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**DEVELOPING CUSTOMER AGILITY IN THE TOURISM
SECTOR: EXAMING A GLOBAL THEORETICAL MODEL
FROM THE PERSPECTIVE OF FIRMS**

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PHD programme in Tourism - Universitat Autònoma de Barcelona

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DOCTORAL DISSERTATION

**DEVELOPING CUSTOMER AGILITY IN THE TOURISM SECTOR:
EXAMING A GLOBAL THEORETICAL MODEL FROM THE
PERSPECTIVE OF FIRMS**

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Acknowledgments

When I start writing the acknowledge section, it means that my four years of doctoral studies are coming to an end. An overwhelming surge of emotions accompanied the memories, engulfing my heart. At the close of 2018, during the period in which I still held employment at a securities firm in Shanghai, an aspiration to pursue a doctoral degree first emerged within me. Fatigued by the intricate workings and beset by persistent overtime hours, I resolved to discover a fresh path toward self-realization. Consequently, during the initial half of 2019, I diligently dedicated my spare time to arduous preparations for my doctoral application. Finally, after careful consideration, Autonomous University of Barcelona emerged as my first choice for studying abroad. For me, this is a brand new, challenging, and exciting journey.

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Abstract

The topic of this doctoral dissertation is in the field of tourism with a special focus on customer agility as a dynamic capability of tourism organizations towards their sustainable goals. The thesis consists of three interrelated chapters that study the antecedents and consequences of customer agility in the tourism sector, the role of customer agility as mediator, and the impact of some moderators such as gender, firm size, and country type, on the customer agility model.

Due to the rapid changes in the market and advancements in big data technology, customer agility becomes a crucial factor for organizations seeking long-term competitiveness. Customer agility topic has received increased attention from both scholars and managers. Customer agility refers to an organization's ability to quickly and accurately respond to changes in the market, thereby satisfying customer needs. Organizations with high levels of agility exhibit better overall performance by responding faster and more effectively to market and customer needs than their competitors. While previous research has explored some organizational factors that contribute to improving customer agility, some key factors are overlooked in exploring the antecedents of customer agility and has focused more on achieving short-term performance rather than sustainable long-term performance. Additionally, the application of customer agility has not been adequately studied in the tourism industry, which is currently undergoing a rapid recovery and facing potential consumption explosions and rebounds. Understanding the role of customer agility in perceiving travel demand and market response can help tourism organizations lead the way in occupying the market.

Our research aims to achieve the following objectives: In **Chapter 1**, we aim to explore some fundamental dynamic capabilities of an organization that enable customer agility, as well as the effect of customer agility on organizational sustainability within the tourism industry. **Chapter 2** focuses on investigating the mediating role of customer agility in sustainability practices and the moderating role of gender in the agility model. Finally, **Chapter 3** plans to confirm the differences in the efficiency of implementing customer agility across companies of different scales from a cross-country perspective.

To achieve the above goals, we conducted multiple-round questionnaire surveys on tourism organization managers in the Chinese and Singapore tourism markets. The reason for choosing these two markets is due to the significant economic, institutional, and cultural variations between these two countries, with China being a representative

of developing economies and Singapore being a typical example of developed economies.

The conclusion from **chapter 1** shows that customer-firm interactions and big data processing capability can become drivers of customer agility, while customer agility can significantly promote organizational sustainability in the tourism context. Also, customer agility significantly mediates the relationship between customer-firm interactions and organizational sustainability, and the relationship between big data processing capability and organizational sustainability.

The findings of **Chapter 2** suggest that enterprise risk management can act as an antecedent of customer agility. Customer agility plays a significant mediating role in the relationship between enterprise risk management and organizational sustainability. Moreover, there is a significant moderating effect of gender on the impact of enterprise risk management on customer agility, as well as the influence of customer agility on organizational sustainability.

The results from **Chapter 3** indicate that technology-oriented investment has a direct positive influence on customer agility. Moreover, the findings suggest that customer agility serves as a mediator in the relationship between technology-oriented investment and organizational sustainability. Additionally, the investigation identifies the significant moderating effects of firm size and country type.

This study is pioneering in its introduction of the concept of customer agility to tourism research. By conceptualizing customer agility as a crucial organizational capability, this research advances our understanding of the applicability of dynamic capabilities theory within the tourism industry. Moreover, this study contributes to enriching the extant literature on agility by validating several key drivers and consequences of customer agility. Furthermore, this analysis addresses existing gaps in the literature by conducting gender and firm-level comparisons that are lacking in previous customer agility research. From the managerial perspective, this study offers valuable insights for tourism managers and marketers seeking to enhance their dynamic capabilities as a means of achieving sustainable development.

Keywords: *customer agility; customer-firm interactions; big data processing capability; organizational sustainability; enterprise risk management; gender; technology-oriented investment; firm size; inter-country analysis; tourism organizations.*

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Introduction

This research pertains to the domain of tourism and specifically delves into the examination of customer agility role, as a dynamic capability of tourism organizations, in the sustainable tourism research. The thesis comprises three interlinked chapters that investigate the antecedents and consequences of customer agility in the tourism environment, the mediator role of customer agility, and the impact of some moderators such as gender, firm size, and country type, on the effectiveness of implementing customer agility.

In the last decade, the agility topic has garnered extensive deliberation in both management and marketing domains. In current volatile and competitive environment, an enterprise's agility has become a decisive factor in ensuring their survival (Darma, 2004; Wong et al., 2022; Zhou et al., 2018). Enterprises strive to acquire an edge over competitors by exploring different resources and means to expand their market, cater to customer needs, and capitalize on business opportunities (Tallon et al., 2019). Increased enterprise agility can enhance business performance (Roberts and Grover, 2012b). Enterprises exhibit several sub-types of agility, including leadership agility, supply chain agility, strategic agility, organizational agility, social media agility, and customer agility (Roberts and Grover, 2012a; Tseng et al., 2022; Wamba, 2022). Current research concentrates on analyzing the underlying reasons and consequences of the aforementioned specific types of agility. Prior studies have established that IT factors (such as IT infrastructure and governance) play a significant role in augmenting corporate agility, and contributing towards enhancing overall business performance (Ngo and Vu, 2020; Tallon et al., 2019). Despite manufacturing and high-tech industries receiving extensive research attention on agility (Rehman et al., 2020), few in-depth explorations have been made in the tourism sector. Thus, this thesis strives to build a wide-accepted framework of customer agility for tourism organizations.

However, prior agility literature has primarily neglected customer agility, in favor of examining other types of agility. Customer agility, serving as a consumer-centric organizational dynamic capability, is indispensable for businesses to thrive and achieve optimal performance (Chatfield and Reddick, 2018; Huang et al., 2021; Roberts and Grover, 2012b). Currently, research regarding the impact mechanism of customer agility is insufficient, with several core elements being disregarded. Firstly, it has been suggested that customer-firm interactions could serve as a predictor of customer agility, given the heightened familiarity resulting from increased information exchange in high-frequency interactions (Lancastre et al., 2006).

The service platforms offered by tourism organizations, whether via personal computer or mobile application, facilitate direct communication, interaction, and dialogue between organizations and consumers (Chin et al., 2003; Guan et al., 2021). Particularly for online tourism companies, building an efficient and humanized platform for customer-firm interactions serves as a core competitive advantage (Cambra-Fierro et al., 2018). These platforms are not merely spaces for conducting online transactions between buyers and sellers, but rather encompass multifunctional capacities that integrate the emotions, needs, and expressions of all parties involved (Zhang, 2020). Elevated levels of customer-firm interactions result in improved customer-firm relationships, as it helps firms to eliminate misunderstandings, identify potential consumer needs, and bridge trust gaps between both parties (Cambra-Fierro et al., 2018). The customer-firm relationship is intrinsically linked with customer agility (Chuang, 2020; Ngo and Vu, 2020), indicating that customer-firm interactions can drive customer agility.

Secondly, despite numerous studies affirming that information processing-related capabilities (such as information management and knowledge capability) may serve as antecedents of organizational agility (Chatfield and Reddick, 2018; Dubey et al., 2018; Hadjielias et al., 2022), no literature has clarified the association between big data processing capability and customer agility. For instance, Mehdibeigi et al. (2016) stipulate how customer knowledge management capability influences organizational agility, while Roberts and Grover (2012b) demonstrate that customer agility can be facilitated by leveraging firms' information technology infrastructure. Firms' dynamic capabilities have also been identified as drivers of organizational agility (Kanten et al., 2017). Thus, it is inferred that big data processing capability, as an information absorption-related capability (Darma, 2004; Mandal, 2018; Mikalef et al., 2018), may also serve as an antecedent of customer agility.

Thirdly, the existing research lacks an integration of risk management and customer agility. Customer agility, being a subset of agility, shares similar attributes with other types of agility (Ngo and Vu, 2020; Roberts and Grover, 2012a; Roberts and Grover, 2012b). The impact of artificial intelligence-based risk management on supply chain agility in small-medium enterprises has been identified by Wong et al. (2022), while Teoh et al. (2017) ascertain that enterprise risk management can serve as an enabler of strategic agility. As an integrated risk management approach, enterprise risk management aims to support strategic development and enhance dynamic management capability through its design and implementation, typically at the board of directors' level (Dionne, 2013). Given customer agility's position as a critical dynamic capability of organizations (Arena et al., 2010), it may be inferred

that enterprise risk management could also exert a positive impact on customer agility.

Fourthly, despite being a technology-reliant capability, customer agility hasn't been linked with technology-oriented investment. CA can be propelled by knowledge management, digitalization, internet technology, and information technology infrastructure (Hadjielias et al., 2022; Roberts and Grover, 2012b). Technological advancements can foster an organization's agility development (Mikalef et al., 2018; Tallon et al., 2019). Although prior research has specified the enabling role of some technology-related capabilities in agility activities, most pertain to supply chain agility, strategic agility, and other types of agility, with few focusing on CA development. Investment remains the decisive factor for technological improvement (Jia et al., 2021; Ren et al., 2022), even though several cases of failed technology investments suggest that increased investment may not necessarily result in successful technology innovation or transfer (Eggers et al., 2012). We believe that a firm's CA may be shaped and optimized through technology innovation and increased investment.

Additionally, existing research primarily concentrates on the influence of a company's agility on its short-term performance, with no studies examining the association between agility and organizational sustainability. Organizational sustainability is a fundamental and persistent topic in contemporary business research (Ridho et al., 2021; Sharpley, 2003; Walker, 2020). The epidemic-induced uncertainty and risk associated with commercial operations have tested the management acumen and risk-management prowess of organizational managers (Hopkin, 2018; Vij, 2019). Endeavors to reduce and prevent potential losses incurred by both organizations and stakeholders have become imperative (Rutynskyi and Kushniruk, 2020; Teoh et al., 2017), underscoring the need to achieve sustainable development in the post-pandemic era. However, achieving efficient sustainability through a single business behavior is challenging (Dao, 2011), necessitating cooperation with partners and customers in the industrial chain to operate sustainably. According to several researchers (e.g., El Khalil and Mezher, 2020; Goriwondo et al., 2013; Vinodh, 2010), combining the concepts of agility and sustainability is essential to attain operational innovation and maintain competitiveness in complex environments due to the shared goals of sustainability and agility (Singh and Vinodh, 2017). However, their conclusions lack empirical data support.

Moreover, the mediating role of customer agility needs further validation, despite prior agility literature demonstrating the mediating effect of firms' agility on some relationships. For instance, Wamba (2022) asserts that organizational agility and

customer agility serve as mediators between artificial intelligence assimilation and firm performance. Haider and Kayani (2020) identify the mediation role of strategic agility in the impact of customer knowledge management capability on project performance. Kurniawan et al. (2021) confirm the mediating effect of business process agility on the relationship between networking capability and firm performance. Given the attribute similarities between customer agility and the aforementioned types of agility, we speculate that customer agility may also exert a mediating role in the relationship between its antecedents and consequences.

Also, no moderator analysis is introduced in the agility study. The thesis will focus on introducing several moderators that have received much attention in the tourism era into the customer agility model. One such moderator is gender. Gender is considered a crucial aspect in a firm's risk management (Ahmad et al., 2023; Mínguez-Vera and Martin, 2011; Zhu et al., 2022). However, most researchers consider it either as a control factor or an antecedent instead of a moderator (Butkouskaya et al., 2020a). Females tend to adopt more balanced strategies and controllable corporate measures towards achieving development goals compared to males, given the general difference between both genders in risk aversion and risk-taking behavior (Mínguez-Vera and Martin, 2011). Additionally, females are more likely to engage in businesses within their cognitive range and professional level than males (Kourtesopoulou and Chatzigianni, 2021; Mínguez-Vera and Martin, 2011). Even when female managers believe that innovative choices will result in positive outcomes, they tend to hesitate and even abandon such decisions (Chen et al., 2016; Han et al., 2017), which also reflects in firms' capability implementation (Butkouskaya et al., 2020b). Males, on the other hand, are more proactive in absorbing knowledge and restructuring their organization (Chen et al., 2016; Fakir & Jusoh, 2020).

Secondly, it is important to note that the effectiveness and outcomes of customer agility may exhibit variations due to the potential moderating impact of firm size. Bayo (2021) highlights that sales growth is subject to moderation by a company's size when assessing the correlation between strategic agility and sales growth. The literature on small and medium-sized enterprises (SMEs) also provides evidence of a connection between organizational agility and firm size (Jafari-Sadeghi et al., 2022; McMahon, 2001). Furthermore, large companies are generally better equipped than SMEs to attract investment from external sources to fund technology-based innovation programs (Danielson and Scott, 2006; Islam, 2011), and benefit from a more professional approach to research and development, thereby achieving successful innovation (Chunling et al., 2021; Rodríguez et al., 2020). Accordingly,

access to innovative technology enables large corporations to enhance their business operations more effectively (Kropsu-Vehkaperä et al., 2009) and achieve superior performance outcomes (Bayo, 2021). Consequently, we postulate that the efficacy of customer agility may vary between SMEs and larger enterprises.

Thirdly, marketing and tourism research should consider the customer agility analysis in the inter-country context. Organizational behaviour is influenced not only by changes within the dynamic business environment but also institutional pressures (Butkouskaya et al., 2020a; Greenwood and Hinings, 1996; Raj et al., 2020). The extent of digitalisation and information technology in developed economies tends to surpass that of developing economies. Furthermore, Škare and Soriano (2021) have demonstrated that a country's level of digitalisation significantly influences the development of firms' agility. Developed economies typically exhibit greater appeal for capital investment due to better institutional safeguards and stronger technological innovation capabilities (Gnyawali and Park, 2009; Panda and Rath, 2018), which are important precursors for driving organizational agility (Tallon et al., 2019). The literature on developing economies further suggests that customer agility could potentially influence organizational performance and competitiveness (Panda and Rath, 2018). Therefore, this study aims to compare the efficacy of implementing customer agility and its impact on organizational sustainability across different countries.

This thesis comprises three interrelated chapters with distinct objectives, covering the examination of the antecedents and consequences of customer agility, testing of the customer agility mediating role, and estimation of the moderating effects of gender, firm size and country type in the agility model.

The objective of **Chapter 1** is: (1) ascertain whether dynamic organizational capabilities such as big data processing and interaction capabilities can be key drivers of customer agility; (2) test the impact of customer agility on organizational sustainability; (3) examine the mediating role of customer agility in the relationship between big data processing capability and organizational sustainability, as well as in the relationship between customer-firm interactions and organizational sustainability; and (4) evaluate the applicability of customer agility within the tourism sector.

Chapter 2 aims to achieve the following objectives: (1) this research aims to investigate whether enterprise risk management could serve as an antecedent of customer agility. (2) this part seeks to confirm the positive impact of customer agility on enhancing organizational sustainability. (3) this chapter aims to explore the

mediating role of customer agility in the relationship between enterprise risk management and organizational sustainability. (4) this study will test the moderating effect of gender in the relationship between enterprise risk management and customer agility, as well as the relationship between customer agility and organizational sustainability.

Chapter 3 has the following set of objectives: (1) examining the positive effect of technology-oriented investment on customer agility; (2) investigating the impact of customer agility on organizational sustainability; (3) exploring the mediating role of customer agility in the relationship between technology-oriented investment and organizational sustainability; (4) evaluating the moderating role of company size in the technology-oriented investment-customer agility relationship, and the customer agility-sustainability relationship; and (5) assessing the moderating effect of country type within the technology-oriented investment-customer agility relationship and the customer agility-sustainability relationship.

Following the above objectives, **Chapter 1** begins by highlighting the significance of investigating customer agility within the tourism context, and providing theoretical support for two key drivers of customer agility - customer-firm interaction and big data processing capability. Subsequently, this chapter explores the importance of customer agility as a consumer-oriented capability for facilitating sustainable organizational performance growth. The methodology employed to test the proposed model and hypotheses is then described in detail. Results from the data collection and path analysis are presented, followed by a comprehensive conclusion that highlights both theoretical and practical contributions, as well as research limitations.

Chapter 2 commences with a simple literature review with the mediating effect of customer agility and the moderating effect of gender. The research context, data collection, measurement, and analysis procedures are then presented. The empirical results with model validation and research model evaluation are subsequently discussed. This chapter concludes with a comprehensive discussion of theoretical and managerial implications, along with a consideration of future research lines.

Chapter 3 starts with a concise literature review on the antecedents and outcomes of customer agility, as well as an overview of the moderating effects of country type and firm size. Detailed descriptions of the research design, data collection process, measurement scales, and analytical procedures are then presented in the methodology section. Subsequently, this chapter provides a comprehensive

analysis of the direct and indirect effects of customer agility, along with the results of multi-group analyses. Finally, Chapter 3 concludes by highlighting the theoretical and practical contributions made by this study, as well as proposing some suggestions for future research.

Chapter 1 represents a significant contribution to the tourism management discipline by providing a comprehensive analysis of the complex interplay between customer-firm interactions, big data processing capabilities, and customer agility. Moreover, this study's exploration of the role of customer agility in enhancing organizational sustainability within the tourism sector offers valuable insights for both administrative science and tourism marketing. The findings of this chapter can empower tourism organizations to leverage customer agility, along with other dynamic capabilities such as customer-firm interactions and big data processing capability, to enhance their overall sustainability actively.

Chapter 2 contributes to sustainability topics, gender issue and tourism marketing by connecting and integrating risk management, customer agility, and sustainability in the tourism sector. The research contributes to providing a deeper understanding the role of enterprise risk management in improving customer agility effectiveness in the tourism sector. The fact that customer agility positively affects organizations' sustainability contributes to empowering the dynamic capability's role in sustainable development. The mediating result also contributes to covering gaps of lacking evidence of the indirect impact of enterprise risk management on organizations' sustainability. The gender difference analysis contributes to providing more evidences for the debates of gender equity in the workplace success.

Chapter 3 makes a contribution to the financial management discipline by verifying the significance of technology-oriented investment in developing a firm's dynamic capabilities. Additionally, this chapter expands the implementation of agility in marketing and tourism studies. These findings also make contributions to the strategic management field by highlighting the importance of investing more in technology to enhance a firm's dynamic capabilities and achieve sustainable development. Furthermore, this study conducts a comparison of China and Singapore markets at the firm-level, which showcases the significance of technology investment for achieving long-term sustainability from a global perspective.

Table 1.1. provides a concise overview of the research questions, theoretical framework, research design, and key findings for all three chapters.

Table 1. 1. Dissertation approach

chapter	One	Two	Three
Research Questions	<p>1. Can customer-firm interactions and big data processing capability drive customer agility?</p> <p>2. How does customer agility influence organizational sustainability in the tourism sector?</p> <p>3. Will customer-firm interactions and big data processing capability have a direct effect on organizational sustainability?</p> <p>4. Does customer agility mediate the relationship between customer-firm interactions and organizational sustainability, and the relationship between big data processing capability and organizational sustainability?</p>	<p>1. Can enterprise risk management be a predictor of customer agility?</p> <p>2. Does customer agility mediate the relationship between enterprise risk management and organizational sustainability?</p> <p>3. Does gender moderate the relationship between enterprise risk management and customer agility, and the relationship between customer agility and organizational sustainability?</p>	<p>1. Can technology-oriented investment be an antecedent of customer agility?</p> <p>2. Does customer agility have a mediating role in the relationship between technology-oriented investment and organizational sustainability?</p> <p>3. Does firm size moderate the relationship between technology-oriented investment and customer agility, and the relationship between customer agility and sustainability?</p> <p>4. Does country type moderate the relationship between technology-oriented investment and customer agility, and the relationship between customer agility and sustainability?</p>
Theoretical Framework	<ul style="list-style-type: none"> ● Dynamic capabilities theory. ● Institutional theory. 	<ul style="list-style-type: none"> ● Dynamic capabilities theory. ● Institutional theory. 	<ul style="list-style-type: none"> ● Dynamic capabilities theory. ● Institutional theory.
Research Design	<ul style="list-style-type: none"> ● Quantitative research. ● An investigation from 217 Chinese tourism organizations. ● Partial least squares structural equation modeling (PLS-SEM). 	<ul style="list-style-type: none"> ● Quantitative research. ● An investigation from 217 Chinese tourism organizations. ● Partial least squares structural equation modeling (PLS-SEM). ● Multi-group analysis. 	<ul style="list-style-type: none"> ● Quantitative research. ● An investigation from 712 Chinese and Singapore tourism organizations. ● Partial least squares structural equation modeling (PLS-SEM). ● Multi-group analysis.
Key Findings	<ul style="list-style-type: none"> ● Customer-firm interactions and big data processing capability can both drive customer 	<ul style="list-style-type: none"> ● Enterprise risk management be a predictor of customer agility. 	<ul style="list-style-type: none"> ● Technology-oriented investment be an antecedent of customer agility. ● Customer agility has a

Continuation of Table 1.1

	<p>agility.</p> <ul style="list-style-type: none"> ● Customer agility positively influence organizational sustainability in the tourism sector. ● Customer-firm interactions and big data processing capability don't have a direct effect on organizational sustainability ● Customer agility mediates the relationship between customer-firm interactions and organizational sustainability, and the relationship between big data processing capability and organizational sustainability. 	<ul style="list-style-type: none"> ● Customer agility significantly mediates the relationship between enterprise risk management and organizational sustainability. ● Gender significantly moderates the relationship between enterprise risk management and customer agility, and the relationship between customer agility and organizational sustainability. 	<p>significant mediating effect in the relationship between technology-oriented investment and organizational sustainability.</p> <ul style="list-style-type: none"> ● Firm size significantly moderates the relationship between technology-oriented investment and customer agility, and the relationship between customer agility and sustainability. ● Country type significantly moderates the relationship between technology-oriented investment and customer agility, and the relationship between customer agility and sustainability.
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Source. Authors' elaboration.

Chapter1.

Customer- firm interaction, big data processing capability, customer
agility and organizational sustainability in the tourism context

Chapter 1. Customer- firm interaction, big data processing capability, customer agility and organizational sustainability in the tourism context

1.1 Introduction

The development prospect of the tourism market is highly uncertain and unstable in the COVID-19 context (Fotiadis et al., 2021; Rogerson and Rogerson, 2021a). Demand in the market and consumption capacity have changed significantly (Rai et al., 2021; Rogerson and Rogerson, 2021b). The rapid, massive, and dynamic changes in the global tourism market have stimulated and tested each tourism organization in the whole tourism ecosystem (Rutynskyi and Kushniruk, 2020; Więckowski, 2021). Therefore, tourism organizations need to grasp the changes more accurately in market trends and consumer demands and respond more quickly by leveraging their dynamic capabilities (Teece, 2007). Amid a crisis driving change, requirements for sustainability have become more urgent. Specifically, the tourism industry in some regions is at a complete standstill due to the impact of COVID-19 (Rogerson and Rogerson, 2021a; Serrano and Kazda, 2020). Previous research demonstrated a positive impact of dynamic capabilities on organizational sustainability (Kanten et al., 2017; Rodríguez et al., 2020). Dynamic capabilities help enterprises achieve sustainable development through centralized resource integration and flexible response (United Nations Department of Economic and Social Affairs, 2023). As the core driver of firm performance, customer agility can quickly detect the changes in market demands and consumer characteristics during a crisis (e.g., a public health crisis like COVID-19) and give targeted responses (Roberts and Grover, 2012a; Roberts and Grover, 2012b; Ngo and Vu, 2021). Consequently, customer agility as a dynamic capability could impact on the organizational sustainability.

However, prior research has never discussed the customer agility impact on organizational sustainability. The study from Ngo and Vu (2020) indicates that customer agility can support a firm in gaining competitive advantages over its rivals in a turbulent business environment. To actualize the innovation of firm operation and preserve competitiveness, several researchers have emphasized the importance of blending the concepts of agility and sustainability since sustainability and agility share similar objectives (e.g., Singh and Vinodh, 2017; Vinodh, 2010).

Additionally, customer-firm interactions could be the predictor of customer agility owing to the increased familiarity through more information exchange in high-frequency interactions (Cambra-Fierro et al., 2018; Lancastre et al., 2006). But they have not been previously verified. The service platform tourism organizations provide, whether PC (personal computer) or mobile application, facilitates direct

communication, interactions, and dialogue between tourism organizations and consumers (Guan et al., 2021). Tourism organizations, especially online tourism companies, are building an efficient and humanized customer-firm interactions platform as their core competitiveness. These platforms are not just a place to realize online transactions between buyers and sellers but more of a multi-functional platform that integrates all parties' emotions, needs, and expressions (Baumöl et al., 2016; Zhang, 2020). Digitalization transmits consumers' inner perception and after-sales experience of tourism organizations' products and services. High-level customer-firm interactions will bring good customer-firm relationships because it helps firms eliminate consumers' misunderstandings, grasp consumers' potential needs, and bridge the trust between both (Cambra-Fierro et al., 2018). The customer-firm relationship is closely associated with customer agility (Ngo and Vu, 2020). The above argument indicates that customer-firm interactions can drive customer agility.

Moreover, no literature clarifies the association of big data processing capability with customer agility, even though numerous investigations confirm that information processing-related capabilities (e.g., information management and knowledge capability) can be the antecedents of an organization's agility (Dubey et al., 2018; Wamba, 2022; Zhou et al., 2018). For instance, Mehdibeigi et al. (2016) specify that customer knowledge management capability affects organizational agility. Roberts and Grover (2012b) prove that customer agility can be facilitated by leveraging firms' information technology infrastructure. Firms' dynamic capabilities can drive organizational agility (Jafari-Sadeghi et al., 2022; Kantén et al., 2017). Accordingly, it is inferred that big data processing capability, as an essential dynamic capability (Arshad et al., 2022; Darma, 2004), can be the antecedent of customer agility.

The research constructs an integrated cause-and-effect framework of customer agility. Specifically, this study explores the influences of customer-firm interactions and big data processing capability on customer agility and the results of the impact of customer agility on organizations' sustainability. Also, the research aims to clarify the mediating role of customer agility in the relationship between big data processing capability and organizational sustainability and the relationship between customer-firm interactions and organizational sustainability. Based on a survey of 217 middle and senior managers in China's tourism market from May 2021 to June 2022, this study empirically analyses the aforementioned relationships and examines the mediating effect through running the SEM-PLS algorithm integrated in the SmartPLS3.

This study aims to fill the gaps in the following aspects: (1) to confirm if

organizational dynamic capabilities (e.g., big data processing capability and interaction capability of an organization with firms) can be the significant drivers of customer agility; (2) to test the positive effect of customer agility on organizational sustainability; (3) to examine the mediating role of customer agility in the relationship between big data processing capability and organizational sustainability and in the relationship between customer-firm interactions and organizational sustainability; (4) to verify the applicability of CA in the tourism sector.

The chapter enriches marketing theory by deeply uncovering the associations between customer-firm interactions and big data processing capability with customer agility. Also, the investigation exploring the role of customer agility and its impact on organizational sustainability in the tourism sector further contributes to the development of current administrative science and tourism marketing. From the practical aspect, the results enlighten organizations to fully utilize customer agility and the other two dynamic capabilities (customer-firm interactions; big data processing capability) to promote their sustainability actively.

1.2 Literature review

1.2.1 Customer agility

Roberts and Grover (2012a) define a firm's customer agility as “the degree to which a firm can sense and respond quickly to customer-based opportunities for innovation and competitive action.” customer agility has similar properties and compositions with other kinds of agility, such as social media agility, organizational agility, supply chain agility. It comprises customer sensing and responding capability (Zaheer and Zaheer, 1997). customer agility has become a decisive factor for a company's success in a complex, changeable and competitive business environment (Roberts and Grover 2012a; Zaheer and Zaheer, 1997). As a firm’s dynamic capability, customer agility can drive customer satisfaction and performance (Ngo and Vu, 2020; Roberts and Grover, 2012a).

1.2.2 Customer-firm interactions as an enabler of customer agility

Customer-firm interactions can be seen as a dynamic communication capability to realize the two-way transmission of information and knowledge between customers and firms. Customer-firm interactions not only exist in the direct face-to-face contact between service organizations and their customers, but also technological advances provide more online channels for the interactions between firms and consumers (Sheng, 2019). Previous conclusions have revealed that customer-firm interactions will bring positive output to enterprises (Saurabh and Anat, 2016). Some scholars have also supported the impact of customer-firm interactions on customer satisfaction

and corporate performance. Lancaster et al. (2006) indicate that the information exchange volume is a by-product of customer-firm interactions. A higher customer-firm interaction means more information exchange (Lancaster et al., 2006). Therefore, customer-firm interactions are considered the core of customer-firm relationships (Cambra-Fierro et al., 2020) because communication successfully bridges the trust between customer and firm. A shred of more direct evidence from Ngo and Vu (2021) reveals that customer relationship management in an organization can create CA. The findings of Chuang (2020) show the positive impact of social media agility on customer-firm relationships. Customer-firm interactions can help enterprises keep abreast of consumer needs and attitudes toward product changes and make targeted responses (Baumöl et al., 2016). In addition, according to the similarity between the attributes of customer agility and other agility (e.g., social media agility), the following reasonable hypothesis can be created:

H1: Customer-firm interactions positively affect customer agility.

1.2.3 Big data processing capacity as an enabler of customer agility

Many scholars explore the internal relationship between information management capability and customer agility (Huang et al., 2021). Tseng et al. (2022) proposed a conceptual framework that reflects the causal relationship between big data capability and customer agility. Their research emphasizes the effect of big data capability (including three dimensions: big data science, management, and infrastructure capability) on customer agility (including two dynamic capabilities: customer-sensing capability and customer-responding capability). Chatfield and Reddick (2018) confirmed the proposed theoretical framework for big data analytics-enabled CA and responsiveness through a case study of Houston's on-demand services. Their conclusions imply the importance of using big data and data analysis in improving customer agility.

As Zhou et al. (2018) outlined, an online customer review set can be considered big data due to its characteristics of significant volume, high speed of data creation, and high degree of data dimensionality. Their research reveals that a large volume of customer reviews will bring greater impetus to developing customer agility. They will better help enterprises master diversified consumer needs and a more comprehensive market view. However, a large volume of customer reviews often means more difficult and costly data processing and analysis (Zhou et al., 2018). Therefore, the organization's high-quality customer review processing capability will significantly improve its development of customer agility. In addition, Zhou et al. (2018) did not consider the impact of reviews' other features as big data (e.g., velocity and variety)

on customer agility. The customer review processing capability given in this study is a complete process of mining, storing, analyzing, and visualizing consumer reviews' characteristics, contents, and helpfulness, especially online consumer reviews, at the current technical level. It is an integrated, all-around, flexible, dynamic capability. Such dynamic capability can help organizations respond faster to consumers' needs and help provide uninterrupted services (Mandal, 2018; Mandal and Dubey, 2020). Thus, the following hypothesis can be proposed:

H2: Big data processing capacity positively affects customer agility.

1.2.4 Customer agility and organizational sustainability

Modern organizations consider sustainability an essential concept for survival (Vinodh, 2010). The World Commission on Environment and Development (WCED) defines sustainable development or sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Rai et al. (2021) defined sustainability as environmental, social, and economical. Enterprises must serve long-term profitability and survival by balancing the above three objectives (Dao, 2011). The topic of sustainability has been widely discussed in many fields (e.g., Walker, 2020).

Although agility and sustainability are two distinct paradigms, in the field of manufacturing, some scholars have begun to integrate these two concepts to realize the innovation of enterprise operation and maintain competitiveness in a complex environment (e.g., El Khalil and Mezher, 2020; Vinodh, 2010). Because the goals of agility and sustainability are the same (Singh and Vinodh, 2017), it also ensures the feasibility of combining the two. El-Khalil and Mezher (2020) investigate the interaction between agility and sustainability in the United States (US) automotive manufacturing industry. The results identify a significant positive internal relationship between the two concepts. Some scholars have also contributed to the research on the relationship between specific agility and sustainability. Mihardjo and Rukmana's (2019) findings show that organizational agility can help enterprises shape a sustainable development model. The case study from Rehman et al. (2020) confirmed supply chain agility's effectiveness in promoting sustainability in a Saudi manufacturing organization. Based on the above arguments and in combination with the similarity in attributes of customer agility and other agility (e.g., organizational agility; supply chain agility), the following reasonable hypothesis can be created:

H3: customer agility positively affects organizational sustainability.

1.2.5 Customer-firm interactions, big data processing capacity and organizational sustainability

Arshad et al. (2022) have concluded that organizational capabilities, such as big data management and analytics, can improve an organization's sustainable performance. Dubey et al. (2019) have proved that big data will positively affect social and environmental sustainability. Past literature also suggests that some organizational dynamic capabilities can promote business sustainability (Rodríguez et al., 2020). Eikelenboom and De (2019) describes that a firm's dynamic capabilities can drive its sustainability. Accordingly, the following hypothesis can be proposed:

H4: Customer-firm interactions positively affect organizational sustainability.

H5: Big data processing capacity positively affects organizational sustainability.

1.2.6 The mediation role of customer agility

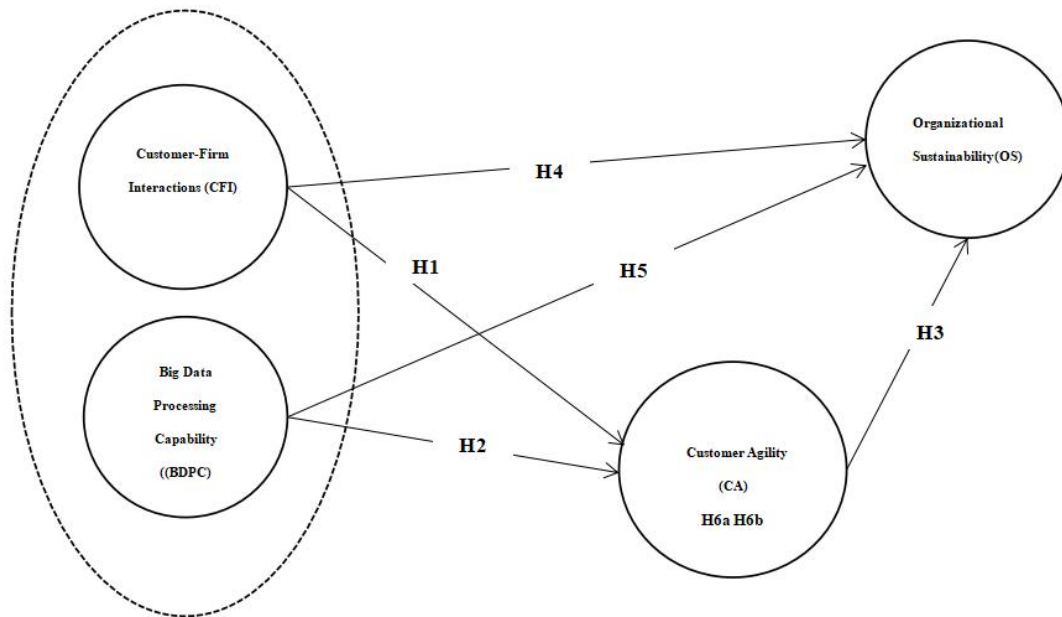
Past studies have repeatedly confirmed the mediation effect of CA and organizational agility. Nurcholis (2021) verifies that organizational agility mediates the relationship between knowledge exploitability and sustainable performance. Wamba (2022) further tests the mediating role of customer agility in the impact of artificial intelligence assimilation on firm performance. Similar to the results that showed that customer agility can mediate the artificial intelligence assimilation-firm performance relationships, this study supposes that it could mediate the relationships between customer-firm interactions and organizational sustainability, and the relationships between big data processing capacity and organizational sustainability. Thus, the following hypothesis can be proposed:

H4a: customer agility mediates the relationship between customer-firm interactions and organizational sustainability.

H5a: customer agility mediates the relationship between big data processing customer agility capacity and organizational sustainability.

Drawing upon the preceding discourse and proposed hypotheses, we formulate a conceptual framework for customer agility, with customer-firm interactions and big data processing capability as its predictors and organizational sustainability as its consequence (Figure 1.1).

Figure1.1. A theoretical model of customer agility antecedents and consequences



Source. Authors' elaboration.

1.3 Methodology

1.3.1 Context

The original data are collected from tourism organizations or intermediaries in the Chinese market to understand the associations between the abovementioned variables. As the first country to have the COVID-19 outbreak, the negative influence of the epidemic on tourism organizations in this market is the broadest and most far-reaching (Fotiadis et al., 2021). Simultaneously, these organizations have the most mature and rich management experience for this crisis. Therefore, taking the tourism organizations in this market as the research object is suitable. In addition, as an emerging market, China has gradually enhanced the technological innovation of enterprises in the region, improved the investment environment, and steadily improved its management ability (Yang et al., 2012), which are suitable for the concepts of this study. Currently, the tourism organizations in the market are also actively looking for investment and response measures to eliminate the negative impact of the epidemic, as well as thinking about the development of enterprises in the post-epidemic period (Serrano and Kazda, 2020).

The primary purpose of sustainable tourism is to reduce the possible negative impacts and crises in tourism activities (Sharpley, 2003) and continuously improve the experience of tourists (Sharpley, 2000). Sustainability has covered all the elements constituting a complete tourism experience (Hjalager, 2000). Dwyer et al. (2009)

point out that the triple bottom line (TBL) approach needs to be applied by tourism organizations to sustainable development by balancing the interests of social, environmental, and economic in the decision-making process.

1.3.2 Data collection

The original data is obtained from the survey of 217 middle and senior managers of tourism organizations in the Chinese market from May 2021 to June 2022. Generally, managers tend to be busy, that leads to a low response rate. The questionnaire was initially created in English because the relevant measurement items were taken from the English literature. Then they are translated into Chinese through back translation, no wording issue occurs. To help the respondents better understand the formulations and fill in the questionnaire more accurately, some professional terms (e.g., customer agility, customer-firm interactions, etc.) are explained in detail. Before the formal investigation, five tourism market managers and tourism academic experts in the tourism industry are invited to conduct a pre-investigation. They all give positive feedback. To collect data and achieve the purpose of this study, we have imposed several identity restrictions on the respondents. Respondents must have the position of middle and senior managers in a tourism organization or intermediary because only those with such a position may be familiar with the industry's internal management rules, core business, and operation mechanism. The respondent's organization must have opened the online business service to meet the requirements of the relevant dynamic capabilities of the enterprises in this study. The limited number of respondents is because the targeted managers are often very busy and unwilling to participate in surveys (Baruch, 1999). The final sample information is shown in Table 12. Specifically, the number of male respondents is slightly higher than that of female respondents, which aligns with the current distribution proportion of Chinese workplace managers (Zhu et al., 2022). Most respondents are over 30 years old and have a high educational background. Thus, most respondents have rich industry work experience, which is typical for managers in Chinese companies. Besides, most of the companies employ over 250 employees, which fits the characteristics of China's industry, where most tourism organizations are state-owned enterprises.

Table 1. 2. Respondents' profile

Respondents' profile	Items	Numbers of Respondents	Proportion		Items	Numbers of Respondents	Proportion
Gender	Male	112	51.6%	Working years	Less than one year	3	1.4%
	Female	105	48.4%		1-3 years	53	24.4%
	Total	217	100%		3-5 years	56	25.8%
Age	Under 18 years old	0	0		5-10 years	36	16.6%
	18-25 years old	2	0.9%		More than 10 years	69	31.8%
	26-30 years old	24	11.1%		Total	217	100%
	31-40 years old	55	25.3%	Company's profile			
	41-50 years old	52	24.0%	Company type	Travel agency	135	62.2%
	51-60 years old	61	28.1%		scenic spot	34	15.7%
	60 years old and above	23	10.6%		Hotel	45	20.7%
	Total	217	100%		Others	3	1.4%
Marital Status	Unmarried	99	45.6%		Total	217	100%
	Married	118	54.4%	Number of employees	250 and fewer employees	80	36.9%
	Total	217	100%		more than 250 employees	137	63.1%
			Total		217	100%	
Education	Elementary School	6	2.8%				
	Middle School	46	21.2%				
	High School	45	20.7%				
	College	13	6.0%				
	Bachelor's Degree	50	23.0%				
	Master's Degree	50	23.0%				
	Doctoral Degree	7	3.2%				
	Total	217	100%				

Source. Authors' elaboration.

1.3.3 Measurement

Seven-point Likert scales are used to measure all concepts in the model (Norman, 2010). The measurement of big data processing capability refers to Huang et al. (2014) and Mikalef et al. (2018), and a total of 6 items are designed, including “leaders understand the importance of big data”; etc. Customer-firm interactions form 4 items based on Mills and Margulies (1980) and Saurabh and Anat (2016). For example, “we will respond quickly to customers’ negative feedback on the company's tourism products and services”. The measurement of customer agility mainly comes from Roberts and Grover (2012a, 2012b), which contains ten items (e.g., “we continuously try to discover additional needs of our customers of which they are unaware”; “we extrapolate key trends to gain insight into what users in a current market will need in the future”; etc.). There are five items in the sustainability measurement, referring to Kocmanová and Dočekalová (2011) and Rai (2021), covering the main three aspects of organizational sustainability (economic, social, and environmental).

1.3.4 Data analysis

Partial least squares structural equation modeling (PLS-SEM) with SmartPLS 3 was used to test hypotheses and evaluate the moderating effect of technology investment (Hair et al., 2017). PLS-SEM is appropriate for the research due to several reasons. Firstly, it is apt for datasets with a small sample size, which in our case, comprises of less than 250 respondents. Secondly, this technique demonstrates more leniency towards the normality assumption of the data (Chin et al., 2003; Hair et al., 2019). Thirdly, PLS-SEM is more suitable for novelty studies and for more complex research models. The PLS analysis method was carried out in two steps, including examination of the measurement model and evaluation of the theoretical model (Hair et al., 2019). First, the internal reliability and convergent and discriminatory validity of samples was determined by evaluating measurement models. Second, the bootstrap resampling procedure was operated to detect the relationship between concepts in the structural model. Cronbach's alpha value is used to test the scale's reliability (Hair et al., 2021).

1.4 Results

1.4.1 Model validation

The results show that Cronbach's alpha values of the six factors are 0.984, 0.976, 0.979, 0.983, 0.990, and 0.980, respectively, more significant than 0.7, proving that the scale's reliability is good (Hair et al., 2021). The loading of each factor is higher than 0.5; the composite reliability of each variable is higher than 0.8, and all AVE value is higher than 0.6 (Appendix A) (Hair et al., 2021). The discriminant validity of the scale (table 1.3) demonstrates that the average extraction variance of each variable is greater than the correlation coefficient between this and other variables, which

indicates that the discriminant validity of the scale is also acceptable (Henseler et al., 2015).

Table 1. 3. Results of discriminant validity tests of the variable

	BDPC	CFI	CA	OS
BDPC	0.961			
CFI	0.459	0.966		
CA	0.596	0.573	0.957	
OS	0.216	0.269	0.286	0.962

Note. BDPC= big data processing capability; CFI= Customer-Firm interactions; CA= Customer Agility; OS= organizational sustainability.

Source. Authors' elaboration.

The fit index of the measurement model is CMIN / DF =1.092, less than 2; GFI =0.905, NFI =0.971, RFL =0.968, IFI = 0.997, CFI= 0.997, TLI= 0.997, all above 0.900; RMSEA =0.021, less than 0.050, all within the critical standard range, indicating that the structural model has a good fit and can be used for path analysis (Mulaik et al., 1989).

1.4.2 Estimation of the research model

The results of examining the cause-effect research model (Table 1.4) show that the relationship between big data processing capability and customer agility is positively important (H1: 0.371, $p < 0.001$). Similarly, customer-firm interactions can positively affect customer agility (H2: 0.407, $p < 0.001$). Furthermore, customer agility positively impacts organizational sustainability (H3: 0.212, $p < 0.05$). customer agility significantly mediates the relationship between big data processing capability and organizational sustainability (H6b: 0.086, $p < 0.05$). Also, the relationship between customer-firm interactions and organizational sustainability is mediated by customer agility (H6a: 0.079, $p < 0.05$). However, the direct effects of big data processing capability and customer-firm interactions on organizational sustainability are not significant (H4: 0.137, $p > 0.1$; H5: 0.032, $p > 0.1$).

Table 1. 4. Examining the cause-effect research model

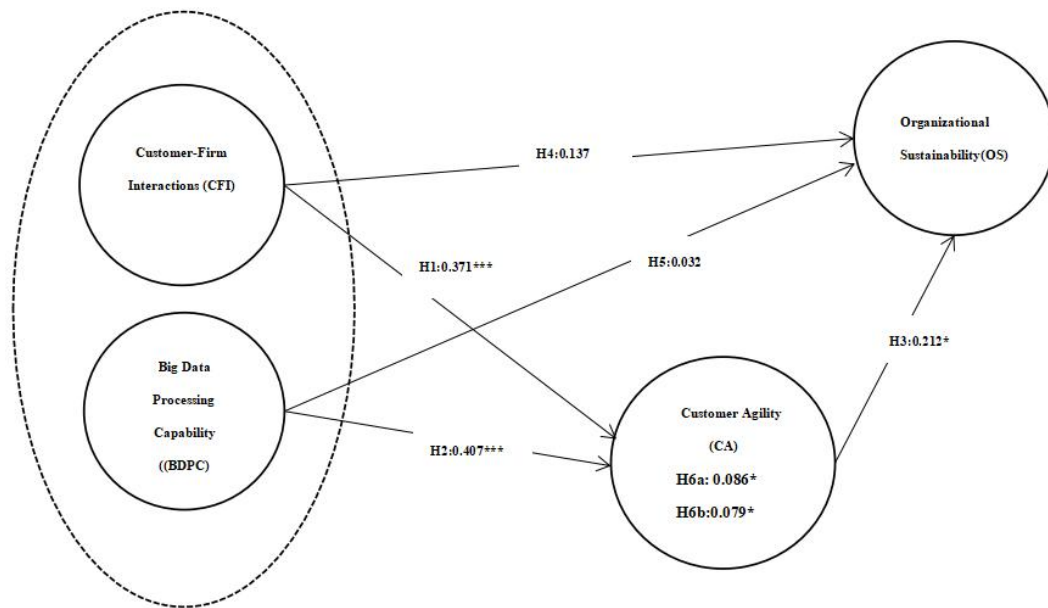
	Path	Path Coefficients	t-Value	p-Value	
H1	CFI->CA	0.371	7.644	0.000***	Supported
H2	BDPC->CA	0.407	7.718	0.000***	Supported
H3	CA->OS	0.212	2.267	0.024**	Supported
H4	CFI->OS	0.137	1.724	0.085	Rejected
H5	BDPC->OS	0.032	0.372	0.710	Rejected
H6a	CFI->CA->OS	0.086	2.102	0.036**	Supported
H6b	BDPC->CA->OS	0.079	2.215	0.027**	Supported

Note. BDPC= big data processing capability; CFI= Customer-Firm interactions; CA= Customer Agility; OS= Organizational Sustainability. ** indicates $p < 0.05$; *** indicates $p < 0.001$.

Source. Authors' elaboration.

Figure 1.2 shows the path analysis results and the mediating effects of customer agility.

Figure 1.2. The analysis results of the proposed model



Note. * indicates $p < 0.05$; *** indicates $p < 0.001$.

Source. Authors' elaboration.

1.5 Discussion

1.5.1 Theoretical contributions

The research confirms the positive effects of customer-firm interactions and big data processing capability on customer agility, which add to the knowledge of customer agility implementation as a dynamic marketing capability. Big data processing capability and customer-firm interactions can be regarded as the antecedents of CA.

Given the previous research conclusion that big data capability and customer-firm interactions positively impact some kinds of agility (e.g., supply chain agility, organizational agility, etc.) (e.g., Chuang, 2020; Mihardjo and Rukmana, 2019; Wirahadi and Pasaribu, 2022). The results further supplement and extend their findings.

Also, this study contributes to enriching the sustainability research by verifying the customer agility impact on organizational sustainability. customer agility can become an important driver of the sustainable performance growth of the organization. The analysis provides empirical support to the idea of Vinodh (2010), who stresses the importance of integrating sustainability and agility in organizational operations.

Moreover, the data verifies that customer agility mediates the relationship between big data processing capability and organizational sustainability. It also mediates the relationship between customer-firm interactions and organizational sustainability. Thus, the findings imply that customer agility can help tourism organizations enhance their sustainable performance by implementing the above capabilities.

However, the direct effects of customer-firm interactions and big data processing capability on organizational sustainability haven't gained verification. Thus, H4 and H5 are rejected by the data. Although Rodríguez et al. (2020) implies that some organizational dynamic capabilities could positively impact sustainable performance, it may not apply to big data processing capability and customer-firm interactions. Further evaluation shows that customer agility is a full mediator in the capability-sustainability relationships, which explains why these two hypotheses are rejected. Customer-firm interactions and big data processing capability can only embody organizational sustainability through customer agility development.

1.5.2 Practical implications

This research enlightens tourism organizations to focus more on the role of customer agility implementation in achieving their sustainable development. They need to focus on improving their customer agility through implementing the cultivation of sensing ability to customer needs and responding to market changes (Zaheer and Zaheer, 1997). Both customer sensing and responding capabilities should be aligned to maximize organizations' sustainable performance.

Meanwhile, managers should invest more resources in cultivating their dynamic capabilities (such as big data processing capability, and customer-firm interactions)

because these capabilities will facilitate the improvement of customer agility (Cambra-Fierro et al., 2018; Chatfield and Reddick, 2018; Huang et al., 2021). For instance, tourism organizations should fully use the existing big data technology to accurately grasp consumer demands, realize the visual report of consumers' attitudes towards the company's products and services and finally form a viable product and service optimization (Dubey et al., 2018; Mandal, 2018). The positive effect of big data processing capability on customer agility is reflected in this case. Also, customer interactions may shorten the psychological distance (Cambra-Fierro et al., 2018; Hamidi and Safareeyeh, 2019). This facilitates managers to understand the real needs of consumers more directly and accurately.

1.6 Conclusions

Both theoretical and managerial contributions are provided in the research. The final empirical findings support most of the initial hypotheses. Specifically, the fact that customer agility, as a dynamic capability, drives organizational sustainability is demonstrated. Simultaneously, the investigation confirms the vital roles of customer-firm interactions and big data processing capability in customer agility implementation effectiveness for organizational sustainability.

The lack of integration of the concepts of agility and sustainability in previous literature is supplemented. The demonstration of predictors of customer-firm interactions and big data processing capability in customer agility practices, and organizational sustainability as its consequence, consolidate the positive effects of firms' dynamic capabilities on performance development.

Additionally, this is pioneering study that applying the customer agility's mediation role in the dynamic capabilities' outcomes. To reach organizations' sustainability, the effectiveness of customer-firm interactions and big data processing capability can be embodied by actuating customer agility.

From the managerial perspective, this chapter highlights the prominent role of customer agility as an organizational dynamic capability in the realization of sustainable development. customer agility is significantly underestimated in dynamic capabilities practices. The direct impacts of customer-firm interactions and big data processing capability on customer agility reflect the interplays among various dynamic capabilities. It reminds that shaping customer agility is not only the improvement of a single ability, but the enhancement of the comprehensive capability, which naturally leads to the reform of internal ecology of a firm. Therefore, the findings stimulate managers in the tourism should invest more in the customer agility development for their final sustainability.

Chapter2.

Enterprise risk management, customer agility and organizations'

sustainability: the gender moderating effect

Chapter 2. Enterprise risk management, customer agility and organizations' sustainability: the gender moderating effect

2.1 Introduction

Enterprise risk management has become an inseparable research object in the business field. The past literature has focused on the role of enterprise risk management in sustainability (Fakir and Jusoh, 2020; Orabueze et al., 2020). Numerous evidences have shown the positive effect of enterprise risk management on organizations' sustainability (Oyewo, 2022; Vij, 2019). For instance, Oyewo (2022) verifies that enterprise risk management will enhance a firm's sustainability. The results of Orabueze et al. (2020) also confirm the positive impact of enterprise risk management on corporate sustainability performance. Enterprise risk management is essential for survival and sustainable development of micro, small and medium enterprises (Agrawal, 2016). The assessment of sustainable goals has been integrated into many enterprise risk management activities (Fakir and Jusoh, 2020). Also, enterprise risk management will affect a firms' agility (Wong et al., 2022). There is a positive relationship between enterprise risk management and strategic agility (Teoh et al., 2017), supply chain agility (Wong et al., 2022), and other agility.

However, the past research lacks the integration of risk management and customer agility. Customer agility, as a branch of agility, has similar attributes to other kinds of agility (Roberts and Grover, 2012a; Wamba, 2022; Zhou, 2018). The effect of artificial intelligence-based risk management on the supply chain agility of small-medium enterprises has been identified by Wong et al. (2022). Teoh et al. (2017) conclude that enterprise risk management can be an enabler of strategic agility. As an integrated risk management approach, enterprise risk management aims to serve the enterprise's strategic development and optimize their dynamic management capability through the design and implementation at a higher level, usually the board of directors (Dionne, 2013). Considering customer agility is also a critical dynamic capability of an organization (Arena et al., 2010; Roberts and Grover, 2012b), it could be accordingly supposed that enterprise risk management may positively affect customer agility.

Even though the previous studies uncover that customer agility can push a firm's performance growth, its impact on the sustainable performance is never discussed. organizations' sustainability or sustainable development is an enduring topic in current business research (Ridho et al., 2021; Sharpely, 2003; Walker, 2020). The uncertainty and risk of commercial operation caused by the epidemic test all organization managers' management wisdom and risk management ability (Hopkin,

2018). organizations and stakeholders are trying to reduce and avoid the already caused potential losses (Rutynskyi and Kushniruk, 2020). It has become urgent to consider achieving sustainable development in the post-pandemic period. However, efficient sustainability is difficult to achieve through a single business behaviour (Dao, 2011), which needs to cooperate with organizations' partners and their customers in the industrial chain to operate sustainably. According to several researchers (e.g., El Khalil and Mezher, 2020; Goriwondo et al., 2013; Vinodh, 2010), it is crucial to combine the concepts of agility and sustainability to actualise the innovation of firm operation and maintain competitiveness in a complex environment due to the similar goals of sustainability and agility (Singh and Vinodh, 2017). But their conclusions have not been supported by empirical data.

Additionally, the current literature lacks investigations of the indirect impact of enterprise risk management on sustainability. The customer agility researches have shown the mediating effect of customer agility. Li et al. (2020) prove that customer agility will mediate the relationships between e-commerce capabilities and firms' performance. Wamba (2022) confirms the customer agility mediating role in the impact of artificial intelligence assimilation on firm performance. Additionally, the sustainability and risk management literature have presented the mediating effect of dynamic capabilities (Soluk et al., 2021; Wu et al., 2022). Thus, the arguments imply that customer agility may also mediate the relationship between enterprise risk management and organizations' sustainability.

Moreover, few literatures focus on the gender comparison analysis in the risk management research. The gender issue is regarded as the non-negligible consideration in a firm's risk management (Ahmad et al., 2023). However, most researchers consider it as a control factor or an antecedent rather than a moderator (Butkouskaya et al., 2020a). Considering the general difference between women and men in risk aversion and risk-taking, female managers will adopt more balanced strategies and controllable corporate measures to get closer to their development goals (Mínguez-Vera and Martin, 2011). Compared to males, females tend to engage in businesses within their cognitive range and within their professional level (Mínguez-Vera and Martin, 2011). Even if female managers believe that breakthrough changes will bring positive results, they will still hesitate and even abandon innovative choices (Chen et al., 2016). Their variation is also reflected in the firms' capability implementation (Butkouskaya et al., 2020b). Male managers are more proactive to absorb knowledge and reform their structure (Chen et al., 2016).

According to the above arguments, the research aims to achieve the following

objectives: firstly, this study will explore if enterprise risk management can be an antecedent of customer agility. Secondly, the analysis of the effect of customer agility on organizations' sustainability will be further confirmed. Thirdly, the mediating role of customer agility in the relationship between enterprise risk management and sustainability will be examined. Finally, the moderating role of gender will be tested in the enterprise risk management-customer agility relationship and the agility-sustainability relationship.

Finally, 217 sample middle and senior tourism organization managers in the Chinese market are collected from May 2021 to June 2022. All the supposed relationships are tested using the partial least squares structural equation modelling (PLS-SEM) method with SmartPLS 3.

The research contributes to sustainability topics, gender issue and tourism marketing by connecting and integrating risk management, customer agility, and sustainability in the tourism sector. The research contributes to providing a deeper understanding the role of enterprise risk management in improving customer agility effectiveness in the tourism sector. The fact that customer agility positively affects organizations' sustainability contributes to empowering the dynamic capability's role in sustainable development. The mediating result also contributes to covering gaps of lacking evidence of the indirect impact of enterprise risk management on organizations' sustainability. The gender difference analysis contributes to providing more evidences for the debates of gender equity in the workplace success.

From the practical perspective, the research stresses the positive effect of enterprise risk management in enhancing customer agility. It also clarifies the customer agility role in driving tourism organizations' sustainable performance. Managers could also conduct enterprise risk management to gain sustainability by customer agility practice. This study emphasises the role of risk management in dynamic capabilities implementation for the firms' sustainable goals. The role of gender moderator indicates that the female managers are more conservative in their application of organizational dynamic capabilities for their goals of sustainability than male.

2.2 Literature review and hypothesis development

2.2.1 Enterprise risk management

In the field of commercial management or non-commercial management, risk management is not a new word. Any issue involving risks will be accompanied by risk control, assessment, and management (Card and Clarkson, 2012). Risk

management is defined by Hopkin (2018, p46) as “the set of activities within an organization undertaken to deliver the most favourable outcome and reduce the volatility or variability of that outcome.” Specialist branches of risk management, including project, energy, financial, operational risk, environmental, and clinical risk management, have been thoroughly discussed in previous studies (Hopkin, 2018). However, in the complex and changeable organizational environment, only considering the above single type of risk management cannot achieve the efficiency of its practice. Thus, "enterprise risk management" (ERM) is introduced, a more integrated, structured, and tailored approach (Bromiley et al., 2015). Enterprise risk management is “a strategic business discipline that supports achieving an organization’s objectives by addressing the full spectrum of its risks and managing the combined impact of those risks as an interrelated risk portfolio” (Hopkin, 2018, p53). Enterprise risk management is a kind of dynamic capability of a company (Arena et al., 2010). A company can reduce its internal and external risks through enterprise risk management to improve its performance and implement enterprise value improvement (Dionne, 2013).

2.2.2 Customer agility

Ngo and Vu (2020, p. 69) define agility as “some sets of specific business processes that detect environmental changes then respond rapidly and effectively”. Agility is a dynamic capability to flexibly make rapid changes and quickly find market opportunities (Goriwondo et al., 2013). An organization's agility has many branches, including customer, organizational, supply chain, and strategic agility. Among them, customer agility is remarkable and more critical to an organization because it is directly targeted at customers' values and needs (Roberts and Grover, 2012a; Zhou et al., 2018). Customer agility will positively affect enterprises' performance and competitive advantages (Roberts and Grover, 2012a, 2012b). The two levels of customer agility include customer-sensing capability and customer-responding capability (Roberts and Grover, 2012a).

2.2.3 Organizations' sustainability

The World Commission defines sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Modern organizations consider sustainability an essential concept for survival (Vinodh, 2010). It has become urgent to consider how to achieve sustainability in COVID-19. The concept of sustainability covers three dimensions: environmental, social and economic (Purvis, 2019). organizations must balance and maximise the above three dimensions to maintain sustainable competitiveness (Dao, 2011).

2.2.4 Enterprise risk management and customer agility

Several authors have exposed the relationship between risk management and agility (e.g., Mandal and Dubey, 2020; Teoh et al., 2017). Wong et al. (2022) identify the impact of artificial intelligence-based risk management on the supply chain agility of small-medium enterprises (SMEs). The findings of Teoh et al. (2017) show that enterprise risk management can be an enabler of strategic agility. Mandal and Dubey (2020) focus on tourism supply chain companies. Their conclusion discloses that tourism risk management orientation can positively affect tourism supply chain agility. Although the opinions of the above authors do not directly point to the relationship between enterprise risk management and customer agility, given the similarity of nature and characteristics between different agility, we have reason to believe that enterprise risk management and customer agility have a similar correlation. Moreover, enterprise risk management, as one of the dynamic capabilities of enterprises, can help enterprises quickly grasp the changes in consumer demands and respond soon (Mandal and Dubey, 2020). And according to the similarity in the attributes of customer agility and other agility (e.g., strategic agility; supply chain agility), the following reasonable hypothesis can be created:

H1 : Enterprise risk management will positively affect customer agility.

2.2.5 Customer agility and organization's sustainability

Although agility and sustainability are two distinct paradigms, in the field of manufacturing, some scholars have begun to integrate these two concepts to realise the innovation of enterprise operation and maintain competitiveness in a complex environment (e.g., El Khalil and Mezher, 2020; Goriwondo et al., 2013; Vinodh, 2010). Because the goals of agility and sustainability are the same (Singh and Vinodh, 2017), it also ensures the feasibility of combining the two. El-Khalil and Mezher (2020) investigate the interaction between agility and sustainability in combination with the United States (US) automotive manufacturing industry. The results identify a significant positive internal relationship between the two concepts. Some scholars have also contributed to the research on the relationship between specific agility and sustainability. Mihardjo and Rukmana's (2019) findings show that organizational agility can help enterprises shape a sustainable development model. The case study from Rehman et al. (2020) confirmed supply chain agility's effectiveness in promoting sustainability in a Saudi manufacturing organization. Based on the above arguments and in combination with the similarity in attributes of customer agility and other agility (e.g., organizational agility; supply chain agility), the following reasonable

hypothesis can be created:

H2: Customer agility will positively affect organizations' sustainability.

2.2.6 The mediating effect of customer agility

Several researches have shown the mediating effect of customer agility and other firms' agility. For instance, the mediator role of customer agility in the e-commerce capabilities and firms' performance relationship is confirmed by Li et al. (2020). Wamba (2022) verifies that customer agility mediates the impact of artificial intelligence assimilation on firm performance. Haider and Kayani (2020) clarify the mediating effect of customer agility on the relationship between knowledge management capability and project performance. Thus, the following reasonable hypothesis can be created:

H3: Customer agility mediates the relationship between enterprise risk management and organizations' sustainability.

2.2.7 The gender moderation role

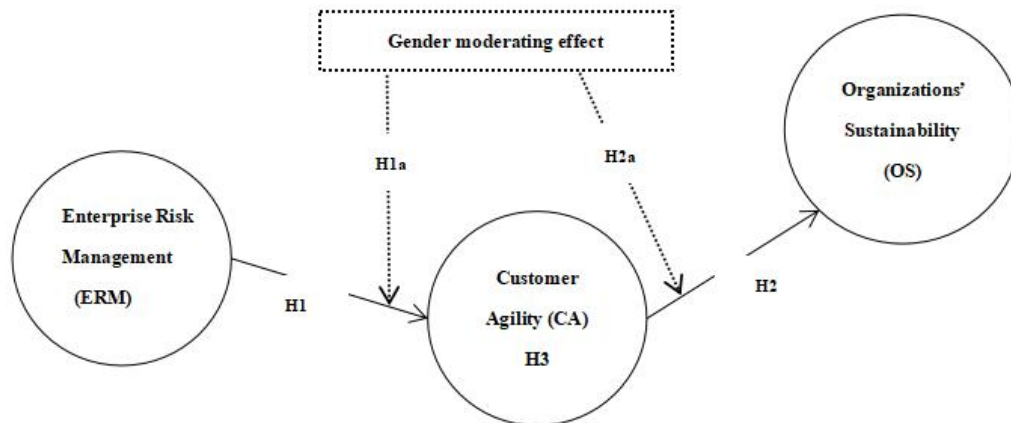
Several dynamic capabilities literature have confirmed the moderator role of gender. Ahmad et al. (2023) states that the chief executive officer gender moderates the relationship of the positive impact of organizations' dynamic capabilities on financial performance. Bogodistov et al. (2017) also clarify the gender diversity on dynamic capabilities efficiency among micro companies. More specifically, they conclude that female managers have more obstacles in organizations' sensing capabilities. The team gender diversity shapes various organizations' structures and cultures, leading to the formation and differentiation of a firm's capabilities (Bogodistov et al., 2017). The gender role will also affect the managerial decision-making (Butkouskaya et al., 2020a). Female leaders' decisions are often accompanied by lower risk taking, conservative strategies and stable business practices (Mínguez-Vera and Martin, 2011). Female managers may suppress their emotions and perception, which limits their capability to notice the opportunities and threats (Chen et al., 2016). It may overlook the positive impact of enterprise risk management on customer agility and the positive effect of customer agility on organizations' sustainability. Accordingly, the following hypothesis is created:

H1a: Gender moderates the relationship between enterprise risk management and customer agility.

H2a: Gender moderates the relationship between customer agility and organizations' sustainability.

Based on the above discussions, we create a theoretical model of the customer agility, enterprise risk management, and organizations' sustainability relationships in different gender groups (Figure 2.1).

Figure 2.1. A theoretical model of customer agility and the gender moderating effect



Source. Authors' elaboration.

2.3 Methodology

2.3.1 Tourism context description

The topic of sustainability has been widely discussed in many fields, including tourism. Sustainability has covered all the elements that constitute a complete tourism experience (Asmelash and Kumar, 2019). Dwyer et al. (2009) point out that the triple bottom line (TBL) approach needs to be applied by tourism organizations to sustainable development by balancing the interests of social, environmental, and economic in the decision-making process. Sustainable development in tourism can reduce the possible negative impacts and crises in tourism activities (Sharpley, 2003) and continuously improve the experience of tourists (Sharpley, 2000).

Ngo and Vu (2020) report that customer agility is also crucial for the survival and growth of a tourism organization. Timely and flexible customer-sensing and customer-responding ability can help improve tourists' satisfaction and boost tourism SMEs' performance (Ngo and Vu, 2020). And tourists' satisfaction is closely associated with sustainable development (Ridho et al., 2021). Thus, combining the concepts of customer agility and sustainability in the tourism domain is necessary.

Numerous literatures have focused on risk management in the tourism industry (e.g., Amirudin et al., 2017; Gjerald and Lyngstad, 2015). For example, Gjerald and Lyngstad (2015) conclude that risk management will affect tourism organizations'

partnerships. Liu et al. (2019) claim that risk management will enhance tourism organizations' competitiveness. Some scholars also concentrate on the role of enterprise risk management in the tourism and hospitality sphere. Vij (2019) emphasises the importance of enterprise risk management strategies in the Indian hospitality industry. Brustbauer (2016) finds that enterprise risk management plays a key role in tourism SMEs.

The gender role is crucial in tourism marketing. Gender variation will lead to various tourist satisfaction, attitude and behavior intentions towards destinations (Han et al., 2017). Gender diversity of tourism managers will also shape different tourism service experiences and tourism marketing strategies (Alexander, 2012). The preference of female group and male group in tourism choice will form differentiated-characteristics tourism products. Female and male leaders will incorporate such group preferences and personal experiences as important basis for decision-making (Kourtesopoulou and Chatzigianni, 2021).

2.3.2 Data collection

The original data was collected from May 2021 to June 2022 by investigating 217 middle and senior managers of tourism organizations in the Chinese market. The relevant measurement items were initially written in English since they mainly refer to already available English literature. Then, they are translated into Chinese to aid the respondents in understanding the questions and providing accurate answers. Back translation results in no linguistic problems. Five tourism market managers and academic experts in the tourism discipline are invited to undertake a pre-investigation before the whole investigation. They all offer supportive comments. The following identity constraints have been placed on the respondents to collect data and fulfil the study's objectives: 1. The respondents must hold a middle or senior management position in a tourism organization agency, as only individuals in such a position may be conversant with the industry's internal management rules, key competencies, and operational mechanisms. 2. The respondent's company must have launched the online business service to satisfy the needs of the relevant dynamic capacities of organizations in this study. Table 2.1 presents the results of the sample in its final form, including respondents' profile with basic information of gender, age, marital status, educational background and working experience, and, company's profile with data of their type and size. More specifically, the male respondents are more than female. Most respondents with over 30 years old have more than 3 years working experience, which conforms to the objective law of the industry in China. About half of the respondents have less than a bachelor's degree, which is also in line with the reality that there are a large number of low-educated workers in China's service

industry. Additionally, most of the company with small-sized are travel agency and hotel. This also accord with the employment situation of the tourism.

Table 2.1. Sample information

Respondents' profile	Items	Numbers of Respondents	Proportion		Items	Numbers of Respondents	Proportion
Age	Under 18 years old	0	0	Gender	Male	112	51.6%
	18-25 years old	2	0.9%		Female	105	48.4%
	26-30 years old	47	11.1%		Total	217	100%
	31-40 years old	55	25.3%	Working years	Less than one year	3	1.4%
	41-50 years old	52	24.0%		1-3 years	53	24.4%
	51-60 years old	61	28.1%		3-5 years	56	25.8%
	60 years old and above	23	10.6%		5-10 years	36	16.6%
	Total	217	100%		More than 10 years	69	31.8%
Marital Status	Unmarried	99	45.6%	Company's profile	Total	217	100%
	Married	118	54.4%				
	Total	217	100%	Company type	Travel agency	135	62.2%
Education	Elementary School	6	2.8%		scenic spot	34	15.7%
	Middle School	46	21.2%		Hotel	45	20.7%
	High School	45	20.7%		Others	3	1.4%
	College	13	6.0%	Total	217	100%	
	Bachelor's Degree	50	23.0%	Number of employees	250 and fewer employees	137	63.1%
	Master's Degree	50	23.0%		more than 250 employees	80	36.9%
	Doctoral Degree	7	3.2%		Total	217	100%
	Total	217	100%				

Source. Authors' elaboration.

2.3.3 Measurement

All constructs are measured using adapted seven-point Likert scales (Norman, 2010). Customer agility form 10 items based on Roberts and Grover (2012a). The

measurement of organizations' sustainability is adapted from Sharpley (2003) and Dwyer et al. (2009) and contains five items. The five measurement items of enterprise risk management capability are designed based on Hopkin (2018) and Bromiley et al. (2015). Specific items are shown in Appendix A.

2.3.4 Data analysis

Recommended by Marsh et al. (2014), the EFA (exploratory factor analysis) and CFA (confirmatory factor analysis) are reasonably applied to examine the consistency of the adapted measures. The relationships between the above-supposed concepts and the moderating impact of gender will be assessed using partial least squares structural equation modelling (PLS-SEM) with SmartPLS 3 (Hair et al., 2017). The utilization of PLS-SEM has been deemed suitable for the purpose of the study owing to multiple justifications. Firstly, this methodology is an appropriate fit for datasets with a restricted sample size, as is evident in our research, consisting of less than 250 respondents. Secondly, this approach portrays greater flexibility concerning the assumption of data normality. Lastly, previous research studies conducted by Chin (2010) and Hair et al. (2019) have confirmed the applicability of PLS-SEM as an established technique for multi-group analysis. Two-step PLS analysis will be applied: 1. the internal reliability and convergent and discriminatory validity of samples will be determined by evaluating measurement models. 2. the bootstrap resampling procedure will be used to test the relationships between concepts in the structural model (Hair et al., 2017). The scale's reliability will be evaluated using Cronbach's alpha value (Hair et al., 2021).

2.4 Results

2.4.1 Model validation

The findings demonstrate that the scale's reliability is excellent because the three factors' respective Cronbach's alpha values are 0.979, 0.983, and 0.990, which are all more significant than 0.7. Each factor's loading is greater than 0.5, each variable's combination reliability is greater than 0.8, and the overall AVE value is greater than 0.6 (Appendix B) (Hair et al., 2021). The average extraction variance of each variable is greater than the correlation coefficient between this variable and other variables, which suggests that the discriminant validity of the scale is also acceptable, as evidenced by the discriminant validity of the scale as presented in Table 2.2.

Table 2. 2. Results of discriminant validity tests of the variables

	ERM	CA	OS
ERM	0.961		
CA	0.571	0.957	
OS	0.270	0.286	0.962

Note. ERM=Enterprise Risk Management; CA= Customer Agility; OS= Organizations' Sustainability.

Source. Authors' elaboration.

2.4.2 Evaluation of research model

The fitness index of the measurement model is CMIN / DF =1.302, less than 2; GFI =0.887, more than 0.800; NFI =0.963, RFL =0.959, IFI = 0.991, CFI= 0.991, TLI= 0.990, all above 0.900; RMSEA =0.037, less than 0.050, all within the critical standard range, indicating that the structural model has a good fit and can be used for path analysis (Mulaik et al., 1989).

The results of examining the cause-effect research model (table 2.3) show that enterprise risk management can positively affect customer agility (H1: 0.563, $p < 0.001$). Furthermore, customer agility positively impacts OS (H2: 0.286, $p < 0.001$).

Table 2.3. Examining of the research model

		Path			
	Path	Coefficient	t-Value	p-Value	
H1	ERM->CA	0.563	13.135	0.000***	Supported
H2	CA->OS	0.286	4.790	0.000***	Supported

Note. ERM=Enterprise Risk Management; CA= Customer Agility; OS= organizations' Sustainability. *** indicates $p < 0.001$.

Source. Authors' elaboration.

In table 2.4, the path analysis result presents that customer agility significantly mediates the relationship between enterprise risk management and organizations' sustainability (H3: 0.168; $p < 0.001$).

Table 2.4. Examining the mediating effect (customer agility)

		Path			
	Path	Coefficient	t-Value	p-Value	
H3	ERM->CA->OS	0.168	4.690	0.000***	Supported

Note. ERM=Enterprise Risk Management; CA= Customer Agility; OS= organizations' Sustainability. *** indicates $p < 0.001$.

Source. Authors' elaboration.

The results of the gender moderating effect in Table 2.5 suggest that in tourism organizations, where middle and senior managers are male, compared to the ones

where managers are female, enterprise risk management has a significantly stronger impact on customer agility ($H3_{\text{female}}$: 0.116 vs $H3_{\text{male}}$: 0.535; $p < 0.001$), and customer agility has a significantly stronger effect on organizations' sustainability ($H4_{\text{female}}$: 0.181 vs $H4_{\text{male}}$: 0.496; $p < 0.001$).

Table 2.5. Testing the gender moderating effect

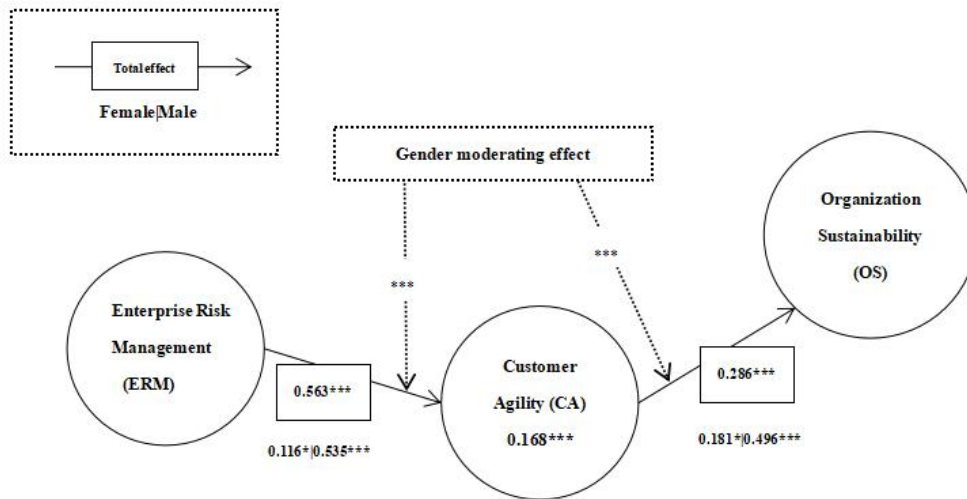
		Female		Male		Multi-Group Analysis	
		Path Coefficients	t-Value	Path Coefficients	t-Value	Path Coefficients Differences	P-Value
H1a	ERM->CA	0.116	2.01*	0.535	9.488***	0.419	0.000***
H2a	CA->OS	0.181	2.562*	0.496	6.220***	0.315	0.000***

Note. ERM=Enterprise Risk Management; CA= Customer Agility; OS= organizations' Sustainability. * indicates $p < 0.05$; *** indicates $p < 0.001$.

Source. Authors' elaboration.

Figure 2.2 presents the analysis results of the supposed model and the moderating effect of gender.

Figure 2.2. Path analysis and moderating effect



Note. *** indicates $p < 0.001$; * indicates $p < 0.05$.

Source. Authors' elaboration.

2.5 Discussion

2.5.1 Theoretical contributions

As the path analysis has shown, the results confirm that enterprise risk management has a significantly positive effect on customer agility. Meanwhile, customer agility

positively impacts organizations' sustainability. Thus, H1 and H2 are both supported. Also, the customer agility mediates the relationship between enterprise risk management and organizations' sustainability. Thus, H3 is supported. The separate effect of enterprise risk management on customer agility in male and female groups is significant. The effect of enterprise risk management on customer agility is significantly stronger in male case than female. The customer agility-organization sustainability relationship accompanies with a similar result. Therefore, H1a and H2a are both empirically supported.

More specifically, the investigation indicates that enterprise risk management can be recognised as the predictor of customer agility, with a similar conclusion to Wong et al. (2022) who claim that risk management will enhance a firm's supply chain agility. The results also extend the findings of Teoh et al. (2017) from strategic agility to customer agility in risk management research. Considering enterprise risk management is the integral component in all business chain, it is bound to affect the efficiency of enterprises' dynamic capabilities implementation (Teece, 2007; Wu, 2022). The research contributes to deeply understanding the role of enterprise risk management in improving customer agility effectiveness in the tourism sector.

Simultaneously, the positive relationship between customer agility and organizations' sustainability presents that customer agility, as an integrated dynamic capability, will help organizations reach the sustainable goals by effective customer agility practices. The analysis empirically supports the conjecture of Vinodh et al. (2010), who conceptually highlight the importance of connecting the sustainability and agility concepts. The case also enriches the dynamic capabilities literature from the verification of the customer agility role in enhancing sustainability.

The confirmation of the customer agility mediating effect contributes to covering the gap of clarifying the indirect impact of enterprise risk management on organizations' sustainability. Enterprise risk management can promote sustainable growth by customer agility implementation. The analysis extends the findings of Haider and Kayani (2020), who identify that customer agility mediating the relationship between knowledge management capability and project performance.

The gender moderating impact on the relationship between risk management and customer agility contributes to emphasizing the gender comparison analysis in the dynamic capabilities study. The analysis is in line with the results of Ahmad et al. (2023), who also confirm the moderator role of managers' gender. Additionally, its moderation role in the customer agility effect on sustainability suggests the variation

of managers' gender will affect effectiveness of organizations' dynamic capabilities implementation in their sustainable performance promotion (Butkouskaya et al., 2020a). Compared to female, Male managers tends to be more active in risk management activities and often reach better sustainable performance by implementing customer agility. Thus, this study contributes to providing a better understanding of the gender diversity analysis in the sustainability topics.

2.5.2 Managerial contributions

The conclusion that enterprise risk management positively affect customer agility suggests that risk management often determines the sensing efficiency and responding speed of enterprises to market opportunities and risks because organizational risk is always closely related to market changes (Card and Clarkson, 2012; Dionne, 2013; Fakir and Jusoh, 2020). High quality risk management leads to better customer agility practice. A firm's customer-sensing capability and customer-responding capability with better risk management capability will be released more fully. When managers can well manage their confronting risks, it also means that they can exert their dynamic capabilities and carry out business activities more efficiently (Gjerald and Lyngstad, 2015).

The impact of customer agility on organization's sustainability highlights the unique role of customer agility in the sustainability development. As a firm's prominent dynamic capability, the exertion of customer agility is crucial to achieving sustainability goals (Goriwondo et al., 2013). Relying on a more comprehensive sense to consumers and a faster response to the market, enterprises will gain consumers' trust faster, harvest more loyal user groups, and reach their sustainable development goals more easily (Roberts and Grover, 2012a; Rehman et al., 2020).

The indirect effect of enterprise risk management on organizations' sustainability suggests suggests that, to achieve sustainable goals, managers can also implement customer agility in the risk management activities. They can integrate risk management and customer agility practices for better sustainability (Teoh et al., 2017).

The significant moderator role of gender in the risk management and customer agility relationship demonstrates the gender differences in implementing dynamic capabilities. Specifically, male leaders with more adventurous and innovative tend to be more proactive in business activities. High risk taking does not mean low risk awareness (Amirudin et al., 2017; Vij, 2019). Instead, their aggressive activity implementations are based on a more comprehensive risk assessment (Wong et al.,

2022). To the opposite, female leaders will be more conservative in activities and decision making (Zhu et al., 2022). Their risk management experiences can hinder organizations' efficiency in activities and finally affect these capabilities' outcomes (Fakir and Jusoh, 2020). It is proved by the evidence of the differentiation of the customer agility impact on organizations' sustainability in male and female managers. In this case, male managers create better sustainable performance than female by customer agility implementation.

2.6 Conclusion

Both theoretical and practical contributions are offered by the research with a special focus on the sustainability topics, risk management, and gender issue. Specifically, the empirical results uncover that enterprise risk management can be used as a predictor of customer agility. And customer agility will further drive the realisation of the long-term sustainable development of organizations. The research implies that enterprise risk management and customer agility can help organizations create long-term and sustainable growth. Also, customer agility mediates the relationship between enterprise risk management and organizations' sustainability. Additionally, male managers and female managers will generate various impacts in the enterprise risk management and customer agility relationship. Meanwhile, the effectiveness of customer agility for the sustainable goals will be quite different in male and female case. More specifically, the impact of enterprise risk management on customer agility is significantly stronger in male managers than in female. Customer agility has a significantly stronger influence on organizations' sustainability in man groups than in women.

From the theoretical perspective, this chapter contributes to the strategic management discipline by focusing on analysing the impact of enterprise risk management on customer agility. Secondly, the research initially organises the concepts of customer agility and sustainability and empirically verifies their positive relationship. Thirdly, the verification of the mediating role of customer agility makes contributions to providing evidence of the indirect effect of enterprise risk management organizations' sustainability. Finally, this study fills in the gap of lacking gender analysis in the risk management research by considering the moderating role of gender in shaping the relationship among different dynamic capabilities (e.g., enterprise risk management and customer agility) and their consequence.

From the managerial perspective, the research offers clear and valuable enlightenment for organizations to invest more in enhancing their risk management capability and customer agility. Specifically, managers should focus on the enterprise

risk management role in driving effective implementation of customer agility. Also, a high level of customer agility creates better a firm's sustainability. To reach sustainable goals, managers could implement customer agility in the risk management activities. The gender role of managers in the dynamic capabilities' implementations cannot be ignored. Male managers will better activate these dynamic capabilities to serve the activities and reach their sustainable goals.

Chapter3.

Technology-oriented investment, customer agility, organizations'
sustainability: the moderating role of firm size in the inter-country
context

Chapter3. Technology-oriented investment, customer agility, organizations' sustainability: the moderating role of firm size in the inter-country context

3.1 Introduction

Technology-oriented investment has become a key focus for enterprise business expansion and development (Davern and Kauffman, 2000). Literature on technology-oriented investment, R&D investment or technology-centric investment has been widespread. Previous researches have confirmed the significant correlation between IT investment and organizational performance (Mahmood, 2000), employee performance (Huang et al., 2015), administrative productivity (Rai et al., 1997) and hotel performance (Melián-González and Bulchand-Gidumal, 2016). As an essential component of organizational strategy, technology investment will play a key role in enterprises' sustainable development and innovation in an uncertain environment (Saldanha et al., 2020). On the balance sheet of many companies, IT expenditures have become an essential item, accounting for over one-third of all capital expenditures (Rai, 1997). The operation efficiency and output of enterprises with high technology input are often higher (Darma, 2004). In addition to the improvement of corporate performance, technology-oriented investment obviously affects its directly-related corporate capabilities, including information technology capability, research and development capability, and other dynamic capabilities (Voudouris et al., 2012).

However, as a technology-relied capability, customer agility never been connected with technology-oriented investment. Several literatures have focused on the antecedents of customer agility. customer agility can be driven by knowledge management, digitalization, internet technology and information technology infrastructure (Hadjielias et al., 2022; Roberts and Grover, 2012b). Technological progress can lead to a firm's agility development (Tallon et al., 2019). Even though past researches have specified the enabling role of some technology-related capabilities in agility activities, most of them contribute to the supply chain agility, strategic agility and other agility literature. Few focus on the customer agility development. Investment is still the decisive factor for technological improvement (Jia et al., 2021), even several cases regarding failed technology investment state that more investment may not always bring technology innovation and transfer (Eggers et al., 2012). Thus, we believe a firm's customer agility may be shaped and optimized by technology innovation within more investment.

In the customer-centric market, organizations' sustainability contains many demand-oriented performances (Kocmanová and Dočekalová, 2011; Lourenço et al.,

2012). customer agility, as the customer-centric dynamic capability, aims to flexibly sense customers' demands and quickly make changes to adapt the market (Roberts and Grover, 2012a; Roberts and Grover, 2012b). The overlaps of the concepts between organizations' sustainability and customer agility indicates a high degree correlation with both. Maybe organizations' sustainability could be set as the goals in the customer agility implementations.

Also, the mediating role of customer agility in the technology-oriented investment and sustainability relationship needs to be further confirmed. The agility literature has presented the firms' agility mediating effect on some relationships. For example, Wamba (2022) claims that organizational agility and customer agility mediate the relationship between artificial intelligence assimilation and firm performance. The mediation role of strategic agility in the impact of customer knowledge management capability on project performance is identified by Haider and Kayani (2020). Also, Kurniawan et al. (2021) confirm that business process agility has a mediating effect on the networking capability and firm performance relationship. Accordingly, the research infers that there is also a mediating effect of customer agility on the relationship between technology-oriented investment and sustainability.

Additionally, the customer agility effectiveness and its outcomes may vary due to the moderating effect of firm size. Some evidences have disclosed the moderating role of firm size in the relationship between firms' agility and its results (e.g., Ngo and Vu, 2021; Bayo, 2021). For example, Bayo (2021) proves that the firm size moderates the relationship between strategic agility and sales growth. The SMEs literature implies that firm size is related to organizations' agility (e.g., Jafari-Sadeghi et al., 2022). Compared with SMEs, large firms will attract more external investment to plan technology innovation programs (Danielson and Scott, 2006). Also, their innovation success could be more easily achieved based on more professional research and development teams (Chunling et al., 2021). Supported by innovative technology, large corporations can develop business more effectively (Kropsu-Vehkapera et al., 2009) and gain better firm performance (Bayo, 2021). Thus, it could be proposed that the customer agility effectiveness may be various in SMEs and large companies.

Moreover, marketing and tourism research should consider the analysis in transnational context. organizational behavior is not only a response to the dynamic business environment, but also an institutional pressure (Greenwood and Hinings, 1996). The level of digitalization and information technology in developed economies is higher than that in developing economies. And Škare and Soriano (2021) have confirmed that the digital level of a country drives the formation of firm agility.

Compared with developing economies, developed economies are more attractive to capital investment, have better institutional safeguards, and have higher overall technological innovation capabilities (Gnyawali and Park, 2009). The aforementioned elements are important antecedents driving agility (Tallon et al., 2019). The developing economies literature also implies the possible impact of customer agility on organizational performance and competitiveness (e.g., Panda and Rath, 2018). Thus, this study compares the efficiency of customer agility implementation and its impact on organizations' sustainability in the inter-country context.

The research aims to verify: (1) the positive impact of technology-oriented investment on customer agility; (2) the effect of customer agility on organizations' sustainability; (3) the mediating role of customer agility in the relationship between technology-oriented investment and organizations' sustainability; (4) the moderator role of company size in the technology-oriented investment-customer agility relationship and the customer agility-sustainability relationship; (3) the moderating effect of country type in the technology-oriented investment-customer agility relationship and the customer agility-sustainability relationship. 712 final samples from the cross-country survey are ascertained for further analysis by PLS-SEM method.

This chapter investigates technology-oriented investment as the antecedent of customer agility and tests the customer agility impact on sustainability of organizations with different sizes in the inter-country context. The research contributes to the financial management discipline by confirming the role of technology-oriented investment in a firm's dynamic capabilities' development. The study also contributes to expand agility implementations in the marketing and tourism research. The verification of the customer agility mediating effect contributes to covering gaps of lacking enough evidences of the indirect effect of customer agility in the current agility literature. The investigation also contributes to the strategic management discipline through investing more in technology to enhance dynamic capabilities, and reaching the sustainable development within a firm-level comparison of China and Singapore market.

From the managerial perspective, the chapter contributes to providing a deeper thinking for managers' financial decision-making by highlighting the unique role of technology investment in shaping dynamic capabilities. It also stresses the positive effect of customer agility on the sustainable development. The mediating role of customer agility suggests that managers could achieve their sustainability though advisable and predictive investment policy in the customer agility activities. The

analysis also enlightens managers in SMEs should make technology-priority financial strategies. In SMEs, limited resources should be prioritized allocated to the technology-related departments. Based on the case comparison of China and Singapore, it reminds policy-makers of developing economies the importance of making friendly policies to attract more investments in technology improvement.

3.2 Literature review and hypothesis development

3.2.1 Technology-oriented investment and customer agility

Technology-oriented investment refers to the company's investment in information technology or communication technology (Feeny and Ives, 1990). More and more enterprises begin to pay attention to investment in technology enhancement because surpassing the technical advantages of competitors will ensure their leading position in the market and be conducive to their long-term development (Darma, 2004). Rai et al. (1997) explain that technology investment will improve the organizational productivity and business performance of enterprises because it will reduce the bounded rationality of decision-making (Kim and Sanders, 2002). Technology investment will also play a good role in promoting the realisation of enterprise value (DOS et al., 1993; Kohli and Devaraj, 2012). The research of Feeny and Ives (1990) emphasises that enterprises' investment in information technology will reap long-term competitive advantages and become a key factor for the sustainable development of enterprises. The effectiveness and returns of technology-oriented investments are reflected through the impact of the enterprise's use of IT on the enterprise's dynamic capability.

Considering customer agility is a technology-relied dynamic capability to sense customers' demand and respond to the market changes, prior studies have confirmed that customer agility can be improved by technology-related constructs, such as knowledge management, digitalization, internet technology and information technology infrastructure (Hadjielias et al., 2022). customer agility is composed of two aspects: customer-sensing capability and customer-responding capability. Both the capabilities implementations reply on the technological support (Wu et al., 2022). The sensing and responding capability are determined by technology levels (Roberts and Grover, 2012b). The mature technology applications in agility implementations have been presented in the past literature. But it is a dynamic procedure from technology investment to its achievements (Desai et al., 2002). Although there are many factors affecting the effectiveness of technology, the continuous investment provides the greatest guarantee for the success (Ren et al., 2022). Thus, the research generates the following hypothesis:

H1: Technology-oriented investment will positively affect customer agility.

3.2.2 Customer agility and sustainability

The evidences from numerous theoretical studies supports the relevance of agility and sustainability (e.g., El-Khalil and Mezher; Goriwondo et al., 2013; Mihardjo and Rukmana, 2019; Rehman et al., 2020; Vinodh, 2010). Goriwondo et al. (2013) refer that the organizational target of agility is to quickly meet the market demand through flexible ways to maintain competitiveness and finally achieve commercial success. And sustainability is to maintain enterprise cooperation, create value and survive in a dynamic competitive business environment (Rehman et al., 2020). Agility is a capability that drives competitiveness to foster sustainability (Rehman et al., 2020). The empirical survey from Mihardjo and Rukmana (2019) disclose that organizations in the ICT industry can shape sustainable development through the driving role of organizational agility in their business model innovation. Rehman et al. (2020) state that supply chain agility can help manufacturing organizations to foster their sustainability.

However, no direct evidence shows the relationship between customer agility and sustainability. Previous research has revealed that the positive role of customer agility in the firm performance (Rehman et al., 2020; Roberts and Grover, 2012a; Wamba, 2022). The customer agility concept is similar to organizational agility. But customer agility is a customer-centered organizational dynamic capability. It is an ability to sense consumer preferences sensitively and respond quickly to consumer needs (Roberts and Grover, 2012a). customer agility determines customer-oriented chances for innovation and competitive activities (Roberts and Grover, 2012a). Of course, it is also crucial to the survival and success of enterprises (Roberts and Grover, 2012b). Thus, the research hypothesizes:

H2: customer agility will positively affect organizations' sustainability.

3.2.3 The mediating role of customer agility

The firms' agility (e.g., strategic agility, organizational agility, business process agility, etc.) mediating effects have been confirmed in past research. For instance, the mediator role of organizational agility and customer agility in the relationship between artificial intelligence assimilation and firm performance is proved by Wamba (2022). The conclusions from Haider and Kayani (2020) present a significant customer agility mediating influence on the relationship between customer knowledge management capability and project performance. Additionally, Kurniawan et al. (2021) state that business process agility has a mediating effect on the networking capability

and firm performance relationship. customer agility accompanies the similar characteristics with the above agility (Roberts and Grover, 2012b). Accordingly, the research hypothesizes:

H3: customer agility mediates the relationship between technology-oriented investment and organizations' sustainability.

3.2.4 The firm size moderating effect

The technology-oriented investment role in customer agility activities may vary in different sized enterprises. SMEs have limited annual financial budgets and attract few external investments (Danielson and Scott, 2006). Technological innovation is the result of long-term investment of large amounts of capital (Chunling et al., 2021). Large enterprises pay more attention to the use of high-tech management (Kropsu-Vehkaperä et al., 2009). Low level of technology adoption among SMEs will reduce their dynamic capability (Kropsu-Vehkaperä et al., 2009). A more transparent financial management process in large enterprises ensures that budget plans are smoothly implemented (Danielson and Scott, 2006). From this point of view, the success rate of large enterprises to invest in technology projects will be higher. Additionally, large enterprises have stronger ability to resist investment risks, while SMEs more easily face issues of breaking the capital chain (Mayadunne and Park, 2016). Although previous SMEs literature report that large enterprises may fail in investment due to a considerable degree of inertia, there has always been a paradox in the research of technology investment on its output (Dans, 2001). Some researchers point out that SMEs do not have a strategic plan for technologies, but rather spend money to introduce technologies and try to use them without any changes (Dans, 2001). They even don't consider the applicability of technology (Danielson and Scott, 2006). The agility studies also affirm the enabling role of technology-related capabilities in customer agility among large enterprises (Roberts and Grover, 2012b). Thus, the research hypothesizes:

H1a: The firm size moderates the relationship between technology-oriented investment and customer agility.

Also, agility implementation effectiveness for organizations' sustainability may be different in SMEs and large companies (Bayo, 2021; Ngo and Vu, 2021). The environment causes more uncertainty to SMEs than larger companies (Islam et al., 2011). SMEs and large firms have different responses to environmental changes (Chen and Hambrick, 1995). Large firms with high-technology adoption always can quickly sense and adapt to the market changes (Birnbaum, 1984). Although previous

researches on SMEs show their advantages in flexibility, large enterprises supported by high technology are different from traditional enterprises (Schneider et al., 2010). Technological innovation has changed their traditional decision-making processes, corporate structures and the execution of plan (Van Knippenberg et al., 2015). More and more large enterprises begin to adopt the differentiated management mode of departmental responsibility system and project responsibility system, and the investment is also implemented from company to department or project, making large enterprises “small” (Van Knippenberg et al., 2015). So, these big companies are getting nimbler. In addition, large enterprises have more professional employees, which also ensures good execution and project output. Accordingly, the research hypothesizes:

H2a: The firm size moderates the relationship between customer agility and organizations’ sustainability.

3.2.5 Inter-country analysis

The technology investment may differentiate in distinct economies. Firstly, developed economies can attract more foreign direct investment (FDI) due to their sound investment policies and stable business environment (Herzer, 2012). Adequate capital reduces risks such as fund chain breakage (Mayadunne and Park, 2016). Secondly, developed economies have more advanced information technology facilities and better reserves of technical talents to support successful technological innovation (Ives and Jarvenpaa, 1991). Thirdly, the mature consumer markets and good national credit of developed economies will also provide endorsement for attracting well-known multinational high-tech enterprises to settle in for better collaboration with ones within the domain (Ives and Jarvenpaa, 1991). Fourthly, a large number of investment cases have proven that technology investment has a noticeable higher success rate in developed economies than developing (Heeks, 2002). Fifthly, more forward-looking and innovative leadership in developed economies ensures the efficient application of technology at the corporate level (Harrison et al., 2018). Accordingly, the research hypothesizes:

H1b: The country type moderates the relationship between technology-oriented investment and customer agility.

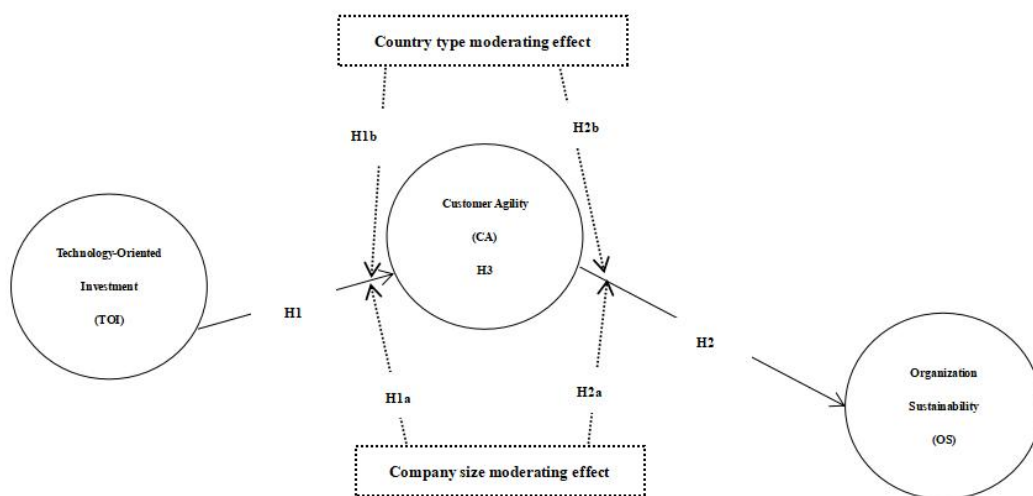
The customer agility effectiveness may vary from country to country (Islam et al., 2011). The technology infrastructure of developed countries is much better than developing, which is more convenient for enterprises to cultivate their dynamic capabilities. Škare and Soriano (2021) explain that the digital level of a country drives

the formation of firm agility. Leadership often determines the organization's agility (Salahat, 2021). Therefore, this may be another manifestation of the differences in customer agility implementation among different economies. The dynamic capabilities literature has uncovered that organizations' capabilities may play different roles in their performances in developing and developed countries (Griffith and Harvey, 2001). It could be judged that customer agility, as a capability of enterprises, may also be implemented with different efficiency in different economies. Thus, the research hypothesizes:

H2b: The country type moderates the relationship between customer agility and organizations' sustainability.

Based on the above mentioned, we build a global model of customer agility, technology-oriented investment, and organizations' sustainability in different sizes of firms (Figure 3.1).

Figure 3.1. A cause-and-consequence model of customer agility with the firm size and country type moderating impacts



Source. Authors' elaboration.

3.3 Method

3.3.1 Research design

To reach our research objectives, the sample of this study mainly includes the original data of two different economies, a developing economy and a developed economy. China is selected as the representative of developing economies, and Singapore is selected as the representative of developed economies, serving as the testing ground for inter-country analysis of the customer agility theoretical framework (Cadogan,

2010). The survey is mainly aimed at the managers of tourism organizations in the two countries. Although their systems are different, both have maintained rapid economic growth in the past decades (Zhu et al., 2022). Singapore is one of Asia's four little dragons, representing the developed economies in Asia (Khoi et al., 2022), while China is the world's largest developing economy (Xu et al., 2022). Moreover, both countries have abundant tourism resources and tourist resources, and both are important tourism markets (Henderson, 2002). However, the market activity, competition density and investment attraction of developed economies (Singapore) are generally higher than those of developing countries (China).

3.3.2 Data collection

The survey was carried out from May 2022 to August 2022. The English original questionnaire is used for investigation in the Singapore market. At the same time, it has also been translated into Chinese for Chinese market inquires. Before the official delivery, it is repeatedly checked by five tourism experts. The questionnaire is mainly launched online. All forms are automatically guaranteed by respondents. To ensure that the research purpose is achieved, the qualifications of respondents are also limited, and they must be the managers of domestic tourism industry organizations. This study divides companies into SMEs (with 250 and fewer employees) and larger companies (with more than 250 employees) according to the number of employees (Butkouskaya and Llonch Andreu, 2021). Table 3.1 shows the final sample information. It's composed of respondents' profile with the statistic information of age, gender, educational background, marital conditions, and working experience, and companies' profile including numbers of employees and geographic origin.

Table 3.1. Tourism organizations' managers' profile from China and Singapore

Characteristics	<i>N</i>	Minimum	Maximum	Mean	SD
<i>Respondent profile</i>					
Age	712	23	68	39.082	9.890
Gender	712	0	1	0.434	0.496
Education (1=Elementary school,2=Middle school, 3=High school, 4= College, 5= Bachelor, 6=master, 7= doctoral degree)	712	1	7	4.474	1.330
Marital Status (0=Unmarried, 1=Married)	712	0	1	0.564	0.496
Working years (1=Less than one year, 2=1~3 years,3= 3~5years, 4=5~10years, 5=More than 10 years)	712	1	5	2.879	0.858
<i>Company's profile</i>					
Numbers of employees (1= SMEs, 2= Larger)	712	1	2	1.466	0.499
Country (1= China, 2= Singapore)	712	1	2	1.524	0.499
<i>Note. SD= Standard deviation; N= it referred to the number of respondents</i>					

Source. Authors' elaboration.

3.3.3 Measurement scales

The research scale refers to the existing mature scales. The 7-Likert scales are applied. Six items of levels of technology investment are adapted from Rai et al. (1997) and Darma (2004). customer agility is measured based on the literature of Roberts and Grover (2012a) and Roberts and Grover (2012b), including ten items. The measurement of organizations' sustainability refers to Sharpley (2003) and Dwyer et al. (2009), consisting of five components. All measurement items are listed in Table 2.

3.3.4 Analytical procedure

the EFA (exploratory factor analysis) and CFA (confirmatory factor analysis), suggested by Marsh et al. (2014), are suitably used to examine the consistency of the adapted measures. The partial least squares structural equation modeling (PLS-SEM) is used for data analysis and hypothesis testing (Chin et al., 2003). Various factors have led to the selection of PLS-SEM as an appropriate methodology for our study. Firstly, PLS-SEM exhibits greater flexibility towards the normality assumption of the

data. Secondly, the credibility and validity of PLS-SEM is reinforced by previous research conducted by Hair et al. (2019), who have established it as a reliable technique for conducting international marketing investigations.

This study operates SmartPLS 3.0 software to process data (Wong, 2013). The running results meet the main fitting indices, such as the standardized root means squared residual (SRMR), the unweighted least squares dispersion (duls) and the geodesic dispersion (dg) (Dijkstra and Henseler, 2015). Two-step PLS model testing is processed: the evaluation of the measurement model as the first step and the examination of the structural model as the second step. The construct reliability, validity parameters and the discriminant validity are used for estimation of measurement model (Henseler et al., 2016). Then, the bootstrap resampling program is operated to examine the structural model. SmartPLS 3 algorithm is applied to estimate the moderating effects by conducting multi-group analysis (MGA) (Tran et al., 2019).

3.4 Results

3.4.1 Model validation

All measured items meet the required core standards: Cronbach's alpha is above 0.7, composite reliability (CR) values are greater than 0.7, average extracted variance (AVE) values are higher than 0.5, and the outer loadings are above 0.7 (Appendix C) (Hair et al., 2021).

The discriminant validity of the scale shown in Table 3.2. demonstrates that the average extraction variance of each variable is greater than the correlation coefficient between this and other variables, which indicates that the discriminant validity of the scale is also acceptable.

Table 3.2. Results of discriminant validity tests

	TOI	CA	OS
TOI	0.956		
CA	0.454	0.918	
OS	0.587	0.390	0.960

Note. TOI= Technology-oriented investment; CA= Customer agility; OS= organizations' sustainability.

Source. Authors' elaboration.

3.4.2 Evaluation of research model

Table 3.3 shows the results of hypothesis testing. The result confirms that technology-

orientation investment has a positive impact on customer agility (H1: 0.454; $p < 0.001$). Additionally, the effect of customer agility on organizations' sustainability is significantly strong (H2: 0.390; $p < 0.001$), which proves that customer agility has a direct positive impact on organizations' sustainability. Thus, both H1 and H2 are supported.

Table 3.3. Evaluation of the structural model (full sample)

	Path	Path Coefficients	t-Value	p-Value	
H1	TOI ->CA	0.454	14.497	0.000***	supported
H2	CA->OS	0.390	12.092	0.000***	supported

Note. TOI= Technology-oriented investment; CA= Customer agility; OS= organizations' sustainability. *** indicates $p < 0.001$.

Source. Authors' elaboration.

In table 3.4, the path analysis result presents that customer agility significantly mediates the relationship between technology-oriented investment and organizations' sustainability (H3: 0.177; $p < 0.001$). Thus, H3 is supported.

Table 3.4. Examining the mediating effect (customer agility)

	Path	Path Coefficient	t-Value	p-Value	
H3	TOI->CA->OS	0.177	7.473	0.000***	Supported

Note. TOI= Technology-oriented investment; CA= Customer agility; OS= organizations' sustainability. *** indicates $p < 0.001$.

Source. Authors' elaboration.

Additionally, table 3.5 shows that both the paths (TOI -> CA and CA->OS) are significant in SMEs samples (0.306; $p < 0.001$; 0.251; $p < 0.001$). The two paths are also significant in large firms' samples (0.480; $p < 0.001$; 0.410; $p < 0.001$). Further MGA result confirms the significant differences in the impact of technology-oriented technology on customer agility between larger firms and SMEs ($[df] = 0.175$; $p < 0.01$). Also, the customer agility effect on organizations' sustainability varies in different-size companies ($[df] = 0.160$; $p < 0.05$). Specifically, the the effect of technology-oriented investment on customer agility is significantly stronger in large firms than in SMEs. Also, there is a stronger influence of customer agility on organizations' sustainability in large companies than in SMEs. Thus, H1a and H2a are both supported.

Table 3.5. Evaluation of the firm size moderating effect

		SMEs		Large		Multi-Group Analysis	
		Path Coefficients	t-Value	Path Coefficients	t-Value	Path Coefficients [df]	P-Value
H1a	TOI ->CA	0.306	7.089***	0.480	10.497* **	0.175	0.006**
H2a	CA->OS	0.251	4.971***	0.410	9.362** *	0.160	0.017*

Note. TOI= Technology-oriented investment; CA= Customer agility; OS= organizations' sustainability. *** indicates $p < 0.001$.

Source. Authors' elaboration.

Table 3.6 presents that in China case, there are positive relationships between technology-oriented investment and customer agility, and between customer agility and organizations' sustainability (0.254; $p < 0.001$; 0.188; $p < 0.001$). Also, both the effect of technology-oriented investment on customer agility and the effect of customer agility on sustainability are significant in Singapore case (0.495; $p < 0.001$; 0.439; $P < 0.001$). The results of additional MGA in the inter-country context uncovers significantly stronger effects of technology-oriented investment on customer agility in Singapore than in China ([df] = 0.241; $p < 0.001$). And the customer agility impact on organizations' sustainability is stronger in Singapore than in China ([df] = 0.252; $p < 0.001$). Thus, H1b and H2b are supported.

Table 3.6. Evaluation of the country type moderating effect

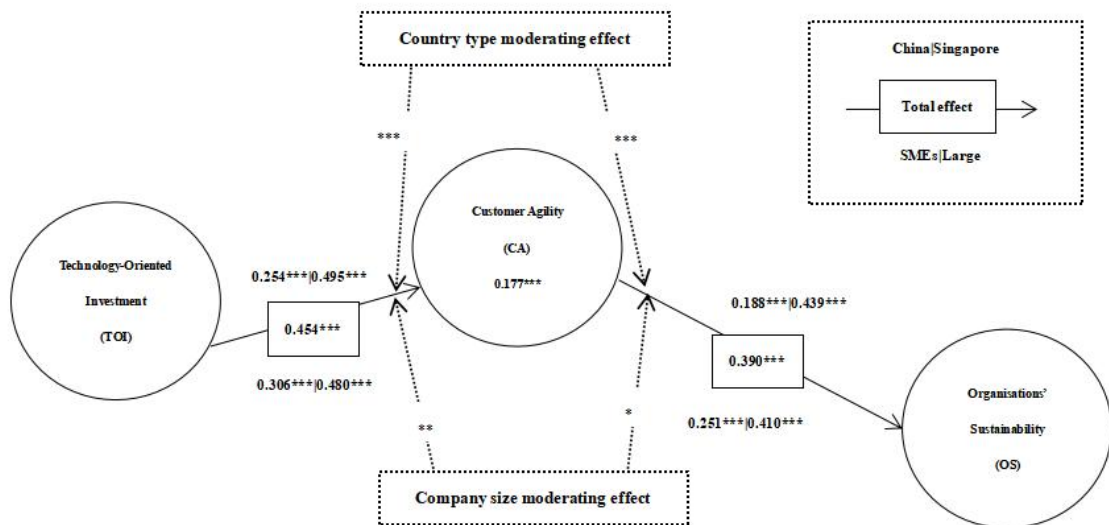
		China		Singapore		Multi-Group Analysis	
		Path Coefficients	t-Value	Path Coefficients	t-Value	Path Coefficients [df]	P-Value
H1b	TOI ->CA	0.254	5.048***	0.495	11.273***	0.241	0.000***
H2b	CA->OS	0.188	3.547***	0.439	10.724***	0.252	0.000***

Note. TOI= Technology-oriented investment; CA= Customer agility; OS= organizations' sustainability; MGA= multi-group analysis; df= path coefficient difference. *** indicates $p < 0.001$.

Source. Authors' elaboration.

Figure 3.2. gathers all the proposed hypotheses and the results of direct and indirect effects.

Figure 3.2. The results of direct and indirect effects



Note. *** indicates $p < 0.001$.

Source. Authors' elaboration.

3.5 Discussion

3.5.1 Theoretical implications

Firstly, the analysis contributes to the financial management discipline by confirming the positive impact of technology-oriented investment on customer agility. It enriches the agility literature through creating knowledge of the association of financial factors with dynamic capabilities. The research confirms the enabling role of technology-oriented investment in the customer agility implementation, extending the conclusions of Roberts and Grover (2012b), who claim that information technology infrastructure will facilitate customer agility. While not just information technology innovation, technology-oriented investment will cover other technology-related capabilities, such as big data capability, knowledge management, etc (Mandal, 2018; Mehdibeigi et al., 2016). We believe technology investment is not limited to the improvement of a single ability of a firm, but boosting the overall innovation ability.

Secondly, the survey data proves the positive effect of customer agility on organizations' sustainability, which extends previous findings of Goriwondo et al. (2013) and Rehman et al. (2020), who emphasize the customer agility role in organizations' performance. The analysis results contribute to filling in their gaps of lacking the effect of customer agility on sustainable performance. Sustainability is the long-term goal and key performance of an organization. The empirical discovery

contributes to the sustainability topics by capturing a new significant enabler for organizations' sustainability from the dynamic capabilities' perspective.

Thirdly, the confirmation of the mediating role of customer agility dramatically expands the current agility research, in which they mainly focus on the direct effect of a firm's agility (Li, 2020; Mihardjo and Rukmana, 2019). In this case, the technology-oriented investment will elevate the firms' sustainability by some dynamic capabilities, such as customer agility. The dual role (enabler and mediator) of customer agility in performance improvement is further amplified. Differentiating from the past literature focusing on the impact of a firm's agility on short-term performance, the study focuses on its contributions to the long-term goals.

Fourthly, the results of the firm size moderation role present the significant differences in the impact of technology-oriented investment on customer agility, and customer agility on organizations' sustainability between SMEs and larger enterprises. Particularly, the investigation data demonstrates that the effect of technology-oriented investment on customer agility is higher in larger companies than SMEs. Meanwhile, the impact of customer agility on organizations' sustainability in SMEs is weaker than in large rivals. Thus, the conclusions suggest that excavating their capital and talent advantages, large enterprises can more efficiently transform investment into innovation advantages and capability advantages, and finally forming the performance precedence. Our findings may differ from some SMEs literature (e.g., Mínguez-Vera and Martin, 2011; Rodríguez et al., 2020). But it provides more empirical evidence for the debates regarding the productivity paradox among SMEs and large firms.

Finally, as suggested, the inter-country analysis verifies the finding of the stronger influence in the relationship between technology-oriented investment in developed than developing economies. In developed countries, the comprehensive infrastructure and professional R&D team clear the obstacles for investment to be transformed into technological innovations (Raj et al., 2020). These technological innovations foster more competitive capabilities (Panda and Rath, 2018). Also, the research confirms the stronger effect of customer agility on sustainability in developed economies than developing. It implies that driving technology-oriented innovation, a more ideal sustainability could be achieved by a high-tech customer agility implementation in developed economies. Firms in developing countries, can't reach equivalent performance applying weaker customer agility through low-level investment.

3.5.2 Managerial implications

As the result of the technology investment role in customer agility suggests, managers in tourism organisations should develop a thoughtful investment plan to ensure the smooth achievement of the innovation transferring from investment. The focus of investment can be on improving the tech-related dynamic capabilities of the enterprises, such as customer agility in this study (Ren et al., 2022). Targeted investment can bring obvious returns. A reliable investment plan can assist companies reduce unnecessary losses and improve the success rate of investment (Voudouris et al., 2012).

Also, the results of the positive effect of customer agility on organizations' sustainability implies that customer agility practices should be paid special attention to in the process of achieving sustainable development goals. organizations can cultivate their customer agility to enhance firm performance and competitive activities (Roberts and Grover, 2012a). Generally, the prominent role of customer agility is not just reflected on the firms' short-term performance, but also on their sustainable performance. A tourism company, regardless of its scale, should attach importance to improvement in customer agility to achieve sustainable development.

Of course, the sustainability will also be affected by other factors. In this study, technology-oriented investment will affect organizations' sustainability by customer agility. It claims that managers could gain better sustainability in the customer agility implementations by more efficient investment in technology innovation. Managers should respect the role of financial strategies in the whole strategy (Ren et al., 2022). A good financial plan will cause a "domino" effect and revitalize the entire business.

Additionally, the success rate of investment and customer agility implementation effectiveness towards organizations' sustainability varies in different size firms. In the case of the impact of technology-oriented on organizations' customer agility improvement, large companies perform better than SMEs due to their stronger capital and talent reserves (Mcmahon, 2001). Also, the efficiency of SMEs in operating customer agility is lower than that of large competitors within the support of technology innovation resulting from the investment. Managers in SMEs could get some suggestions from the conclusions, that they should make some technology innovations to boost their customer agility efficiency based on their actual demands and limited budgets. A forward-looking financial plan is vital in the process of achieving sustainability because it will receive good returns by avoiding predictable risks .(Ren et al., 2022)

Also, the inter-country context changes the efficiency of technology-oriented investment and organizations' customer agility implementation towards their sustainability. The efficiency of investment is higher in developed countries than developing countries. With supports of more advanced technology infrastructure in developed economies, organizations avoid plenty of redundant costs (e.g., technical equipment upgrades outside the company). They just need to concentrate resources on the firm-level technical innovation. Thus, the findings remind policy makers and corporate leaders in developing countries, to keep vitality of SMEs, should make top-level design for their investment policy in technology infrastructure construction. organizations in a developed economy normally implement their customer agility more effectively than ones in a developing economy due to more professional executive team (Michailova and Ott, 2019). SMEs in developed countries, even they are limited with capitals, could cooperate with the domestic high-tech enterprises to finish innovation. While SMEs and large firms in developing countries, if they want to gain sustainability by their capabilities' implementations, need to boost their credibility and popularity because investment, especially foreign direct investment (FDI), is determined by the trust among investors and investees.

3.6 Conclusion

This study provides both theoretical and practical contributions. The research closes the gap in lacking analysis of the direct effect of technology-oriented investment on customer agility and the role of customer agility in driving organizations' sustainability. Also, the mediating role of customer agility in the investment-sustainability relationship is confirmed. Additionally, the effects of technology-oriented investment on customer agility in both large firms and SMEs samples are significant. But there is a stronger impact effect of technology-oriented investment on customer agility in large companies than in SMEs. The impacts of customer agility on sustainability in both large firms and SMEs samples are significant. But the effect is significantly stronger in large firms than in SMEs. The research also uncovers the moderating role of country type in the investment-customer agility relationship and the customer agility-sustainability relationship. Specifically, the effect of technology-oriented investment on customer agility is stronger in developed economies than in developing economies. And the customer agility impact on organizations' sustainability is stronger in developed than developing countries.

The chapter contributes to financial management by emphasizing the prominent role of technology-oriented investment in enabling customer agility. Also, the research offers extra contributions to the sustainability issue based on the exploration

of customer agility role in the firms' sustainable development. The investigation also contributes to expand the agility research by confirming the mediating role of customer agility in the investment-sustainability relationship. The results also subvert some past findings regarding SMEs and provide more evidence to support the achieved better sustainability by customer agility implementations within more attractive technology investment. Also, the analysis consolidates the prior conclusions of the inter-country analysis, that the customer agility effectiveness will be better reached in developed countries than developing.

From the practical implications, managers in tourism organizations should design a balanced investment strategy to maximize their customer agility efficiency. To achieve sustainability in the tourism, tourism organizations should actively implement the customer agility activities with the support of technology innovation. Also, SMEs should pay special attention to creating their innovation-related capabilities transferring from the limited budgets based on a reasonable plan. In developing economies, policy makers should make the preferential laws to attract external capital for the better technology infrastructure improvement.

Conclusions

Conclusions

This research outlines a systematic framework for investigating customer agility research through three progressive chapters. Specifically, the study confirms four novel constructs - customer-firm interactions, big data processing capability, enterprise risk management and technology-oriented investment - as antecedents to customer agility. Current antecedent factors related to customer agility are primarily concentrated on organizational information technology-related constructs, such as information management structure, artificial intelligence assessment and knowledge management. Nevertheless, certain crucial determinants of customer agility have been neglected in prior research. This research bridges this gap by identifying several elements closely linked to customer sensing and responding capabilities.

Enterprises depend on two primary channels, customer-firm interactions and big data processing capability, to gather market data. Customer-firm interactions pertain to obtaining direct feedback from consumers, while big data processing capability pertains to acquiring second-hand consumer information sourced from the internet, such as online reviews (Cambra-Fierro et al., 2018; Dubey et al., 2018). An enterprise's perception and judgments of the market tend to become more robust and precise as it can collect greater amounts of external information (Mandal, 2018). Furthermore, an enterprise with superior data processing competence is less likely to misjudge market fluctuations, evade strategic errors and capitalize on market opportunities (Mikalef et al., 2018).

Enterprise risk management is a crucial aspect that underpins corporate strategy formulation and business operations. Prior research has revealed the positive influence of enterprise risk management on an enterprise's dynamic capabilities (e.g., Teoh et al., 2017; Wong et al., 2022). One of these essential capabilities is customer agility, to which this study contributes new empirical evidence that bolsters prior findings. A company with robust risk management capability possesses superior resistance and avoidance ability against risks, enabling it to be proactive in recognizing external market fluctuations (Oyewo, 2022). As risk management competency improves, concurrent enhancement in market insight and response capacity enhances a company's ability to perceive and deal with threats originating from alterations in consumer demand or characteristics.

This research addresses a noteworthy knowledge gap regarding the impact of financial factors on enhancing customer agility. Investment is an integral aspect of augmenting dynamic capabilities within an enterprise (Mayadunne and Park, 2016).

Dynamic capabilities, such as customer agility, that directly influence organizational performance necessitate targeted resource allocation, often culminating in significant enhancements in these dynamic capabilities. Investment enables companies to establish hardware facilities that relate to consumer information perception and data processing while also providing the budget to hire specialized professionals to optimize team structures that promote customer agility. Adequate budget allocation guarantees trial and error opportunities for implementing customer agility. In summary, technology-oriented investments fortify support mechanisms facilitating improvement in customer agility.

Few research has been conducted on the impact of customer agility concerning an enterprise's long-term performance. This research addresses this crucial knowledge gap by shedding light on the pivotal role of customer agility in ensuring organizational sustainability. In the modern business environment, sustainability has emerged as a critical developmental objective for enterprises. Many businesses have elevated sustainability to a strategic goal (El-Khalil and Mezher, 2020; Goriwondo et al., 2013). The findings of this study provide valuable insights for enterprises aiming for sustained success. Cultivating dynamic capabilities such as customer agility can serve as a starting point in achieving sustainability.

This thesis also fills the gap in the lack of gender issues in customer agility research. Distinct disparities exist between managers of various genders in their interpretation and reaction to the market, which can be attributed to their inherent peculiarity in personality traits, education, and professional experience (Butkouskaya et al., 2020a). These variations are likewise mirrored in their managerial modes and strategic resolutions concerning the company. Moreover, the contrasting cognitive capacities and decision-making proclivity between male and female managers play a crucial role in determining the allocation of enterprise resources for fostering customer agility.

The study employs group comparison to investigate the managerial implications of customer agility for small and medium-sized enterprises (SMEs) and large enterprises. Results show that significant disparities exist in the customer agility level between the two, with larger enterprises displaying stronger customer agility than SMEs (Eikelenboom and De Jong, 2019; Garcia-Morales et al., 2007). To bridge this gap and gain a competitive edge, SMEs should channel their limited resources toward enhancing consumer perception and response. Large enterprises, on the other hand, should maintain their existing capabilities while keeping seeking innovative opportunities. Moreover, SMEs and large enterprises espouse divergent views

regarding the concept of sustainability. While the former prioritizes regional competitiveness and mere survival, the latter is inclined towards maintaining industry dominance and monopoly. Accordingly, furnishing sustainable strategies commensurate with current capacities and desired goals constitutes a crucial concern for both SMEs and large enterprises.

Also, this study presents a global model that offers insights for companies operating in both developed and developing economies. Notably, customer agility plays a pivotal role in enterprise development for enterprises in both economies, albeit with differing emphases. Developed economy enterprises have the privilege of abundant human resources and funding budgets, thereby enabling them to allocate financial resources across multiple factors that significantly enhance customer agility. Conversely, developing economy enterprises, which are perceived as less attractive to foreign investment, should judiciously use their limited funds to target specific factors for customer agility enhancement. In light of this, companies in developing economies should perform more comprehensive program evaluations and design more detailed implementation plans to successfully implement customer agility strategies.

Furthermore, the research represents a pioneering effort in introducing customer agility as a dynamic capability centered around consumers in the tourism industry. The findings substantiate the applicability of the concept of customer agility across various industries. Given the volatile nature of the global tourism market since the onset of the COVID-19 pandemic, competition within the industry has intensified. Against this backdrop, tourism organizations should prioritize the importance of customer agility to maintain their competitiveness and ensure sustainable development.

While the present study is conducted in the context of tourism, its findings are not limited to the tourism industry alone. Rather, other consumer-oriented service industries, such as catering and transportation, can also draw valuable insights from our research outcomes. These industries share similarities with tourism regarding management models, corporate structure, and consumer base, making the applicability of the findings more robust and far-reaching.

Limitations and Future Research Lines

Despite its contributions, this research also has several limitations that warrant consideration. Firstly, the study employs an online questionnaire as its primary data collection method, which may lead to respondents' misinterpretation of the meaning of some items despite identity screening and other measures. Secondly, the analysis

relies on a limited number of respondents, indicating a need for future studies with larger sample sizes to enhance the model's accuracy. Thirdly, while this thesis incorporates gender, firm size, and country type as moderators in the customer agility model, additional moderators such as entrepreneurship policies and networking opportunities (Butkouskaya and Llonch Andreu, 2021) could be included for further analysis. Moreover, since this study only focuses on the tourism industry, validation of the model's applicability to other industries is necessary for generalizability. Lastly, as CA shares similar attributes with other forms of agility, such as strategic agility and supply chain agility, future research is needed to confirm the conclusions' applicability in these related fields.

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Appendix

Appendix A. Reliability and convergent validity tests of variables

(Chapter 1)

Variables	Items	Loadings
Big Data Processing Capability (BDPC) (Huang et al., 2014; Mikalef et al., 2018)		
$\alpha=0.984$; C.R.= 0.986; AVE=0.924		
ORPC1	We have an online platform of providing online tourism services and products.	0.990
ORPC2	Our leaders understand the importance of big data.	0.947
ORPC3	We have an independent big data management department or a dedicated team to handle online customer-generated content.	0.953
ORPC4	Our leaders rely heavily on big data to make decisions.	0.945
ORPC5	Our current technical team is relatively stable and mature.	0.968
ORPC6	Our data processing ability is stronger than the competitors.	0.964
Customer-Firm interactions (CFI) (Mills and Margulies, 1980; Saurabh and Anat, 2016)		
$\alpha=0.976$; C.R.= 0.982; AVE=0.932		
CFI1	Consumers actively share their company's tourism products and services on the online platform.	0.986
CFI2	We will respond quickly to customers' negative feedback on the company's tourism products and services.	0.959
CFI3	The communication channels between the company and our customers are not limited to fixed trading platforms, but also include other forms such as online social platforms.	0.959
CFI4	We will have some employees responsible for the communication with consumers every day.	0.958
Customer Agility (CA) (Roberts and Grover, 2012, 2012b)		
$\alpha=0.990$; C.R.= 0.991; AVE=0.915		
CA1	We continuously try to discover additional needs of our customers of which they are unaware.	0.958
CA2	We extrapolate key trends to gain insight into what users in a current market will need in the future.	0.958
CA3	We continuously try to anticipate our customers' needs even before they are aware of them.	0.954
CA4	We attempt to develop new ways of looking at customers and their needs.	0.958
CA5	We sense our customers' needs even before they are aware of them.	0.957
CA6	We respond rapidly if something important happens concerning our customers.	0.954
CA7	We quickly implement our planned activities concerning	0.955

	customers.	
CA8	We quickly react to fundamental changes concerning our customers.	0.953
CA9	When we identify a new customer need, we are quick to respond to it.	0.959
CA10	We are fast to respond to changes in our customers' product or service needs.	0.961
Organizational sustainability (OS) (Kocmanová and Dočekalová, 2011; Rai, 2021) $\alpha=0.980$; C.R.= 0.984; AVE=0.926		
OS1	Our performance has achieved sustainable growth (economic sustainability)	0.967
OS2	We remain good customer satisfaction during and since the epidemic (economic sustainability)	0.962
OS3	We have increased the investment to respond the environmental changes (environmental sustainability)	0.964
OS4	We improve our innovation ability to adapt to the effects of environmental changes (environmental sustainability)	0.956
OS5	We focus on job creation for local and economically, affected society (social sustainability)	0.960

Note. α =Cronbach's alpha value; C.R. = Composite Reliability; AVE=Average Variance Extracted.

Source. Authors' elaboration.

Appendix B. Reliability and convergent validity tests of variables

(Chapter 2)

Variable	Items	Loadings
Enterprise Risk Management (ERM) (Bromiley et al., 2015; Hopkin, 2018)		
$\alpha=0.979$; C.R.= 0.984; AVE=0.923		
RMQ1	We can timely predict the possible risks in an uncertain context.	0.961
RMQ2	We can properly control the risks already facing.	0.968
RMQ3	We have a complete set of scientific, systematic procedures and rules to assess and address risks.	0.961
RMQ4	Our corporate risk response is often efficient and timely.	0.962
RMQ5	We can handle the risk at a smaller cost.	0.952
Customer Agility (CA) (Roberts and Grover; 2012a)		
$\alpha=0.990$; C.R.= 0.991; AVE=0.915		
CA1	We continuously try to discover additional needs of our customers of which they are unaware.	0.958
CA2	We extrapolate key trends to gain insight into what users in a current market will need in the future.	0.958
CA3	We continuously try to anticipate our customers' needs even before they are aware of them.	0.954
CA4	We attempt to develop new ways of looking at customers and their needs.	0.958
CA5	We sense our customers' needs even before they are aware of them.	0.957
CA6	We respond rapidly if something important happens concerning our customers.	0.954
CA7	We quickly implement our planned activities concerning customers.	0.955
CA8	We quickly react to fundamental changes concerning our customers.	0.953
CA9	When we identify a new customer need, we are quick to respond to it.	0.959
CA10	We are fast to respond to changes in our customers' product or service needs.	0.961
Organization's Sustainability (OS) (Dwyer et al., 2009; Sharpley, 2003)		
$\alpha=0.980$; C.R.= 0.984; AVE=0.926		
OS1	Our performance has achieved sustained growth (economic sustainability)	0.967
OS2	We remain competitive during and since the epidemic (economic sustainability)	0.962
OS3	Environmental changes, especially COVID-19, have not brought sustained losses to the company (environmental sustainability)	0.964
OS4	We have been able to adapt to the effects of environmental changes over the long term (environmental sustainability)	0.956

OS5	During the epidemic period, we have earnestly fulfilled our corporate social responsibility and actively rewarded and helped the community (social sustainability)	0.960
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Source. Authors' elaboration.

Appendix C. Reliability and convergent validity tests of variables (Chapter 3)

Variables	Items	Loadings	α	CR	AVE
Technology-oriented investment (TOI) (Darma, 2004; R et al., 1997)					
TOI1	We have a special technology investment plan every year.	0.968			
TOI2	Technology investment accounts for a large proportion of our total investment.	0.957			
TOI3	Our technical budget is not only used for technical hardware costs but also includes the cost of software, technical personnel training costs, and the cost of supporting IT user services.	0.954			
TOI4	Technology investment helps us to shorten the decision-making time and improve the efficiency of business processing.	0.955			
TOI5	Technology investment helps us improve our perception of the changing market environment and changing consumer demand.	0.959			
TOI6	Technology investment has helped us to enhance the industry's competitiveness.	0.942			
Customer agility (CA) (Roberts and Grover; 2012a; Roberts and Grover, 2012b)					
CA1	We continuously try to discover additional needs of our customers of which they are unaware.	0.915			
CA2	We extrapolate key trends to gain insight into what users in	0.911			

	a current market will need in the future.			
CA3	We continuously try to anticipate our customers' needs even before they are aware of them.	0.912		
CA4	We attempt to develop new ways of looking at customers and their needs.	0.912		
CA5	We sense our customers' needs even before they are aware of them.	0.906		
CA6	We respond rapidly if something important happens concerning our customers.	0.922		
CA7	We quickly implement our planned activities concerning customers.	0.921		
CA8	We quickly react to fundamental changes concerning our customers.	0.922		
CA9	When we identify a new customer need, we are quick to respond to it.	0.934		
CA10	We are fast to respond to changes in our customers' product or service needs.	0.930		
	organizations' sustainability (OS) (Dwyer et al., 2009; Sharpley, 2003)	0.980	0.983	0.922
OS1	Our performance has achieved sustained growth (economic sustainability)	0.969		
OS2	We remain competitive during and since the epidemic (economic sustainability)	0.962		
OS3	Environmental changes, have not brought sustained losses to the company (environmental sustainability)	0.965		
OS4	We have been able to adapt to the effects of environmental changes over the long term (environmental sustainability)	0.958		
OS5	We have earnestly fulfilled	0.961		

our corporate social
responsibility and actively
rewarded and helped the
community (social
sustainability)

Note. α =Cronbach's alpha value; CR= Composite Reliability; AVE=Average Variance Extracted.

Source. Authors' elaboration.
