMO4	0.761	0.761	0.016	47.093	[0.728, 0.791]
	RMO5	0.759	0.759	0.016	47.486	[0.725, 0.788]
	RMO6	0.783	0.783	0.014	54.618	[0.754, 0.810]
	SEN1	0.820	0.820	0.011	72.302	[0.798, 0.841]
	SEN2	0.818	0.818	0.012	70.140	[0.795, 0.840]
SEN	SEN3	0.824	0.824	0.012	67.999	[0.798, 0.846]
	SEN4	0.800	0.800	0.013	63.088	[0.774, 0.824]
	SEN5	0.744	0.744	0.017	43.494	[0.708, 0.775]
	SEN6	0.814	0.814	0.012	65.433	[0.787, 0.837]
	SEZ1	0.799	0.799	0.015	54.821	[0.769, 0.826]
SEZ	SEZ2	0.811	0.811	0.013	60.382	[0.783, 0.835]
	SEZ3	0.789	0.789	0.016	50.225	[0.756, 0.817]
	SEZ4	0.814	0.813	0.013	60.463	[0.785, 0.838]
	SLD1	0.849	0.849	0.011	80.778	[0.827, 0.868]
SLD	SLD2	0.832	0.831	0.013	65.407	[0.805, 0.855]
	SLD3	0.830	0.830	0.012	68.183	[0.805, 0.853]
	SRF1	0.851	0.850	0.011	80.760	[0.828, 0.869]
SRF	SRF2	0.793	0.793	0.014	56.100	[0.765, 0.819]
	SRF3	0.842	0.842	0.013	66.117	[0.814, 0.865]
	STS1	0.823	0.824	0.013	65.124	[0.797, 0.846]
STS	STS2	0.858	0.858	0.011	81.269	[0.836, 0.877]
	STS3	0.833	0.833	0.013	64.778	[0.806, 0.857]
	TCO1	0.706	0.706	0.020	34.562	[0.664, 0.744]
	TCO2	0.837	0.837	0.011	79.167	[0.815, 0.856]
TCO	TCO3	0.735	0.734	0.019	38.846	[0.695, 0.769]
	TCO4	0.874	0.874	0.008	104.378	[0.857, 0.890]
	TCO5	0.859	0.859	0.009	98.198	[0.841, 0.876]
	TCT1	0.797	0.796	0.014	58.626	[0.768, 0.822]
	TCT2	0.835	0.835	0.011	77.375	[0.812, 0.855]
TCT	TCT3	0.863	0.863	0.009	91.269	[0.843, 0.880]
	TCT4	0.838	0.839	0.010	84.909	[0.819, 0.857]
	TCT5	0.866	0.866	0.009	91.416	[0.846, 0.883]
	TRN1	0.810	0.810	0.012	67.675	[0.786, 0.833]
	TRN2	0.781	0.781	0.015	52.053	[0.751, 0.809]
TRN	TRN3	0.785	0.785	0.014	55.738	[0.756, 0.811]
	TRN4	0.813	0.813	0.012	69.026	[0.789, 0.835]
	TRN5	0.784	0.784	0.015	52.783	[0.753, 0.812]
	TRN6	0.815	0.815	0.012	66.174	[0.789, 0.838]
	VAI1	0.786	0.785	0.025	31.051	[0.733, 0.832]
VAI	VAI2	0.831	0.829	0.020	41.114	[0.788, 0.867]
	VAI3	0.845	0.843	0.019	45.581	[0.805, 0.877]
	VAI4	0.868	0.867	0.017	51.473	[0.831, 0.898]
	VOI1	0.813	0.811	0.024	33.646	[0.762, 0.857]
VOI	VOI2	0.854	0.853	0.022	38.118	[0.808, 0.895]
	VOI3	0.853	0.852	0.021	40.103	[0.809, 0.891]

5.3.2.2 Internal consistency reliability

For evaluating internal consistency reliability, a commonly used approach is the utilization of composite reliability, as proposed by Jöreskog (1971). This involves considering Cronbach's

alpha as the low threshold, composite reliability (ρC) as the high threshold, and composite reliability (ρA) as the optimal point of assessment for internal consistency reliability. The recommended range for these three measures is set between 0.70 and 0.95 (Hair et al., 2021; Sarstedt et al., 2022). Based on Hair et al. (2019), values ranging from 0.60 to 0.70 are acknowledged as "acceptable in exploratory research," values ranging from 0.70 to 0.90 are acknowledged as "satisfactory to good," and values above 0.95 are concerning as they propose item superfluity. As indicated in Table 5.5, the composite reliability results for all variables range between 0.772 and 0.923, falling within the satisfactory to good range and meeting the established thresholds.

Table 5.5 Variable reliability

Variables	Cronbach's alpha	Composite Reliability (ρA)	Composite reliability (ρC)	Meet the threshold?
FMP	0.892	0.893	0.920	Yes
INV	0.895	0.896	0.920	Yes
MKT	0.861	0.864	0.896	Yes
ORA	0.859	0.862	0.899	Yes
PMO	0.906	0.906	0.924	Yes
RMO	0.861	0.863	0.896	Yes
SEN	0.890	0.891	0.916	Yes
SEZ	0.817	0.818	0.879	Yes
SLD	0.786	0.787	0.875	Yes
SRF	0.772	0.772	0.868	Yes
STS	0.788	0.788	0.876	Yes
TCO	0.862	0.872	0.902	Yes
TCT	0.896	0.898	0.923	Yes
TRN	0.886	0.886	0.913	Yes

5.3.2.3 Convergent validity

The reflective measurement approach necessitates the evaluation of convergent validity for each latent variable. Convergent validity gauges the level to which latent variables converge to elucidate the variance of their respective indicators (Hair et al., 2019). This evaluation selects the average variance extracted (AVE), with a criterion AVE figure of 0.50 or higher proving that the variable substitutes a minimum of 50% of the variance. As demonstrated in Table 5.6, all AVE results fall within the range of 0.590 to 0.706, satisfying the specified criterion.

Table 5.6 Average variance extracted (AVE)

Variable	AVE	STDEV	T Value	95% confidence intervals
FMP	0.698	0.011	61.066	[0.675, 0.720]
INV	0.657	0.012	55.577	[0.633, 0.679]
MKT	0.591	0.013	46.609	[0.566, 0.615]
ORA	0.641	0.013	48.912	[0.615, 0.666]
PMO	0.605	0.013	47.990	[0.580, 0.630]
RMO	0.590	0.013	44.283	[0.564, 0.616]
SEN	0.646	0.012	55.285	[0.622, 0.669]
SEZ	0.645	0.013	51.546	[0.621, 0.670]

SLD	0.700	0.013	54.999	[0.676, 0.725]
SRF	0.687	0.013	52.753	[0.660, 0.712]
STS	0.703	0.013	55.298	[0.677, 0.727]
TCO	0.648	0.012	55.743	[0.625, 0.670]
TCT	0.706	0.011	61.938	[0.683, 0.727]
TRN	0.637	0.013	50.839	[0.613, 0.662]

5.3.2.4 Discriminant validity

To evaluate discriminant validity, the Heterotrait-Monotrait (HTMT) proportion of correlation introduced by Hair et al. (2019) is employed, which adopted the recommendations of Henseler et al. (2015). The prescribed thresholds are as follows: (1) For conceptual similarity latent variables: HTMT < 0.90; (2) For conceptual dissimilarity latent variables: HTMT < 0.85; and (3) Test HTMT significance against the threshold. In the scope of this thesis, the HTMT range falls between 0.600 and 0.777, thereby demonstrating that all latent variables integrated into the model satisfy HTMT-based discriminant validity. The detailed HTMT data is presented in Table 5.7.

Smart PLS 4 provides a comprehensive Fornell-Larcker criterion report, an approach introduced by Fornell and Larcker (1981). This criterion posits that the square root of the AVE value for a latent variable should exceed the correlation of that latent variable with each other latent variable in a path model. The Fornell-Larcker evaluation data is presented in the lower triangular matrix format, with the angle bisector representing the square root of AVE values. All inter-construct correlation values are situated below the AVE values in this matrix, affirming the model's strong Fornell-Larcker criterion-based discriminant validity (presented in Annex A, Table A15).

Furthermore, for evaluating discriminant validity, cross-loadings (presented in Annex A, Table A16) are employed as proposed by Sarstedt et al. (2022). The factor loadings (highlighted in bold) of measurement indicators pertaining to each latent variable significantly outweigh the cross-factor loadings observed with other latent variables.

Consequently, this research effectively demonstrates robust discriminant validity, as corroborated by the HTMT ratio, Fornell-Larcker evaluation, and cross-loading analysis.

Table 5.7 Heterotrait-monotrait ratio (HTMT)

	FMP	INV	MKT	ORA	PMO	RMO	SEN	SEZ	SLD	SRF	STS	TCO	TCT	TRN
FMP														
INV	0.687													
MKT	0.662	0.688												
ORA	0.611	0.664	0.607											
PMO	0.685	0.690	0.739	0.686										
RMO	0.637	0.671	0.699	0.736	0.727									
SEN	0.636	0.650	0.664	0.682	0.687	0.701								
SEZ	0.675	0.709	0.747	0.703	0.715	0.737	0.722							
SLD	0.652	0.674	0.684	0.709	0.696	0.704	0.708	0.724						
SRF	0.665	0.707	0.690	0.724	0.739	0.743	0.731	0.714	0.754					
STS	0.670	0.733	0.696	0.741	0.720	0.755	0.734	0.773	0.762	0.759				
TCO	0.626	0.605	0.636	0.557	0.622	0.626	0.600	0.585	0.553	0.621	0.606			
TCT	0.666	0.619	0.688	0.612	0.723	0.608	0.657	0.652	0.632	0.739	0.655	0.625		
TRN	0.691	0.681	0.721	0.728	0.756	0.716	0.700	0.729	0.738	0.777	0.753	0.632	0.686	

5.3.3 Formative measurement models assessment

For formative measurement model assessment, this thesis follows up on Hair et al. (2012) proposal of assessment items that are indicator weights and collinearities with the variance inflation factor (VIF).

5.3.3.1 Indicator weight assessment

This thesis follows Sarstedt et al. (2022) suggestion to assess formative indicator weights, as detailed below in Table 5.8. Each indicator's weight falls into 95% confidence intervals without excluding zero, T values, or P values, which are significant. The formative indicators meet the weighted assessment requirement.

Table 5.8 Indicators weights

Variable	Indicators	Weights	95% confidence intervals	STDEV	T values	P values
VOI	VOI1	0.373	[0.289, 0.454]	0.043	8.728	0.000
	VOI2	0.397	[0.305, 0.491]	0.047	8.486	0.000
	VOI3	0.420	[0.332, 0.504]	0.044	9.459	0.000
VAI	VAI1	0.215	[0.140, 0.297]	0.039	5.485	0.000
	VAI2	0.302	[0.224, 0.380]	0.039	7.675	0.000
	VAI3	0.303	[0.225, 0.379]	0.039	7.726	0.000
	VAI4	0.373	[0.295, 0.450]	0.040	9.418	0.000
RMI	RMI1	0.527	[0.434, 0.615]	0.047	11.273	0.000
	RMI2	0.583	[0.494, 0.668]	0.045	13.062	0.000

5.3.3.2 Collinearity assessment

Sarstedt et al. (2022) suggested using the variance inflation factor (VIF) to validate collinearity for formative measurement model items. The VIF thresholds are that if VIF is below or equal to 3, it should be considered to have no collinearity issues; if VIF is from 3 to 5, it should be considered to have possible collinearity issues; and if VIF is equal to or above 5, it should be considered to have critical collinearity issues. The three formative constructs, VOI, VAI, and RMI, which are used to measure BMI, have all their indicators' VIF values below 3, as shown in Table 5.9. Thus, all formative indicators of VIF occur with low probability.

Table 5.9 VIF for each formative indicator

Constructs	Indicators	VIF
VOI	VOI1	1.574
	VOI2	1.775
	VOI3	1.700
VAI	VAI1	1.852
	VAI2	1.924
	VAI3	2.029
	VAI4	2.023
RMI	RMI1	1.632
	RMI2	1.632

There is also a validated inner model VIF valve, as detailed in Table 5.10. All the inner model VIFs are below threshold 3 and in good condition.

Table 5.10 Variance inflation factor (VIF) of inner model

	FMP	RMI	VAI	VOI
INV		2.282	2.282	2.282
MKT		2.393	2.393	2.393
ORA		2.297	2.297	2.297
PMO		2.769	2.769	2.769
RMI	1.920			
RMO		2.487	2.487	2.487
SEN		2.365	2.365	2.365
SEZ		2.374	2.374	2.374
SLD		2.137	2.137	2.137
SRF		2.340	2.340	2.340
STS		2.386	2.386	2.386
TCO		1.815	1.815	1.815
TCT		2.266	2.266	2.266
TRN		2.740	2.740	2.740
VAI	2.119			
VOI	1.992			

In addition, other reflective indicators were validated using VIF (variance inflation factor) values (presented in Annex A, Table A17). Most of the indicators exhibited VIF values below 3, indicating acceptable levels of multicollinearity. However, three indicators, namely TCO4, INV5, and TCT5, had VIF values falling within the range of 3 to 5, which is slightly higher but still within an acceptable threshold.

5.3.4 Structural model evaluation for BMI effect on firm performance

Spieth and Schneider (2016) proposed that BMI contain three constructs, which are VOI, VAI, and RMI. We developed nine formative indicators for these three constructs and a two-layer formative measurement model to evaluate relationships: (1) between the nine indicators and the three latent variables (described in Chapter 5.3.3) for lower order, and (2) between the three latent variables and BMI (described in Chapter 5.4.1) for higher order. This section will assess the relationship between three latent variables and firm performance.

To conduct this evaluation task, we can only put the analysis in stage one of the disjoint two-stage method as described in Chapter 5.2.1. For path coefficients and R^2 theory, criteria, or threshold introductions, refer to chapters 5.4.2.2 and 5.4.2.3.

As below, Table 5.11 indicated that RMI (Path coefficient = 0.201, 95% confidence intervals = [0.201, 0.037], t = 5.463, P < 0.01), VAI (Path coefficient = 0.352, 95% confidence intervals = [0.352, 0.038], t = 9.286, P < 0.01), and VOI (Path coefficient = 0.201, 95% confidence intervals = [0.201, 0.038], t = 5.252, P < 0.01) denote a positive and significant

correlation to BMI.

Table 5.11 First stage path coefficients

Items	Path coefficients	STDEV	95% confidence intervals	T values	P values
RMI -> FMP	0.201	0.037	[0.201, 0.037]	5.463	0.000
VAI -> FMP	0.352	0.038	[0.352, 0.038]	9.286	0.000
VOI -> FMP	0.201	0.038	[0.201, 0.038]	5.252	0.000

Based on the above description, the hypothesis test result is as below:

Passed hypothesis H8a test: The VOI in BMI demonstrates a positive influence on firm performance for SMEs.

Passed hypothesis H8b test: VAI in BMI demonstrates a positive influence on firm performance for SMEs.

Passed hypothesis H8c test: RMI in BMI demonstrates a positive influence on firm performance for SMEs.

As Table 5.12 shows, BMI's constructs (VOI, VAI, and RMI) have an R^2 value above the 0.5 threshold and can be considered moderate; the FMP R^2 value is 0.438, which meets the 0.333 threshold and can be considered to have high explanatory relevance.

Table 5.12 First stage R^2 of the endogenous construct

Items	R^2	STDEV	95% confidence intervals	T values	P values
FMP	0.438	0.026	[0.438, 0.026]	16.712	0.000
RMI	0.508	0.024	[0.508, 0.024]	21.304	0.000
VAI	0.605	0.022	[0.605, 0.022]	27.319	0.000
VOI	0.523	0.024	[0.523, 0.024]	21.934	0.000

The f^2 effect size is redundancy to measuring the path coefficients (Hair et al., 2019); more precisely, when conducting predictor constructs explaining dependent constructs, the rank order is usually the same while comparing the values of the path coefficients and the f^2 magnitude of effects. The f^2 magnitude of effects explains the representation of partial or complete mediation (Nitzl et al., 2016). As a general guideline, values greater than 0.02 account for small effects, 0.15 account for medium effects, and 0.35 account for large f^2 magnitudes of effects (Cohen, 1992). As Table 5.13 indicated, the f^2 magnitude of the effects of VOI, VAI, and RMI on FMP falls into the 0.02 to 0.15 interval, thus they are medium f^2 effect sizes.

Table 5.13 First stage f^2 magnitude of effects of the endogenous path

Items	f^2	STDEV	95% confidence intervals	T values	P values
RMI -> FMP	0.038	0.014	[0.038, 0.014]	2.616	0.009
VAI -> FMP	0.104	0.025	[0.104, 0.025]	4.178	0.000
VOI -> FMP	0.036	0.015	[0.036, 0.015]	2.469	0.014

5.4 Second stage for higher order structure model

As Figure 5.2 shows, we have implemented the PLS-SEM algorithm calculation function through Smart PLS 4, with the following condition settings: weighting scheme is path, type of results is standardized, and initial weight is default. In this algorithm result, we have created a new dataset with original component data and new latent variable data. The new latent variable will be used for components in higher-order constructs.

To get the confidence interval of parameter loadings, weights, and AVE, we have implemented the PLS-SEM bootstrapping calculation function through Smart PLS 4, with the following condition settings: Subsamples are 5000, the number of results is complete, the confidence interval method is percentile bootstrapping, the test type is two-tailed, the significance level is 0.05, and the random number generator is a fixed seed.

5.4.1 Measurement model evaluation

In stage two, only assess three new higher-order constructs, which are DC, STA, and BMI. DC has three latent variables: LV SEN, LV SEZ, and LV TRN. STA has three latent variables: LV SLD, LV SRF, and LV STS. BMI has three latent variables: LV VOI, LV VAI, and LV RMI. For formative measurement model assessment, this thesis follows up on Hair et al. (2012) proposal of assessment items that are indicator weights and collinearities with the variance inflation factor (VIF).

5.4.1.1 Latent indicators weight

This thesis follows Sarstedt et al. (2022) suggestion to assess formative indicator weights in detail. Each latent indicator's weight falls into 95% confidence intervals without including zero, T values, or P values. The formative indicators meet the weighted assessment requirement. Additionally, indicator loading is not recommended by Hair et al. (2012) for evaluating the formative model but is still used to determine which indicators should be eliminated while both weight and loading are unsignificant (Hair et al., 2021). It is shown that all of the indicator loading is above 0.708, which is the criteria summarized by Hair et al. (2019), showing that latent variables (or constructs) account for over 50% of the component's variance, hence allowing for satisfactory reliability (presented in Annex A, Table A18).

This thesis evaluated the weights of formative indicators, as illustrated in Table 5.14 below.

Table 5.14 Latent indicators outer weights

Variables	Latent indicators	Weights	95% confidence intervals	STDEV	T values	P values
DC	LV SEN	0.261	[0.185, 0.336]	0.039	6.731	0.000
	LV SEZ	0.409	[0.337, 0.481]	0.037	10.947	0.000
	LV TRN	0.482	[0.408, 0.552]	0.037	12.934	0.000
STA	LV SLD	0.403	[0.323, 0.479]	0.040	9.991	0.000
	LV SRF	0.283	[0.207, 0.357]	0.038	7.479	0.000
	LV STS	0.479	[0.398, 0.555]	0.040	12.065	0.000
BMI	LV VOI	0.325	[0.259, 0.387]	0.033	9.844	0.000
	LV VAI	0.505	[0.444, 0.567]	0.032	16.005	0.000
	LV RMI	0.311	[0.243, 0.377]	0.034	9.190	0.000

5.4.1.2 Collinearity statistics

Sarstedt et al. (2022) suggested using the VIF to validate collinearity for formative measurement items. The VIF thresholds are that if VIF is below or equal to 3, it should be considered to have no collinearity issues; if VIF is from 3 to 5, it should be considered to have possible collinearity issues; and if VIF is equal to or above 5, it should be considered to have critical collinearity issues. The three formative constructs, VOI, VAI, and RMI, which are used to measure BMI, have all their indicators' VIF values below 3, as shown in Table 5.15. Thus, all formative indicators of VIF occur with low probability.

Table 5.15 Outer mode VIF

Variables	Latent indicators	VIF
DC	LV SEN	1.901
	LV SEZ	1.892
	LV TRN	1.920
STA	LV SLD	1.801
	LV SRF	1.780
	LV STS	1.817
BMI	LV VOI	1.991
	LV VAI	2.119
	LV RMI	1.920

5.4.2 Structural model evaluation

After the measurement model assessment meets the acceptable criteria, the subsequent phase involves evaluating the structural model, as shown in Figure 5.2. This evaluation encompasses crucial parameters, including the coefficient of determination (R^2), the cross-validated redundancy measure (Q^2) employing blindfolding algorithms, and path coefficients, in accordance with the guidelines presented by Hair et al. (2019). The second-order structure model diagram is presented in Figure 5.2 below.

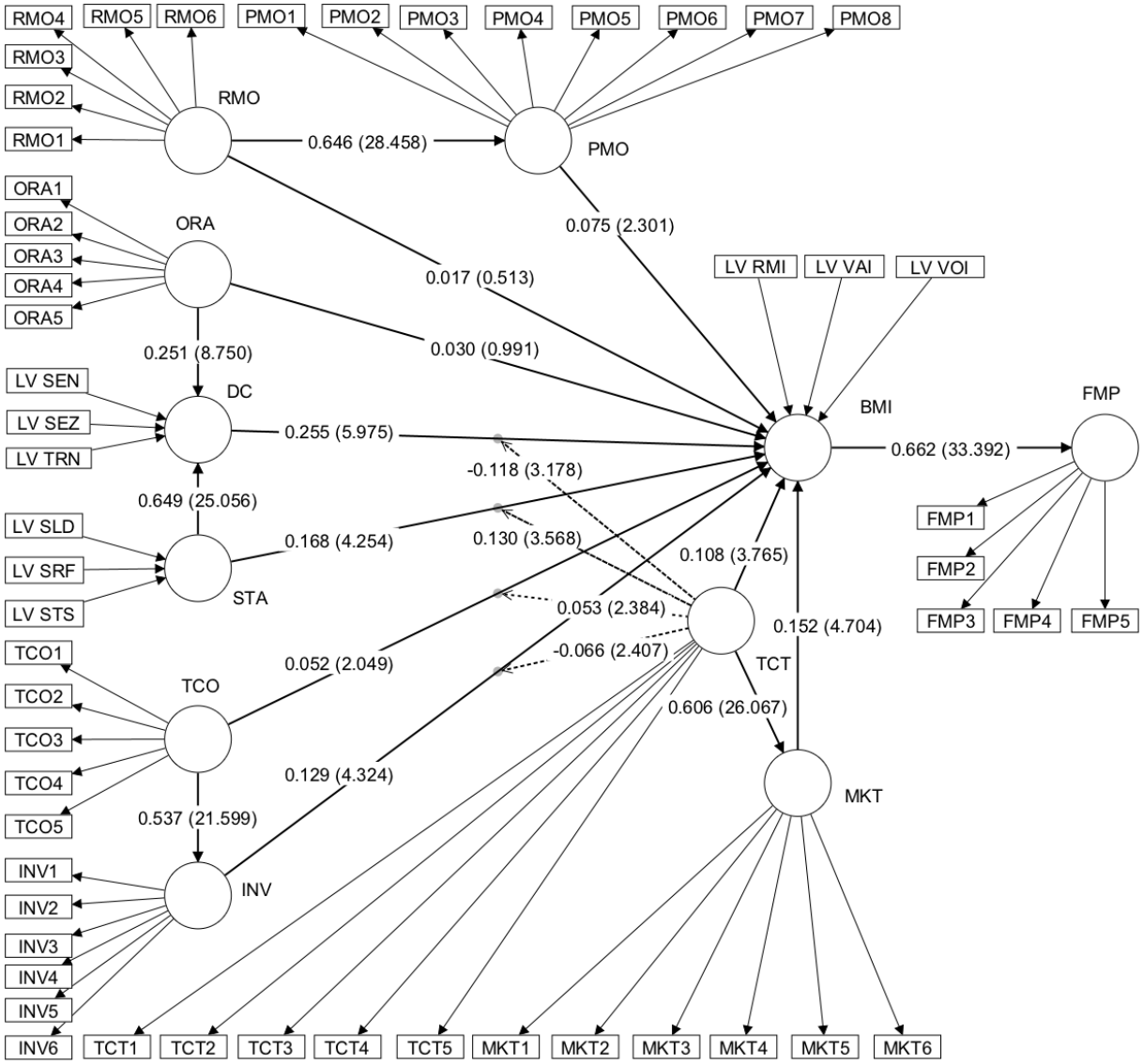

Figure 5.2 Second-order structure model

We created this structure model based on the conceptual model mentioned in Chapter 3.6. RMO, PMO, ORA, TCO, INV, TCT, MKT, DC, and STA are antecedents of BMI, and BMI will affect FMP. The path coefficients provide evidence for the strength of the path model (Hair et al., 2012). In Figure 5.2, for example, the data is 0.075 (2.301) on the line from PMO to BMI; 0.075 is the path coefficient, 2.301 is the T value, and a T value above 1.96 means it is 95% significant. As Figure 5.2 shows, in this model, BMI, DC, and STA are higher-order constructs. DC has three latent variables: LV SEN, LV SEZ, and LV TRN. STA has three latent variables: LV SLD, LV SRF, and LV STS. BMI has three latent variables: LV VOI, LV VAI, and LV RMI. Others include RMO, PMO, ORA, TCO, INV, TCT, MKT, and FMP, which are lower-order constructs.

5.4.2.1 Collinearity statistics

Because computing the path coefficient is founded on several regression calculation assumptions, we must ensure collinearity challenges do not impact regression consequences and therefore conduct inner model VIF validation (Sarstedt et al., 2021). The inner VIF threshold is the same as the requirement for formative measurement models.

There is also a validated inner model VIF valve, as detailed in Table 5.16. Except for DC to BMI and STA to BMI, the inner VIF values fall within the 3 to 5 thresholds, and all the other inner model VIF values are below threshold 3 and meet good condition.

Table 5.16 Inner mode VIF

Variables	BMI	FMP
BMI		1
DC	4.614	
INV	2.265	
MKT	2.377	
ORA	2.297	
PMO	2.756	
RMO	2.470	
STA	3.905	
TCO	1.799	
TCT	2.206	

5.4.2.2 Path coefficients

Normal path coefficients range from -1 to +1; high positive relationships are those nearer to +1, whereas high negative relationships are those nearer to -1. (Sarstedt et al., 2021). A path coefficient of 0.5 translates to an endogenous variable that will increase by 0.5 STDEV units for every STDEV unit increase in the exogenous variable if you do not change all other independent constructs (Sarstedt et al., 2021). If zero does not fall within the 95% confidence intervals, a path coefficient is statistically significant at a 5% significance level (Sarstedt et al., 2021). Ascertaining whether the level of the coefficient is significant must be determined within the realm of study. As below, Table 5.17 shows, and each path analysis summary is as below:

Table 5.17 Second stage path coefficients

Path	Path coefficients	95% confidence intervals	STDEV	T values	P values
BMI -> FMP	0.662	[0.622, 0.700]	0.020	33.392	0.000
DC -> BMI	0.255	[0.171, 0.338]	0.043	5.975	0.000
INV -> BMI	0.129	[0.074, 0.190]	0.030	4.324	0.000
MKT -> BMI	0.152	[0.089, 0.214]	0.032	4.704	0.000
ORA -> BMI	0.030	[-0.031, 0.09]	0.031	0.991	0.322
PMO -> BMI	0.075	[0.010, 0.138]	0.033	2.301	0.021
RMO -> BMI	0.017	[-0.048, 0.081]	0.033	0.513	0.608
STA -> BMI	0.168	[0.089, 0.244]	0.040	4.254	0.000
TCO -> BMI	0.052	[0.003, 0.103]	0.026	2.049	0.041
TCT -> BMI	0.108	[0.052, 0.162]	0.029	3.765	0.000

Table 5.17 is indicated that PMO (Path coefficient = 0.075, 95% confidence intervals = [0.010, 0.138], t = 2.301, P less than 0.05), STA (Path coefficient = 0.168, 95% confidence intervals = [0.089, 0.244], t = 4.254, P less than 0.01), DC (Path coefficient = 0.255 95% confidence intervals = [0.171, 0.338], t = 5.975, P less than 0.01), TCO (Path coefficient = 0.052, 95% confidence intervals = [0.003, 0.103], t = 2.049, P less than 0.05), TCT (Path coefficient = 0.108, 95% confidence intervals = [0.052, 0.162], t = 3.765, P less than 0.01), INV (Path coefficient = 0.129, 95% confidence intervals = [0.074, 0.190], t = 4.324, P less than 0.01), MKT (Path coefficient = 0.152, 95% confidence intervals = [0.089, 0.214], t = 4.704, P less than 0.01) have positive and significant correlation with BMI.

RMO (Path coefficient = 0.017, 95% confidence intervals = [-0.048, 0.081], t = 0.513, P greater than 0.05), and ORA (Path coefficient = 0.030, 95% confidence intervals = [-0.031, 0.09], t = 0.991, P greater than 0.05) have a positive or negative correlation with BMI based on 95% confidence intervals that include 0 and have an unsignificant correlation with BMI also.

BMI (path coefficient = 0.662, 95% confidence intervals = [0.622, 0.7], t = 33.392, P less than 0.01) has a positive and significant correlation with FMP.

As described above, the hypothesis test result is displayed below:

Fail hypothesis H1a test: Responsive market orientation does not demonstrate a positive effect on BMI for SMEs.

Passed hypothesis H1b test: Proactive market orientation demonstrates a positive influence on BMI for SMEs.

Passed hypothesis H2 test: Strategic agility demonstrates a positive effect on BMI for SMEs.

Passed hypothesis H3 test: DC demonstrates a positive effect on BMI for SMEs.

Fail hypothesis H4 test: Organizational agility does not demonstrate a positive effect on BMI for SMEs.

Passed hypothesis H5a test: Technological openness demonstrates a positive effect on BMI for SMEs.

Passed hypothesis H5b test: Technological turbulence demonstrates a positive effect on BMI for SMEs.

Passed hypothesis H6 test: Innovativeness demonstrates a positive effect on BMI for SMEs.

Passed hypothesis H7 test: Market turbulence demonstrates a positive effect on BMI for SMEs.

Passed hypothesis H8 test: BMI demonstrates a positive effect on FMP for SMEs.

5.4.2.3 Coefficient of determination R^2

Every one of the endogenous constructs includes an R-squared (R^2) value, which serves as an indicator of the model's capacity to provide explanations or account for variance within those constructs (Shmueli & Koppius, 2011). The As a guideline, an R^2 value equal to or above 0.75 can be considered substantial, a value equal to or above 0.50 can be considered moderate, and a value equal to or above 0.25 could be viewed as feeble (Hair et al., 2011). More precisely, Chin et al. (1998) proposed that R^2 be greater than 0.333, which is higher than average and can be considered with high explanatory relevance. As Table 5.18 shows, the BMI R^2 value is 0.712, which meets the 0.75 threshold, and the FMP R^2 value is 0.438, which meets the 0.333 threshold.

Table 5.18 R^2 of the endogenous construct

Construct	R^2	STDEV	95% confidence intervals	T values	P values
BMI	0.712	0.018	[0.751, 0.679]	38.818	0.000
FMP	0.438	0.026	[0.490, 0.387]	16.705	0.000

5.4.2.4 Blindfolding Q^2

The Q^2 value (Geisser, 1974) is another approach to evaluating the PLS-SEM path model's prediction. This process relies on the blindfolding algorithm, which involves the removal of individual data points from the matrix, replacing them with the mean, and subsequently computing the value of the model (Sarstedt et al., 2014). Q^2 values greater than 0 hold significance, and the values larger than 0, 0.25, and 0.50 could be considered as small, medium, and large predictions of the PLS-SEM path model (Hair et al., 2019). As Table 5.19 shows, constructs with BMI and FMP Q^2 values of 0.530 and 0.303 achieve medium predictive precision in the path model, while other constructs have values larger than 0 and achieve small predictive precision in the path model.

Table 5.19 Q^2 of the cross-validated approach

Variables	SSO	SSE	Q^2 (=1-SSE/SSO)
BMI	2901	1363.616	0.530
DC	2901	2901	0.000
FMP	4835	3369.41	0.303
INV	5802	5802	0.000
MKT	5802	5802	0.000
ORA	4835	4835	0.000
PMO	7736	7736	0.000
RMO	5802	5802	0.000
STA	2901	2901	0.000
TCO	4835	4835	0.000
TCT	4835	4835	0.000

5.4.3 Mediation effect analysis

5.4.3.1 Method of Mediation analysis

Mediation events occur when a third variable acts as a bridge between two interconnected latent variables (Hair et al., 2021). To be more specific, a modification in the exogenous variable leads to an alteration in the latent variable of the mediator, subsequently leading to a shift in the endogenous variable within the PLS-SEM path model. Thus, the mediator variable will influence the properties of the connection between two latent variables. Hair et al. (2021) provide a more comprehensive description of the systematic mediator analysis approach in PLS-SEM. The figure (presented in Annex B, Figure B1) describes a simple mediation model in which "e" is the mean path coefficient, e3 is the direct effect, e1 e2 is the indirect effect, and the direct effect (e3) plus the indirect effect (e1 e2) equals the total effect. In Smart PLS, you can use the PLS-SEM algorithm and bootstrap calculation function to produce the direct path coefficient, the total indirect path coefficient, the specific indirect path coefficient, and the total path coefficients. Researchers can utilize Smart PLS results to conduct mediation analysis. Smart PLS also has the capability to provide results for analyzing single and multiple mediation scenarios, including parallel and serial mediation.

As the sample figure (presented in Annex B, Figure B1) for the mediation model demonstrates, M (the mediator) will intervene between latent variables X and Y relations by different categories and degrees. The mediation analysis flow chart was introduced by another figure (presented in Annex B, Figure B2). Zhao et al. (2010) suggest using this procedure flow chart for analyzing mediation categories. Hair et al. (2021) adopt this method for PLS-SEM mediation analysis. This thesis used this method to conduct mediation evaluation and summarized the condition of each mediation category as below:

Firstly, two types of no mediation are summarized by Hair et al. (2021) as below: (1) Direct only, no mediation: the condition is that the direct effect is significant and the indirect effect is unsignificant. (2) No effect, no mediation: The condition is that direct effects are unsignificant and indirect effects are also unsignificant.

Secondly, Hair et al. (2021) summarized three types of mediation as below: (1) Complementary partial mediation: the condition is that the indirect effect is significant and the direct effect is significant, and also in the same direction. (2) Competitive partial mediation: the condition is that the indirect effect is significant, and the direct effect is significant in the opposite direction. (3) Indirect only with full mediation: the condition is that the indirect effect is statistically significant, while the direct effect is not statistically significant.

5.4.3.2 Implement of Mediation analysis

As a follow-up to the above-described method for mediation analysis, the second-order structure model, and the Chapter 3.6 descripted conceptual model, we worked out this mediation mechanism as shown in Figure 5.2 and presented path coefficients and T values. According to Figure 5.2 and Chapter 5.4.3.1, we found five mediation effects listed below:

(1) In the paths STA->DC->BMI (e1*e2) and STA->BMI (e3), STA is X, DC is M, and BMI is Y.

(2) In the paths TCO->INV->BMI (e1*e2) and TCO->BMI (e3), TCO is X, INV is M, and BMI is Y.

(3) In the paths TCT->MKT->BMI (e1*e2) and TCT->BMI (e3), TCT is X, MKT is M, and BMI is Y.

(4) In the paths RMO->PMO->BMI (e1*e2) and RMO->BMI (e3), RMO is X, PMO is M, and BMI is Y.

(5) In the paths ORA->DC->BMI (e1*e2) and ORA->BMI (e3), ORA is X, DC is M, and BMI is Y.

We used the PLS-SEM bootstrap function to calculate the data, as shown below in Table 5.20. It shows that it is indicated that STA->DC->BMI direct (path coefficient = 0.168, $P < 0.01$) and indirect (path coefficient = 0.166, $P < 0.01$) are both significant and point in the positive direction. TCO->INV->BMI direct (Path coefficient = 0.052, $P < 0.05$) and indirect (Path coefficient = 0.070, $P < 0.01$) are both significant and point in the positive direction. TCT->MKT->BMI direct (Path coefficient = 0.108, $P < 0.05$) and indirect (Path coefficient = 0.092, $P < 0.01$) are both significant and point in the positive direction, and these are complementary partial mediations.

In the above Table 5.20, it is indicated that RMO->PMO->BMI, where direct (Path coefficient = 0.017, $P > 0.05$) is not significant and indirect (Path coefficient = 0.048, $P < 0.05$) is significant. ORA->DC->BMI present is direct (Path coefficient = 0.030, $P > 0.05$) is not significant and indirect (Path coefficient = 0.064, $P < 0.01$) is significant. Thus, these are only indirect full mediations.

According to the above explanation, the hypothesis test result is as below:

Hypothesis 9a: DC mediate the relationship between STA and BMI for SMEs. Pass the hypothesis test.

Hypothesis 9b: DC mediate the relationship between ORA and BMI for SMEs. Pass the hypothesis test.

Table 5.20 Mediation path coefficient analysis result

Path	Effect	Path Coef.	95% confidence intervals	STDEV	T values	P values	Sig.	Type of mediation
STA -> DC -> BMI	Direct	0.168	[0.089, 0.244]	0.040	4.254	0.000	Yes	Complementary (partial mediation)
	Indirect	0.166	[0.11, 0.224]	0.029	5.723	0.000	Yes	
	Total	0.334	[0.25, 0.414]	0.042	8.002	0.000	Yes	
RMO -> PMO -> BMI	Direct	0.017	[-0.048, 0.081]	0.033	0.513	0.608	No	Indirect only (full mediation)
	Indirect	0.048	[0.007, 0.09]	0.021	2.287	0.022	Yes	
	Total	0.065	[-0.004, 0.136]	0.036	1.823	0.068	No	
ORA -> DC -> BMI	Direct	0.030	[-0.031, 0.09]	0.031	0.991	0.322	No	Indirect only (full mediation)
	Indirect	0.064	[0.041, 0.091]	0.013	4.952	0.000	Yes	
	Total	0.095	[0.033, 0.155]	0.031	3.067	0.002	Yes	
TCO -> INV -> BMI	Direct	0.052	[0.003, 0.103]	0.026	2.049	0.041	Yes	Complementary (partial mediation)
	Indirect	0.070	[0.04, 0.103]	0.016	4.227	0.000	Yes	
	Total	0.122	[0.07, 0.177]	0.028	4.39	0.000	Yes	
TCT -> MKT -> BMI	Direct	0.108	[0.052, 0.162]	0.029	3.765	0.000	Yes	Complementary (partial mediation)
	Indirect	0.092	[0.054, 0.132]	0.020	4.615	0.000	Yes	
	Total	0.200	[0.134, 0.266]	0.033	6.012	0.000	Yes	

Hypothesis 9c: INV mediates the relationship between TCO and BMI for SMEs. Pass the hypothesis test.

Hypothesis 9d: MKT mediates the relationship between TCT and BMI for SMEs. Pass the hypothesis test.

Hypothesis 9e: PMO mediates the relationship between RMO and BMI for SMEs. Pass the hypothesis test.

All the specific indirect path coefficients from the antecedents to firm performance reveal important insights into the relationships (presented in Annex A, Table A19). The outcomes indicate that many of the indirect path coefficients are positive and significant, highlighting the influential role of the mediators in linking the antecedents to BMI and ultimately impacting firm performance. Notably, the paths "ORA -> BMI -> FMP" and "RMO -> BMI -> FMP" were found to be insignificant. However, alternative paths, including "ORA -> DC -> BMI -> FMP" and "RMO -> PMO -> BMI -> FMP", emerged as significant and positive, shedding light on the complex interplay between the drive factors, mediators, BMI, and enterprise performance. This comprehensive understanding of the underlying mechanisms provides valuable insights into how certain antecedents influence each other through mediating factors, ultimately influencing firm performance.

5.4.4 Moderation effect analysis

5.4.4.1 Path coefficient analysis

Based on the moderation effect analysis method suggested by Hair et al. (2021), the second-order structure model, and the Chapter 3.6 descripted conceptual model, we worked out this moderation mechanism as shown in Figure 5.2. We have four moderation paths and a detailed description below, which displays path coefficients and T values.

(1) Moderation path: TCT x TCO -> BMI; TCT is the moderator and will moderate the path from TCO to BMI.

(2) Moderation path: TCT x INV -> BMI; TCT is the moderator and will moderate the path from INV to BMI.

(3) Moderation path: TCT x STA -> BMI; TCT is the moderator and will moderate the path from STA to BMI.

(4) Moderation path: TCT x DC -> BMI; TCT is the moderator and will moderate the path from DC to BMI.

We used the PLS-SEM bootstrap function to calculate the moderation path coefficient data,

as demonstrated below in Table 5.21.

Table 5.21 Moderation route coefficient analysis result

Path	Path coefficients	95% confidence intervals	STDEV	T values	P values
TCT -> BMI	0.108	[0.052, 0.162]	0.029	3.765	0.000
DC -> BMI	0.255	[0.171, 0.338]	0.043	5.975	0.000
INV -> BMI	0.129	[0.074, 0.190]	0.030	4.324	0.000
STA -> BMI	0.168	[0.089, 0.244]	0.040	4.254	0.000
TCO -> BMI	0.052	[0.003, 0.103]	0.026	2.049	0.041
TCT x STA -> BMI	0.130	[0.061, 0.205]	0.036	3.568	0.000
TCT x INV -> BMI	-0.066	[-0.122, -0.014]	0.027	2.407	0.016
TCT x DC -> BMI	-0.118	[-0.189, -0.044]	0.037	3.178	0.001
TCT x TCO -> BMI	0.053	[0.007, 0.093]	0.022	2.384	0.017

5.4.4.2 Sample slop analysis

A common moderator analysis chart is represented using simple slope plots (Ringle et al., 2022). Smart PLS provides simple slope plots in the sample slope analysis menu of the PLS-SEM algorithm results report (Ringle et al., 2022). This thesis follows up Ringle et al. (2022) and Hair et al. (2021), who suggested an approach to evaluate and summarize the moderation analysis result. The figures (presented in Annex B, figure B3 slope chart for TCT x TCO, figure B4 slope chart for TCT x INV, figure B5 slope chart for TCT x STA, and figure B6 slope chart for TCT x DC) show slope plots for TCO, INV, STA, and DC moderated by TCT. All the moderated effects of TCT on TCO, INV, STA, and DC are significant and positive.

According to the slop chart (presented in Annex B, Figure B3) for TCT x TCO and Table 5.21, the moderation path coefficient analysis result shows that TCT moderates TCO to BMI; one standard deviation (STDEV) increase in TCT would make TCO 0.052 + (0.053) change in path coefficient between TCO and BMI in the figure as a green line, and one standard deviation (STDEV) decrease in TCT would make TCO 0.052 - (0.053) change in path coefficient between TCO and BMI in the figure as a red line. Because of T-values greater than 1.96 and P-values less than 0.05. Thus, TCT imposes a significant positive moderating effect on TCO and BMI.

According to the slop chart (presented in Annex B, Figure B4) for TCT x INV and Table 5.21, the moderation path coefficient analysis result shows that TCT moderates INV to BMI; one standard deviation (STDEV) increase in TCT would make INV 0.129 + (-0.066) change in path coefficient between INV and BMI in the figure as a green line, and one standard deviation (STDEV) decrease in TCT would make INV 0.129 - (-0.066) change in path coefficient between INV and BMI in the figure as a red line. Because of T-values greater than 1.96 and P-values less than 0.05. Thus, TCT imposes a significant positive moderating effect on INV and BMI.

According to the slop chart (presented in Annex B, Figure B5) for TCT x STA and Table 5.21, the moderation path coefficient analysis result shows that TCT moderates STA to BMI; one standard deviation (STDEV) increase in TCT would make STA 0.168 + (0.130) change in path coefficient between STA and BMI in the figure as a green line, and one standard deviation (STDEV) decrease in TCT would make STA 0.168 - (0.130) change in path coefficient between STA and BMI in the figure as a red line. Because of T-values greater than 1.96 and P-values less than 0.05. Thus, TCT imposes a significant positive moderating effect on STA and BMI.

According to the slop chart (presented in Annex B, Figure B6) for TCT x DC and Table 5.21, the moderation path coefficient analysis result shows that TCT moderates DC to BMI; one standard deviation (STDEV) increase in TCT would make DC 0.255 + (-0.118) change in path coefficient between DC and BMI in the figure as a green line, and one standard deviation (STDEV) decrease in TCT would make DC 0.255 - (-0.118) change in path coefficient between DC and BMI in the figure as a red line. Because of T-values greater than 1.96 and P-values less than 0.05. Thus, TCT imposes a significant positive moderating effect on DC and BMI.

Based on the above description, the hypothesis test result is as below:

Hypothesis 10a: Technological turbulence imposes a significant positive moderating influence on technological openness and BMI for SMEs. Pass the hypothesis test.

Hypothesis 10b: Technological turbulence imposes a significant positive moderating influence on innovativeness and BMI for SMEs. Pass the hypothesis test.

Hypothesis 10c: Technological turbulence imposes a significant positive moderating influence on strategic agility and BMI for SMEs. Pass the hypothesis test.

Hypothesis 10d: Technological turbulence imposes a significant positive moderating influence on dynamic capabilities and BMI for SMEs. Pass the hypothesis test.

5.5 Hypothesis test summary

In the preceding chapter, hypotheses H1a to H8 were examined in Chapter 5.4.2.2; hypotheses H8a to H8c were evaluated in Chapter 5.3.4; hypotheses H9a to H9e were tested in Chapter 5.4.3.2; and hypotheses H10a to H10d were assessed in Chapter 5.4.4.2. This section provides an overall summary of all hypothesis results, which are displayed in Table 5.22.

Table 5.22 Hypothesis results summarizing

NO	Hypothetical Relationships	Results
H1a	RMO → BMI (+)	Not supported
H1b	PMO → BMI (+)	Supported
H2	STA → BMI (+)	Supported

H3	DC → BMI (+)	Supported
H4	ORA → BMI (+)	Not supported
H5a	TCO → BMI (+)	Supported
H5b	TCT → BMI (+)	Supported
H6	INV → BMI (+)	Supported
H7	MKT → BMI (+)	Supported
H8	BMI → FMP (+)	Supported
H8a	VOI → Firm performance (+)	Supported
H8b	VAI → Firm performance (+)	Supported
H8c	RMI → Firm performance (+)	Supported
H9a	STA → DC → BMI (+, partial mediation)	Supported
H9b	ORA → DC → BMI (+, Full mediation)	Supported
H9c	TCO → INV → BMI (+, partial mediation)	Supported
H9d	TCT → MKT → BMI (+, partial mediation)	Supported
H9e	RMO → PMO → BMI (+, Full mediation)	Supported
H10a	TCT x TCO → BMI (+)	Supported
H10b	TCT x INV → BMI (+)	Supported
H10c	TCT x STA → BMI (+)	Supported
H10d	TCT x DC → BMI (+)	Supported

Note: (1) H9a to H9e are mediation descriptions, e.g., STA → DC → BMI, meaning that DC mediates the relationship between STA and BMI. (2) H10a to H10d are moderation descriptions, e.g., TCT x TCO → BMI, meaning that TCT imposes a moderating effect on TCO and BMI. (3) The full variable abbreviation could refer to Chapter 1.4.1.

5.6 Chapter summary

Chapter 5 focuses on the empirical analysis in this thesis, which is described in detail below:

First, use the SPSS statistical software for conducting descriptive statistical analysis. This analysis provides a thorough explanation of the data, including measures of central tendency, variability, and distribution.

Second, we conducted the data validation, which included reliability and validity assessments.

Third, it delves into the determination of methods and procedures for conducting PLS-SEM. A two-stage approach is adopted, with the first stage focusing on the lower-order measurement model. This stage involves examining the connection between the indicators and their respective latent variables. The reliability and validity are assessed through factor loadings, composite reliability, and AVE. In the second phase, the higher-order structural model is evaluated, which involves assessing the connections among the variables and testing the hypothesized paths.

Additionally, it discusses the analysis of mediation effects, exploring the indirect relationships between variables. Moderation effect analysis is conducted to investigate the conditions under which certain relationships may vary based on the presence of a third variable.

Chapter 6: Conclusion and Prospects

In the preceding chapters, this research successfully established a strong basis regarding the significance of the connection between antecedents, BMI, and enterprise performance for SMEs. The chapter concludes by providing a systematic summary of these thesis conclusions, practical and theoretical implications, innovative research methods, identified research gaps, and outlining potential avenues for forthcoming investigations.

6.1 Research conclusions

6.1.1 Antecedent effect on BMI

This research conducted nine antecedents, or driver assessments, that affect BMI. For internal antecedents effecting BMI, which included market orientation (containing RMO and PMO), strategic agility (STA), dynamic capabilities (DC), organizational agility (ORA), and innovativeness (INV), six latent variables were used to measure internal antecedents of BMI. For external antecedents, which included technological openness (TCO), market turbulence (MKT), and technological turbulence (TCT), three latent variables were used to measure the external antecedents of BMI.

To assess the nine antecedents, the most important statistical indicator is the path coefficient, which demonstrates the degree of the connection from antecedents or drivers to BMI. A path coefficient of 0.5 means that if the independent variable increases by 1 STDEV unit, the dependent variable will increase by 0.5 STDEV units if that does not change all other variables (Sarstedt et al., 2021).

As shown in Chapter 5.4.2.2, PMO (Path coefficient = 0.075, $P < 0.05$), STA (Path coefficient = 0.168, $P < 0.01$), DC (Path coefficient = 0.255, $P < 0.01$), TCO (Path coefficient = 0.052, $P < 0.05$), TCT (Path coefficient = 0.108, $P < 0.01$), INV (Path coefficient = 0.129, $P < 0.01$), and MKT (Path coefficient = 0.152, $P < 0.01$) have a positive and significant correlation with BMI. RMO (Path coefficient = 0.017, $P > 0.05$) and ORA (Path coefficient = 0.030, $P > 0.05$) have a positive or negative correlation with BMI based on 95% confidence intervals that include 0 and have an unsignificant correlation with BMI. More detailed descriptions are below:

(1) The antecedent of the PMO effect on BMI with the strength of the path coefficient is

0.075, meaning if PMO increases 1 standard deviation unit and keeps other factors constant, then the BMI will increase 0.075 standard deviation units with a probability above 95% ($P < 0.05$). PMO has positive effects on BMI. The result is also supported by Yang et al. (2020).

(2) The antecedent of the STA effect on BMI with the strength of the path coefficient is 0.168, meaning if STA increases 1 standard deviation unit and keeps other factors constant, then the BMI will increase 0.168 standard deviation units with a probability above 99.9% ($P < 0.001$). This thesis analyzed STA, which included STS, SLD, and SRF. Using these three constructs, we created a higher-order construct of strategic agility. validated that strategic agility has positive effects on BMI and has similar results to those proposed by Clauss et al. (2019).

(3) The antecedent of DC effect BMI with strength of path coefficient is 0.255, meaning if DC increases 1 standard deviation unit and keeps other factors as constants, then the BMI will increase 0.255 standard deviation units with a probability above 99.9% ($P < 0.001$). DC This thesis analyzed dynamic capabilities, which included sensing, seizing, and transforming three constructs. We are creating a higher-order construct of DC. validated that DC has a positive impact on BMI and has similar results to those proposed by Kump et al. (2019).

(4) The antecedent of the TCO effect on BMI with the strength of the path coefficient is 0.052, meaning if TCO increases 1 standard deviation unit and keeps other factors constant, then the BMI will increase 0.052 standard deviation units with a probability above 95% ($P < 0.05$). Guo et al. (2020) indicated that technological openness plays a positive function in positively adjusting the correlation between BMI and FMP increase, and we get similar results between TCO and BMI.

(5) The antecedent of TCT effect on BMI with strength of path coefficient is 0.108, meaning if TCT increases 1 standard deviation unit and keeps other factors constant, then the BMI will increase 0.108 standard deviation units with a probability above 99.9% ($P < 0.001$). We analyze technological turbulence (TCT) as an antecedent role for BMI and find out that TCT has positive effects on BMI.

(6) The antecedent of the INV effect on BMI with the strength of the path coefficient is 0.129, meaning if INV increases 1 standard deviation unit and keeps other factors as constants, then the BMI will increase 0.129 standard deviation units with a probability above 99.9% ($P < 0.001$). Pucihar et al. (2019) research discovered that a firm INV as an internal antecedent has a significant effect on BMI, and we get similar results between INV and BMI.

(7) The antecedent of MKT effect BMI with strength of path coefficient is 0.152, meaning if MKT increases 1 standard deviation unit and keeps other factors as constants, then the BMI

will increase 0.152 standard deviation units with a probability above 99.9% ($P < 0.001$). We analyze market turbulence (MKT) as an antecedent role for BMI and find out that MKT has positive effects on BMI.

(8) RMO did not have direct positive effects on BMI. But RMO has indirect positive effects on BMI through PMO as a mediator; as discussed in Chapter 5.4.3, the mediation category is indirect full mediation. The antecedent of the RMO effect on BMI has an indirect strength of path coefficient of 0.048 through the mediator PMO, meaning if RMO increases 1 standard deviation unit and keeps other factors constant, then indirect affects BMI by increasing 0.048 standard deviation units with a probability above 95% ($P < 0.05$).

(9) ORA did not have direct positive effects on BMI. But ORA has indirectly positive effects on BMI through DC as a mediator; as discussed in Chapter 5.4.3, the mediation category is indirectly full mediation. The antecedent of the ORA effect on BMI with indirect strength of path coefficient is 0.064 through mediator DC, meaning if ORA increases 1 standard deviation unit and keeps other factors as constants, then it will indirectly affect BMI by increasing 0.064 standard deviation units with a probability above 99.9% ($P < 0.001$).

6.1.2 BMI effect on firm performance

This research found that BMI has positive and significant path coefficients with the FMP. The path coefficient shows the degree of strength of the connection from BMI to firm performance. If BMI increases by 1 standard deviation unit and other factors remain constant, the firm's performance will increase by 0.662 standard deviation units with a probability above 99.9% ($P < 0.001$). For details, refer to Chapter 5.4.2.2 Assessment.

We also evaluated connections from BMI's three subconstructs (containing VOI, VAI, and RMI) to firm performance path coefficients. The subconstruct VOI effect on FMP with a strength of path coefficient of 0.201 means that if VOI increases by 1 standard deviation unit and other factors are kept constant, then FMP will increase by 0.201 standard deviation units with a probability above 99.9% ($P < 0.001$). The subconstruct VAI effect on FMP with a strength of path coefficient of 0.352 means that if VAI increases 1 standard deviation unit and keeps other factors constant, then FMP will increase 0.352 standard deviation units with a probability above 99.9% ($P < 0.001$). The subconstruct RMI effect on FMP with a strength of path coefficient of 0.201 means that if VOI increases by 1 standard deviation unit and other factors are kept constant, then FMP will increase by 0.201 standard deviation units with a probability above 99.9% ($P < 0.001$). For details, refer to Chapter 5.3.4 Assessment.

6.1.3 Mediation effect

This thesis implements mediation assessment as described in Chapter 5.4.3. Two types of mediation were verified in the structure model: complementary partial mediation and indirect only with full mediation, whose definition was proposed by Hair et al. (2021).

(1) STA through the mediator DC to BMI shows that direct (path coefficient = 0.168) and indirect (path coefficient = 0.166) values are significant and positive. Thus, it is complementary partial mediation.

(2) TCO through the mediator INV to BMI shows that direct (Path coefficient = 0.052) and indirect (Path coefficient = 0.070) values are significant and positive. Thus, it is complementary partial mediation.

(3) TCT through the mediator MKT to BMI shows that direct (Path coefficient = 0.108) and indirect (Path coefficient = 0.092) values are significant and positive. Thus, it is complementary partial mediation.

(4) RMO through the mediator PMO to BMI shows that direct (Path coefficient = 0.017) is not significant, but indirect (Path coefficient = 0.048) is significant. Thus, it is full mediation (indirect only).

(5) ORA through the mediator DC to BMI shows that direct (Path coefficient = 0.030) is not significant, but indirect (Path coefficient = 0.064) is significant. Thus, it is full mediation (indirect only).

6.1.4 Moderation effect

This thesis implements moderation assessment as described in Chapter 5.4.4. We followed the moderation effect analysis method suggested by Hair et al. (2021) and combined it with simple slope plot moderator analysis (Ringle et al., 2022). We used the PLS-SEM bootstrap to get moderation path coefficient results and the PLS-SEM algorithm to get slope plots. The moderation detail result is described below:

(1) TCT moderates the path from TCO to BMI; one standard deviation (STDEV) increase in TCT would make TCO 0.052 + (0.053) change in path coefficient from TCO to BMI; one standard deviation (STDEV) decrease in TCT would make TCO 0.052 - (0.053) change in path coefficient from TCO to BMI. Thus, TCT moderates the path from TCO to BMI positively and significantly.

(2) TCT moderates the path from INV to BMI; one standard deviation (STDEV) increase in TCT would make INV 0.129 + (-0.066) change in path coefficient from INV to BMI; one

standard deviation (STDEV) decrease in TCT would make INV 0.129 - (-0.066) change in path coefficient from INV to BMI. Thus, TCT moderates the path from INV to BMI positively and significantly.

(3) TCT moderates the path from STA to BMI; one standard deviation (STDEV) increase in TCT would make STA 0.168 + (0.130) change in path coefficient from STA to BMI; one standard deviation (STDEV) decrease in TCT would make STA 0.168 - (0.130) change in path coefficient from STA to BMI. Thus, TCT moderates the path from STA to BMI positively and significantly.

(4) TCT moderates the path from DC to BMI; one standard deviation (STDEV) increase in TCT would make DC 0.255 + (-0.118) change in path coefficient from DC to BMI; one standard deviation (STDEV) decrease in TCT would make DC 0.255 - (-0.118) change in path coefficient from DC to BMI. Thus, TCT moderates the path from DC to BMI positively and significantly.

6.2 Management and theory implications

6.2.1 Management implications

Although SMEs perform a crucial function in economic expansion in most nations, research on BMI for SMEs is comparatively scarce (Anwar, 2018; Hock-Doepgen et al., 2021). While the BMI literature is primarily focused on large enterprises (Guo et al., 2017), we contribute to the BMI study by assessing the internal and external antecedents of BMI that are suitable for SMEs. Our study provided a model for a better understanding of the factors driving BMI for SMEs. This is especially important to SMEs due to their limited resources, such as limited financial resources and less capability to afford expensive experiments for new BMI under high indeterminacy, but they should identify and leverage internal mechanisms and resources to keep their BM improving (Hock-Doepgen et al., 2021). This result provided important management implications to help management conduct their BMI and improve the firm's performance, as detailed below:

(1) Antecedents or drivers, which include PMO, STA, DC, TCO, TCT, INV, and MKT, have significantly positive effects on BMI. But antecedents or drivers, which include RMO and ORA, did not have directly positive effects on BMI. But RMO has indirect positive effects on BMI through PMO as a mediator with full mediation. ORA has indirect positive effects on BMI through DC as a mediator with full mediation.

(2) Management plans to successfully implement BMI in firms should work to increase their companies' capacity for: (a) responsive market orientations (RMO), (b) proactive market orientations (PMO), (c) strategic agility (STA), (d) dynamic capabilities (DC), (e) organizational agility (ORA), (f) technological openness (TCO), (g) innovativeness (INV), (h) market turbulence (MKT), and (i) technological turbulence (TCT).

(3) Management should know that the three aspects of BMI will have a positive effect on FMP at different levels and coincide with path coefficients.

6.2.2 Theory implications

Although more and more studies are being conducted to investigate the drive factor of BMI and the outcome of BMI on company outcomes, there are few empirical studies implementing BMI that involve a set of multiple antecedents. This thesis focuses on Foss and Saebi (2016) proposed research conceptual model, which includes antecedents, outcomes, and moderation. Zhang et al. (2021) followed this conceptual model to implement meta-analysis from a total of 87 empirical studies. Foss and Saebi (2016) identified related theories to address and handle the research gaps for the antecedents of BMI. The theory included complexity theory (Levinthal, 1997), complementarity theory (Ennen & Richter, 2010), innovation theory (Henderson & Clark, 1990), dynamic capabilities theory (Teece et al., 1997), and open innovation theory (Chesbrough, 2010). The thesis followed this conceptual model to conduct our empirical research. Through PLS-SEM analysis, obtain the relationship among antecedents, BMI, and firm performance. This result provided important theoretic meaning to describe each construct and its relationships and summarized the theory's implications as below:

(1) Contribute to building the PLS-SEM model to assess 17 constructs, which include antecedents, BMI, and firm performance, and provide a simpler way to deal with complex situations through the higher-order constructs method. On the basis of Foss and Saebi (2016) proposed conceptual model and complexity theory (Levinthal, 1997), complexity theory is suitable for use in conducting our PLS-SEM model because our research has a complex and dynamic nature. This thesis adopted a disjoint two-stage approach to higher-order constructs to simplify the PLS-SEM model. In the first-stage model, there are 17 constructs in total, which include RMO, PMO, STS, SLD, SRF, SEN, SEZ, TRN, ORA, TCO, INV, MKT, TCT, VOI, VAI, RMI, and FMP. In stage two, the model was reduced to 11 constructs in total. We are using a disjoint two-stage method of the higher-order construct method to provide detail on complexity in stage one and make it easy to understand in stage two. This research process and method could provide an example for future research to deal with similar complex situations.

(2) Contribute to finding out and assessing nine antecedents in one structure model. Foss and Saebi (2016) conducted a literature review and discovered that few studies focus on the antecedents or drivers of BMI. Their future research gap for BMI included identifying and assessing antecedents and outcomes. The antecedents or drivers for BMI could represent different characteristics and degrees and could be considered inside or outside of the company (Foss & Saebi, 2016).

For internal antecedents that affect BMI, we included RMO, PMO, strategic agility (STA), dynamic capabilities (DC), organizational agility (ORA), and innovativeness (INV) as six variables to measure the internal antecedents of BMI. In the literature, have individual research for each antecedent and detail it as below: Yang et al. (2020) conducted empirical research on RMO and PMO as antecedents. Clauss et al. (2019) conducted strategic agility (STA), which included STS,SLD, and SRF as three constructs; Kump et al. (2019) analyzed dynamic capabilities (DC), which included sensing, seizing, and transforming as three constructs; Cegarra-Navarro et al. (2016) analyzed organizational agility (ORA); and Pucihar et al. (2019) identified INV as an internal antecedent that has a positive effect on BMI.

For external antecedents, we include technological openness (TCO), market turbulence (MKT), and technological turbulence (TCT) as three variables to measure the external antecedents of BMI. In the literature, have individual research for each antecedent and detail it as below: Guo et al. (2020) researched technological openness (TCO) as a moderator role to positively moderate the connection between BMI and enterprise performance increases. Jaworski and Kohli (1993) proposed that the environment of a firm faced three constructs: MKT, competitive intensity, and TCT, and developed scales for these three constructs. Environmental turbulence could stimulate firms to change their BM (Clauss et al., 2019; Heij et al., 2014). Clauss et al. (2019) used market turbulence to operationalize the environmental turbulence variable. The thesis selected market turbulence and technological turbulence as external antecedents of BMI, whose scale comes from Jaworski and Kohli (1993).

(3) Contribute to enhanced BMI measurement dimensions from two dimensions, which are efficiency and novelty (Zott & Amit, 2007), to three dimensions, which are VOI, VAI, and RMI (Spieth & Schneider, 2016).

Foss and Saebi (2016) proposed future investigation streams. One of the research gaps is defining and scaling the BMI construct and categorizing the dimensions to measure BMI. Clauss (2016) proposed using value creation, proposition, and capture to measure BMI. Spieth and Schneider (2016) proposed using VOI, VAI, and RMI to measure BMI. Spieth and Schneider (2016) used the value proposition for VOI, the value creation for VAI, and the logic

of revenues generated for RMI to conduct external convergent validity. Heider et al. (2021) and Miroshnychenko et al. (2021) used Spieth and Schneider (2016) proposed scales for VAI, VOI, and RMI to implement their research and identified that value proposition is VOI, value creation is VAI, and value capture is RMI. Thus, we go through the above-described literature review and get the result that value proposition is the counterpart to VOI, value creation is the counterpart to value architecture innovation (VAI), and value capture is the counterpart to revenue model innovation (RMI). They should have similar or the same conceptions in the BMI research field. On this basis, we use three dimensions (VOI, VAI, and RMI) to measure BMI. Through this thesis' empirical research, we contribute to enhancing BMI measurement dimensions from two dimensions, which are efficiency and novelty-centered BMI (Zott & Amit, 2007), to three dimensions, which are VOI, VAI, and RMI (Spieth & Schneider, 2016).

(4) Contribute to the outcomes of BMI; this thesis outcome is firm performance. Foss and Saebi (2016) proposed future research to address another research gap: the outcomes of BMI. This thesis evaluated the relationships between these three BMI dimensions, which are VOI, VAI, and RMI, and firm performance, as detailed in Chapter 5.3.4. The evaluation results provided support that VOI, VAI, and RMI present a positive impact on enterprise performance with medium f^2 effect sizes.

(5) Contribute to evaluating mediation mechanisms among nine antecedents and find five mediation routes much more meaningful, in detail as below:

First, STA through the mediator DC to BMI, which are complementary partial mediations.

Second, TCO through the mediator INV to BMI, which are complementary partial mediations.

Third, TCT through the mediator MKT to BMI, which are complementary partial mediations.

Fourth, RMO through the mediator PMO to BMI, which is indirect only, is full mediation.

Fifth, ORA through the mediator DC to BMI, which is indirect only, is full mediation.

(6) Contribute to the evaluation of moderation mechanisms by technological turbulence (TCT), in detail as below:

Firstly, TCT demonstrates a statistically meaningful to positively moderate influence on the path from TCO to BMI.

Secondly, TCT exhibits a statistically meaningful to positively moderate influence on the path from INV to BMI.

Thirdly, TCT reveals a statistically meaningful to positively moderate influence on the path from STA to BMI.

Lastly, TCT displays a statistically meaningful to positively moderate influence on the path from DC to BMI.

6.3 Innovation in research method

This thesis demonstrates research innovation across three dimensions: the utilization of research questionnaire data, the enhancement and instantiation of the explore model, and the application of advanced research data evaluation methods.

(1) Regarding the distribution of research questionnaire data sources, the survey encompassed a diverse range of organizational hierarchies, including chairpersons, general managers, vice general managers, directors, department managers, other technical or managerial positions, as well as first-line employees. A detailed breakdown reveals the following: (1) Chairpersons or general managers contributed 199 questionnaires, accounting for 20.58%; (2) vice general managers contributed 105 questionnaires, accounting for 10.86%; (3) directors or department managers contributed 208 questionnaires, accounting for 21.51%; (4) individuals in other technical or managerial roles contributed 217 questionnaires, accounting for 22.44%; and (5) first-line employees participated with 238 questionnaires, accounting for 24.61%.

Additionally, respondents hail from all provinces of China, with the top 10 provinces being: Sichuan (472 questionnaires, 48.8%), Guangdong (235 questionnaires, 24.3%), Chongqing (33 questionnaires, 3.4%), Shanghai (31 questionnaires, 3.2%), Beijing (26 questionnaires, 2.7%), Zhejiang (23 questionnaires, 2.4%), Jiangxi (18 questionnaires, 1.9%), Shaanxi (15 questionnaires, 1.6%), Henan (13 questionnaires, 1.3%), Hunan (13 questionnaires, 1.3%), and the other 21 regions have 88 questionnaires and account for 9.1%. This extensive coverage ensures the representation and robustness of the subsequent data analysis, with further details available in Chapter 5.1.1.

(2) The enhancement and instantiation of the research model were grounded in the framework proposed by Foss and Saebi (2016). This model encompassed modules including antecedents, BMI, firm performance, moderator, and mediator, as detailed in Chapter 3.1. While the framework initially presented a basic outline of constructs for each module, the study made refined selections to bolster its empirical foundations. For instance, internal antecedents included market orientation (containing RMO and PMO), strategic agility (STA), dynamic capabilities (DC), organizational agility (ORA), and innovativeness (INV), while external antecedents comprised technological openness (TCO), market turbulence (MKT), and

technological turbulence (TCT). Furthermore, the study adopted Spieth and Schneider (2016) proposal of VOI, VAI, and RMI to measure BMI, thus enhancing the model's precision and comparability with existing literature. As described above for research model improvement and instantiation, integrated conceptual models, individual antecedent empirical research, measurement of BMI, and firm performance come from literature by different scholars.

(3) The research data analysis method employed in this thesis centered around PLS-SEM, facilitated by the user-friendly Smart PLS software. This approach streamlined operations, reducing the potential for human errors, and enabling researchers to allocate more focus to substantive research challenges. Employing PLS-SEM, the study constructed a structural model to assess the interaction among antecedents, BMI, and enterprise performance. Notably, the research embraced PLS-SEM functions including algorithm execution, bootstrapping, confirmatory tetrad analysis (CTA), and blindfolding. The research encompassed 17 lower-order constructs, entailing 42 arrows to denote direct path coefficients in the initial stage, excluding mediation and moderation relationships. To address the intricate relationships among antecedents and the three sub-constructs of BMI, a disjoint two-stage approach was adopted. Moreover, the study introduced higher-order constructs, including BMI, DC, and STA, to simplify the structural model, rendering it more accessible. In the second stage, including these higher-order constructs, the model encompassed 11 constructs (8 lower-order and 3 higher-order constructs) and featured 10 arrows denoting direct path coefficients, as elaborated in Chapter 5.4.2. The meticulous data analysis approach employed in this study was aimed at ensuring the research's reliability, accessibility, and clarity.

6.4 Research limitations and future research prospects

6.4.1 Methods of formative constructs assessment

For formative measurement model assessment, we are following up on the Hair et al. (2012) proposal, which includes indicator weights (with t-values, p-values, and standard deviation) and VIF. Hair et al. (2019) and Sarstedt et al. (2022) suggested adding convergent validity, which is redundancy analysis for formative measurement, but this convergent validity needs to be planned in the research design phase to contain additional reflective items of the same theme in scale. Because this research already has 80 questionnaire items, lengthy surveys will induce lower response rates (Burchell & Marsh, 1992).

Sarstedt et al. (2022) summarized a total of 486 literatures using PLS-SEM from 2011 to

2020; 112 of the 486 literatures had formative measurement constructs, and only 6 of the 112 used convergent validity (using the redundancy analysis method). Chin et al. (1998) proposed redundancy-based convergent validity for PLS-SEM formative constructs, but mainstream guidelines have included this proposal more recently (Hair et al., 2021), which could prove limited to practice in research activity. According to the above description, we did not include redundancy analysis for formative construct assessment to reduce the survey length and keep formative constructs at an acceptable quality and confidence level.

Consequently, forthcoming studies could center their attention on exploring alternative measurement approaches that offer greater convenience to replace the current redundancy analysis-based convergent validity method for formative measurement. One such viable option is to adopt a reflective measurement approach, leveraging the ease and convenience of assessing convergent validity through average variance extraction (AVE), which can significantly simplify researchers' implementation efforts.

6.4.2 Two antecedents indirectly effect on BMI

Responsive market orientation (RMO) does not exhibit a direct positive influence on BMI. However, RMO does manifest indirect positive impacts on BMI through its role as a mediator, specifically through PMO. This mediation effect falls within the category of indirect full mediation. This discovery fits with the research of Yang et al. (2020), who carried out research encompassing diverse industries and enterprises of varying sizes across different provinces. Utilizing the BMI measurement scale developed by Zott and Amit (2007), their results underscore the significant and positive relationship between RMO and BMI.

Similarly, organizational agility (ORA) does not directly yield positive effects on BMI. Nonetheless, ORA does exert indirect positive effects on BMI by way of mediation, particularly through the intermediary role of DC. This mediation category also falls under the umbrella of indirect full mediation. This observation is in keeping with the research carried out by Bhatti et al. (2021), who focused on the IT industry in Pakistan. Their findings emphasize the noteworthy and positive correlation between ORA and BMI.

Therefore, future research endeavors could potentially delve into verifying whether the positive impact of RMO on BMI is contingent upon enterprise size. Furthermore, it could investigate whether the positive effect of ORA on BMI is influenced by specific industry sectors.

6.4.3 Standardization antecedents of BMI

Bashir and Verma (2019) proposed internal antecedents influencing BMI, encompassing company nature (including aspects like culture, structure, and organizational inertia), leadership, and technology. Meanwhile, Zhang et al. (2021) conducted a meta-analysis of empirical literature (totaling 87 studies, with 42 focusing on internal factors and 45 on external factors) to examine the causal interactions among BMI, its antecedents, and enterprise performance. The antecedents were categorized into internal and external groups, as proposed by Foss and Saebi (2016). The category of external antecedents included elements like market opportunities, environmental factors, value chains, and technological innovation, while internal antecedents comprised management cognition, internal resources and capabilities, and organizational nature. In another study, Ammirato et al. (2022) identified 35 antecedents that drive BMI performance through an integrative literature review method.

In alignment with Foss and Saebi (2016) proposal, this thesis categorizes antecedents into internal and external dimensions. For internal antecedents influencing BMI, we included six latent variables: RMO, PMO, strategic agility (STA), dynamic capabilities (DC), organizational agility (ORA), and innovativeness (INV). As for external antecedents, we incorporated three latent variables: technological openness (TCO), market turbulence (MKT), and technological turbulence (TCT). This study examined a total of nine BMI antecedents, while other significant factors like knowledge management (Hock-Doepgen et al., 2021), entrepreneurial leadership (Phangestu et al., 2020), and absorptive capacity (Miroshnychenko et al., 2021) were not included.

This analysis highlights two gaps in the current literature regarding BMI antecedents. Firstly, there is a lack of standardized definitions for these antecedents, with some even lacking appropriate measurement scales. Secondly, empirical research rarely integrates a broader spectrum of antecedents within a single study. Thus, we recommend that future research focus on the following two areas:

(1) Establish standardized definitions and measurement scales for each BMI antecedent.

(2) Integrate a wider array of antecedents within a single empirical study, potentially offering a comprehensive model to guide management in their BMI endeavors.

Bibliography

Aagaard, A., Aagaard, A., & Harrison. (2018). *Digital business models–Driving transformation and innovation*. Springer International Publishing.

Abdelkafi, N., Makhotin, S., & Posselt, T. (2013). Business model innovations for electric mobility-what can be learned from existing business model patterns?. *International Journal of Innovation Management, 17*(1), 1–41.

Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.

Ademi, B., Klungseth, N. J., & Olsson, N. O. E. (2021, June 16–18). *Strategic flexibility and business model innovation: a literature review.* European Academy of Management Conference: Reshaping Capitalism for a Sustainable World, Brussels, Belgium.

Afuah, A., & Tucci, C. L. (2003). *Internet business models and strategies: Text and cases (Vol. 2)*. McGraw-Hill.

Afuah, A., & Tucci, C. L. (2012). Crowdsourcing as a solution to distant search. *Academy of Management Review, 37*(3), 355–375.

Aguilar-Fernández, M. E., & Otegi-Olaso, J. R. (2018). Firm size and the business model for sustainable innovation. *Sustainability (Switzerland), 10*(12), 1–27.

Ahmadin, M. (2022). Social Research methods: qualitative and quantitative approaches. *Jurnal Kajian Sosial Dan Budaya: Tebar Science, 6*(1), 104–113.

Al-Debei, M. M., Al-Lozi, E., & Al-Hujran, O. (2015). Critical design and evaluation factors of mobile business models: "Road block" eradicators for mobile networks operators. *Journal of Enterprise Information Management, 28*(5), 698–717.

Al-Debei, M. M., El-Haddadeh, R., & Avison, D. (2008, August 14–17). *Defining the business model in the new world of digital business.* 14th Americas Conference on Information Systems, Toronto, ON, Canada.

Alegre, J., & Sard, M. (2015). When demand drops and prices rise. Tourist packages in the Balearic Islands during the economic crisis. *Tourism Management, 46*(1), 375–385.

Ambrosini, V., & Bowman, C. (2009). What are dynamic capabilities and are they a useful construct in strategic management?. *International Journal of Management Reviews, 11*(1), 29–49.

Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal, 22*(6), 493–520.

Amit, R., & Zott, C. (2012). Creating value through business model innovation. *MIT Sloan Management Revie*w, 53(3), 41–49.

Amit, R., & Zott, C. (2020). *Business model innovation strategy–Transformational concepts and tools for entrepreneurial leaders*. John Wiley & Sons.

Ammirato, S., Linzalone, R., & Felicetti, A. M. (2022). Business model innovation drivers as antecedents of performance. *Measuring Business Excellence, 26*(1), 6–22.

Andreini, D., Bettinelli, C., Foss, N. J., & Mismetti, M. (2022). Business model innovation: a review of the process-based literature. *Journal of Management and Governance, 26*(4), 1089–1121.

Andries, P., Debackere, K., & van Looy, B. (2013). Simultaneous experimentation as a learning strategy: Business model development under uncertainty. *Strategic Entrepreneurship Journal, 7*(4), 288–310.

Anwar, M. (2018). Business model innovation and SMEs performance-Does competitive advantage mediate?. *International Journal of Innovation Management, 22*(7), 1–31.

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*(3), 396–402.

Armstrong, J. S., Overton, T. S., Armstrong J. Scott, & Overton Terry S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*(3), 396–402.

Arnold, C., Kiel, D., & Voigt, K. I. (2016). How the industrial internet of things changes business models in different manufacturing industries. *International Journal of Innovation Management, 20*(8), 1–15.

Aspara, J., Hietanen, J., & Tikkanen, H. (2010). Business model innovation vs replication: Financial performance implications of strategic emphases. *Journal of Strategic Marketing, 18*(1), 39–56.

Aspara, J., Lamberg, J. A., Laukia, A., & Tikkanen, H. (2013). Corporate business model transformation and inter-organizational cognition: The case of nokia. *Long Range Planning, 46*(6), 459–474.

Åström, J., Reim, W., & Parida, V. (2022). Value creation and value capture for AI business model innovation: a three-phase process framework. *Review of Managerial Science, 16*(7), 2111–2133.

Atuahene-Gima, K., & Ko, A. (2001). An empirical investigation of the effect of market orientation and entrepreneurship orientation alignment on product innovation. *Organization Science, 12*(1), 54–74.

Augier, M., & Teece, D. J. (2007). Dynamic capabilities and multinational enterprise: Penrosean insights and omissions. *Management International Review, 47*(2), 175–192.

Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning, 46*(6), 419–426.

Baden-Fuller, C., & Morgan, M. S. (2010). Business models as models. *Long Range Planning, 43*(2), 156–171.

Balboni, B., Bortoluzzi, G., Pugliese, R., & Tracogna, A. (2019). Business model evolution, contextual ambidexterity and the growth performance of high-tech start-ups. *Journal of Business Research,* 99(1), 115–124.

Balocco, R., Cavallo, A., Ghezzi, A., & Berbegal-Mirabent, J. (2019). Lean business models change process in digital entrepreneurship. *Business Process Management Journal,* 25(7), 1520–1542.

Barclay, D. W., Higgins, C. A., & Thompson, R. (1995). The partial least squares approach to causal modeling: personal computer adoption and use as illustration. *Technology Studies, 2*(2), 285– 309.

Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management, 27*(6), 625–641.

Bashir, M., Naqshbandi, M. M., & Farooq, R. (2020). Business model innovation: a systematic review and future research directions. *International Journal of Innovation Science, 12*(4), 457–476.

Bashir, M., & Verma, R. (2017). Why business model innovation is the new competitive advantage. *IUP Journal of Business Strategy, 14*(1), 7–17.

Bashir, M., & Verma, R. (2019). Internal factors & consequences of business model innovation. *Management Decision, 57*(1), 262–290.

Bastug, E., Bennis, M., Medard, M., & Debbah, M. (2017). Toward interconnected virtual reality: opportunities, challenges, and enablers. *IEEE Communications Magazine, 55*(6), 110–117.

Becker, J. M., Klein, K., & Wetzels, M. (2012). Hierarchical latent variable models in PLS-SEM: Guidelines for using reflective-formative type models. *Long Range Planning, 45*(5), 359–394.

Bellman, R., Clark, C. E., Malcolm, D. G., Craft, C. J., & Ricciardi, F. M. (1957). On the construction of a multi-Stage, multi-person business game. *Operations Research, 5*(4), 469–503.

Berglund, H., & Sandström, C. (2013). Business model innovation from an open systems perspective: Structural challenges and managerial solutions. *International Journal of Product Development, 18*(3), 274–285.

Bergman, J. P., Jantunen, A., & Tarkiainen, A. (2015). Managerial cognition and dominant logic in innovation management: Empirical study in media industry. *International Journal of Business Innovation and Research, 9*(3), 253–271.

Bernd W. Wirtz, V. G. and P. D. (2016). Business Model Innovation: Development, Concept and Future Research Directions. *Journal of Business Model*, *4*(1), 1–28.

Betz, F. (2002). Strategic business models. *EMJ - Engineering Management Journal*, *14*(1), 21–28.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, *37*(2), 471–482.

Bhatti, S. H., Santoro, G., Khan, J., & Rizzato, F. (2021). Antecedents and consequences of business model innovation in the IT industry. *Journal of Business Research*, *123*(1), 389–400.

Bititci, U. S., Carrie, A. S., & McDevitt, L. (1997). Integrated performance measurement systems: A development guide. *International Journal of Operations and Production Management, 17*(5), 522–534.

Bock, A. J., Opsahl, T., George, G., & Gann, D. M. (2012). The effects of culture and structure on strategic flexibility during business model innovation. *Journal of Management Studies, 49*(2), 279–305.

Bocken, N. M. P., & Geradts, T. H. J. (2020). Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities. *Long Range Planning, 53*(4), 1–23.

Bodlaj, M., Coenders, G., & Zabkar, V. (2012). Responsive and proactive market orientation and innovation success under market and technological turbulence. *Journal of Business Economics and Management*, *13*(4), 666–687.

Bouwman, H., Heikkilä, J., Heikkilä, M., Leopold, C., & Haaker, T. (2018). Achieving agility using business model stress testing. *Electronic Markets, 28*(2), 149–162.

Bouwman, H., Nikou, S., & de Reuver, M. (2019). Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs?. *Telecommunications Policy, 43*(9), 101–118.

Bouwman, H., Nikou, S., Molina-Castillo, F. J., & de Reuver, M. (2018). The impact of digitalization on business models. *Digital Policy, Regulation and Governance , 20*(2), 105–124.

Bowling, N. A., Huang, J. L., Bragg, C. B., Khazon, S., & Blackmore, C. E. (2016). Supplemental material for who cares and who Is careless? insufficient effort responding as a reflection of respondent personality. *Journal of Personality and Social Psychology, 111*(2), 218–229.

Brea-Solís, H., Casadesus-Masanell, R., & Grifell-Tatjé, E. (2015). Business model evaluation: Quantifying walmart's sources of advantage. *Strategic Entrepreneurship Journal, 9*(1), 12–33.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, *1*(3), 185–216.

Brown, S. L., & Eisenhardt, K. M. (2003). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Organizational Improvisation, 42*(1), 225–256.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.

Bucherer, E., Eisert, U., & Gassmann, O. (2012). Towards systematic business model innovation: Lessons from product innovation management. *Creativity and Innovation Management, 21*(2), 183–198.

Budler, M., Župič, I., & Trkman, P. (2021). The development of business model research: A bibliometric review. *Journal of Business Research, 135*(6), 480–495.

Burchell, B., & Marsh, C. (1992). The effect of questionnaire length on survey response. *Quality and Quantity, 26*(3), 233–244.

Burmeister, C., Dirk Lüttgens, & Frank T. Piller. (2016). Business model innovation for industrie 4.0: Why the "industrial internet" mandates a new perspective on innovation. *Die Unternehmung, 70*(2), 124–152.

Cagliano, R., Blackmon, K., & Voss, C. (2001). Small firms under MICROSCOPE: International differences in production/operations management practices and performance. *Integrated Manufacturing Systems, 12*(7), 469–482.

Calantone, R. J., Tamer, C. S., & Yushan, Z. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management, 31*(6), 515–524.

Carayannis, E. G., Grigoroudis, E., Sindakis, S., & Walter, C. (2014). Business model innovation as antecedent of sustainable enterprise excellence and resilience. *Journal of the Knowledge Economy, 5*(3), 440–463.

Carayannis, E. G., Sindakis, S., & Walter, C. (2015). Business model innovation as lever of organizational sustainability. *Journal of Technology Transfer, 40*(1), 85–104.

Carpenter, S. (2018). Ten steps in scale development and reporting: A guide for researchers. *Communication Methods and Measures, 12*(1), 25–44.

Casadesus-Masanell, R., & Ricart, J. E. (2010). From strategy to business models and onto tactics. *Long Range Planning, 43*(3), 195–215.

Casadesus-Masanell, R., & Zhu, F. (2013). Business model innovation and competitive imitation: The case of sponsor-based business models. *Strategic Management Journal, 34*(4), 464–482.

Cegarra-Navarro, J. G., Soto-Acosta, P., & Wensley, A. K. P. (2016). Structured knowledge processes and firm performance: The role of organizational agility. *Journal of Business Research, 69*(5), 1544–1549.

Chang, S. J., Van Witteloostuijn, A., & Eden, L. (2010). From the editors: Common method variance in international business research. *Journal of International Business Studies, 41*(2), 178–184.

Chen, K. H., Wang, C. H., Huang, S. Z., & Shen, G. C. (2016). Service innovation and new product performance: The influence of market-linking capabilities and market turbulence. *International Journal of Production Economics, 172*(11), 54–64.

Chen, X., & Wang, X. (2015). Free or bundled: Channel selection decisions under different power structures. *Omega (United Kingdom), 53*(1), 11–20.

Chesbrough, H. (2003). The logic of open innovation: managing intellectual property. *California Management Review, 45*(3), 33–58.

Chesbrough, H. (2007). Business model innovation: It's not just about technology anymore. *Strategy and Leadership, 35*(6), 12–17.

Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning, 43*(3), 354–363.

Chesbrough, H., & Crowther, A. K. (2006). Beyond high tech: Early adopters of open innovation in other industries. *R and D Management, 36*(3), 229–236.

Chesbrough, H., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change, 11*(3), 529–555.

Chesbrough, H., & Appleyard, M. M. (2007). Open innovation and strategy. California *Management Review, 50*(1), 57–76.

Chin, W. W., Chinn, W. W., & Chin, W. W. (1998). The partial least squares approach to structural equation modelling. *Modern Methods for Business Research, 295*(2), 295–336.

Chong, W. K., Bian, D., & Zhang, N. (2016). E-marketing services and e-marketing performance: the roles of innovation, knowledge complexity and environmental turbulence in influencing the relationship. *Journal of Marketing Management, 32*(1–2), 149–178.

Christensen, C. M., Bartman, T., & Van Bever, D. (2016). The hard truth about business model innovation. *MIT Sloan Management Review, 58*(1), 31–40.

Clauss, T. (2016). Measuring business model innovation: conceptualization, scale development, and proof of performance. *R and D Management, 47*(3), 385–403.

Clauss, T., Abebe, M., Tangpong, C., & Hock, M. (2019). Strategic agility, business model innovation, and firm performance: An Empirical investigation. *IEEE Transactions on Engineering Management, 68*(3), 767–784.

Clauss, T., Bouncken, R. B., Laudien, S., & Kraus, S. (2020). Business model reconfiguration and innovation in smes: A mixed-method analysis from the electronics industry. *International Journal of Innovation Management, 24*(2), 1–35.

Clauss, T., & Kesting, T. (2017). How businesses should govern knowledge-intensive collaborations with universities: An empirical investigation of university professors. *Industrial Marketing Management, 62*(2), 185–198.

Clauss, T., Kraus, S., Kallinger, F. L., Bican, P. M., Brem, A., & Kailer, N. (2021). Organizational ambidexterity and competitive advantage: The role of strategic agility in the exploration-exploitation paradox. *Journal of Innovation and Knowledge, 6*(4), 203–213.

Cloutier, C., & Langley, A. (2020). What makes a process theoretical contribution?. *Organization Theory, 1*(1), 1–32.

Codini, A. P., Abbate, T., & Messeni Petruzzelli, A. (2022). Business model innovation and exaptation: A new way of innovating in SMEs. *Technovation, 119*(4), 0166–4972.

Cohen, J. (1992). Statistical power analysis for the behavioral sciences. *Current Directions in Psychological Science, 1*(3), 98–101.

Colovic, A. (2021). Leadership and business model innovation in late internationalizing SMEs. *Long Range Planning, 55*(2), 71–87.

Cosenz, F., & Bivona, E. (2021). Fostering growth patterns of SMEs through business model innovation. A tailored dynamic business modelling approach. *Journal of Business Research, 130*(1), 658–669.

Cosenz, F., & Noto, G. (2018). A dynamic business modelling approach to design and experiment new business venture strategies. *Long Range Planning, 51*(1), 127–140.

Creswell, J. W. (2012). *Educational research*. Pearson.

Cucculelli, M., & Bettinelli, C. (2015). Business models, intangibles and firm performance: evidence on corporate entrepreneurship from Italian manufacturing SMEs. *Small Business Economics, 45*(2), 329–350.

Cucculelli, M., & Peruzzi, V. (2018). Post-crisis firm survival, business model changes, and learning: evidence from the Italian manufacturing industry. *Small Business Economics, 54*(2), 459–474.

Dahan, N. M., Doh, J. P., Oetzel, J., & Yaziji, M. (2010). Corporate-NGO collaboration: Co-creating new business models for developing markets. *Long Range Planning, 43*(3), 326–342.

Dawes, J. (1999). The Relationship between subjective and objective company performance measures in market orientation research: Further empirical evidence. *Marketing Bulletin, 10*(3), 65–75.

De Clercq, D., & Pereira, R. (2020). Knowledge-sharing efforts and employee creative behavior: the invigorating roles of passion for work, time sufficiency and procedural justice. *Journal of Knowledge Management, 24*(5), 1131–1155.

De Luca, L. M., Verona, G., & Vicari, S. (2010). Market orientation and R and D effectiveness in high-technology firms: An empirical investigation in the biotechnology industry. *Journal of Product Innovation Management, 27*(3), 299–320.

De Maesschalck, R., Jouan-Rimbaud, D., & Massart, D. L. (2000). The Mahalanobis distance. *Chemometrics and Intelligent Laboratory Systems, 50*(1), 1–18.

De Reuver, M., Bouwman, H., & Haaker, T. (2013). Business model roadmapping: A practical approach to come from an existing to a desired business model. *International Journal of Innovation Management, 17*(1), 1–15.

Demil, B., & Lecocq, X. (2010). Business model evolution: In search of dynamic consistency. *Long Range Planning, 43*(3), 227–246.

Deschryvere, M. (2014). R&D, firm growth and the role of innovation persistence: An analysis of Finnish SMEs and large firms. *Small Business Economics, 43*(4), 767–785.

Dess, G. G., & Robinson, R. B. (1984). Measuring organizational performance in the absence of objective measures: The case of the privately-held firm and conglomerate business unit. *Strategic Management Journal, 5*(3), 265–273.

DeVellis, R. F., & Thorpe, C. T. (2021). Scale development: Theory and applications. Sage publications.

Dias, Á. L., Manuel, E. C., Dutschke, G., Pereira, R., & Pereira, L. (2021). Economic crisis effects on SME dynamic capabilities. International Journal of Learning and Change, 13(1), 63–80.

Djaja, I., & Arief, M. (2015). The impact of dynamic information technology capability and strategic agility on business model innovation and firm performance on ICT firms. *Advanced Science Letters, 21*(5), 1225–1229.

Djamba, Y. K., & Neuman, W. L. (2002). Social research methods: Qualitative and quantitative approaches. *Teaching Sociology, 30*(3), 380–386.

Donath, R., Kalakota, R., Cerf, B. S., & Kalyanam, K. (1999). Taming e-business models. *ISBM Business Marketing Web Consortium, 3*(1), 1–24.

Dottore, F. A. (1977). Data base provides business model. *Computerworld, 11*(44), 5–6.

Dove, R. (2002). *Response ability: the language, structure, and culture of the agile enterprise*. John Wiley & Sons.

Doz, Y. L., & Kosonen, M. (2010). Embedding strategic agility: A leadership agenda for accelerating business model renewal. *Long Range Planning, 43*(3), 370–382.

Drucker, P. F. (1954). *The Practice of management*. Harper and Row Publishers.

Drucker, P. F. (1995). *People and performance: The best of Peter Drucker on management*. Routledge.

Dubosson-Torbay, M., Osterwalder, A., & Pigneur, Y. (2001). E-business model design, classification, and measurements. *Wiley Online Library, 44*(1), 5–23.

Ducq, Y., & Vallespir, B. (2005). Definition and aggregation of a performance measurement system in three aeronautical workshops using the ECOGRAI method. *Production Planning and Control, 16*(2), 163–177.

Dunlap, D., McDonough, E. F., Mudambi, R., & Swift, T. (2016). Making up is hard to do: Knowledge acquisition strategies and the nature of new product innovation. *Journal of Product Innovation Management, 33*(4), 472–491.

Dushnitsky, G., & Lenox, M. J. (2005). When do incumbents learn from entrepreneurial ventures?: Corporate venture capital and investing firm innovation rates. *Research Policy, 34*(5), 615–639.

Dymitrowski, A., & Mielcarek, P. (2021). Business model innovation based on new technologies and its influence on a company's competitive advantage. *Journal of Theoretical and Applied Electronic Commerce Research, 16*(6), 2110–2128.

Economist Intelligence Unit. (2005). *Business 2010: Embracing the challenge of change*. The Economist.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they?. *Strategic Management Journal, 21*(10), 1105–1121.

Ennen, E., & Richter, A. (2010). The whole is more than the sum of its parts—or is it? A review of the empirical literature on complementarities in organizations. *Journal of Management, 36*(1), 207–233.

Evans, J. D., & Johnson, R. O. (2013). Tools for managing early-stage business model innovation. *Research-Technology Management, 56*(5), 52–56.

Ferreira, F. N. H., Proença, J. F., Spencer, R., & Cova, B. (2013). The transition from products to solutions: External business model fit and dynamics. *Industrial Marketing Management, 42*(7), 1093–1101.

Ferreras-Méndez, J. L., Olmos-Peñuela, J., Salas-Vallina, A., & Alegre, J. (2021). Entrepreneurial orientation and new product development performance in SMEs: The mediating role of business model innovation. *Technovation, 108*(2), 1–13.

Filser, M., Kraus, S., Breier, M., Nenova, I., & Puumalainen, K. (2021). Business model innovation: Identifying foundations and trajectories. *Business Strategy and the Environment, 30*(2), 891–907.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Foss, N. J., & Saebi, T. (2016). Fifteen years of research on business model innovation: How far have we come, and where should we go?. *Journal of Management, 43*(1), 200–227.

Foss, N. J., & Saebi, T. (2018). Business models and business model innovation: Between wicked and paradigmatic problems. *Long Range Planning, 51*(1), 9–21.

Frankenberger, K., Weiblen, T., Csik, M., & Gassmann, O. (2013). The 4I-framework of business model innovation: A structured view on process phases and challenges. *International Journal of Product Development, 18*(3), 249–273.

Frankenberger, K., & Zott, C. (2018). *The role of differentiation, integration, and governance in developing innovative business models*. Academy of Management Proceedings, Briarcliff Manor, NY, USA.

Gambardella, A., & McGahan, A. M. (2010). Business-model innovation: General purpose technologies and their implications for industry structure. *Long Range Planning, 43*(3), 262–271.

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *Internet and Higher Education, 10*(3), 157–172.

Garzella, S., Fiorentino, R., Caputo, A., & Lardo, A. (2021). Business model innovation in SMEs: the role of boundaries in the digital era. *Technology Analysis and Strategic Management, 33*(1), 31–43.

Geisser, S. (1974). A predictive approach to the random effect model. *Biometrika, 61*(1), 101–107.

George, G., & Bock, A. J. (2011). The Business model in practice and its implications for entrepreneurship research. *Entrepreneurship Theory and Practice, 35*(1), 83–111.

Gerbing, D. W., & Hamilton, J. G. (1996). Viability of exploratory factor analysis as a precursor to confirmatory factor analysis. *Structural Equation Modeling, 3*(1), 62–72.

Ghalayini, A. M., Noble, J. S., & Crowe, T. J. (1997). An integrated dynamic performance measurement system for improving manufacturing competitiveness. *International Journal of Production Economics, 48*(3), 207–225.

Ghezzi, A., & Cavallo, A. (2020). Agile business model innovation in digital entrepreneurship: lean startup approaches. *Journal of Business Research, 110*(1), 519–537.

Ghezzi, A., Cortimiglia, M. N., & Frank, A. G. (2015). Strategy and business model design in dynamic telecommunications industries: A study on Italian mobile network operators. *Technological Forecasting and Social Change, 90*(1), 346–354.

Giesen, E., Berman, S. J., Bell, R., & Blitz, A. (2007). Three ways to successfully innovate your business model. *Strategy and Leadership, 35*(6), 27–33.

Girod, S. J. G., & Whittington, R. (2017). Reconfiguration, restructuring and firm performance: Dynamic capabilities and environmental dynamism. *Strategic Management Journal, 38*(5), 1121–1133.

Gordijn, J., & Akkermans, H. (2001). Intelligent e-business: Designing and evaluating e-business models. *IEEE Intelligent Systems, 16*(4), 11–17.

Gruber, H. (2019). Proposals for a digital industrial policy for Europe. *Telecommunications Policy, 43*(2), 116–127.

Guo, H., Su, Z., & Ahlstrom, D. (2016). Business model innovation: The effects of exploratory orientation, opportunity recognition, and entrepreneurial bricolage in an emerging economy. *Asia Pacific Journal of Management, 33*(2), 533–549.

Guo, H., Tang, J., Su, Z., & Katz, J. A. (2017). Opportunity recognition and SME performance: the mediating effect of business model innovation. *R and D Management, 47*(3), 431–442.

Guo, H., Wang, C., Su, Z., & Wang, D. (2020). Technology push or market pull? Strategic orientation in business model design and digital start-up performance*. *Journal of Product Innovation Management, 37*(4), 352–372.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139–152.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science, 40*(3), 414–433.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2017). *Advanced issues in partial least squares structural equation modeling*. saGe publications.

Haleblian, J., & Finkelstein, S. (1993). Top management team size, ceo dominance, and firm performance: The moderating roles of environmental turbulence and discretion. *Academy of Management Journal, 36*(4), 844–863.

Hamel, G. (2001). Leading the revolution. *Journal of Product Innovation Management, 18*(2), 212–215.

Hanafiah, M. H., Volume, A., Least, P., Structural, S., Modeling, E., May, R., & Classification, M. S. (2020). Formative vs. reflective measurement model: Guidelines for structural equation modeling research. *International Journal of Analysis and Applications, 18*(5), 876–889.

Hartmann, M., Oriani, R., & Bateman, H. (2013). Exploring the antecedents to business model innovation: An empirical analysis of pension funds. *Academy of Management Proceedings, 2013*(1), 20–35.

Hautz, J., Seidl, D., & Whittington, R. (2017). Open strategy: Dimensions, dilemmas, dynamics. *Long Range Planning, 50*(3), 298–309.

Hedman, J., & Kalling, T. (2003). The business model concept: Theoretical underpinnings and empirical illustrations. *European Journal of Information Systems, 12*(1), 49–59.

Heider, A., Gerken, M., van Dinther, N., & Hülsbeck, M. (2021). Business model innovation through dynamic capabilities in small and medium enterprises – Evidence from the German Mittelstand. *Journal of Business Research, 130*(2), 635–645.

Heij, C. V., Volberda, H. W., & Van Den Bosch, F. A. J. (2014, January 1–5). *How does business model innovation influence firm performance: The moderating effect of environmental dynamism*. 74th Annual Meeting of the Academy of Management, Briarcliff Manor, NY, USA.

Heikkilä, M., Bouwman, H., & Heikkilä, J. (2018). From strategic goals to business model innovation paths: an exploratory study. *Journal of Small Business and Enterprise Development, 25*(1), 107–128.

Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal, 36*(6), 831–850.

Henderson, R. M., & Clark, K. B. (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly, 35*(1), 9–30.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135.

Hock-Doepgen, M., Clauss, T., Kraus, S., & Cheng, C. F. (2021). Knowledge management capabilities and organizational risk-taking for business model innovation in SMEs. *Journal of Business Research, 130*(3), 683–697.

Hock, M., Clauss, T., & Schulz, E. (2016). The impact of organizational culture on a firm's capability to innovate the business model. *R and D Management, 46*(3), 433–450.

Hockerts, K., & Wüstenhagen, R. (2010). Greening Goliaths versus emerging Davids - Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. *Journal of Business Venturing, 25*(5), 481–492.

Hollenstein, H. (1996). A composite indicator of a firm's innovativeness. An empirical analysis based on survey data for Swiss manufacturing. *Research Policy, 25*(4), 633–645.

Hossain, M. (2017). Business model innovation: past research, current debates, and future directions. *Journal of Strategy and Management, 10*(3), 342–359.

Huang, H. C., Lai, M. C., Lin, L. H., & Chen, C. T. (2013). Overcoming organizational inertia to strengthen business model innovation: An open innovation perspective. *Journal of Organizational Change Management, 26*(6), 977–1002.

Huang, J. L., Bowling, N. A., Liu, M., & Li, Y. (2014). Detecting insufficient effort responding with an infrequency scale: Evaluating validity and participant reactions. *Journal of Business and Psychology, 30*(2), 299–311.

Hult, G. T. M., Hurley, R. F., & Knight, G. A. (2004). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management, 33*(5), 429–438.

Hurley, R. F., & Hult, G. T. M. (1998). Innovation, market orientation, and organizational learning: An integration and empirical examination. *Journal of Marketing, 62*(3), 42–54.

Hurt, H. T., Joseph, K., & Cook, C. D. (1977). Scales for the measurement of innovativeness. *Human Communication Research, 4*(1), 58–65.

Jaworski, B. J., & Kohli, A. K. (1993). Market orientation: Antecedents and consequences. *Journal of Marketing, 57*(3), 53–70.

Jin, C., Liu, A., Liu, H., Gu, J., & Shao, M. (2022). How business model design drives innovation performance: The roles of product innovation capabilities and technological turbulence. *Technological Forecasting and Social Change, 178*(1), 1–13.

Johnson, J. D., Meyer, M. E., Berkowitz, J. M., Miller, V., & Ethington, C. T. (1997). Testing two contrasting structural models of innovativeness in a contractual network. *Human Communication Research, 24*(2), 320–348.

Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review, 86*(12), 57–68.

Johnson, M. W., & Lafley, A. G. (2010). *Seizing the white space: Business model innovation for growth and renewal.* Harvard Business Press.

Jones, G. M. (1960). Educators, electrons, and business models: A problem in synthesis. *The Accounting Review, 35*(4), 619–620.

Jöreskog, K. G. (1971). Simultaneous factor analysis in several populations. *Psychometrika, 36*(4), 409–426.

Kagermann, H., Helbig, J., Hellinger, A., & Wahlster, W. (2013). *Recommendations for implementing the strategic initiative INDUSTRIE 4.0: Securing the future of German manufacturing industry; final report of the Industrie 4.0 Working Group*. Forschungsunion.

Kang, H. S., Lee, J. Y., Choi, S., Kim, H., Park, J. H., Son, J. Y., Kim, B. H., & Noh, S. Do. (2016). Smart manufacturing: Past research, present findings, and future directions. *International Journal of Precision Engineering and Manufacturing-Green Technology, 3*(1), 111–128.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard: Measures that drive performance. *Harvard Business Review, 83*(1), 71–79.

Kaplan, R. S., & Norton, D. P. (1998). Putting the balanced scorecard to work. *The Economic Impact of Knowledge, 3*(2), 315–324.

Karimi, J., & Walter, Z. (2016). Corporate entrepreneurship, disruptive business model innovation adoption, and its performance: The case of the newspaper industry. *Long Range Planning, 49*(3), 342–360.

Khan, M. W. J., Khalique, M., & Nor, R. M. (2014). Exploring the measurements of organizational performance: Small and medium enterprises (SMEs) perspective. *Market Forces, 9*(2), 31–38.

Khanagha, S., Volberda, H., & Oshri, I. (2014). Business model renewal and ambidexterity: Structural alteration and strategy formation process during transition to a Cloud business model. *R and D Management, 44*(3), 322–340.

Kim, S. K., & Min, S. (2015). Business model innovation performance: When does adding a new business model benefit an incumbent?. *Strategic Entrepreneurship Journal, 9*(1), 34–57.

Kindström, D., & Kowalkowski, C. (2014). Service innovation in product-centric firms: A multidimensional business model perspective. *Journal of Business and Industrial Marketing, 29*(2), 96–111.

Konczal, E. F. (1975). Models are for managers, not mathematicians. *Journal of Systems Management, 26*(165), 12–15.

Kono, S., Ito, E., & Loucks-Atkinson, A. (2021). Are leisure constraints models reflective or formative?: Evidence from confirmatory tetrad analyses. *Leisure Sciences, 44*(1), 55–76.

Kraus, S., Filser, M., Puumalainen, K., Kailer, N., & Thurner, S. (2020). Business model innovation: A systematic literature review. *International Journal of Innovation and Technology Management, 17*(6), 2–22.

Kump, B., Engelmann, A., Kessler, A., & Schweiger, C. (2019). Toward a dynamic capabilities scale: Measuring organizational sensing, seizing, and transforming capacities. *Industrial and Corporate Change, 28*(5), 1149–1172.

Lamore, P. R., Berkowitz, D., & Farrington, P. A. (2013). Proactive/responsive market orientation and marketing - Research and development integration. *Journal of Product Innovation Management, 30*(4), 695–711.

Lantano, F., Petruzzelli, A. M., & Panniello, U. (2022). Business model innovation in video-game consoles to face the threats of mobile gaming: Evidence from the case of Sony PlayStation. *Technological Forecasting and Social Change, 174*(1), 121210.

Larbi-Siaw, O., Xuhua, H., Owusu, E., Owusu-Agyeman, A., Fulgence, B. E., & Frimpong, S. A. (2022). Eco-innovation, sustainable business performance and market turbulence moderation in emerging economies. *Technology in Society, 68*(2), 101–122.

Latifi, M. A., & Bouwman, H. (2018, June 17–20). *Business model innovation and firm performance: The role of mediation and moderation factors*. 31st Bled EConference: Digital Transformation: Meeting the Challenges, Bled, Slovenia.

Latifi, M. A., Nikou, S., & Bouwman, H. (2021). Business model innovation and firm performance: Exploring causal mechanisms in SMEs. *Technovation, 107*(4), 1–12.

Lee, J., Suh, T., Roy, D., & Baucus, M. (2019). Emerging technology and business model innovation: The case of artificial intelligence. *Journal of Open Innovation: Technology, Market, and Complexity, 5*(3), 44.

Lee, S. M., Olson, D. L., & Trimi, S. (2012). Co-innovation: Convergenomics, collaboration, and co-creation for organizational values. *Management Decision, 50*(5), 817–831.

Lee, S., Park, G., Yoon, B., & Park, J. (2010). Open innovation in SMEs-An intermediated network model. *Research Policy, 39*(2), 290–300.

Leedy, P. D., & Ormrod, J. E. (2001). *Practical research: Planning and designing*. New Jersey: Merritt Prentice Hall.

Lehoux, P., Daudelin, G., Williams-Jones, B., Denis, J. L., & Longo, C. (2014). How do business model and health technology design influence each other? Insights from a longitudinal case study of three academic spin-offs. *Research Policy, 43*(6), 1025–1038.

Lestari, S. D., Leon, F. M., Widyastuti, S., Brabo, N. A., & Putra, A. H. P. K. (2020). Antecedents and consequences of innovation and business strategy on performance and competitive advantage of SMEs. *Journal of Asian Finance, Economics and Business, 7*(6), 365–378.

Levinthal, D. A. (1997). Adaptation on rugged landscapes. *Management Science, 43*(7), 934–950.

Lewis, M. W., Andriopoulos, C., & Smith, W. K. (2014). Paradoxical leadership to enable strategic agility. *California Management Review, 56*(3), 58–77.

Li, F., Etienne, A., Vernadat, F., & Siadat, A. (2018). Comprehensive performance expression model for industrial performance management and decision support. *IFAC Papers OnLine, 51*(11), 558–563.

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *Journal of Strategic Information Systems, 24*(3), 149–157.

Lohmöller, J.-B. (2013). *Latent variable path modeling with partial least squares*. Springer Science & Business Media.

Loon, M., & Quan, X. I. (2021). Theorising business model innovation: An integrated literature review. *Australian Journal of Management, 46*(3), 548–577.

Lopez-Nicolas, C., Nikou, S., Molina-Castillo, F. J., & Bouwman, H. (2020). Gender differences and business model experimentation in European SMEs. *Journal of Business and Industrial Marketing, 35*(7), 1205–1219.

Lu, Y., & Ramamurthy, K. R. (2011a). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS Quarterly, 35*(4), 931–954.

Lu, Y., & Ramamurthy, K. R. (2011b). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS Quarterly, 35*(4), 931–954.

Lucas Henry C., J., Agarwal, R., Clemons, E. K., El Sawy, O. A., & Weber, B. (2013). Impactful research on transformational information technology: An opportunity to inform new audiences. *MIS Quarterly, 37*(2), 371–382.

Magretta, J. (2002). Why business models matter. *Harvard Business Review, 80*(5), 86–92.

Makkonen, H., Pohjola, M., Olkkonen, R., & Koponen, A. (2014). Dynamic capabilities and firm performance in a financial crisis. *Journal of Business Research, 67*(1), 2707–2719.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*(1), 71–87.

Marino, A., Aversa, P., Mesquita, L., & Anand, J. (2015). Driving performance via exploration in changing environments: Evidence from formula one racing. *Organization Science, 26*(4), 1079–1100.

Markides, C. (2006). Disruptive innovation: In need of better theory. *Journal of Product Innovation Management, 23*(1), 19–25.

Markovic, S., Koporcic, N., Arslanagic-Kalajdzic, M., Kadic-Maglajlic, S., Bagherzadeh, M., & Islam, N. (2021). Business-to-business open innovation: COVID-19 lessons for small and medium-sized enterprises from emerging markets. *Technological Forecasting and Social Change, 170*(7), 120883.

Marolt, M., Maletič, D., Borštnar, M. K., Lenart, G., & Pucihar, A. (2016, March 12–15). *Comparative analysis of business model ontologies*. Proceedings of the 35th International Conference on Organizational Science Development, Portorož, Slovenia.

Martins, L. L., Rindova, V. P., & Greenbaum, B. E. (2015). Unlocking the hidden value of concepts: A cognitive approach to business model innovation. *Strategic Entrepreneurship Journal, 9*(1), 99–117.

Massa, L., Tucci, C. L., & Afuah, A. (2017). A critical assessment of business model research. *Academy of Management Annals, 11*(1), 73–104.

Matzler, K., Bailom, F., von den Eichen, S. F., & Kohler, T. (2013). Business model innovation: Coffee triumphs for Nespresso. *Journal of Business Strategy, 34*(2), 30–37.

McDermott, C. M., & Prajogo, D. I. (2012). Service innovation and performance in SMEs. *International Journal of Operations and Production Management, 32*(2), 216–237.

McGuire, J. W. (1965). How much freedom does business REALLY want?. *Business Horizons, 8*(2), 73–78.

McWilliams, A., & Siegel, D. S. (2011). Creating and capturing value: Strategic corporate social responsibility, resource-based theory, and sustainable competitive advantage. *Journal of Management, 37*(5), 1480–1495.

Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods, 17*(3), 437–455.

Medori, D., & Steeple, D. (2000). A framework for auditing and enhancing performance measurement systems. *International Journal of Operations and Production Management, 20*(5), 520–533.

Miller, K., McAdam, M., Spieth, P., & Brady, M. (2021). Business models big and small: Review of conceptualisations and constructs and future directions for SME business model research. *Journal of Business Research, 131*(1), 619–626.

Minatogawa, V., Franco, M., Rampasso, I. S., Holgado, M., Garrido, D., Pinto, H., & Quadros, R. (2022). Towards systematic sustainable business model innovation: What can we learn from business model innovation. *Sustainability (Switzerland), 14*(5), 29–39.

Miroshnychenko, I., Strobl, A., Matzler, K., & De Massis, A. (2021). Absorptive capacity, strategic flexibility, and business model innovation: Empirical evidence from Italian SMEs. *Journal of Business Research, 130*(1), 670–682.

Mitchell, D., & Coles, C. (2003). The ultimate competitive advantage of continuing business model innovation. *Journal of Business Strategy, 24*(5), 15–21.

Mitchell, D. W., & Bruckner Coles, C. (2004). Business model innovation breakthrough moves. *Journal of Business Strategy, 25*(1), 16–26.

Molina-Castillo, F. J., Stanko, M. A., Islam, N., & de Reuver, M. (2022). The impact of technological turbulence on smes business model innovation performance: The contingent role of entry order. *IEEE Transactions on Engineering Management, 1*(1), 1–15.

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: Toward a unified perspective. *Journal of Business Research, 58*(6), 726–735.

Morrison, J. T. (2009). Evaluating factor analysis decisions for scale design in communication research. *Communication Methods and Measures, 3*(4), 195–215.

Müller, J. M. (2019). Business model innovation in small- and medium-sized enterprises: Strategies for industry 4.0 providers and users. *Journal of Manufacturing Technology Management, 30*(8), 1127–1142.

Müller, J. M., Buliga, O., & Voigt, K. I. (2018). Fortune favors the prepared: How SMEs approach business model innovations in Industry 4.0. *Technological Forecasting and Social Change, 132*(1), 2–17.

Müller, J. M., Buliga, O., & Voigt, K. I. (2021). The role of absorptive capacity and innovation strategy in the design of industry 4.0 business models - A comparison between SMEs and large enterprises. *European Management Journal, 39*(3), 333–343.

Naman, J. L., & Slevin, D. P. (1993). Entrepreneurship and the concept of fit: A model and empirical tests. *Management, 14*(1), 137–153.

Nambisan, S. (2017). Digital Entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship: Theory and Practice, 41*(6), 1029–1055.

Narver, J. C., Slater, S. F., & MacLachlan, D. L. (2004). Responsive and proactive market orientation and new-product success. *Journal of Product Innovation Management, 21*(5), 334–347.

Neely, A., Adams, C., & Crowe, P. (2001). The performance prism in practice. *Measuring Business Excellence, 5*(2), 6–13.

Neely, A., Gregory, M., & Platts, K. (1995). Performance measurement system design: a literaturer review. *International Journal of Operations & Production Management, 15*(4), 80–116.

Nitzl, C., Roldan, J. L., & Cepeda, G. (2016). Mediation analysis in partial least squares path modelling, Helping researchers discuss more sophisticated models. *Industrial Management and Data Systems, 116*(9), 1849–1864.

Oderanti, F. O., Li, F., Cubric, M., & Shi, X. (2021). Business models for sustainable commercialisation of digital healthcare (eHealth) innovations for an increasingly ageing population: (A new business model for eHealth). *Technological Forecasting and Social Change, 171*(4), 1–15.

OECD. (2018). *OECD science, technology and innovation outlook 2018*. Paris: OECD publishing.

Osterwalder, A. (2004). *The business model ontology a proposition in a design science approach* [Doctoral dissertation]. Université de Lausanne, Faculté des hautes études commerciales.

Osterwalder, A., & Pigneur, Y. (2010). Business model generation: a handbook for visionaries, game changers, and challengers. *Journal of Product Innovation Management, 1*(6), 1099–1100.

Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: origins, present, and future of the concept. *Communications of the Association for Information Systems, 16*(1), 1–43.

Pateli, A. G., & Giaglis, G. M. (2005). Technology innovation-induced business model change: A contingency approach. *Journal of Organizational Change Management, 18*(2), 167–183.

Pereira, R. (2020). A historical perspective of entrepreneurship in Angola. *A Historical Perspective of Entrepreneurship in Angola, 11*(1), 60–76.

Pereira, R., & Maia, R. (2019). The role of politics and institutional environment on entrepreneurship: empirical evidence from Mozambique. *JANUS. NET e-Journal of International Relations, 10*(1), 96–109.

Peteraf, M. A., & Barney, J. B. (2003). Unraveling the resource-based tangle. *Managerial and Decision Economics, 24*(4), 309–323.

Petti, C., Rubini, L., & Podetti, S. (2017). Government support and R&D investment effectiveness in Chinese SMEs: A complex relationship. *Asian Economic Papers, 16*(1), 201–226.

Phangestu, J., Kountur, R., & Prameswari, D. A. (2020). The moderating effect of entrepreneurial leadership and competitive advantage on the relationship bbetween business model innovation and startup performance. *Journal of Business & Retail Management Research, 14*(03), 53–61.

Pieroni, M. P. P., McAloone, T. C., & Pigosso, D. C. A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *Journal of Cleaner Production, 215*(1), 198–216.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903.

Podsakoff, P. M., & Organ, D. W. (1986). Self-Reports in organizational research: Problems and prospects. *Journal of Management, 12*(4), 531–544.

Pohle, G., & Chapman, M. (2006). IBM's global CEO report 2006: Business model innovation matters. *Strategy and Leadership, 34*(5), 34–40.

Porter, M. E. (2001). Strategy and the Internet. *Harvard Business Review, 6358*(1), 63–78.

Pucci, T., Nosi, C., & Zanni, L. (2017). Firm capabilities, business model design and performance of SMEs. *Journal of Small Business and Enterprise Development, 24*(2), 222–241.

Pucihar, A., Lenart, G., Borštnar, M. K., Vidmar, D., & Marolt, M. (2019). Drivers and outcomes of business model innovation-micro, small and medium-sized enterprises perspective. *Sustainability (Switzerland), 11*(2), 344–361.

Rakesh Kumar, P., Nandakumar, M. K., Ghobadian, A., Ireland, R. D., & O'Regan, N. (2018). Business model design–performance relationship under external and internal contingencies: Evidence from SMEs in an emerging economy. *Long Range Planning, 51*(5), 750–769.

Randhawa, K., Wilden, R., & Gudergan, S. (2021). How to innovate toward an ambidextrous business model? The role of dynamic capabilities and market orientation. *Journal of Business Research, 130*(1), 618–634.

Ravelomanantsoa, M. S., Ducq, Y., & Vallespir, B. (2019). General enterprise performance measurement architecture. *International Journal of Production Research, 58*(22), 7023–7043.

Rayna, T., & Striukova, L. (2016). From rapid prototyping to home fabrication: How 3D printing is changing business model innovation. *Technological Forecasting and Social Change, 102*(1), 214–224.

Renato, P., & M. Naguib, O. (2016). Strategic entrepreneurship and dynamic flexibility: Towards an integrative framework. *International Journal of Organizational Leadership, 5*(4), 307–312.

Reuver, M. de, Bouwman, H., & MacInnes, I. (2009). Business models dynamics for start-ups and innovating e-businesses. *International Journal of Electronic Business, 7*(3), 269–286.

Reuver, M., Cligge, M., & Haaker, T. (2019). Online courses on business model innovation for practitioners in SMEs. *Journal of Business Models, 7*(3), 12–23.

Rezazadeh, A. (2017). The contribution of business model innovation to collaborative entrepreneurship between SMEs: A review and avenues for further research. International *Journal of Business and Globalisation, 18*(1), 112–129.

Rhoads, K., Townsend, D., & Busenitz, L. (2011). Novel business models and radical technologies under capital constraints: Complements or liabilities?. *Frontiers of Entrepreneurship Research, 31*(12), 3–8.

Rialti, R., Zollo, L., Ferraris, A., & Alon, I. (2019). Big data analytics capabilities and performance: Evidence from a moderated multi-mediation model. *Technological Forecasting and Social Change, 149*(1), 1–10.

Ricciardi, F., Zardini, A., & Rossignoli, C. (2016). Organizational dynamism and adaptive business model innovation: The triple paradox configuration. *Journal of Business Research, 69*(11), 5487–5493.

Richter, C., Kraus, S., Brem, A., Durst, S., & Giselbrecht, C. (2017). Digital entrepreneurship: Innovative business models for the sharing economy. *Creativity and Innovation Management, 26*(3), 300–310.

Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). Editor's comments: a critical look at the use of PLS-SEM in MIS Quarterly. *MIS Quarterly: Management Information Systems, 36*(1), 3–14.

Robu, M. (2013). The dynamic and importance of SMEs in economy. *The USV Annals of Economics and Public Administration, 13*(1), 84–89.

Rogers, E. M. (2014). In An integrated approach to communication theory and research. In A. Singhal (Ed.), *Diffusion of innovations* (pp. 432-448). Routledge.

Sabatier, V., Craig-Kennard, A., & Mangematin, V. (2012). When technological discontinuities and disruptive business models challenge dominant industry logics: Insights from the drugs industry. *Technological Forecasting and Social Change, 79*(5), 949–962.

Saebi, T., & Foss, N. J. (2015). Business models for open innovation: Matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal, 33*(3), 201–213.

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly, 27*(2), 237–263.

Sánchez, P., & Ricart, J. E. (2010). Business model innovation and sources of value creation in low-income markets. *European Management Review, 7*(3), 138–154.

Santa-Maria, T., Vermeulen, W. J. V., & Baumgartner, R. J. (2022). How do incumbent firms innovate their business models for the circular economy? Identifying micro-foundations of dynamic capabilities. *Business Strategy and the Environment, 31*(4), 1308–1333.

Santos, J. B., & Brito, L. A. L. (2012). Toward a subjective measurement model for firm performance. *BAR - Brazilian Administration Review, 9*(1), 95–117.

Sarstedt, M., Hair, J. F., Cheah, J. H., Becker, J. M., & Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australasian Marketing Journal, 27*(3), 197–211.

Sarstedt, M., Hair, J. F., Pick, M., Liengaard, B. D., Radomir, L., & Ringle, C. M. (2022). Progress in partial least squares structural equation modeling use in marketing research in the last decade. *Psychology and Marketing, 39*(5), 1035–1064.

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2021). Partial least squares structural equation modeling. In M. Sarstedt (Ed.), *Handbook of market research* (pp. 587–632). Springer International Publishing.

Sarstedt, M., Ringle, C. M., Henseler, J., & Hair, J. F. (2014). On the Emancipation of PLS-SEM: A Commentary on Rigdon (2012). *Long Range Planning, 47*(3), 154–160.

Schaller, A. A., & Vatananan-Thesenvitz, R. (2019, July 3–7). *Business model innovation process: A systematic literature review with bibliometric analysis*. In 2019 Portland International Conference on Management of Engineering and Technology, Portland, US.

Schilke, O., Hu, S., & Helfat, C. E. (2018). Quo vadis, dynamic capabilities? A content-analytic review of the current state of knowledge and recommendations for future research. *Academy of Management Annals, 12*(1), 390–439.

Schneider, S., & Spieth, P. (2013). Business model innovation: Towards an integrated future research agenda. *International Journal of Innovation Management, 17*(1), 1–34.

Schneider, S., Spieth, P., & Clauss, T. (2013). Business model innovation in the aviation industry. *International Journal of Product Development, 18*(3), 286–310.

Senbeto, D. L., & Hon, A. H. Y. (2020). Market turbulence and service innovation in hospitality: examining the underlying mechanisms of employee and organizational resilience. *The Service Industries Journal, 40*(15), 1119–1139.

Shafer, S. M., Smith, H. J., & Linder, J. C. (2005). The power of business models. *Business Horizons, 48*(3), 199–207.

Shahrabi, B. (2012). The Role of Organizational learning and agility in change management in state enterprises: A customer-oriented approach. *International Research Journal of Applied and Basic Sciences, 3*(12), 2540–2547.

Shiau, W. L., & Luo, M. M. (2012). Factors affecting online group buying intention and satisfaction: A social exchange theory perspective. *Computers in Human Behavior, 28*(6), 2431–2444.

Shmueli, G., & Koppius, O. R. (2011). Predictive analytics in information systems research. *MIS Quarterly, 35*(3), 553–572.

Sinkovics, N., Sinkovics, R. R., & Yamin, M. (2014). The role of social value creation in business model formulation at the bottom of the pyramid - Implications for MNEs?. *International Business Review, 23*(4), 692–707.

Sjödin, D., Parida, V., Jovanovic, M., & Visnjic, I. (2020). Value creation and value capture alignment in business model innovation: A process view on outcome-based business models. *Journal of Product Innovation Management, 37*(2), 158–183.

Slater, S. F., & Narver, J. C. (1994). Does competitive environment moderate the market orientation-performance relationship?. *Journal of Marketing, 58*(1), 46–55.

Snihur, Y., & Zott, C. (2020). The genesis and metamorphosis of novelty imprints: How business model innovation emerges in young ventures. *Academy of Management Journal, 63*(2), 554–583.

Snihur, Y., Zott, C., & Amit, R. (2021). Managing the value appropriation dilemma in business model innovation. *Strategy Science, 6*(1), 22–38.

Sniukas, M. (2015). *The micro-foundations of business model innovation as a dynamic capability*. The University of Manchester (United Kingdom).

Sorescu, A., Frambach, R. T., Singh, J., Rangaswamy, A., & Bridges, C. (2011). Innovations in retail business models. *Journal of Retailing, 87*(1), S3–S16.

Sosna, M., Trevinyo-Rodríguez, R. N., & Velamuri, S. R. (2010). Business model innovation through trial-and-error learning: The naturhouse case. *Long Range Planning, 43*(2), 383–407.

Sousa-Zomer, T. T., & Cauchick-Miguel, P. A. (2019). Exploring business model innovation for sustainability: an investigation of two product-service systems. *Total Quality Management and Business Excellence, 30*(5), 594–612.

Souto, J. E. (2015). Business model innovation and business concept innovation as the context of incremental innovation and radical innovation. *Tourism Management, 51*(1), 142–155.

Spieth, P., Schneckenberg, D., & Matzler, K. (2016). Exploring the linkage between business model (&) innovation and the strategy of the firm. *R and D Management, 46*(3), 403–413.

Spieth, P., Schneckenberg, D., & Ricart, J. E. (2014). Business model innovation - state of the art and future challenges for the field. *R and D Management, 44*(3), 237–247.

Spieth, P., & Schneider, S. (2016). Business model innovativeness: designing a formative measure for business model innovation. *Journal of Business Economics, 86*(6), 671–696.

Stadler, C., Helfat, C. E., & Verona, G. (2013). The impact of dynamic capabilities on resource access and development. *Organization Science, 24*(6), 1782–1804.

Subramanian, A. (1996). Innovativeness: Redefining the concept. *Journal of Engineering and Technology Management - JET-M, 13*(3), 223–243.

Svejenova, S., Planellas, M., & Vives, L. (2010). An individual business model in the making: a chef's quest for creative freedom. *Long Range Planning, 43*(3), 408–430.

Tallman, S., Luo, Y., & Buckley, P. J. (2018). Business models in global competition. *Global Strategy Journal, 8*(4), 517–535.

Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model. *MIS Quarterly, 35*(2), 463–486.

Taran, Y., Nielsen, C., Montemari, M., Thomsen, P., & Paolone, F. (2016). Business model configurations: a five-V framework to map out potential innovation routes. *European Journal of Innovation Management, 19*(4), 492–527.

Tavassoli, S., & Bengtsson, L. (2018). The role of business model innovation for product innovation performance. International *Journal of Innovation Management, 22*(7), 1–28.

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350.

Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning, 43*(2), 172–194.

Teece, D. J. (2014). A dynamic capabilities-based entrepreneurial theory of the multinational enterprise. *Journal of International Business Studies, 45*(1), 8–37.

Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning, 51*(1), 40–49.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509–533.

Teece, D. J., Peteraf, M., & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California Management Review, 58*(4), 13–35.

Tehseen, S., Ramayah, T., & Sajilan, S. (2017). Testing and controlling for common method variance: A review of available methods. *Journal of Management Sciences, 4*(2), 142–168.

Tikkanen, H., Lamberg, J. A., Parvinen, P., & Kallunki, J. P. (2005). Managerial cognition, action and the business model of the firm. *Management Decision, 43*(6), 789–809.

Timmers, P. (1998). Business models for electronic markets. Electronic Markets, 8(2), 3–8.

Tommaso, D., R., M., Rubini, L., & Barbieri, E. (2012). *Southern China: Industry, development and industrial policy*. In Routledge.

Torraco, R. J. (1997). *Human resource development research handbook: Linking research and practice*. Berrett-Koehler Publishers.

Trapp, M., Voigt, K. I., & Brem, A. (2018). Business models for corporate innovation management: Introduction of a business model innovation tool for established firms. *International Journal of Innovation Management, 22*(1), 1–24.

V. Alberti-Alhtaybat, L., Al-Htaybat, K., & Hutaibat, K. (2019). A knowledge management and sharing business model for dealing with disruption: The case of Aramex. *Journal of Business Research, 94*(1), 400–407.

Vagnoni, E., & Khoddami, S. (2016). Designing competitivity activity model through the strategic agility approach in a turbulent environment. *Foresight, 18*(6), 625–648.

Van der Panne, G., van Beers, C., & Kleinknecht, A. (2003). Success and Failure of Innovation: A Literature Review. *International Journal of Innovation Management, 7*(03), 309–338.

Van Oosterhout, M., Waarts, E., & van Hillegersberg, J. (2006). Change factors requiring agility and implications for IT. *European Journal of Information Systems, 15*(2), 132–145.

Velu, C. (2015). Business model innovation and third-party alliance on the survival of new firms. *Technovation, 35*(2), 1–11.

Velu, C., & Jacob, A. (2016). Business model innovation and owner-managers: The moderating role of competition. *R and D Management, 46*(3), 451–463.

Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of Management Review, 11*(4), 801–814.

Vidal, E., & Mitchell, W. (2013). When do first entrants become first survivors?. *Long Range Planning, 46*(4), 335–347.

Viscio, A. J., & Pasternack, B. A. (1996). Toward a new business model. *Strategy & Business, 20*(2), 125–134.

Visnjic, I., Wiengarten, F., & Neely, A. (2016). Only the brave: product innovation, service business model innovation, and their impact on performance. *Journal of Product Innovation Management, 33*(1), 36–52.

Visnjic Kastalli, I., & Van Looy, B. (2013). Servitization: Disentangling the impact of service business model innovation on manufacturing firm performance. *Journal of Operations Management, 31*(4), 169–180.

Voelpel, S. C., Leibold, M., & Tekie, E. B. (2004). The wheel of business model reinvention: how to reshape your business model to leapfrog competitors. *Journal of Change Management, 4*(3), 259–276.

Volberda, H. W. (1997). Building flexible organizations for fast-moving markets. *Long Range Planning, 30*(2), 148–169.

Vukanović, Z. (2016). Business model research agenda positioning: conceptual frameworks, functions, benefits, rationale, dynamics, performance, and economic feasibility. In Z. Vukanović (Ed.), *Foreign direct investment inflows into the south east European media market: Towards a hybrid business model* (pp. 5–66). Springer International Publishing.

Waldner, F., Poetz, M. K., Grimpe, C., & Eurich, M. (2015). Antecedents and consequences of business model innovation: The role of industry structure. *Advances in Strategic Management, 33*(1), 347–386.

Walravens, N. (2015). Qualitative indicators for smart city business models: The case of mobile services and applications. *Telecommunications Policy, 39*(3), 218–240.

Ward, M. K., & Meade, A. W. (2023). Dealing with careless responding in survey data: Prevention, identification, and recommended best practices. *Annual Review of Psychology, 74*(1), 577–596.

Weber, Y., & Tarba, S. Y. (2014). Strategic agility: A state of the art introduction to the special section on strategic agility. *California Management Review, 56*(3), 5–12.

Wei, Z., Yang, D., Sun, B., & Gu, M. (2014). The fit between technological innovation and business model design for firm growth: Evidence from China. *R and D Management, 44*(3), 288–305.

Wei, Z., Zhao, J., & Zhang, C. (2014). Organizational ambidexterity, market orientation, and firm performance. *Journal of Engineering and Technology Management - JET-M, 33*(1), 134–153.

Weking, J., Hein, A., Böhm, M., & Krcmar, H. (2020). A hierarchical taxonomy of business model patterns. *Electronic Markets, 30*(3), 447–468.

Wetzels, M., Odekerken-Schröder, G., Van Oppen, C., & Oppen, C. Van. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly, 33*(1), 177–195.

Widya-Hasuti, A., Mardani, A., Streimikiene, D., Sharifara, A., & Cavallaro, F. (2018). The role of process innovation between firm-specific capabilities and sustainable innovation in SMEs: Empirical evidence from Indonesia. *Sustainability (Switzerland), 10*(7), 1–26.

Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A configurational approach. *Journal of Business Venturing, 20*(1), 71–91.

Wilden, R., Devinney, T. M., & Dowling., G. R. (2016). The architecture of dynamic capability research : Identifying the building blocks of a configurational approach university of newcastle. *Academy of Management Annals, 10*(1), 997–1096.

Wilden, R., Gudergan, S. P., Nielsen, B. B., & Lings, I. (2013). Dynamic capabilities and performance: Strategy, structure and environment. *Long Range Planning, 46*(1), 72–96.

Williams, C. (2007). Research methods. *Journal of Business & Economics Research, 5*(3), 65–71.

Wirtz, B. W. (2011). *Business model management*. Design–Instrumente–Erfolgsfaktoren von Geschäftsmodellen.

Wirtz, B. W., & Daiser, P. (2018). Business model innovation: A systematic literature review. *International Journal of Innovation and Technology Management, 6*(1), 40–58.

Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). Business models: Origin, development and future research perspectives. *Long Range Planning, 49*(1), 36–54.

Wirtz, B. W., Schilke, O., & Ullrich, S. (2010). Strategic development of business models: Implications of the web 2.0 for creating value on the internet. *Long Range Planning, 43*(2), 272–290.

Witschel, D., Baumann, D., & Voigt, K. I. (2022). How manufacturing firms navigate through stormy waters of digitalization: the role of dynamic capabilities, organizational factors and environmental turbulence for business model innovation. *Journal of Management & Organization, 28*(3), 681–714.

Wrigley, C., & Straker, K. (2016). Designing innovative business models with a framework that promotes experimentation. *Strategy and Leadership, 44*(1), 11–19.

Wu, J., Guo, B., & Shi, Y. (2013). Customer knowledge management and IT-enabled business model innovation: A conceptual framework and a case study from China. *European Management Journal, 31*(4), 359–372.

Wudhikarn, R., Chakpitak, N., & Neubert, G. (2018). A literature review on performance measures of logistics management: an intellectual capital perspective. *International Journal of Production Research, 56*(13), 4490–4520.

Yang, D., Wei, Z., Shi, H., & Zhao, J. (2020). Market orientation, strategic flexibility and business model innovation. *Journal of Business and Industrial Marketing, 35*(4), 771–784.

Yannopoulos, P., Auh, S., & Menguc, B. (2012). Achieving fit between learning and market orientation: Implications for new product performance. *Journal of Product Innovation Management, 29*(4), 531–545.

Yin, R. K. (2011). *Applications of case study research*. Sage.

Yin, X. (2020). *商业模式创新与企业绩效关系的实证研究* [*Empirical research on the relationship between business model innovation and enterprise's performance*] [Doctoral dissertation]. Jilin University of China.

Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science, 23*(5), 1398–1408.

Yunus, M., Moingeon, B., & Lehmann-Ortega, L. (2010). Building social business models: Lessons from the grameen experience. *Long Range Planning, 43*(2), 308–325.

Zahra, S. A., Sapienza, H. J., & Davidsson, P. (2006). Entrepreneurship and dynamic capabilities: A review, model and research agenda. *Journal of Management Studies, 43*(4), 917–955.

Zhang, H., Xiao, H., Wang, Y., Shareef, M. A., Akram, M. S., & Goraya, M. A. S. (2021). An integration of antecedents and outcomes of business model innovation: A meta-analytic review. *Journal of Business Research, 131*(8), 803–814.

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research, 37*(2), 197–206.

Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry. *Information Systems Research, 16*(1), 61–84.

Zott, C., & Amit, R. (2007). Business model design and the performance of entrepreneurial firms. *Organization Science, 18*(2), 181–199.

Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: Implications for firm performance. *Strategic Management Journal, 29*(1), 1–26.

Zott, C., & Amit, R. (2010). Business model design: An activity system perspective. *Long Range Planning, 43*(3), 216–226.

Zott, C., & Amit, R. (2017). Business model innovation: How to create value in a digital world. *NIM Marketing Intelligence Review, 9*(1), 18–23.

Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management, 37*(4), 1019–1042.

Webliography

Alexander, C. (2016, July 25). *10 Business Models That Will Inspire You*. WhatAVenture. Retrieved September 14, 2021, from https://www.whataventure.com/blog/10-inspiring-business-models/

EISMEA. (2021, May 6). *SMEs and the Business Environment*. EISMEA. Retrieved June 08, 2023, from https://single-market-scoreboard.ec.europa.eu/policy_areas/smes-business-environment_en

European Commission. (2020, June 20). *SME definition*. European Commission. Retrieved September 08, 2021, from https://ec.europa.eu/growth/smes/sme-definition_en

Muller, P., Ramada, P., Julius, J., Herr, D., Gagliardi, D., Marzocchi, C., Lonkeu, O.-K., & Wenger, J. (2017, Auguest 10). *Annual report on European SMEs 2016–2017*. European Commission. Retrieved Auguest 03, 2023, from https://www.smeacademy.eu/uploads /5/2/4/2/52422965/171217_annual_report_-_eu_ smes_2016-2017.pdf.

Ringle, C. M., Wende, S., & Becker, J.-M. (2022, May 16). *SmartPLS 4*. Oststeinbek: SmartPLS. Retrieved March 2, 2023, from https://www.smartpls.com

Rometty, G. (2006, April 11). *Expanding the Innovation Horizon: The Global CEO Study 2006*. IBM Business Consulting. Retrieved Jun 6, 2022, from https://sci-hub.ren/https://innovate.typepad.com/innovation/files/ibm_the_global_ceo_study_2006.pdf

Xu, P. (2023, May 17). *More than 52 million small and medium-sized enterprises in China*. People's Daily Overseas Edition. Retrieved Auguest 23, 2023, from https://www.gov.cn/lianbo/bumen/202306/content_6887257.htm

Xuanzang Road Organizing Committee. (2023, March 11). *The 18th Xuanzang Road Gobi Challenge*. www.Bizchallenge.Net. Retrieved Auguest 3, 2023, from http://www.bizchallenge.net/qy/mediaCmptDetail?dHlwZT05JnV1aWQ9JmNtcHRJZD01NTQ5JnY9MTY5 MTExMzE4NjAwMA==?9=9

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Other References

Chinese Government. (2011). *Regulations on the Classification Standards for Small and Medium sized Enterprises*. (Report No. Ministry of Industry and Information Technology of China 2011-300).

European Commission. (2023). *Key figures on European business*. (Report No. Publications Office of the European Union 2023rd ed).

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Annex A: List of Tables

Table A1 Variables list of acronyms

Variables	Abbreviation	Construct	Abbreviation
Market orientation	MO	Responsive market orientations	RMO
		Proactive market orientations	PMO
Strategic agility	STA	Strategic Sensitivity	STS
		Leadership unity	SLD
		Resource Fluidity	SRF
Dynamic capabilities	DC	Sensing	SEN
		Seizing	SEZ
		Transforming	TRN
Organizational agility	ORA	Organizational agility	ORA
Technological openness	TCO	Technological openness	TCO
Innovativeness	INV	Innovativeness	INV
Business model innovation	BMI	Value offering innovation	VOI
		Value architecture innovation	VAI
		Revenue model innovation	RMI
Environment turbulence	EMT	Market turbulence	MKT
		Technological turbulence	TCT
Firm performance	FMP	Firm performance	FMP

Table A2 Scale for market orientations

No.	Construct	Items	Sources
RMO1	Responsive market orientations	We constantly monitor our level of commitment and orientation to serving customers' needs.	Yannopoulos et al. (2012); Lamore et al. (2013)
RMO2		Our strategy for competitive advantage is based on our understanding of needs.	
RMO3		We measure customer satisfaction systematically and frequently.	
RMO4		We are more customer-focused than our competitors.	
RMO5		We freely communicate information about our successful and unsuccessful customer experiences across all business functions.	
RMO6		Data on customer satisfaction are disseminated at all levels in this company on a regular basis.	
PMO1	Proactive market orientations	We continuously try to discover additional needs of our customers of which they are unaware.	
PMO2		We search for opportunities in areas where customers have a difficult time expressing their needs.	
PMO3		We extrapolate key trends to gain insight into what customers will need in the future.	
PMO4		We help our customers anticipate developments in their use of our products and services.	
PMO5		We incorporate solutions to unarticulated customer needs in our products and services.	
PMO6		We brainstorm on how customers use our products and services.	

PMO7	We innovate even at the risk of making our own offering obsolete.	
PMO8	We work with lead users of our offerings to recognize customer' needs months in advance of the majority of users.	

Table A3 Scale for strategic agility

No.	Construct	Items	Sources
STS1	Strategic Sensitivity	We are very sensitive for external changes (regarding customers, competitors, technologies) and integrate these into strategic planning of our company.	
STS2		We utilize different mechanisms to become aware of strategic developments early.	Hock et al. (2016)
STS3		Requirements for strategic adaptations are communicated fast and comprehensively through the organization.	
SLD1	Leadership unity	Our top management is able to make bold and fast strategic decisions.	
SLD2		Our management collaborates for strategic decisions.	
SLD3		Strategic questions are collectively solved by our management without being bogged down in top-level 'win-lose' politics.	
SRF1	Resource Fluidity	We are able to reallocate and utilize capital resources fluidly.	
SRF2		Our people and their competencies are highly mobile within our organization.	
SRF3		Our organizational structure allows for flexible redeployment of our resources.	

Table A4 Scale for dynamic capabilities

No.	Construct	Items	Sources
SEN1	Sensing	Our company knows the best practices in the market.	
SEN2		Our company is up to date on the current market situation.	
SEN3		Our company systematically searches for information on the current market situation.	Kump et al. (2019)
SEN4		As a company, we know how to access new information.	
SEN5		Our company always has an eye on our competitors' activities.	
SEN6		Our company quickly notices changes in the market.	
SEZ1	Seizing	Our company can quickly relate to new knowledge from the outside.	
SEZ2		We recognize what new information can be utilized in our company.	
SEZ3		Our company is capable of turning new technological knowledge into process and product innovation.	
SEZ4		Current information leads to the development of new products or services.	
TRN1	Transforming	By defining clear responsibilities, we successfully implement plans for changes in our company.	

TRN2	Even when unforeseen interruptions occur, change projects are seen through consistently in our company.
TRN3	Decisions on planned changes are pursued consistently in our company.
TRN4	In the past, we have demonstrated our strengths in implementing changes.
TRN5	In our company, change projects can be put into practice alongside the daily business.
TRN6	In our company, plans for change can be flexibly adapted to the current situation.

Table A5 Scale for organizational agility

No.	Items	Sources
ORA1	We have the ability to respond rapidly to customers' needs.	Cegarra-Navarro et al. (2016)
ORA2	We have the ability to adapt our production/ service provision rapidly to demand fluctuations.	
ORA3	We have the ability to cope rapidly with problems from suppliers.	
ORA4	We rapidly implement decisions to face market changes.	
ORA5	We continuously search for forms to reinvent or redesign our organization.	

Table A6 Scale for technology

No.	Construct	Items	Sources
TCO1	Technological openness	Many technologies we rely on are free of charge.	Guo et al. (2020)
TCO 2		We can easily access technical information in our field.	
TCO 3		There are a lot of technical talents in our field.	
TCO 4		It is easy to find technical service providers in our field.	
TCO 5		We can get technical services at a low cost.	
TCT 1	Technological turbulence	The technology in our industry is changing rapidly.	
TCT 2		Technological changes provide big opportunities in our industry.	
TCT 3		It is very difficult to forecast where the technology in our industry will be in the next 2 to 3 years.	
TCT 4		A large number of new product ideas have been made possible through technological breakthroughs in our industry.	
TCT 5		Technological developments in our industry are rather minor.	

Table A7 Scale for innovativeness

No.	Items	Sources
INV1	Our company frequently tries out new ideas.	Calantone et al. (2004)
INV2	Our company seeks out new ways to do things.	
INV3	Our company is creative in its methods of operation.	
INV4	Our company is often the first to market with new products and services.	
INV5	Innovation in our company is perceived as too risky and is resisted.	
INV6	Our new product introduction has increased over the last 5 years.	

Table A8 Scale for market turbulence

No.	Construct	Items	Sources
MKT1	Market Turbulence	In our kind of business, customers' product preferences change quite a bit over time.	Jaworski and Kohli (1993)
MKT2		Our customers tend to look for new product all the time.	
MKT3		Sometimes our customers are very price-sensitive, but on other occasions, price is relatively unimportant.	
MKT4		We are witnessing demand for our products and services from customers who never bought them before.	
MKT5		New customers tend to have product-related needs that are different from those of our existing customers.	
MKT6		We cater to many of the same customers that we used to in the past.	

Table A9 Scale for BMI

No.	Construct	Items	Sources
VOI1	Value offering innovation	Target customers have changed.	Spieth and Schneider (2016)
VOI2		The product and service offering has changed.	
VOI3		The firm's positioning in the market has changed.	
VAI1	Value architecture innovation	The firm's core competences and resources have changed.	
VAI2		Internal value creation activities have changed.	
VAI3		Roles and involvement of partners in the value creation process have changed.	
VAI4		Distribution has changed.	
RMI1	Revenue model innovation	Revenue mechanisms have changed.	
RMI2		Cost mechanisms have changed.	

Table A10 Scale for firm performance

No.	Items	Sources
FMP1	Relative to our competitors our financial performance was much better.	Venkatraman and Ramanujam, (1986)
FMP2	Relative to our competitors, the market share of our organization was much better.	
FMP3	Relative to our competitors, the sales growth of our organization was much better.	
FMP4	Relative to our competitors, the product development of our organization was much better.	
FMP5	Relative to our competitors, the development of our organization was much better.	

Table A11 Sample demographic

Variable	Description	Number	Percentage
Position	Chairman, General manager	199	20.58%
	Vice General manager	105	10.86%
	Director, Department Manager	208	21.51%
	Other technical or management position	217	22.44%
	First line employees	238	24.61%
Employees Quantity	Less 10 employees	114	11.79%
	10 to 49 employees	266	27.51%
	50 to 249 employees	229	23.68%
	250 to 2000 employees	285	29.47%

	Above 2000 employees	73	7.55%
Years of establishment	Less 3 years	178	18.41%
	3 to 6years	213	22.03%
	6 to 10 years	156	16.13%
	Above 10 years	420	43.43%
Annual revenue	10 million RMB	294	30.40%
	10 to 50 million RMB	215	22.23%
	50 to 100 million RMB	96	9.93%
	100 million to 1 billion RMB	276	28.54%
	Above 1 billion RMB	86	8.89%
R&D Function	Has R&D employee	686	70.94%
	No Has R&D employee	281	29.06%

Table A12 Scale for response by province

Province	Quantity	Percentage	Province	Quantity	Percentage
Sichuan	472	48.81%	Abroad	6	0.62%
Guangdong	235	24.30%	Shandong	6	0.62%
Chongqing	33	3.41%	Hubei	5	0.52%
Shanghai	31	3.21%	Yunnan	4	0.41%
Beijing	26	2.69%	Gansu	2	0.21%
Zhejiang	23	2.38%	Hebei	2	0.21%
Jiangxi	18	1.86%	Ningxia	2	0.21%
Shaanxi	15	1.55%	Shanxi	2	0.21%
Henan	13	1.34%	Tibet	2	0.21%
Hunan	13	1.34%	Jilin	1	0.10%
Jiangsu	12	1.24%	Liaoning	1	0.10%
Hainan	9	0.93%	Qinghai	1	0.10%
Anhui	8	0.83%	Tianjin	1	0.10%
Fujian	8	0.83%	Hong Kong	1	0.10%
Guangxi	7	0.72%	Xinjiang	1	0.10%
Guizhou	7	0.72%	Total	967	100.00%

Table A13 Criteria for determine type of measurement models

Determine criteria	Reflective model	Formative model
1. From definition of construct and its indicators to evaluate cause and effect.	cause and effect direction from construct to indicators.	Cause and effect direction from indicators to constructs.
1a. The relationship of indicator and construct.	Indicators reflect constructs.	Indicators define construct aspect.
1b. Whether the indicators change will induce construct change or not?	Change indicators will not induce constructs change.	Change indicators will induce constructs change.
1c. Whether the construct change will induce indicators change or not?	Constructs change will induce indicators change.	Constructs change will not induce indicators change.
2. Indicators interchangeable.	Indicators should be interchangeable.	Indicators no need interchangeable.
2a. Indicator have similar sign content, shared common theme?	Indicators have some to similar content, share common theme.	Indicators no need similar. content, nor share common theme.
2b. Delete one indicator will change the construct definition.	Delete one indicator will not impact construct definition change.	Delete one indicator will impact construct definition change.

3. Indicators have a high correlation.	Indicators need correlation.	Indicators no need correlation.
3a. Change one indicators will induce to change other indicators?	Yes, will.	No.
4. Indicators have nomological net and need same cause and effect relationship.	Indicators need same cause and effect relationship.	Indicators no need same cause and effect relationship.

Source: Hanafiah et al. (2020)

Table A14 Confirmatory tetrad analysis result

Constructs	Items	Original sample	CI low adj.	CI up adj.	Results
FMP	1: FMP1,FMP2,FMP3,FMP4	0.008	-0.017	0.033	Reflective
	2: FMP1,FMP2,FMP4,FMP3	-0.024	-0.054	0.006	
	4: FMP1,FMP2,FMP3,FMP5	0.009	-0.017	0.035	
	6: FMP1,FMP3,FMP5,FMP2	-0.011	-0.038	0.015	
	10: FMP1,FMP3,FMP4,FMP5	-0.024	-0.051	0.002	
INV	1: INV1,INV2,INV3,INV4	0.006	-0.021	0.033	Reflective
	2: INV1,INV2,INV4,INV3	-0.015	-0.049	0.020	
	4: INV1,INV2,INV3,INV5	-0.032	-0.051	-0.013	
	6: INV1,INV3,INV5,INV2	-0.033	-0.063	-0.003	
	7: INV1,INV2,INV3,INV6	-0.007	-0.035	0.020	
	10: INV1,INV2,INV4,INV5	-0.036	-0.060	-0.012	
	16: INV1,INV2,INV5,INV6	-0.058	-0.083	-0.033	
	22: INV1,INV3,INV4,INV6	0.008	-0.025	0.041	
	26: INV1,INV3,INV6,INV5	-0.006	-0.025	0.013	
MKT	1: MKT1,MKT2,MKT3,MKT4	0.011	-0.014	0.037	Reflective
	2: MKT1,MKT2,MKT4,MKT3	-0.003	-0.030	0.024	
	4: MKT1,MKT2,MKT3,MKT5	-0.009	-0.032	0.013	
	6: MKT1,MKT3,MKT5,MKT2	-0.006	-0.031	0.020	
	7: MKT1,MKT2,MKT3,MKT6	-0.013	-0.040	0.013	
	10: MKT1,MKT2,MKT4,MKT5	0.019	-0.007	0.045	
	16: MKT1,MKT2,MKT5,MKT6	-0.016	-0.043	0.010	
	22: MKT1,MKT3,MKT4,MKT6	-0.008	-0.032	0.016	
	26: MKT1,MKT3,MKT6,MKT5	0.007	-0.014	0.029	
ORA	1: ORA1,ORA2,ORA3,ORA4	0.036	0.009	0.063	Reflective
	2: ORA1,ORA2,ORA4,ORA3	0.037	0.010	0.064	
	4: ORA1,ORA2,ORA3,ORA5	-0.010	-0.030	0.009	
	6: ORA1,ORA3,ORA5,ORA2	0.009	-0.010	0.028	
	10: ORA1,ORA3,ORA4,ORA5	0.005	-0.014	0.025	
PMO	1: PMO1,PMO2,PMO3,PMO4	0.002	-0.024	0.028	Reflective
	2: PMO1,PMO2,PMO4,PMO3	0.011	-0.013	0.035	
	4: PMO1,PMO2,PMO3,PMO5	0.017	-0.011	0.045	
	6: PMO1,PMO3,PMO5,PMO2	0.004	-0.020	0.028	
	7: PMO1,PMO2,PMO3,PMO6	-0.003	-0.031	0.025	
	10: PMO1,PMO2,PMO3,PMO7	-0.002	-0.029	0.026	
	13: PMO1,PMO2,PMO3,PMO8	-0.004	-0.032	0.024	
	17: PMO1,PMO2,PMO5,PMO4	0.007	-0.017	0.031	
	23: PMO1,PMO2,PMO7,PMO4	-0.024	-0.055	0.007	
	26: PMO1,PMO2,PMO8,PMO4	0.016	-0.009	0.041	
	30: PMO1,PMO5,PMO6,PMO2	-0.026	-0.057	0.005	
	33: PMO1,PMO5,PMO7,PMO2	-0.018	-0.049	0.012	
	42: PMO1,PMO6,PMO8,PMO2	0.037	0.004	0.071	
	73: PMO1,PMO3,PMO7,PMO8	-0.022	-0.056	0.012	
	85: PMO1,PMO4,PMO6,PMO7	0.024	-0.010	0.058	

	97: PMO1,PMO5,PMO6,PMO8	-0.031	-0.067	0.004	
	100: PMO1,PMO5,PMO7,PMO8	-0.031	-0.065	0.003	
	110: PMO2,PMO3,PMO6,PMO4	-0.014	-0.042	0.014	
	121: PMO2,PMO3,PMO5,PMO7	-0.009	-0.035	0.016	
	156: PMO2,PMO6,PMO7,PMO5	-0.004	-0.028	0.020	
	1: RMO1,RMO2,RMO3,RMO4	0.009	-0.020	0.037	
	2: RMO1,RMO2,RMO4,RMO3	0.015	-0.013	0.043	
	4: RMO1,RMO2,RMO3,RMO5	0.026	-0.003	0.054	
	6: RMO1,RMO3,RMO5,RMO2	-0.001	-0.024	0.023	
RMO	7: RMO1,RMO2,RMO3,RMO6	-0.017	-0.045	0.012	Reflective
	10: RMO1,RMO2,RMO4,RMO5	0.031	0.005	0.057	
	16: RMO1,RMO2,RMO5,RMO6	-0.027	-0.055	0.001	
	22: RMO1,RMO3,RMO4,RMO6	0.002	-0.025	0.029	
	26: RMO1,RMO3,RMO6,RMO5	-0.029	-0.058	0.000	
	1: SEN1,SEN2,SEN3,SEN4	-0.008	-0.033	0.017	
	2: SEN1,SEN2,SEN4,SEN3	0.007	-0.014	0.028	
	4: SEN1,SEN2,SEN3,SEN5	-0.028	-0.057	0.000	
	6: SEN1,SEN3,SEN5,SEN2	0.028	0.000	0.057	
SEN	7: SEN1,SEN2,SEN3,SEN6	0.028	0.005	0.052	Reflective
	10: SEN1,SEN2,SEN4,SEN5	-0.007	-0.030	0.016	
	16: SEN1,SEN2,SEN5,SEN6	0.000	-0.018	0.018	
	22: SEN1,SEN3,SEN4,SEN6	-0.027	-0.050	-0.004	
	26: SEN1,SEN3,SEN6,SEN5	-0.010	-0.032	0.012	
SEZ	1: SEZ1,SEZ2,SEZ3,SEZ4	0.026	0.007	0.045	Reflective
	2: SEZ1,SEZ2,SEZ4,SEZ3	0.015	-0.006	0.035	
	1: TCO1,TCO2,TCO3,TCO4	0.004	-0.022	0.030	
	2: TCO1,TCO2,TCO4,TCO3	-0.031	-0.058	-0.004	
TCO	4: TCO1,TCO2,TCO3,TCO5	0.006	-0.016	0.029	Reflective
	6: TCO1,TCO3,TCO5,TCO2	-0.054	-0.085	-0.023	
	10: TCO1,TCO3,TCO4,TCO5	0.028	0.001	0.056	
	1: TCT1,TCT2,TCT3,TCT4	0.002	-0.013	0.018	
	2: TCT1,TCT2,TCT4,TCT3	-0.054	-0.080	-0.028	
TCT	4: TCT1,TCT2,TCT3,TCT5	0.011	-0.001	0.023	Reflective
	6: TCT1,TCT3,TCT5,TCT2	-0.104	-0.129	-0.081	
	10: TCT1,TCT3,TCT4,TCT5	0.026	0.009	0.042	
	1: TRN1,TRN2,TRN3,TRN4	-0.002	-0.023	0.019	
	2: TRN1,TRN2,TRN4,TRN3	-0.031	-0.058	-0.005	
	4: TRN1,TRN2,TRN3,TRN5	0.022	-0.002	0.046	
	6: TRN1,TRN3,TRN5,TRN2	-0.017	-0.042	0.006	
TRN	7: TRN1,TRN2,TRN3,TRN6	0.010	-0.010	0.030	Reflective
	10: TRN1,TRN2,TRN4,TRN5	-0.009	-0.036	0.018	
	16: TRN1,TRN2,TRN5,TRN6	0.003	-0.018	0.024	
	22: TRN1,TRN3,TRN4,TRN6	-0.014	-0.036	0.008	
	26: TRN1,TRN3,TRN6,TRN5	-0.048	-0.078	-0.018	

Table A15 Fornell-Larcker criterion of structure model

	FMP	INV	MKT	ORA	PMO	RMO	SEN	SEZ	SLD	SRF	STS	TCO	TCT	TRN
FMP	0.835													
INV	0.617	0.810												
MKT	0.581	0.605	0.769											
ORA	0.536	0.584	0.522	0.801										
PMO	0.615	0.624	0.655	0.607	0.778									
RMO	0.559	0.589	0.602	0.634	0.646	0.768								
SEN	0.568	0.581	0.581	0.597	0.618	0.615	0.804							
SEZ	0.578	0.607	0.628	0.588	0.616	0.619	0.616	0.803						
SLD	0.547	0.566	0.563	0.584	0.587	0.580	0.592	0.581	0.837					
SRF	0.551	0.589	0.562	0.590	0.619	0.607	0.606	0.567	0.586	0.829				
STS	0.563	0.616	0.574	0.610	0.610	0.622	0.616	0.620	0.600	0.593	0.838			
TCO	0.548	0.535	0.548	0.484	0.551	0.543	0.530	0.494	0.457	0.508	0.503	0.805		
TCT	0.595	0.558	0.604	0.538	0.651	0.536	0.588	0.560	0.531	0.616	0.552	0.551	0.840	
TRN	0.614	0.607	0.629	0.637	0.678	0.627	0.623	0.621	0.615	0.642	0.630	0.556	0.612	0.798

Table A16 First stage cross loading

Indicators	FMP	INV	MKT	ORA	PMO	RMI	RMO	SEN	SEZ	SLD	SRF	STS	TCO	TCT	TRN	VAI	VOI
FMP1	**0.797**	0.454	0.451	0.440	0.540	0.446	0.446	0.443	0.425	0.419	0.475	0.433	0.471	0.493	0.477	0.455	0.415
FMP2	**0.854**	0.521	0.499	0.443	0.497	0.460	0.465	0.487	0.490	0.474	0.466	0.489	0.445	0.497	0.505	0.541	0.470
FMP3	**0.858**	0.510	0.494	0.444	0.507	0.451	0.460	0.469	0.494	0.462	0.455	0.487	0.418	0.501	0.520	0.508	0.482
FMP4	**0.827**	0.537	0.477	0.433	0.523	0.466	0.472	0.487	0.496	0.444	0.442	0.457	0.537	0.512	0.529	0.515	0.459
FMP5	**0.839**	0.551	0.502	0.473	0.506	0.479	0.492	0.485	0.504	0.481	0.462	0.486	0.427	0.483	0.532	0.537	0.495
INV1	0.427	**0.793**	0.442	0.429	0.462	0.377	0.442	0.421	0.453	0.417	0.425	0.496	0.383	0.383	0.453	0.468	0.421
INV2	0.479	**0.825**	0.489	0.501	0.497	0.474	0.470	0.480	0.512	0.467	0.460	0.504	0.384	0.419	0.471	0.503	0.473
INV3	0.529	**0.807**	0.490	0.465	0.537	0.503	0.479	0.483	0.505	0.486	0.507	0.488	0.426	0.483	0.506	0.523	0.481
INV4	0.557	**0.774**	0.490	0.497	0.513	0.470	0.499	0.498	0.493	0.463	0.503	0.495	0.519	0.485	0.515	0.509	0.465
INV5	0.500	**0.881**	0.524	0.469	0.516	0.487	0.490	0.481	0.488	0.446	0.513	0.513	0.467	0.485	0.525	0.518	0.474
INV6	0.495	**0.776**	0.500	0.463	0.499	0.443	0.467	0.453	0.495	0.460	0.436	0.495	0.416	0.446	0.474	0.501	0.467
MKT1	0.482	0.509	**0.820**	0.378	0.531	0.511	0.464	0.459	0.500	0.452	0.444	0.473	0.406	0.472	0.502	0.561	0.519
MKT2	0.455	0.435	**0.758**	0.444	0.534	0.443	0.490	0.483	0.502	0.444	0.495	0.436	0.441	0.515	0.513	0.501	0.455
MKT3	0.417	0.412	**0.734**	0.330	0.440	0.428	0.415	0.399	0.437	0.416	0.420	0.381	0.389	0.443	0.459	0.430	0.445
MKT4	0.419	0.492	**0.750**	0.384	0.478	0.415	0.472	0.428	0.494	0.442	0.391	0.476	0.388	0.416	0.454	0.483	0.447

MKT5	0.443	0.494	**0.794**	0.410	0.485	0.438	0.460	0.438	0.511	0.410	0.390	0.450	0.412	0.436	0.479	0.504	0.470
MKT6	0.460	0.446	**0.752**	0.459	0.545	0.442	0.469	0.470	0.449	0.432	0.442	0.432	0.496	0.503	0.494	0.469	0.463
ORA1	0.423	0.431	0.410	**0.826**	0.502	0.395	0.524	0.495	0.463	0.479	0.500	0.495	0.393	0.453	0.511	0.423	0.425
ORA2	0.432	0.448	0.409	**0.834**	0.520	0.438	0.530	0.515	0.470	0.455	0.522	0.478	0.418	0.463	0.530	0.444	0.432
ORA3	0.444	0.501	0.450	**0.773**	0.477	0.447	0.504	0.446	0.516	0.479	0.431	0.479	0.353	0.413	0.497	0.467	0.453
ORA4	0.381	0.459	0.381	**0.739**	0.421	0.385	0.480	0.420	0.463	0.429	0.405	0.488	0.340	0.341	0.450	0.413	0.403
ORA5	0.459	0.494	0.436	**0.829**	0.505	0.445	0.509	0.511	0.445	0.496	0.511	0.510	0.435	0.477	0.554	0.494	0.450
PMO1	0.464	0.518	0.534	0.458	**0.778**	0.460	0.508	0.500	0.496	0.490	0.471	0.495	0.388	0.501	0.525	0.490	0.478
PMO2	0.454	0.447	0.471	0.458	**0.783**	0.432	0.510	0.467	0.483	0.446	0.489	0.426	0.460	0.507	0.513	0.476	0.451
PMO3	0.478	0.470	0.520	0.499	**0.799**	0.449	0.487	0.528	0.474	0.465	0.506	0.484	0.442	0.533	0.530	0.463	0.470
PMO4	0.507	0.433	0.500	0.493	**0.791**	0.473	0.498	0.503	0.465	0.464	0.492	0.448	0.435	0.501	0.543	0.496	0.474
PMO5	0.471	0.465	0.494	0.481	**0.801**	0.450	0.492	0.474	0.454	0.442	0.496	0.481	0.460	0.529	0.533	0.462	0.448
PMO6	0.435	0.555	0.527	0.477	**0.736**	0.461	0.523	0.450	0.491	0.459	0.467	0.531	0.398	0.453	0.541	0.535	0.467
PMO7	0.484	0.519	0.522	0.404	**0.719**	0.472	0.477	0.422	0.479	0.449	0.433	0.434	0.383	0.495	0.492	0.504	0.473
PMO8	0.529	0.467	0.498	0.502	**0.811**	0.474	0.526	0.499	0.488	0.444	0.493	0.497	0.471	0.532	0.539	0.488	0.471
RMI1	0.487	0.540	0.539	0.478	0.504	**0.889**	0.482	0.441	0.523	0.481	0.460	0.489	0.391	0.491	0.531	0.580	0.558
RMI2	0.505	0.489	0.511	0.473	0.558	**0.912**	0.495	0.507	0.502	0.491	0.469	0.496	0.466	0.540	0.568	0.582	0.551
RMO1	0.457	0.464	0.472	0.514	0.556	0.471	**0.795**	0.496	0.530	0.450	0.470	0.475	0.452	0.455	0.512	0.488	0.463
RMO2	0.433	0.430	0.473	0.553	0.551	0.439	**0.805**	0.536	0.489	0.496	0.543	0.504	0.436	0.451	0.533	0.451	0.450
RMO3	0.398	0.425	0.418	0.401	0.435	0.374	**0.709**	0.390	0.446	0.343	0.374	0.446	0.382	0.360	0.414	0.420	0.386
RMO4	0.419	0.460	0.455	0.465	0.460	0.382	**0.759**	0.451	0.480	0.457	0.428	0.496	0.375	0.366	0.451	0.419	0.414
RMO5	0.405	0.496	0.496	0.449	0.451	0.408	**0.747**	0.451	0.472	0.473	0.452	0.464	0.389	0.392	0.453	0.458	0.436
RMO6	0.463	0.441	0.456	0.532	0.512	0.418	**0.789**	0.502	0.430	0.456	0.527	0.485	0.464	0.439	0.518	0.432	0.435
SEN1	0.475	0.462	0.501	0.497	0.539	0.446	0.512	**0.821**	0.493	0.523	0.527	0.491	0.448	0.496	0.528	0.483	0.451
SEN2	0.502	0.488	0.454	0.472	0.487	0.439	0.519	**0.817**	0.522	0.502	0.491	0.522	0.409	0.464	0.534	0.497	0.485
SEN3	0.445	0.447	0.472	0.489	0.532	0.432	0.493	**0.825**	0.490	0.474	0.508	0.460	0.449	0.504	0.507	0.458	0.437
SEN4	0.445	0.488	0.450	0.468	0.466	0.409	0.486	**0.799**	0.516	0.465	0.469	0.486	0.460	0.443	0.483	0.457	0.463
SEN5	0.407	0.456	0.453	0.419	0.429	0.377	0.477	**0.743**	0.460	0.426	0.386	0.501	0.353	0.390	0.422	0.438	0.427
SEN6	0.462	0.462	0.472	0.533	0.522	0.438	0.487	**0.816**	0.489	0.472	0.547	0.515	0.439	0.533	0.525	0.469	0.429
SEZ1	0.443	0.454	0.479	0.501	0.515	0.453	0.499	0.527	**0.801**	0.456	0.499	0.467	0.431	0.437	0.497	0.481	0.457
SEZ2	0.455	0.502	0.510	0.499	0.502	0.464	0.515	0.507	**0.813**	0.509	0.444	0.523	0.368	0.449	0.493	0.520	0.456
SEZ3	0.449	0.488	0.480	0.451	0.458	0.430	0.483	0.452	**0.789**	0.418	0.409	0.509	0.387	0.434	0.474	0.492	0.447
SEZ4	0.508	0.506	0.545	0.439	0.505	0.477	0.490	0.494	**0.811**	0.483	0.468	0.493	0.404	0.476	0.530	0.530	0.501
SLD1	0.484	0.490	0.481	0.510	0.488	0.438	0.490	0.511	0.516	**0.850**	0.519	0.508	0.377	0.454	0.522	0.545	0.479
SLD2	0.443	0.435	0.468	0.508	0.526	0.452	0.525	0.532	0.477	**0.845**	0.532	0.518	0.406	0.473	0.543	0.485	0.435

SLD3	0.446	0.496	0.464	0.446	0.461	0.468	0.443	0.444	0.466	**0.816**	0.423	0.483	0.369	0.407	0.480	0.510	0.448
SRF1	0.467	0.480	0.463	0.544	0.547	0.442	0.509	0.535	0.453	0.489	**0.851**	0.531	0.433	0.534	0.539	0.470	0.456
SRF2	0.450	0.511	0.490	0.400	0.469	0.433	0.462	0.434	0.462	0.460	**0.776**	0.444	0.439	0.512	0.508	0.470	0.435
SRF3	0.453	0.475	0.444	0.524	0.521	0.409	0.544	0.540	0.494	0.516	**0.857**	0.502	0.392	0.482	0.550	0.448	0.430
STS1	0.498	0.506	0.501	0.582	0.569	0.478	0.535	0.577	0.512	0.516	0.571	**0.829**	0.463	0.517	0.554	0.521	0.511
STS2	0.474	0.524	0.480	0.464	0.487	0.461	0.516	0.504	0.527	0.506	0.452	**0.855**	0.400	0.439	0.506	0.534	0.479
STS3	0.442	0.519	0.461	0.486	0.475	0.435	0.512	0.464	0.520	0.488	0.467	**0.830**	0.403	0.430	0.523	0.539	0.460
TCO1	0.366	0.340	0.369	0.266	0.336	0.307	0.344	0.308	0.296	0.274	0.335	0.296	**0.703**	0.331	0.350	0.351	0.348
TCO2	0.491	0.484	0.479	0.460	0.502	0.432	0.480	0.499	0.462	0.422	0.474	0.468	**0.840**	0.506	0.522	0.474	0.437
TCO3	0.438	0.414	0.423	0.412	0.476	0.380	0.435	0.446	0.384	0.375	0.420	0.410	**0.736**	0.490	0.439	0.409	0.395
TCO4	0.452	0.446	0.452	0.388	0.455	0.399	0.448	0.445	0.420	0.375	0.401	0.412	**0.872**	0.443	0.455	0.471	0.450
TCO5	0.450	0.458	0.471	0.403	0.437	0.391	0.468	0.415	0.408	0.383	0.396	0.426	**0.860**	0.436	0.455	0.456	0.436
TCT1	0.463	0.402	0.473	0.436	0.522	0.432	0.431	0.483	0.420	0.416	0.480	0.424	0.455	**0.797**	0.477	0.438	0.420
TCT2	0.494	0.490	0.516	0.454	0.548	0.495	0.431	0.483	0.495	0.466	0.496	0.474	0.433	**0.835**	0.524	0.516	0.491
TCT3	0.519	0.486	0.534	0.437	0.548	0.496	0.447	0.481	0.464	0.435	0.537	0.464	0.515	**0.863**	0.521	0.525	0.497
TCT4	0.508	0.487	0.501	0.494	0.579	0.498	0.492	0.546	0.505	0.488	0.543	0.498	0.459	**0.838**	0.536	0.515	0.485
TCT5	0.511	0.471	0.509	0.439	0.535	0.481	0.456	0.477	0.460	0.429	0.518	0.458	0.458	**0.866**	0.509	0.493	0.446
TRN1	0.498	0.445	0.502	0.536	0.561	0.501	0.492	0.527	0.489	0.482	0.517	0.518	0.472	0.490	**0.810**	0.525	0.498
TRN2	0.497	0.519	0.527	0.466	0.535	0.488	0.467	0.486	0.490	0.499	0.536	0.472	0.440	0.501	**0.781**	0.509	0.455
TRN3	0.510	0.469	0.513	0.501	0.520	0.477	0.492	0.467	0.481	0.508	0.495	0.495	0.414	0.517	**0.785**	0.501	0.467
TRN4	0.518	0.495	0.490	0.527	0.562	0.490	0.521	0.526	0.512	0.472	0.537	0.496	0.507	0.511	**0.813**	0.536	0.487
TRN5	0.448	0.517	0.503	0.485	0.513	0.480	0.503	0.482	0.514	0.492	0.468	0.545	0.382	0.439	**0.784**	0.511	0.479
TRN6	0.471	0.465	0.478	0.532	0.556	0.492	0.534	0.495	0.489	0.503	0.523	0.493	0.449	0.474	**0.817**	0.491	0.444
VAI1	0.487	0.443	0.480	0.468	0.525	0.516	0.472	0.487	0.482	0.476	0.458	0.497	0.482	0.482	0.519	**0.783**	0.546
VAI2	0.491	0.568	0.533	0.462	0.528	0.523	0.502	0.486	0.567	0.496	0.452	0.568	0.414	0.466	0.540	**0.834**	0.525
VAI3	0.503	0.545	0.575	0.487	0.532	0.580	0.486	0.488	0.539	0.528	0.464	0.524	0.455	0.516	0.539	**0.847**	0.564
VAI4	0.558	0.509	0.542	0.463	0.526	0.535	0.479	0.488	0.512	0.538	0.487	0.526	0.468	0.518	0.545	**0.866**	0.574
VOI1	0.453	0.448	0.466	0.451	0.515	0.513	0.481	0.464	0.459	0.419	0.465	0.470	0.450	0.471	0.495	0.524	**0.811**
VOI2	0.478	0.473	0.526	0.439	0.511	0.505	0.464	0.476	0.502	0.471	0.445	0.483	0.442	0.479	0.517	0.573	**0.857**
VOI3	0.472	0.522	0.537	0.472	0.490	0.532	0.473	0.469	0.498	0.474	0.430	0.503	0.412	0.460	0.480	0.567	**0.852**

Table A17 First stage Variance inflation factor (VIF) of each reflective indicators

Constructs	Indicators	VIF	Constructs	Indicators	VIF
RMO	RMO1	1.832	FMP	FMP1	1.928
	RMO2	1.975		FMP2	2.396
	RMO3	1.556		FMP3	2.490
	RMO4	1.757		FMP4	2.102
	RMO5	1.730		FMP5	2.183
	RMO6	1.913	INV	INV1	2.413
SEN	SEN1	2.155		INV2	2.495
	SEN2	2.109		INV3	2.025
	SEN3	2.311		INV4	1.788
	SEN4	1.996		INV5	3.668
	SEN5	1.720		INV6	1.839
	SEN6	2.256	MKT	MKT1	2.012
TRN	TRN1	2.122		MKT2	1.715
	TRN2	1.867		MKT3	1.623
	TRN3	1.924		MKT4	1.736
	TRN4	2.080		MKT5	1.949
	TRN5	1.887		MKT6	1.686
	TRN6	2.183	ORA	ORA1	2.081
SEZ	SEZ1	1.696		ORA2	2.169
	SEZ2	1.734		ORA3	1.694
	SEZ3	1.645		ORA4	1.588
	SEZ4	1.702		ORA5	2.115
SLD	SLD1	1.691	PMO	PMO1	1.980
	SLD2	1.651		PMO2	2.039
	SLD3	1.596		PMO3	2.241
SRF	SRF1	1.750		PMO4	2.151
	SRF2	1.408		PMO5	2.317
	SRF3	1.752		PMO6	1.793
STS	STS1	1.545		PMO7	1.711
	STS2	1.814		PMO8	2.309
	STS3	1.680	TCT	TCT1	2.171
TCO	TCO1	1.537		TCT2	2.665
	TCO2	2.114		TCT3	2.949
	TCO3	1.599		TCT4	2.416
	TCO4	3.087		TCT5	3.120
	TCO5	2.909			

Table A18 Latent indicators outer Loadings

Variables	Latent indicators	Loadings	95% confidence intervals	STDEV	T values	P values
DC	LV SEN	0.813	[0.774, 0.848]	0.019	42.754	0.000
	LV SEZ	0.869	[0.836, 0.898]	0.016	54.631	0.000
	LV TRN	0.898	[0.869, 0.923]	0.014	65.828	0.000
STA	LV SLD	0.858	[0.816, 0.892]	0.019	45.679	0.000
	LV SRF	0.806	[0.762, 0.845]	0.021	38.763	0.000
	LV STS	0.890	[0.857, 0.918]	0.016	56.517	0.000
BMI	LV VOI	0.849	[0.818, 0.877]	0.015	55.527	0.000
	LV VAI	0.920	[0.897, 0.939]	0.011	85.995	0.000
	LV RMI	0.836	[0.801, 0.866]	0.016	50.781	0.000

Table A19 Specific indirect path coefficients from antecedents to firm performance

Path	Path coefficients	95% confidence intervals	STDEV	T values	P values
STA -> DC -> BMI -> FMP	0.110	[0.072, 0.150]	0.020	5.508	0.000
TCO -> INV -> BMI -> FMP	0.046	[0.026, 0.069]	0.011	4.118	0.000
STA -> BMI -> FMP	0.111	[0.059, 0.161]	0.026	4.26	0.000
DC -> BMI -> FMP	0.169	[0.113, 0.226]	0.029	5.77	0.000
INV -> BMI -> FMP	0.086	[0.048, 0.126]	0.020	4.237	0.000
TCO -> BMI -> FMP	0.035	[0.002, 0.068]	0.017	2.054	0.040
TCT -> MKT -> BMI -> FMP	0.061	[0.035, 0.088]	0.014	4.493	0.000
ORA -> DC -> BMI -> FMP	0.042	[0.027, 0.060]	0.009	4.841	0.000
PMO -> BMI -> FMP	0.050	[0.007, 0.092]	0.022	2.287	0.022
MKT -> BMI -> FMP	0.101	[0.058, 0.144]	0.022	4.607	0.000
ORA -> BMI -> FMP	0.020	[-0.020, 0.059]	0.020	0.989	0.323
RMO -> PMO -> BMI -> FMP	0.032	[0.004, 0.060]	0.014	2.269	0.023
TCT -> BMI -> FMP	0.071	[0.034, 0.108]	0.019	3.767	0.000
RMO -> BMI -> FMP	0.011	[-0.031, 0.054]	0.022	0.512	0.609

Annex B: List of Figures

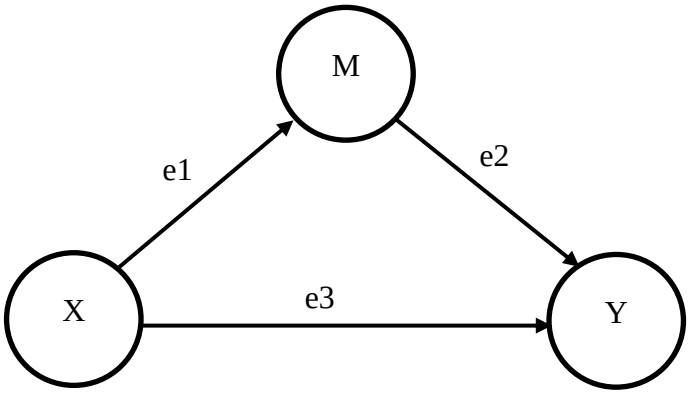

Figure B1 Simple mediation model

Source: Hair et al. (2021)

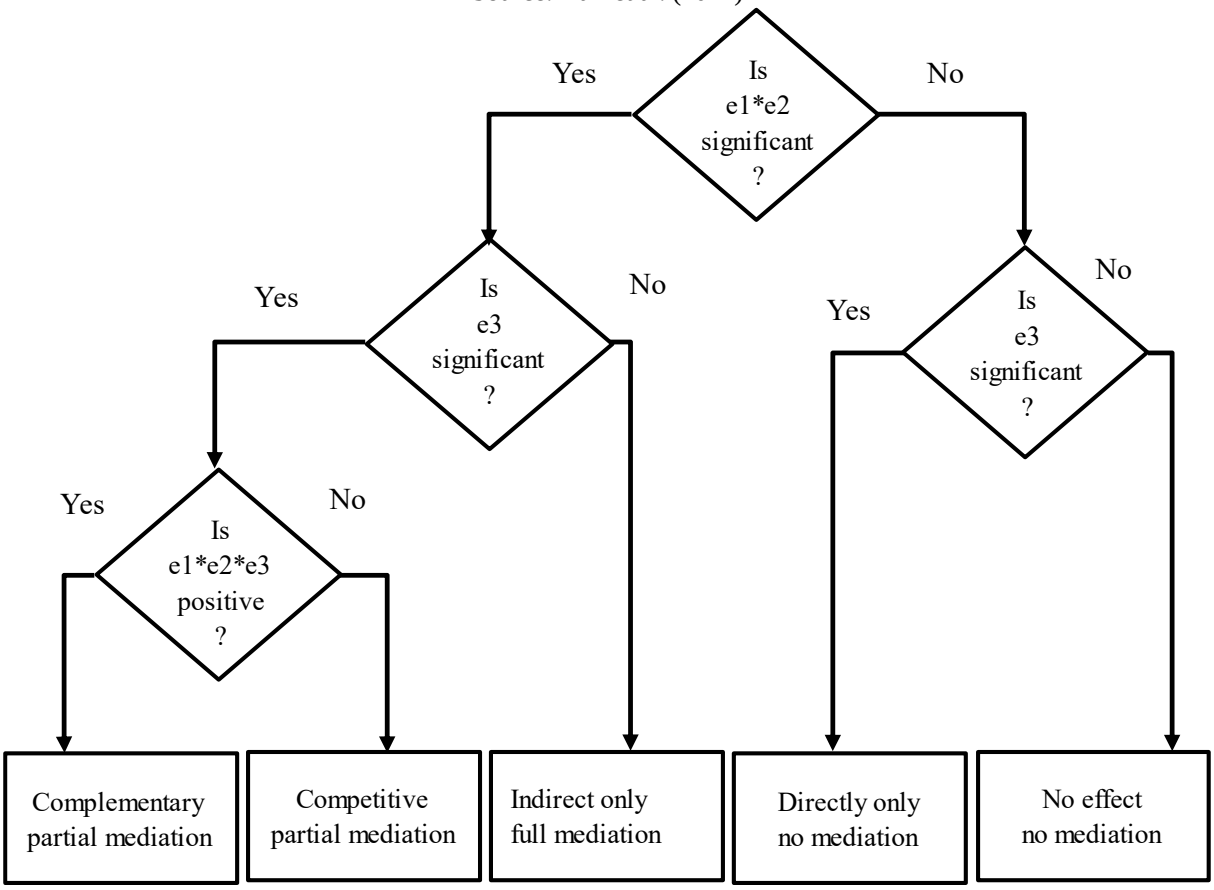

Figure B2 Procedure flow chart for analyze mediation category

Source: Hair et al. (2021)

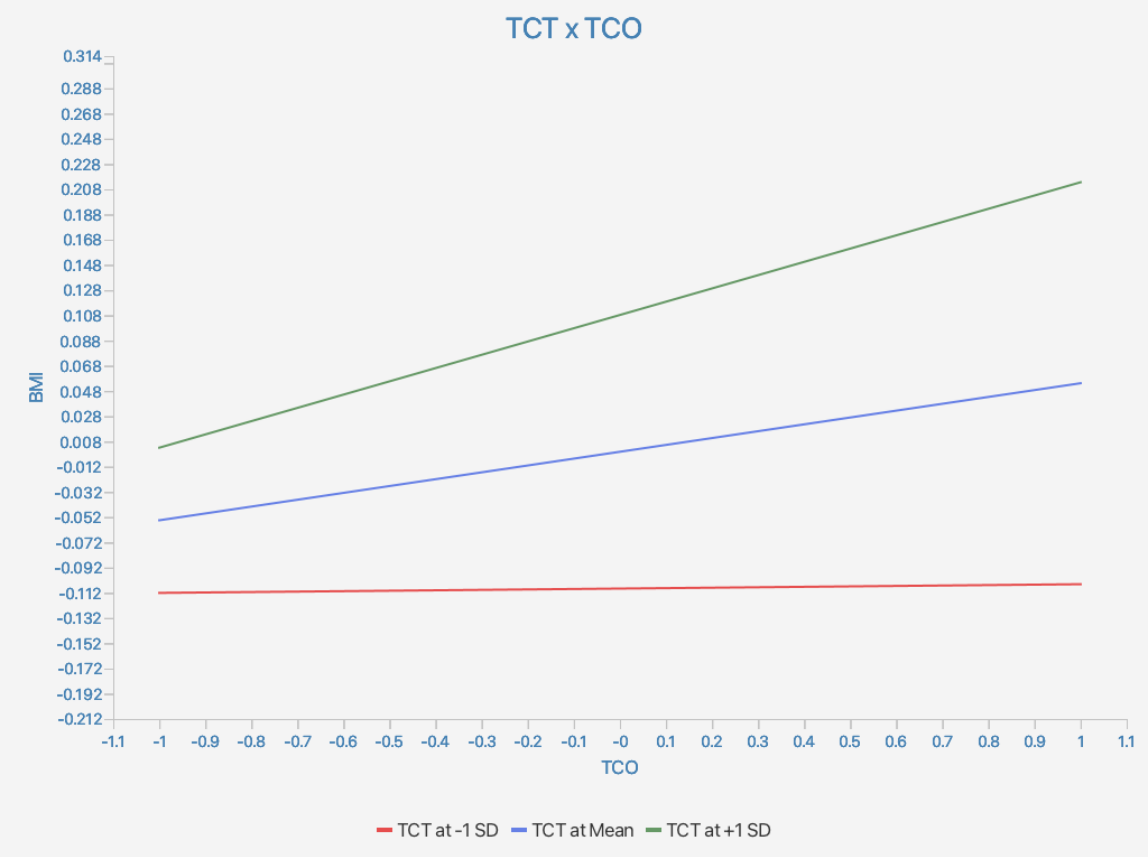

Figure B3 Slope chart for TCT x TCO

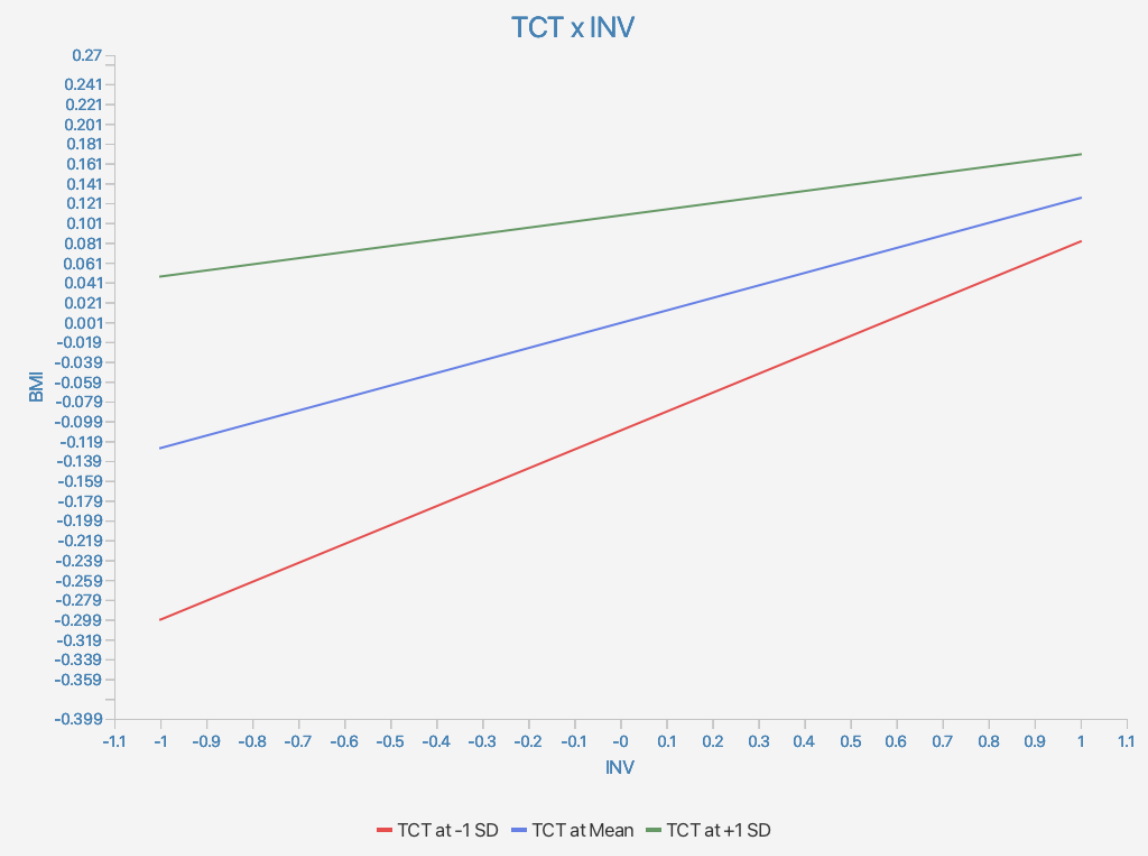

Figure B4 Slope chart for TCT x INV

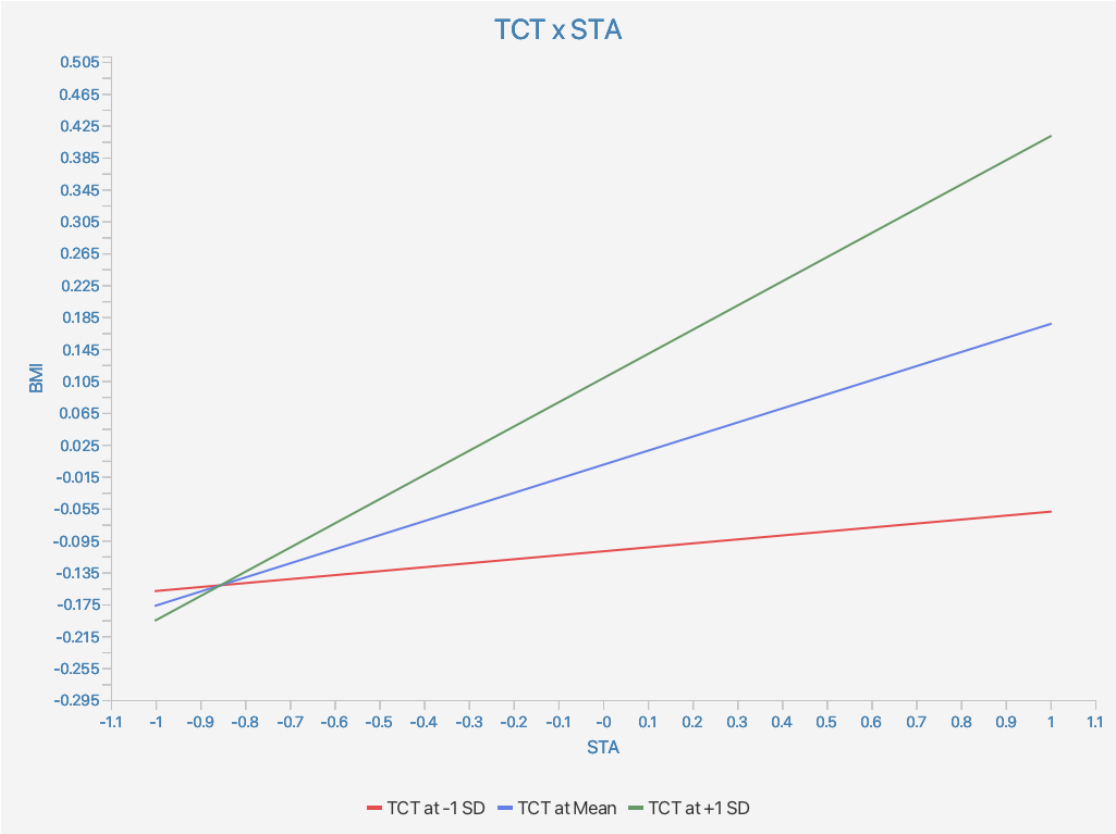

Figure B5 Slope chart for TCT x STA

Figure B6 Slope chart for TCT x DC