Lisbon School of Economics & Management
Universidade de Lisboa

MASTER

MANAGEMENT AND INDUSTRIAL STRATEGY

MASTER´S FINAL WORK

DISSERTATION

SERVITIZATION IN THE MANUFACTURING INDUSTRY IN PORTUGAL: ANTECEDENTS AND INNOVATION OUTCOMES

INAARA AMIN DAÚDO VALI

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SUPERVISION:

PROFESSOR NUNO FERNANDES CRESPO

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Abstract

Servitization, typically understood as the shift from selling products to offering an integrated combination of products and services, has become a growing trend within manufacturing firms. This phenomenon, studied since the past century, has gained significant interest and it can be explored across various fields. Based on institutional theory and resource-based view, this master's final work investigates the adoption of servitization strategies within the Portuguese manufacturing industry. This investigation choice is justified by the increasing relevance of servitization. While the existing literature addresses the impact of servitization on business performance, there is limited research exploring its antecedents and broader implications for firms' innovation performance. To address these gaps, a quantitative research methodology was employed, with the aim of: i) understanding the role of competitive intensity and market turbulence as antecedents of servitization and business model innovation, and ii) exploring how these strategies, in turn, influence firms' product and service innovation performance. The hypotheses for this study were tested using responses from 372 manufacturing firms, collected through an online questionnaire. The results provide empirical support to the study's hypotheses, confirming the majority of the proposed research hypotheses. The findings reveal that market turbulence significantly drives both servitization and business model innovation, while competitive intensity primarily influences business model innovation. Additionally, the results show that servitization positively impacts product and service innovation performance, with business model innovation playing a crucial role in enhancing these outcomes. Given the increasing relevance of servitization in recent decades, this research contributes to the literature by providing novel insights that bridge this strategy with business model innovation.

Keywords: Servitization; Manufacturing firms; Business Model Innovation; Service Innovation Performance; Product Innovation Performance.

Resumo

A servitização, normalmente entendida como a passagem da venda de produtos para a oferta de uma combinação integrada de produtos e serviços, tornou-se uma tendência crescente nas empresas industriais. Este fenómeno, estudado desde o século passado, tem ganho um interesse significativo e pode ser explorado em vários campos. Com base na teoria institucional e na visão baseada nos recursos, este trabalho final de mestrado investiga a adoção de estratégias de servitização na indústria transformadora portuguesa. Esta escolha de investigação justifica-se pela crescente relevância da servitização. Embora a literatura existente aborde o impacto da servitização no desempenho das empresas, existe pouca investigação que explore os seus antecedentes e as implicações mais amplas para o desempenho inovador das empresas. Para colmatar estas lacunas, foi utilizada uma metodologia de investigação quantitativa, com o objetivo de: i) compreender o papel da intensidade competitiva e da turbulência do mercado como antecedentes da servitização e da inovação do modelo de negócio, e ii) explorar a forma como estas estratégias, por sua vez, influenciam o desempenho da inovação de produtos e serviços das empresas. As hipóteses deste estudo foram testadas utilizando respostas de 372 empresas industriais, recolhidas através de um questionário *online*. Os resultados fornecem suporte empírico para as hipóteses do estudo, confirmando a maioria das hipóteses de investigação propostas. Os resultados revelam que a turbulência do mercado impulsiona significativamente tanto a servitização como a inovação do modelo empresarial, enquanto a intensidade competitiva influencia principalmente a inovação do modelo empresarial. Além disso, os resultados mostram que a servitização tem um impacto positivo no desempenho da inovação de produtos e serviços, com a inovação do modelo de negócio a desempenhar um papel crucial na melhoria destes resultados. Dada a crescente relevância da servitização nas últimas décadas, esta investigação contribui para a literatura ao fornecer novas perspetivas que ligam esta estratégia à inovação do modelo de negócio.

Palavras-chave: Servitização; Empresas industriais; Inovação do modelo de negócio; Desemprenho da inovação de serviços; Desempenho da inovação de produtos.

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List of Abbreviations and Acronyms

AVE – Average Variance Extracted
BMI – Business Model Innovation
PSS – Product-Service System
RBV – Resource-based view
RQ – Research Question
SPSS – Statistical Package for the Social Sciences
VIF – Variation Inflation Factors

1. Introduction

The boundaries between manufacturing and service firms are increasingly dissolving worldwide, with many manufacturing firms now competing through a portfolio of integrated products and services rather than products alone (Baines & Lightfoot, 2013; Sousa & da Silveira, 2017). This shift represents a service-led competitive strategy, commonly referred to as servitization (Franco, 2020).

In recent years, servitization has emerged as a crucial strategic approach for manufacturing firms seeking to maintain a competitive advantage in the evolving business landscape. Initially introduced as a way for firms to differentiate themselves through integrated product-service offerings, servitization has now become a key driver of innovation and long-term competitiveness (Baines *et al*., 2009; Visnjic *et al*., 2016). As markets become more volatile and competitive pressures intensify, manufacturers are compelled to innovate not only through products but also by transforming their business models to incorporate services.

While the existing literature emphasizes the positive impact of servitization on business performance, particularly through service innovation, there remains a gap in understanding its antecedents (Leocádio *et al*., 2024). Specifically, the role of external factors such as competitive intensity and market turbulence in driving internal business model innovation has not been fully explored. This external forces often influence manufacturing firms' strategic direction, compelling them to innovate and adapt through servitization to sustain their competitive advantage (Teece, 2010). Yet, the extent to which these factors drive servitization and subsequently impact innovation performance requires deeper investigation (Tavassoli & Bengtsson, 2018).

Therefore, the objectives that will guide this study are as follows: i) to study and understand the relevance of competitive intensity and market turbulence as key drivers of servitization and business model innovation, and ii) to explore how these strategies, in turn, influence firms' product and service innovation performance. The first objective is grounded in institutional theory, while the second draws on the resource-based view as its theoretical foundation.

To conduct this exploratory study, a quantitative research methodology was employed, through the application of a questionnaire. The questionnaire, sent to 8.627 Portuguese manufacturing firms, yielded 372 valid responses, which constitute the final sample.

Our findings offer several key insights. While no significant evidence was found linking competitive intensity directly to servitization, it was shown to be positively related to business model innovation. Conversely, market turbulence was found to be a driver for both servitization and business model innovation. Additionally, servitization was shown to positively influence innovation outcomes, enhancing both product and service innovation performance, with business model innovation playing a key role in this process.

As a contribution to the literature, this study explores the relationship between servitization and business model innovation, demonstrating how servitization drives significant shifts in business models to support integrated product-service offerings, positioning it among the first studies assessing this relationship.

This study is structured into 7 chapters. The first of which corresponds to this introduction. The Chapter 2 concerns the Literature Review, in which the main concepts will be deepened. The Chapter 3 is dedicated to the Conceptual Model and Research Hypotheses that will serve as the basis of our empirical research. Posteriorly, in the Chapter 4, the Research Methodology is presented. In the following chapter, Chapter 5, Data Analysis and Results will be addressed, followed by the Chapter 6 that correspond to the Discussion of the Findings. Lastly, in Chapter 7, the conclusions, as well as the theoretical and empirical implications and the limitations of this study are advanced.

2. Literature Review

This literature review aims to provide the reader with a theoretical framework on the subject under research. The first section will address the concept, characterization, and implementation of servitization. Subsequently, the relationship between servitization and innovation will be discussed. Next, given its interplay with servitization, the concept and foundations of business model innovation will also be explored. Finally, the theoretical foundations for this research will be articulated.

2.1. Servitization

2.1.1. Characterization of Servitization

The concept of servitization has been constantly developing over the last decades (Baines *et al*., 2017). The first references to servitization appeared in the late

1980s when Vandermerwe & Rada (1988) defined this term as the increased offering of market packages or bundles of customer-focused combinations of goods, services, support, self-service, and knowledge aiming at adding value to their core product offerings and, thereby, sustain a competitive advantage. Decades later, Neely (2008) expanded the concept, suggesting that servitization involves innovating an organization's capabilities and processes in the sense that, rather than merely offering products, the organization can provide customers with complete product-service systems to better create value. According to Roos (2013), servitization can be understood as all service-related activities offered by a manufacturing firm, as long as these activities are linked to the products produced by the firm. This means that without the manufactured product, the associated services would not exist.

Manufacturers typically begin their servitization journey by offering basic services that are closely linked to their products (Oliva & Kallenberg, 2003). Vaittinen, *et al.,* (2018), refer that some types of such services include warranties, spare parts, repairs, and maintenance. Simply put and in line with Baines *et al*. (2009), servitization can be understood as a shift from selling products to selling an integrated combination of products and services that deliver value in use.

The existing literature is nearly unanimous in suggesting manufacturers to integrate services into their core product offerings (Gadiesh & Gilbert, 1998; Quinn *et al*., 1990; Wise & Baumgartner, 1999, Oliva & Kallenberg, 2003).

Over time, the activities involved in value creation for companies have evolved significantly (Spring & Araujo, 2009). While in the past the potential value added was centred on production activities, today the potential for value creation is shifting towards the pre- and post-production phases of manufacturing companies (Fischer *et al*. 2012). This shift from production-centred value creation to an emphasis on pre- and post-sales activities is strongly influenced by technological advancements. These advancements have enabled the migration of production activities to lower-cost jurisdictions, resulting in a global trade landscape dominated by intermediate goods.
The existing literature made it clear that the contribution of manufacturing has been declining, while the importance of services has been increasing in developed countries (Acemoglu & Guerrieri, 2008; Crozet & Milet, 2017; Vendrell-Herrero & Wilson, 2017). In today's evolving business environment, characterized by market turbulence and competitive intensity, levering the role of services emerges as a distinct and favourable

strategic option for manufacturers, enabling them to sustain stable value creation and address competitive pressures (Roos, 2013; Kowalkowski *et al.*, 2017; Raddats et al., 2019).

2.1.2. Implementation of Servitization

As it has been analysed, servitization is seen as a process of transition from a pure product business model to a Product-Service System (PSS) business model. By its turn a PSS is defined as a combination of "tangible products and intangible services" that jointly can fulfil specific customer needs (Tukker, 2004, p. 246).

As shown in Figure 2, there are three main categories of PSS (Tukker, 2004): product oriented, use oriented and result oriented services.

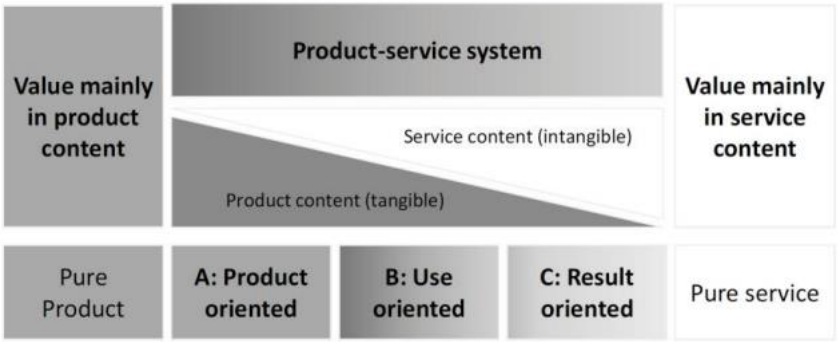

***Figure 1**: Main categories of PSS*

Source: Kryvinska *et al*. (2014)

In the first main category, product-oriented services, the primary focus of the business strategy is still on product sales, but some extra services are included. Within this category we can find two types of more specific PSS types:

- *Product-related service:* in this type of PSS, apart from selling a product, the provider also offers services that are needed during the use phase of the product. A maintenance contract, a financing scheme and the supply of consumables are examples of services that might be offered under this category (Tukker, 2004; Carvalho, 2021).
- *Advice and consultancy:* in this category, apart from the product sold, the provider offers advice related to the product's most efficient use (Mastrogiacomo *et al.*, 2019).

The use-oriented category is illustrated by still having a great focus on products, but the business strategy is not about selling these products. In this model, the product

remains under the ownership of the provider and it is made available in a different form, and sometimes shared by several users. Here we can find another three subtypes of PSS:

- *Product lease:* In the leasing model, the provider has the ownership of the product, being responsible for its maintenance, repair and control. Clients (the lessees) pay a fee for the use of the product and they normally have unlimited and individual access to the leased product (Sharma & Singh, 2017).
- *Product renting or sharing:* This model works in a similar way as the product leasing. The main difference is that the user does not have unlimited and individual access to the product. This means that other clients can use the same product, at different times (Steunebrink, 2012).
- *Product pooling:* This is similar to a product renting or sharing. The difference is that in product pooling there is a simultaneous use of the product (Steunebrink, 2012).

In the last main category, there is an agreement between provider and client on a result and no predetermined product is involved. Also, three subtypes of PSS can be found under this category:

- *Activity management/outsourcing:* In this category a part of an activity of a company is outsourced to a third party. To secure the quality of the outsourced service, performance indicators are established in the contract (Tukker, 2004).
- *Pay per service unit:* Here, the system still has a product as the basis, but the user only buys the output of the product according to the level of use, and not the product itself. A clear example of this is the print of documents by copier producers. In this example, the client only pays for his impressions and the provider takes over all activities that are needed to keep a copying function (paper and toner supply and maintenance) (Sharma & Singh, 2017).
- *Functional result:* In this model, the provider agrees with the client the delivery of a result. In contrast to activity management/outsourcing, here the provider is completely free to define how to deliver the result

(Steunebrink, 2012). Therefore, the product is secondary because what matters is the final result (Carvalho, 2021).

As Tukker (2004) refers, from the first to the last of these eight types of PSS, the reliance on the product as the core component of the PSS decreases.

Focusing on other dimension, some researchers, including Zhang *et al*. (2023), proposed two types of servitization, embedded and hybrid. This classification is based on the product relatedness and the degree of integration in the value chain, which indicate the extent to which a manufacturer's service offerings link to its core manufacturing products. Embedded servitization entails value-added services built around the core products and embedded in the production value chain. In contrast, hybrid servitization is defined as services developed by manufacturers to obtain extra operating income without any strategic matching relationship with a company's main products.

Despite the existing literature being practically unanimous in suggesting manufacturers to become service providers, this shift has been relatively slow (VDMA, 1998) and manufacturers continue to face substantial challenges in fully adopting service-oriented business models (Baines *et al.*, 2009; Crozet & Milet, 2017; Moreno *et al.*, 2020).

Oliva & Kallenberg (2003) state that three successive hurdles are identified in making this transition. First, manufacturers might not believe in the economic potential of the service component for their product, as it was highlighted by interviewees from Oliva & Kallenberg (2003, p. 161) research: "It is difficult for an engineer who has designed a multi-million-dollar piece of equipment to get excited about a contract worth $10,000 for cleaning it." Then, even if a manufacturer realizes the service market potential, it may think that providing services is outside the scope of its competencies. Lastly, a manufacturer might realize the service market potential, decide to enter that market, but fail in deploying a successful service strategy.

Moreover, some studies have shown that servitization might result in short-term performance sacrifices for longer-term performance benefits (Visnjic *et al*., 2016). This phenomenon is defined as service paradox (Gebauer *et al*., 2005). This paradox emerges when companies struggle to capitalize on the financial benefits of an extended service offering. This challenge is commonly experienced by product manufacturers: they invest in broadening their service offerings, often incurring higher

costs, but this does not result in correspondingly higher returns. Consequently, due to the increase in costs and the lack of corresponding returns, the growth in service revenue fails to meet its expected objectives (Gebauer *et al*., 2005). The service paradox reflects several implementation difficulties ranging from the lack of support by the top management, shortcomings in organizational design and cultural coordination, to a lack of capabilities in service management (Gebauer *et al*., 2012; Neely, 2008; Kastalli & Van Looy, 2013; Feng *et al.,* 2021).

Several authors (Eloranta & Turunen, 2016; Story *et al*., 2017; Martinez *et al.,* 2017) highlight that delivering services requires different operational processes, capabilities, platforms, and resource combinations that differ from those commonly used to deliver products. Bearing this in mind, it is made clear that one of the key challenges for manufacturers firms is managing the transition to services.

Service-driven transformation involves reconfiguring key elements of the product-service offering, developing a new proposition process, refining sales and delivery processes, and optimizing the value network (Martinez *et al.,* 2017). According to Foss & Saebi (2015), such process involves altering the set of activities (“reactivating”), adjusting the linkages between activities (“relinking”), redefining the firm's boundaries (“repartitioning”) or changing the location where activities are performed (“relocating”).

Organizations need change for servitization to be established and therefore a shift in management perspective is required to allow the transition to servitization (Barnett *et al*., 2013). Avlonitis *et al.* (2014) refer that key levers to succeed in servitization include setting the strategic direction, developing service design and delivery capabilities, adjusting organizational design and establishing a service culture. From making the necessary investments to develop and implement services, to changing the mind-set and capabilities of the organisation, manufacturers face a stream of both short- and long-term challenges until they are able to achieve the desired servitization outcome.

Firms traditionally having a product focus face challenges related to the relationship between the development and sales of products and services. This is because increasing service quality can lead to decreasing product sales, while increasing product quality may cause the customers to seek services less frequently (Avlonitis *et al.*, 2014).

In accordance with Zhang *et al*. (2017), the challenges of servitization can be summarize into five categories: organizational structure, business model, development process, customer management and risk management. Organisational structure refers to the formal allocation of job functions and the adoption of management mechanisms to control internal activities and support the implementation of business strategy within an organization (Burgelman & Doz, 2001). In servitization research, the focus of organizational literature is on restructuring internal structures to support business transformation, particularly due to the altered value creation process where value is delivered through a combination of product-service offerings (Zhang *et al*., 2017). The business model serves as the basis of every organization, summarizing the fundamental business logic of how a company generates, evolves, and delivers value propositions to its customers (Shafer, *et al*., 2005). Modifying the business model in servitized organisations has gathered considerable attention, as many changes are required to integrate a service strategy (Tukker, 2015). As servitized offerings merge services and products, an integrated development process for both becomes imperative for servitized companies. Many scholars (e.g., Alghisi & Saccani, 2015; Baines *et al*., 2009; Kowalkowski *et al.*, 2015), emphasise that reconstructing an innovative development process for a servitized offering is a top priority as the existing processes are not adequate. Given that servitization research originated in the industrial sector, business customers in the B2B context are the main focus. The existing literature identified several challenges related to the management of customer relationship because buying “solutions” is a relatively new concept to business customers (Zhang *et al*., 2017). Risk management has attracted increasing attention in servitization research as researchers have recognized that manufacturers who adopt service strategies are exposed to various types of risks, ranging from financial and operational risks to external factors impacting the business landscape (Benedettini *et al*., 2015; Gebauer *et al*., 2005; Mo, 2012).

2.1.3 Servitization and innovation

As servitization reflects a shift from product development and sales to services innovation and delivery (Oliva & Kallenberg, 2003), innovation is an important underlying concept in this context.

Servitization itself has been characterized as a new form of business model innovation (BMI) for manufacturers (Vendrell-Herrero *et al*., 2023). Delivering services requires different processes, capabilities and resources than those used to deliver products (Story *et al*., 2017 and Eloranta & Turunen, 2016). This shift drives manufacturers to innovate in how they deliver value to customers, creating the need for the development of new business models that prioritize long-term customer relationships and continuous value creation over one-time product sales (Vendrell-Herrero *et al*., 2023).

Empirical studies have provided strong support for the positive relationship between servitization and innovation. Kastalli & Looy (2013) found that firms engaging in servitization reported higher levels of innovation performance compared to those focusing solely on product sales. Similarly, Martín-Peña *et al.* (2023) observed that developing and providing integrated product–service offerings enhance product innovation and differentiation.

In conclusion, servitization acts as a mechanism that unlocks innovation (Zhang *et al.,* 2016) and the relationship between servitization and innovation is evident across various dimensions of business operations.

2.2. Business Model Innovation

The concept of Business Model Innovation (BMI) has gained significant attention in the literature due to its critical role in sustaining firms' competitive advantage. BMI enables companies to effectively adapt to rapidly changing market conditions, helping them not only survive but also thrive in a volatile business environment (Huang & Ichikohji, 2023). It can be defined as the process of designing a new or modifying an existing activity system within the firm (Amit & Zott, 2010) or as "the discovery of a fundamentally different business model in an existing business" (Markides, 2006, p.20). In other words, BMI refers to the process by which a company creates and captures value through innovative changes to key elements or the overall architecture of its business model (Bucherer *et al.,* 2012).

Since the value proposition of a business model is strongly shaped by the products and services offered, product, services or process innovations can lead to BMI. However, BMI encompasses more than just these traditional forms of innovation, as it involves broader reconfigurations or complementary changes in how a company

restructures its business. When successfully implemented, BMI can provide a long-term competitive advantage that extends beyond improvements in individual products, services or processes (Bucherer *et al.,* 2012).

Amit & Xott (2012) categorize BMI into three types: Content BMI, which involves adding novel activities such as forward or backward integration; Structure BMI, which refers to linking activities in innovative ways; and Governance BMI, which entails altering the parties responsible for performing various activities.

In today's rapidly evolving business environment, BMI has emerged as a crucial element of corporate strategy for achieving long-term success. However, its implementation presents a range of challenges that organizations must address. Christensen *et al*. (2016), identify four primary categories of constraints related to BMI: organizational challenges, market challenges, business challenges and strategic challenges. Organizational challenges include issues such as resistance to change, insufficient resources, and coordination problems. Market challenges encompass customer engagement issues, technological volatility, and competitive pressures. Business challenges are characterized by evolving business trends and regulatory restrictions. By its turn, strategic challenges involve difficulties with strategic coordination and uncertainty regarding the success of innovative initiatives.

As outlined above, implementing new business models presents significant challenges, and achieving success depends on addressing several key factors (Zolinski, 2023). First, effective and strong leadership is essential: top management must be committed to the implementation process, as their ability to create a shared vision and inspire their team can significantly streamline the process. Additionally, employee engagement is crucial for achieving successful outcomes: involving employees from the outset and actively considering their feedback can enhance implementation by ensuring they feel valued, motivated, and invested in the project's success. Another key factor is resource allocation: organizations must strategically allocate resources to support the adoption process effectively. Collaboration with external stakeholders also plays a critical role, as it can introduce new ideas, skills, and resources, enhancing the implementation process and increasing the likelihood of success. Finally, flexibility and adaptability are fundamental to both the adoption of new business models and overall organizational success. Companies must remain responsive to changing market dynamics and evolving consumer needs, which

requires fostering a culture of experimentation and learning. These five criteria - leadership, employee engagement, resource allocation, collaboration, and flexibility - are highlighted in the literature as critical for the successful adoption of BMI (Westerman *et al.,* 2014; Aagaard, 2019; Zolinski, 2023).

2.3. Theoretical Foundations

2.3.1. Institutional Theory

According to the institutional theory, pioneered by Philip Selznick (1953), firms are influenced by institutional pressures and constraints (Scott, 1987). This theory posits that institutional environment shapes an organization's structure, behaviour, and practices, by establishing social expectations and norms for what constitutes appropriate organizational conduct (DiMaggio & Powell, 1983). Aligning with these expectations and norms is crucial for firms to maintain legitimacy and thrive in competitive markets (DiMaggio & Powell, 1983; Heugens & Lander, 2009; Huo *et al*., 2013). Therefore, to achieve legitimacy and support from their environment, organizations often comply with pressures from the external institutional environment and adopt practices recognized by key stakeholders within a particular organizational context (Wang *et al*., 2022). Thus, organizational behaviour is driven not only by economic rationality but also by legitimacy mechanisms (Chen & Zuo, 2024).

Different studies have highlighted the role of institutional pressure in influencing firms' decision-making (Liu *et al*., 2010; Rogers *et al*., 2007; Wang *et al.*, 2022). Teo *et al.*, (2003) note that institutional theory is widely used to explain decisions regarding the adoption of innovations. Given that servitization represents an innovation strategy for manufacturers, Wang *et al.*, (2022) suggest that institutional pressure provides a rationale for the adoption of servitization.

Drawing from this theory, this study examines how external pressures (specifically competitive intensity and market turbulence) influence manufacturing firms in adopting servitization strategies and innovating their business models.

2.3.2. Resource-based view

When studying comprehensive explanations of servitization and BMI, researchers have frequently relied on the resource-based view (RBV) as a key theoretical foundation (Wahyono, 2019; Zhang *et al.*, 2020).

The RBV focuses on understanding how firms can build competitive advantages by leveraging valuable, rare, inimitable and non-substitutable resources (Barney, 1991). It is described as one of the most important theoretical frameworks for understanding how companies achieve superior performance and sustain competitive edges (Barney, 1991; Lubasi & Muthu, 2021).

In line with RBV, firms that demonstrate a strong ability to adjust their business model and add services to their product offerings tend to exhibit higher levels of innovation performance compared to those that remain solely product-focused (Kastalli & Looy, 2013). This is particularly evident in manufacturing firms, where the shift toward servitization requires manufacturers to develop new capabilities (Neely, 2008).

Grounded in this theoretical framework, this research investigates how servitization and BMI impact and influence product and service innovation performance.

3. Conceptual Framework and Research Hypotheses

3.1. Development of the framework

The study of servitization within manufacturing firms has gathered significant attention in the recent literature (Baines *et al.*, 2017; Kowalkowski *et al.,* 2017; Behl *et al*. 2023). However, there are still many aspects that require further exploration, particularly regarding how servitization impacts BMI and innovation outcomes.

As addressed before, servitization involves a shift from traditional product-centric business models to service-oriented ones, requiring substantial innovation in business processes (Oliva & Kallenberg, 2003; Vendrell-Herrero *et al.*, 2017). This transformation requires manufacturers to rethink their value propositions, architecture, and revenue models to create and deliver integrated product-service offerings. As a result, servitization represents a strategy shift that impacts different aspects of a firm (Baines *et al.,* 2017).

Apart from demanding significant BMI (Storbacka *et al.* 2013), a servitization strategy has shown to play an important role in a firm's innovation performance (Visnjic *et al.,* 2016; Shen *et al.,* 2021).

Servitization is often influenced or pushed by external factors such as competitive intensity and market turbulence (Kowalkowski *et al.*, 2017). Competitive

intensity can significantly influence a firm's strategic choices and innovation activities. High levels of competitive intensity compel firms to differentiate themselves through innovative business models and enhanced service offerings (Porter, 2008). Similarly, market turbulence, requires agile and adaptive business strategies (Jaworski & Kohli, 1993). Firms operating in turbulent markets must constantly innovate to cope with these changes and sustain their competitive advantage (Osiyevskyy *et al.,* 2020).

The conceptual framework presented below was developed to address the abovementioned aspects. By analysing the interplay between servitization, some of its antecedents (competitive intensity and market turbulence), BMI, and innovation outcomes, the proposed framework aims to contribute to the understanding of how Portuguese manufacturers navigate the servitization landscape.

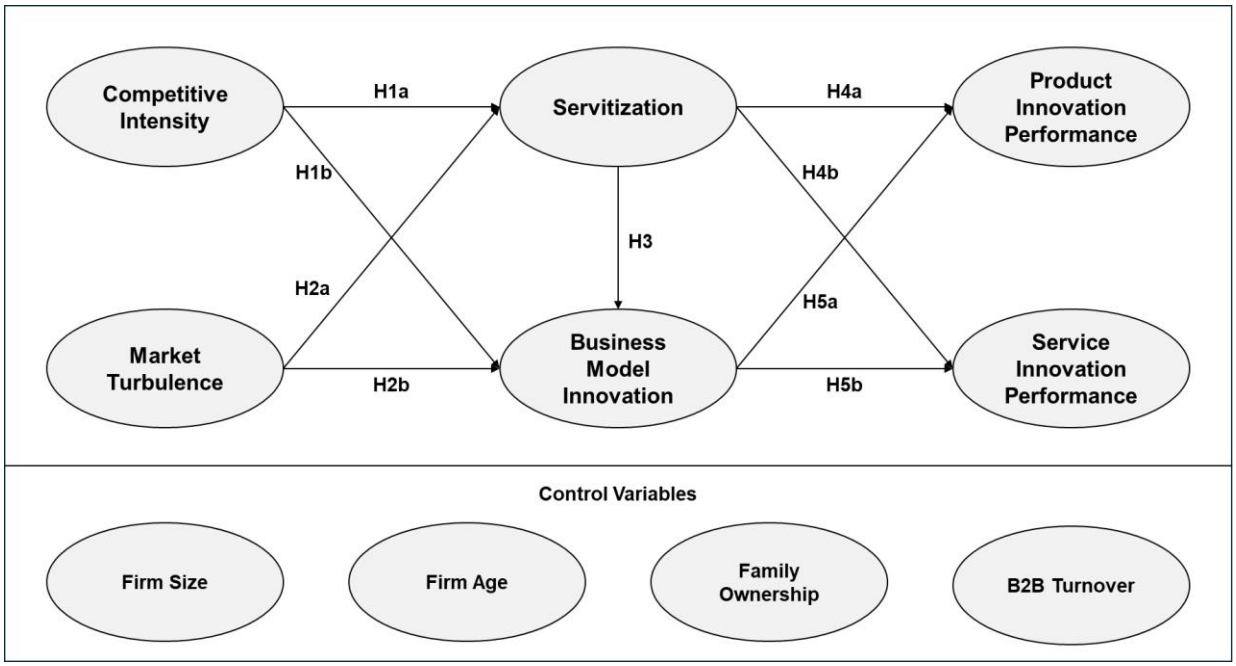

Figure 2: *Conceptual Framework*

3.2. Research hypotheses

According to Auh & Menguc (2005) and Gao *et al.* (2015), competitive intensity refers to the degree of competition in an industry and it increases with the number of competitors as well as the intensity of competitive moves.

Due to increasing competitive intensity, manufacturers are driven to find innovative ways to compete and differentiate themselves in the market, seeking new revenue streams beyond their core product business (Cusumano *et al*., 2015; Visnjic

et al., 2019). Servitization provides a strategy for manufacturers to not only differentiate their core product offerings but also to introduce additional services that can increase customer switching costs and loyalty (Visnjic *et al.*, 2019).

Hence, competitive intensity can create environmental pressures that push manufacturers to differentiate their offerings through servitization (Heirati *et al.,* 2024). Moreover, Shahri *et al.* (2023) found in their study about business model innovation that companies that perceive greater competition in their industry are more likely to engage in higher levels of business model innovation.

Following this reasoning, we hypothesized that:

H1a: Competitive intensity is positively related to servitization.

H1b: Competitive intensity is positively related to Business Model Innovation.

Market turbulence refers to the dynamic shifts in customer preferences over time, the tendency of customers to look for new products and the different needs between new and current costumers (Frank *et al.*, 2020).

Increased competition allows customers to find more products and services options, by this means reducing switching costs (Porter, 1998). This intensifies market turbulence, as customers become more inclined to switch providers (Frank *et al.,* 2022).

As Suarez *et al.* (2013) identified, services can act as a mechanism to create capability-based switching costs. Specifically, product firms may use customized services to share product knowledge with customers, reducing their uncertainties and helping them maximize investments in both current and emerging technologies. Consequently, the firm's product support through customized services enhances customers confidence in a changing market scenario, ultimately resulting in increased customer loyalty (Frank *et al.,* 2022).

To address market turbulence, firms need to develop a service-centric business model rather than a product-centric one (Gebauer *et al*., 2011; Zhang *et al*., 2020). Customized services require specific service orientation, capabilities and activities that differ from product-centric business models (Ayala *et al*., 2017).

In addition, Heij *et al.* (2014) suggest that in the context of market turbulence, firms experience an increased need to change and innovate their business models to

effectively address dynamic customer needs. By taking the previous arguments, we hypothesized:

H2a: Market turbulence is positively related to servitization.

H2b: Market turbulence is positively related to Business Model Innovation.

Servitization involves improving an organization's innovation capabilities by shifting from purely product offerings to integrated product-service systems (Kastalli & Looy, 2013).

As Xu *et al.* (2021) state, there is significant heterogeneity and cognitive distance between manufacturing and service businesses. Therefore, servitization requires manufacturers to change the way of providing value (Robinson *et al.,* 2016; Barnett *et al.,* 2013; Parida *et al.*, 2014) and often necessitates significant business model innovation (Visnjic *et al.,* 2016).

Accordingly, being a new form of value creation for manufacturing firms, servitization requires manufacturers to fundamentally change their business model (Storbacka *et al.* 2013). This shift compels firms to reconfigure resources, capabilities, and processes to deliver value through integrated solutions (Visnjic *et al.,* 2016).

Based on the existing literature, we hypothesize that:

H3: Servitization is positively related to Business Model Innovation.

Innovation, in general, has often been associated to servitization, as a potential driver (Vilkas *et al*., 2022). In their study about the role of servitization, digitalization, and innovation performance in manufacturing enterprises, Shen *et al.* (2021) concluded that firms' innovation performance of firms is affected by their servitization strategy.

While some empirical findings show a weak positive effect of servitization on product innovation (Green *et al*., 2017), others found that the interaction between product innovation and servitization may initially lead to a short-term decline in performance but ultimately fosters long-term knowledge accumulation and enhanced performance (Visnjic *et al*., 2016). In addition to financial returns, the integration of products and services generates valuable knowledge, originated from customer interaction during service provision (Kastalli & Looy 2013; Visnjic *et al.*, 2016). Consequently, servitized firms acquire a deeper understanding about customer needs,

which enhances their ability to align their value proposition with customer needs and leads to more opportunities for product innovation (Chen *et al*., 2016; Dachs *et al*., 2014; Kroh *et al*., 2018). Moreover, firms can not only design new products for increased user experience that customers are willing to pay for, but also ensure these products are designed for better serviceability (Visnjic *et al.,* 2016).

Therefore, it can be argued that:

H4a: Servitization is positively related to Product Innovation Performance.

H4b: Servitization is positively related to Service Innovation Performance.

BMI enhances both product and service innovation performance by fostering complementarity between both domains. For example, service business model changes can boost product innovation by providing valuable consumer insights while simultaneously driving service innovation through better alignment of resources and capabilities (Chesbrough, 2010; Kastalli & Looy, 2013).

Tavassoli & Bengtsson (2018) found a significant positive association between BMI configuration and product innovation performance, revealing that BMI leads to enhanced product innovation outcomes. The same authors added that when organizations engage in BMI, the output on product innovation performance is significantly higher than focusing solely on product innovation.

Johnson *et al*. (2008) further argue that BMI fosters the development of new offerings that address customer needs in novel ways, thereby enhancing the design of products and services that better meet those needs.

Additionally, Mitchell & Coles (2004) define BMI as business model replacements that provide products or services offerings to customers that were previously unavailable.

Hence, we propose the following hypothesis:

H5a: Business Model Innovation is positively related to Product Innovation Performance.

H5b: Business Model Innovation is positively related to Service Innovation Performance.

4. Research Methodology

Fortin (2009, p.37) defines methodology as the "set of methods and techniques that guide the development of the scientific research process". As presented, this research aims to study the phenomenon of servitization, within the Portuguese manufacturing landscape.

Therefore, the aim of this research is exploratory, seeking to understand how Portuguese manufacturers implement servitization, explore the antecedents that drive the adoption of this strategy and study its resulting impacts on innovation performance. The study will adopt a deductive approach and an epistemological research perspective rooted on positivism, by establishing hypotheses based on the existing literature and testing them subsequently (Saunders *et al*., 2019).

The adopted research perspective is quantitative, which assumes that opinions and information obtained through data collection can be represented as numerical data so that they can then be categorized and analysed (Watson, 2015).

The following sections aim to describe the methodological procedures that guided the development of the study, briefly characterize the research scenario and explain how the data were collected and analysed.

4.1. Sample

The target population of this research consists of Portuguese manufacturing companies. Due to the challenge of precisely defining the size of the population and identifying all the companies that comprise it, we considered Portuguese manufacturing companies from the InformaD&B (Dun & Bradstreet) database and selected only companies with more than 10 employees. A total of 8.627 company´s email addresses constituted the database received.

4.2. Questionnaire Design

To collect data that would help address the research objectives, a questionnaire was developed. Questionaries are widely used in academic research (Hulland *et al*., 2018), as they allow an easier collection of a large amount of data from a population (Saunders *et al*., 2009). The questionnaire was designed based on the previous literature review, which allowed the identification of validated measures that adapt to this research.

In accordance with Deutskens *et al.* (2004), incentives and follow-up mailings are important factors for maximizing the quality and rate of response. Considering this, it was decided to offer the respondents the opportunity to receive a report with the questionnaire's conclusions, as a way of thanking their participation.

The questionnaire was structured in five sections (Appendix 1). Section A assessed the characterization of the respondent. Section B focused on the characterization of the company. Section C was about the servitization strategy, while section D examined the company and its context. Finally, Section E covered questions about the company's performance. To avoid interpretation issues and increase the number of participants, the questionnaire was written in Portuguese (as it was intended only for Portuguese firms).

4.2.1. Measures

Aiming to facilitate responses from participants, this study used a seven-point Likert scale with a neutral central point to measure the variables. Sections A and B were exceptions, where respondents answered short open-ended questions and list questions, allowing us to gather information about the participants and the company characterization.

Servitization was a second-order variable, measured through 14 items adapted from Frank *et al.* (2022), based on previous works of Ayala *et al*. (2019) and all related to three main service-centric business model dimensions: service offering (5 items), service resource base (4 items), and service activity (5 items).

The *business model innovation* was also a second-order variable measured using a total of 13 items adapted from Spieth & Schneider (2016), which comprises the following dimensions: value offering (3 items), value architecture (4 items), revenue model (3 items) and business model innovativeness (3 items).

Concerning *competitive intensity*, as an element of the company's contextual environment, it was measured using 6 items adapted from Morgan *et al.* (2019) and originally developed by Kohli & Jaworski (1990). By its turn, *market turbulence* was measured through 5 items also adapted from Morgan *et al.* (2019), and originally based on Jaworski & Kohli (1993) studies.

Lastly, innovation performance was measured using 7 items: 4 items related to product innovation performance adapted from Behl *et al*. (2023) and originally based

on Schaarschmidt *et al*. (2018); and 3 items related to service innovation performance also adapted from Behl *et al*. (2023) and based on previous works from Storey & Kahn (2010) and Schaarschmidt *et al*. (2018).

4.2.1.1. Control Variables

The control variables considered in this study were the *firm size*, the *firm age*, the *type of firm* (family *vs* non-family firm) and the *B2B turnover*.

The *firm size* tends to be positively correlated with the servitization of manufacturing, meaning that the larger the firm, the more services it provides (Neely 2008, Li *et al*., 2022). This variable was operationalized as the number of employees.

By its turn, *firm age* affects servitization negatively. This last behaviour is related to the fact that over the time, firms tend to be less dynamic and may have issues such as, inertia and sunk costs in ongoing operations that may hamper the ability to explore new business strategies (Abou-foul *et al.,* 2021). This variable was operationalized as the number of years of existence of the firm.

Additionally, *family firms*, compared to non-family firms, are less inclined to invest in servitization (Guedes *et al*., 2022). This is because owners of family firms may prioritize legacy preservation over profit when making major strategic decisions (Dawson & Mussolino, 2014). Servitization requires intensive collaboration and trust with a variety of non-family stakeholders. Making the boundaries of family firms more porous to accommodate servitization may reduce family identity and control, further explaining their reluctance to engage in servitization (Guedes *et al*., 2022). This variable was operationalized as a dummy variable that present the value ‘1’ when the firm is family owned, and ‘0’ when the firm in non-family owned.

Lastly, *B2B turnover* is positively related to the adoption of servitization. Oliva and Kallenberg (2003) note that B2B firms, particularly those with high levels of customer interaction and customization, are more likely to engage in servitization. This variable was operationalized as the percentage of B2B vs B2C turnover.

4.3. Participants and Data Collection Procedures

The designed questionnaire was launched online using Limesurvey, the platform chosen to manage and share the questionnaire with companies from the database with the contacts.

The questionnaire was open from 21 May 2024 until end of June 2024, and the invitation to participate was sent via email on the first day the questionnaire was launched. This invitation explained the purpose of the study, the estimated response time, assured respondents of the confidentiality of their data and request them to answer the survey through a link included in the same email. To increase responses, reminder emails were sent weekly until the questionnaire closed.

From the 8.627 companies included in the database, about 976 bounced back, meaning that these contacts were not available already. In addition, about 27 companies sent an email informing us that they were unavailable to respond or considered themselves not fitting the sample criteria. Although 605 companies started the survey (response rate of 7,9%), we only considered the 372 responses that were complete (final response rate of 4,9%).

4.4. Methods for Data Analysis

In an initial stage, all the gathered data were imported into SPSS to aggregate the variables. The variables used to characterize the sample were analysed using the SPSS software. Similarly, the conceptual model and proposed hypotheses were tested using SmartPLS software. The Structural Equation Model (SEM) was employed, as it is a method that allows the creation of relationships between multiple independent and dependent variables (Ullman & Bentler, 2012). This technique is particularly valuable because it enables researchers to design their conceptual model before data validation (Lowry & Gaskin, 2014).

5. Data Analysis and Results

5.1. Sample Analysis

The following section presents the description of our sample. Pie charts are used to better illustrate the characteristics of the respondents and the firms included in the sample.

5.1.1. Characterization of the Respondents

The ages of the respondents were grouped into ranges. Around 38% of the participants were aged between 50 and 59 years old, making it the most represented age group, followed by the group between 40 and 49 years old (29%). Regarding gender, the sample was balanced, but still with a slight predominance of men (51%).

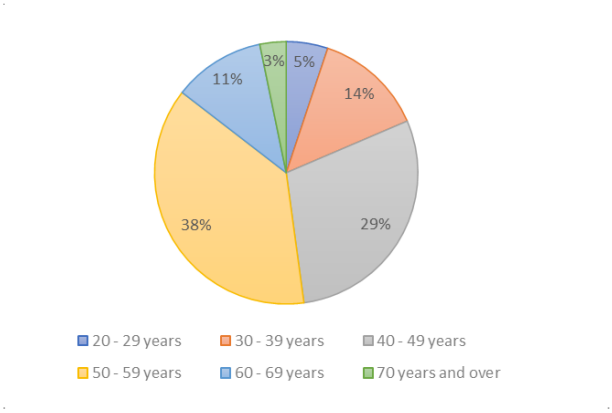

Figure 3: *Age of the respondents*

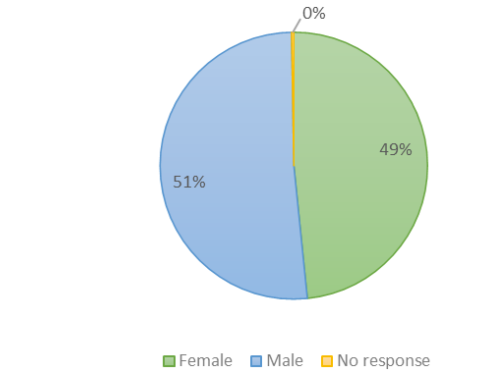

Figure 4: *Gender of the respondents*

Concerning the level of education, around 66% of the respondents held a university degree, while only 1% had the lowest level of education, elementary school. In addition, 21% completed high school and 5% had professional education.

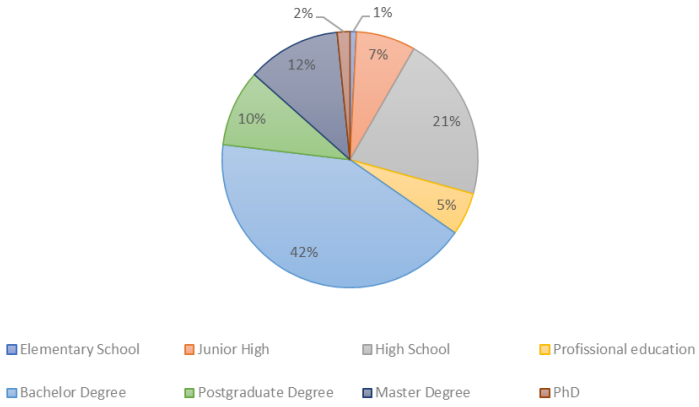

Figure 5: *Education level of the respondents*

Concerning the respondents' positions within their companies, the majority were business owners or managing partners (17%). Financial chiefs represented 13% and 10% were administrators. The role of financial officer or certified accountant accounted for 9%, so as the position of manager. Chief executives or managing directors made up 8%, and 6% held the position of CEO. Additionally, 14% were involved in various managerial roles, including production, quality, operations, export, and sales managers. The remaining 14% occupied other positions within their companies.

The respondents were also asked if they were the founders of the company. As shown in the chart below, 27% of the respondents were founders.

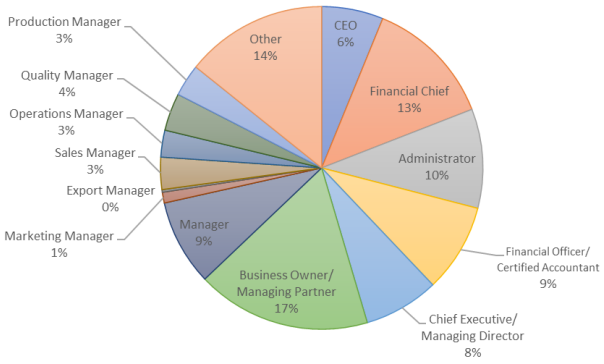

Figure 6: *Position in the firm*

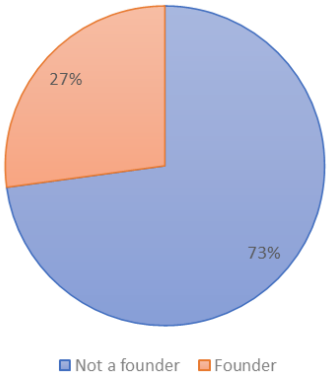

Figure 7: *Founder of the company*

5.1.2. Characterization of the Firms

Some relevant characteristics of the responding firms include their property and management types. As illustrated in Figures 8 and 9, our sample was mainly constituted by family-owned companies (76%), with their management also being mainly family-based (72%).

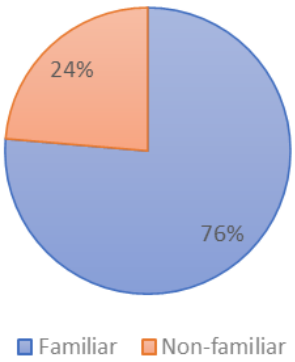

Figure 8: *Type of property*

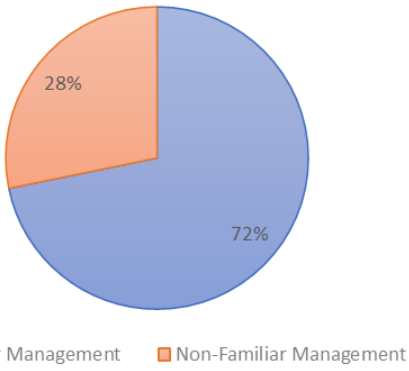

Figure 9: *Type of Management*

The sample comprised firms with diverse ages. Most of the responding firms were mature firms, with 30 or more years of operation (56%), while only 1% of the companies were in their initial stage, between 1 to 5 years.

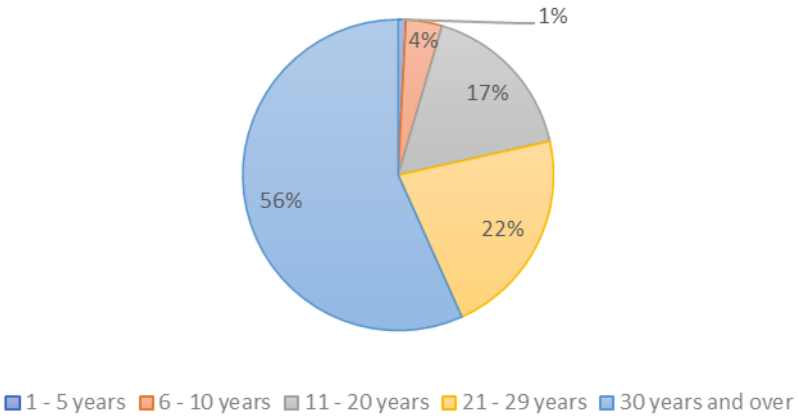

Figure 10: *Firm age*

5.2. Initial Data Screening

5.2.1. Missing values

Missing values are important to address because SmartPLS software does not process datasets with missing data (Ringle *et al*., 2022). However, our questionnaire was designed with only mandatory responses, resulting in no missing values in the final database.

5.2.2. Descriptive Analysis of the Measures

Aiming at better understanding the constructs and their items, a descriptive analysis was conducted. For each construct, we present the values of the mean, standard deviation, skewness, and kurtosis in Table II (see appendix 2).

5.2.3. Normality

The data's normality was assessed by analysing the skewness and kurtosis of each item. Problems related to normality are typically identified when the skewness index exceeds |3| and the kurtosis index exceeds |10| (Kline, 2015). The skewness and kurtosis values for the variables in this study are presented in Table II (see appendix 2).

For skewness, the values in this study ranged between -1.713 and 1.896 (absolute values), which are within the limits defined by the literature.

Regarding kurtosis, the values ranged between -1.016 and 5.817, also within the established limits. Therefore, no issues related to data's normality were detected in this study.

However, it is important to underline that one control variable, firm size, presented skewness and kurtosis indexes above the thresholds, with values of 5.519 and 39.643, respectively. This deviation is due to the fact that firm size has no upper limit. Nevertheless, since this is objective data, we decided to maintain this variable as a control variable.

5.2.4. Non-response Bias

To test non-response bias, we divided the sample into two subsamples distinguishing early and late respondents (considered as the first 75% and the last 25% responses of the final sample). The answers of these two subsamples were compared for the constructs included in the conceptual framework as well for the control variables, and no significant differences were found between the means by performing t-tests for the comparison of means. Therefore, non-response bias was not a problem in our model (Armstrong & Overton, 1977).

5.2.5. Common-method Bias

To minimize common-method bias caused by gathering data from a single respondent per firm, several careful procedures were made when designing the questionnaire (Montabon *et al*., 2018; Podsakoff & Organ, 1986; Podsakoff *et al*., 2003). These included ensuring the anonymity and confidentiality of respondents, not providing respondents with access to the theoretical model, varying the sequence of questions from the order of variables in the framework, organizing constructs into broader sections rather than individual questions, incorporating additional variables beyond those in the conceptual framework, and employing scales with both extreme values (1 and 7) and a central value (4).

In addition to the precautions mentioned above, and to ensure that common-method bias was not a presenting issue, Harman's one-factor test was performed by including all the variables used in this study in an exploratory factor analysis. The results, as shown in Table III (see appendix 3), revealed no reason for concern. 9 factors with eigenvalues greater than 1.0 were found, explaining 68.993% of the total

variance (more than 50%). Additionally, the largest factor accounts for 33.802% of the variance, which is below the 50% threshold suggested by Podsakoff *et al.*, (2003).

5.3. Assessment of Measurement Model

This section presents the overall quality evaluation of the measurement model by assessing reliability, convergent validity, discriminant validity, and overall fit for all the latent variables included in the research framework.

5.3.1. Reliability

To assess data reliability, Cronbach's alpha (α) coefficients and composite reliability (CR) were analysed for each measure. Both values should exceed 0.7 (Hair *et al.,* 2018). As shown in Table IV (see Appendix 4), all the values for both Cronbach's alpha and composite reliability fall within the defined limits: Cronbach's alpha ranges between 0.846 (Market Turbulence) and 0.960 (Business Model Innovation), while composite reliability ranged between 0.891 (Market Turbulence) and 0.965 (Business Model Innovation).

5.3.2. Convergent Validity

Regarding convergent validity, all the standardized loadings of the multi-item constructs used in the conceptual mode should be higher than 0.60-0.70 (Bagozzi & Yi, 2012). When we ran the PSL-SEM algorithm for the first time, two items (Comp_Intens_it3 and ProdInnPerf_it4) registered a standardized loading below 0,60. As Hair *et al.* (2018) recommended, we removed these items. After removing them and rerunning the PLS-SEM algorithm, all loadings ranged from 0.694 to 0.972, as shown in Tables IV and V (see Appendix 4 and 5).

5.3.3. Discriminant Validity

To evaluate the discriminant validity, three complementary approaches were used. First, the analysis of cross-loadings confirmed that each item had the highest loading on its corresponding latent variable. Second, the Fornell and Larcker (1981) criterion was applied, showing that the square root of the Average Variance Extracted (AVE) for each variable was greater than the correlations between that variable and the others. This is illustrated in Table VI (see Appendix 6), where the bold values on the diagonal represent the square root of the AVE, and the values below the diagonal are the correlations. Third, the heterotrait–monotrait ratio (HTMT) was examined. As shown above the diagonal in Table VI (see Appendix 6), all HTMT values are below

the conservative threshold of 0.85 (Henseler *et al*., 2015), confirming discriminant validity.

Additionally, we also examined potential collinearity issues by analysing the variation inflation factors (VIF) for all regressions within the research framework. VIF values ranged from 1.00 to 1.542, being significantly below the threshold of 5.00, indicating that multicollinearity was not a concern (Hair *et al*., 2017).

5.3.4. Model Fit

In line with Hair *et al.* (2012), the model fit was assessed by analysing the explained variance of the dependent variables (R^2), the effect size (f^2) and the cross-validated redundancy measure (Q^2).

Following the procedures outlined by Falk & Miller (1992), the explained variance (R^2) values should be greater than 10%. Our results showed that the structural model explained 36,6% of the variance in business model innovation, 17,3% in servitization, 41,6% in product innovation performance, and 47,4% in service innovation performance. Thus, the requirement for explained variance was achieved.

Regarding the effect size (f^2), thresholds of 0.02, 0.15, and 0.35 were established for small, medium, and large effects, respectively (Cohen, 2013; Hair *et al*., 2017). This evaluation assesses the change in the R^2 value of each endogenous variable when a specific exogenous variable was removed from the model. It was found that servitization has a medium effect on product innovation performance ($f^2 = 0.32$), while that competitive intensity has a marginal effect on both business model innovation ($f^2 = 0.01$) and on servitization ($f^2 = 0.00$). All the other variables displayed the small effect sizes.

Concerning predictive validity, the PLSPredict procedure was employed to obtain the Q^2 value for each latent variable. To confirm predictive relevance, the values of Q^2 must be greater than zero for each endogenous construct (Hair *et al.,* 2017). The results confirm the predictive power of the model, since all values exceed zero: $Q^2 = 0.28$ for business model innovation, $Q^2 = 0.15$ for servitization, $Q^2 = 0.16$ for product innovation performance and $Q^2 = 0.19$ for service innovation performance.

5.4. Assessment of Structural Model

The conceptual model of this study includes six latent variables, namely: Competitive Intensity, Market Turbulence, Servitization, Business Model Innovation, Product Innovation Performance and Service Innovation Performance. As the thresholds for reliability and validity of all the latent variables were fulfilled, a bootstrapping procedure of 5000 sub-samples was conducted (Hair *et al.,* 2012). The results of the Structural Model are presented below in Table I.

As shown in the table, Competitive Intensity had no significant impact on Servitization (β=0.020, n.s.), thus failing to support H1a. However, Competitive Intensity shows a positive and significant association with Business Model Innovation (β=0.117, p<0.05), thus supporting H1b.

Market Turbulence was positively associated with both Servitization (β=0.402, p<0.001) and Business Model Innovation (β=0.353, p<0.001), supporting H2a and H2b, respectively.

Likewise, the variable Servitization showed a positive and significant impact in Business Model Innovation (β=0.293, p<0.001), Product Innovation Performance (β=0.489, p<0.001) and Service Innovation Performance (β=0.565, p<0.001), giving support to H3, H4a and H4b.

Additionally, Business Model Innovation also presents a positive association with Product Innovation Performance (β=0.222, p<0.001) and Service Innovation Performance (β=0.176, p<0.001). Hence, both H5a and H5b were supported.

Regarding the control variables, six relationships were significant. First, Firm Age was positively associated with Servitization (β=0.095, p<0.05), though the effect size is modest. Firm age was also significantly and negatively related to Service Innovation Performance (β=-0.094, p<0.05), with a modest effect size. Firm size showed a positive and significant effect on Product Innovation Performance (β=0.107, p<0.01) and Service Innovation Performance (β=0.091, p<0.01), albeit with both effects being modest. Lastly, both control variables B2B Turnover and Family Ownership were significantly and negatively related to Service Innovation Performance (β=-0.108, p<0.01; β=-0.186, p<0.05, respectively).

Table I: *Structural Model's Results*

Path	S.E.	T - Value	R^2	Hyp.	P value	Result
Competitive Intensity → Servitization	0.020	0.309		H1a	0.757	Not supported
Market Turbulence → Servitization	0.402	6.554	0.173	H2a	***	Supported
Competitive Intensity → Business Model Innovation	0.117	2.378		H1b	*	Supported
Market Turbulence → Business Model Innovation	0.353	6.913		H2b	***	Supported
Servitization → Business Model Innovation	0.293	5.373	0.336	H3	***	Supported
Servitization → Product Innovation Performance	0.489	10.192		H4a	***	Supported
Business Model Innovation → Product Innovation Performance	0.222	4.961	0.416	H5a	***	Supported
Servitization → Service Innovation Performance	0.565	10.934		H4b	***	Supported
Business Model Innovation → Service Innovation Performance	0.176	3.546	0.474	H5b	***	Supported
Control variables						
Firm Size → Servitization	0.010	0.233	-	-	0.816	-
Firm Age → Servitization	0.095	2.302	-	-	*	-
Family Ownership → Servitization	0.040	0.338	-	-	0.736	-
B2B Turnover → Servitization	0.015	0.256	-	-	0.798	-
Firm Size → Product Innovation Performance	0.107	3.252	-	-	**	-
Firm Age → Product Innovation Performance	-0.005	0.098	-	-	0.922	-
Family Ownership → Product Innovation Performance	-0.090	1.848	-	-	0.065	-
B2B Turnover → Product Innovation Performance	-0.067	1.383	-	-	0.167	-
Firm Size → Service Innovation Performance	0.091	2.749	-	-	**	-
Firm Age → Service Innovation Performance	-0.094	2.135	-	-	*	-
B2B Turnover → Service Innovation Performance	-0.108	2.902	-	-	**	-
Family Ownership → Service Innovation Performance	-0.186	2.019	-	-	*	-

Note: *** p<0.001; ** p<0.01; * p<0.05

6. Discussion of Findings

This chapter aims to discuss the results of the empirical study and highlight the main outcomes and contributions to the fields of both servitization and business model innovation. The conducted research tried to outline the importance of servitization and its key characteristics, exploring their impact on a firm's strategic direction and innovation outcomes within the context of competitive intensity and market turbulence.

As mentioned before, this empirical research includes six variables: Competitive Intensity, Market Turbulence, Servitization, Business Model Innovation, Product

Innovation Performance and Service Innovation Performance, along with four control variables. Statistical support was found for most of the hypotheses, with one exception, which will be discussed in further detail below.

Contrary to our expectations, our results contradict the findings of prior studies that suggested that increasing Competitive Intensity drives manufacturers to differentiate through Servitization (Cusumano *et al.*, 2015; Visnjic *et al.,* 2019; Heirati *et al.,* 2024). While these studies proposed that increased competition leads firms to adopt servitization strategies to gain a competitive advantage and enhance customer loyalty, we could not find statistical evidence to support this relationship. This suggests that Competitive Intensity may not be a primary driver for the adoption of servitization. In contrast, our results reveal a positive relationship between Competitive Intensity and Business Model Innovation, being in accordance with Shahri *et al.* (2023) conclusions.

We also aimed to test the correlation between Market Turbulence and both Servitization and Business Model Innovation to determine whether this market condition influences companies to modify their offerings. Our findings support the existence of a positive relationship between Market Turbulence and Servitization, as well as between Market Turbulence and Business Model Innovation, being consistent with the existing literature. As Teece (2010) notes, turbulent environments often drive firms to rethink and innovate their business models to maintain competitiveness. Moreover, in such dynamic settings, manufacturing firms are frequently driven by the need to become more customer-centric, with servitization strategies offering a key opportunity to achieve this (Baines *et al,* 2009; Gebauer *et al*., 2011; Zhang *et al.2020*).

Regarding the relationship between Servitization and Business Model Innovation, the results showed a positive correlation between the two. As previous studies reported, Servitization acts as a key driver of Business Model Innovation by compelling manufacturers to fundamentally change their business model, reconfiguring their entire system to deliver integrated product–service offerings (Robinson *et al.,* 2016; Barnett *et al.,* 2013; Parida *et al.*, 2014; Visnjic *et al.,* 2016; Storbacka *et al.* 2013).

Another relevant finding is the positive relationship between Servitization and Innovation outcomes. Building on previous research, Servitization was found to be positive related to both Product and Service Innovation Performance. Firms that adopt Servitization, through interactions with customers during service provision, develop a

better understanding of customer needs (Kastalli & Looy, 2013; Visnjic *et al.,* 2017), leading to new opportunities for product innovation tailored to those needs (Chen *et al*., 2016; Dachs *et al.,* 2014; Kroh *et al.,* 2018) and ensuring that these products are designed for better serviceability (Visnjic *et al*., 2016).

Finally, we focus on the relationship between Business Model Innovation and innovation performance. Our results revealed a positive relationship between Business Model Innovation and both Product Innovation Performance and Service Innovation Performance. These findings are in line with the literature, which has shown that business model innovation has a positive and significant impact on both product and service innovation performance (Kastalli & Looy, 2013). Business model innovation enables the design of new offerings that address customer needs in novel ways, thereby enhancing the development of innovative products and services that better meet those needs (Johnson *et al*., 2008).

7. Conclusions, Limitations, and Further Research

7.1. Main conclusions

The present study was developed in order to explore the dynamic relationship between servitization and innovation within Portuguese manufacturing firms. Grounded in institutional theory and resource-based view, the conceptual model was designed to address different associations between the variables included in our research framework, particularly variables related to servitization antecedents and innovation outcomes.

This research had two main objectives. The first was to understand how external factors, such as market turbulence and competitive intensity, drive the adoption of servitization and business model innovation. The second was to investigate how these strategic choices, in turn, affect a firm's innovation performance, both in terms of products and services.

In general terms, the findings of this study confirm that market turbulence plays a significant role in driving both servitization and business model innovation (Teece, 2010; Gebauer *et al*., 2011; Zhang *et al*., 2020). In contrast, competitive intensity was found to influence business model innovation directly rather than servitization, challenging some of the assumptions made in previous literature. These results suggest that firms facing turbulent market conditions are more likely to adopt servitization strategies to maintain competitiveness, while those experiencing intense competition might focus more on innovating their business models.

Regarding the second objective, this research's findings confirm a positive relation between the adoption of servitization and business model innovation, as well as how these two strategies positively affect both product and service innovation performance (Kastalli & Looy, 2013; Kroh *et al*., 2018; Tavassoli & Bengtsson, 2018).

7.2. Theoretical Implications

This study allows us to address some theoretical implications within the field of strategic management and business model innovation. The proposed model establishes relationships between market conditions, servitization, business model innovation and innovation performance.

A key academic contribution of this study lies in its reinforcement of the theoretical relationship between servitization and innovation supported by many authors, such as Oliva & Kallenberg (2003), Kastalli & Looy (2013) and Zhang *et al.* (2016), while directly examining the impact of servitization on both product and service innovation performance. By providing empirical evidence of these connections, the research advances existing theory on servitization and its role in fostering broader innovation outcomes. Moreover, this study introduces new empirical evidence on the relationship between servitization and BMI, revealing how servitization drives significant shifts in business models to support integrated offerings. This previously underexplored connection deepens the academic understanding of servitization as a catalyst of business model transformation and innovation (Visnjic *et al.,* 2016), building a stronger foundation for future theoretical developments in this area.

7.3. Managerial Implications

This research allows us to identify different aspects that can influence management within firms in a practical way.

Firstly, this research enables managers to identify the external factors and market conditions that drive companies to adopt servitization and business model innovation. Understanding these triggers provides actionable insights into how firms, especially those in manufacturing, can proactively adjust their strategies to remain competitive. These strategies, supported by literature, are proven pathways for improving long-term performance, adaptability and market responsiveness. In addition, firms should focus on leveraging customer feedback and deepening their understanding of market demands. By closely monitoring customer needs and competitor actions, managers can identify opportunities for both servitization and BMI. Continuous market analysis allows companies to stay ahead of trends and adjust their offerings, making them more competitive in fast-changing environments.

Furthermore, flexible and adaptive pricing strategies play a crucial role in fostering BMI. Managers should consider adopting pricing models that reflect the value delivered through integrated services and products. This approach helps firms remain competitive by aligning its revenue streams with customer expectations, especially in B2B settings where customization and long-term relationships are essential.

A key managerial implication is that the adoption of servitization fosters a positive relationship with business model innovation. This synergy can increase a firm's competitive edge by steering continuous improvement and flexibility, aiding managers to rethink and refine their strategies for sustained growth. Additionally, optimizing internal processes and resource alignment is vital for implementing servitization. Managers must ensure that their teams are cross-functional, and that their dynamic capabilities are robust enough to support service-oriented transformations. Investing in employee training facilitates smoother transitions, boosting both service and product innovation performance.

Another managerial implication is that adopting servitization and business model innovation not only improves service innovation performance but also drives product innovation performance. By embracing a service-oriented approach, firms can simultaneously augment their service capabilities and offerings while stimulating improvements in their products, which leads to a broader innovation across the business.

In summary, this study suggests that manufacturing firms need to evolve their business models, particularly by adopting more service-oriented strategies, as this can also lead to a positive impact on their overall performance.

7.4. Limitations and Further Research

As mentioned earlier in this study, there is a gap in research concerning the antecedents and broader implications of servitization on both product and service innovation outcomes.

This research focuses specifically on Portuguese firms, limiting the applicability of its findings to the context of Portugal. Furthermore, the relatively small number of respondents in this study limits the extent to which the results can be generalized. To overcome these limitations, it is crucial for future research to incorporate a larger and more diverse sample of firms across different countries. This approach would enable more comprehensive comparisons and a better assessment of the findings' generalizability across different contexts and settings.

Also regarding the generalizability of the present findings, it is important to note that this study provides a general overview by surveying firms across various industry sectors. However, future research could benefit from examining specific industries

individually, as this could harvest more tailored insights and account for industry-specific variations in the effectiveness of servitization and business model innovation strategies.

This study highlights several areas for future research. It does not address how changes in operational practices over time might impact servitization and business model innovation outcomes. Additionally, variations in firms' capabilities, such as managerial expertise and skills, financial resources, and technology infrastructures, as well as the role of dynamic capabilities, were not explored. Investigating these factors in more complex models could provide deeper insights into how firms can better adapt and succeed with these strategies.

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Appendixes

Appendix 1: Questionnaire

INSTRUÇÕES DE PREENCHIMENTO DO QUESTIONÁRIO

1. Este questionário dirige-se a uma grande diversidade de empresas pertencentes a diferentes sectores industriais, que produzem uma grande diversidade de produtos e prestam mais ou menos serviços associados a esses produtos.

2. Neste questionário não há respostas certas ou erradas. O importante é o seu caso específico. Selecione a opção que melhor represente a sua opinião ou situação.

3. Este questionário foi elaborado de modo a ter a maioria das questões de resposta múltipla, para poder ser preenchido o mais rapidamente possível. A experiência mostra que em média o mesmo tem sido preenchido em aproximadamente 12 minutos.

SECÇÃO A – CARACTERIZAÇÃO DO RESPONDENTE

1. Indique, por favor, a sua idade. _____

2. Indique, por favor, o seu género. ☐ Masculino ☐ Feminino

3. Indique, por favor, como classificaria o seu nível educacional completo mais elevado:

☐	4ª Classe	☐	Licenciatura
☐	9º Ano	☐	Pós-Graduação ou Curso de Especialização
☐	Ensino Secundário Completo (12º Ano)	☐	Mestrado
☐	Curso Profissional	☐	Doutoramento

4. Quantas línguas estrangeiras fala fluentemente? _____

5. Foi um dos fundadores desta empresa? ☐ Sim ☐ Não

6. Atualmente, como define a sua posição na empresa? _____

SECÇÃO B – CARACTERIZAÇÃO DA EMPRESA

1. Qual o ano de fundação da empresa? _____

2. Qual é o número de trabalhadores da empresa, aproximadamente? _____

3. Qual o peso aproximado dos clientes finais (B2C) e clientes empresariais (B2B) no seu volume de negócios (%)?

Clientes individuais finais: ___%

Clientes empresariais: ___%

4. Como classifica a empresa quanto à sua propriedade?

☐	Maioria da propriedade familiar	☐	Maioria da propriedade não-familiar

5. Como classifica a atual gestão da empresa?

☐	Gestão familiar	☐	Gestão não familiar ou profissional

6. Em que ano é que a empresa se internacionalizou pela primeira vez? (ou seja, teve receitas com as suas atividades internacionais – exportação de produtos, prestação de serviços no estrangeiro, receitas de outras formas contratuais, etc)? _____

7. Atualmente, quais os modos de atividade internacional utilizados pela empresa?

☐	Exportação	☐	Acordos internacionais para desenvolvimento de produtos ou serviços
☐	Contratos de licença	☐	Escritórios comerciais
☐	Contratos de franchising	☐	Subsidiárias detidas em parceria (Joint ventures)
☐	Sub-contratação da produção no estrangeiro	☐	Subsidiárias detidas totalmente pela empresa

8. Qual o número países para os quais a empresa exporta regularmente? _____

9. De forma aproximada, qual o peso das exportações do volume de negócios da sua empresa?_____

10. De forma aproximada, quantos colaboradores da empresa estão alocados às atividades internacionais?

_____

SECÇÃO C – SERVITIZAÇÃO

1. A estratégia de servitização de uma empresa pode ser considerada como uma mudança da venda de produtos para a venda de uma combinação integrada de produtos e serviços que adicionam valor aos produtos.

Com que frequência é que a sua empresa oferece cada um dos serviços listados abaixo à sua base de clientes:

		1 = Nunca			*4 = Frequência média*			*7 = Muito frequente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Demonstrações de produtos	☐	☐	☐	☐	☐	☐	☐
b)	Seminários para clientes	☐	☐	☐	☐	☐	☐	☐
c)	Formação técnica de utilizadores	☐	☐	☐	☐	☐	☐	☐
d)	Cálculo de custo-benefício	☐	☐	☐	☐	☐	☐	☐
e)	Garantia	☐	☐	☐	☐	☐	☐	☐
f)	Suporte técnico de utilizadores	☐	☐	☐	☐	☐	☐	☐
g)	Consultoria e suporte ao cliente por telefone/correio	☐	☐	☐	☐	☐	☐	☐
h)	Demonstrações de produtos	☐	☐	☐	☐	☐	☐	☐
i)	Serviço de financiamento	☐	☐	☐	☐	☐	☐	☐
j)	Serviço de seguros	☐	☐	☐	☐	☐	☐	☐
k)	Serviço de instalação	☐	☐	☐	☐	☐	☐	☐
l)	Serviço de reparação	☐	☐	☐	☐	☐	☐	☐
m)	Peças de substituição	☐	☐	☐	☐	☐	☐	☐
n)	Serviço de entrega	☐	☐	☐	☐	☐	☐	☐
o)	Manutenção	☐	☐	☐	☐	☐	☐	☐
p)	Serviço de reciclagem	☐	☐	☐	☐	☐	☐	☐
q)	Serviço de investigação	☐	☐	☐	☐	☐	☐	☐
r)	Serviço de design e desenvolvimento de protótipos	☐	☐	☐	☐	☐	☐	☐
s)	Estudos de viabilidade	☐	☐	☐	☐	☐	☐	☐
t)	Análises da capacidade de fabricação do produto	☐	☐	☐	☐	☐	☐	☐
u)	Serviço de adaptação de produtos	☐	☐	☐	☐	☐	☐	☐
v)	Serviço de atualização de produto	☐	☐	☐	☐	☐	☐	☐

w)	Gestão de projetos	☐	☐	☐	☐	☐	☐	☐
x)	Serviço de operação do produto vendido para o cliente	☐	☐	☐	☐	☐	☐	☐
y)	Serviço para operação do processo do cliente	☐	☐	☐	☐	☐	☐	☐
z)	Serviço de documentação	☐	☐	☐	☐	☐	☐	☐
aa)	Material escrito de informação	☐	☐	☐	☐	☐	☐	☐
bb)	Serviço de armazenamento	☐	☐	☐	☐	☐	☐	☐
cc)	Consultoria técnica	☐	☐	☐	☐	☐	☐	☐
dd)	Consultoria de negócios	☐	☐	☐	☐	☐	☐	☐

2. Ainda sobre a importância dos serviços no modelo de negócio da empresa, indique por favor o seu grau de concordância com as afirmações abaixo:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	A oferta de serviços na minha empresa é considerada um aspeto estratégico para a nossa competitividade.	☐	☐	☐	☐	☐	☐	☐
b)	Competimos principalmente na diferenciação de serviços.	☐	☐	☐	☐	☐	☐	☐
c)	Os nossos serviços são oferecidos de forma espontânea quando a necessidade do cliente é identificada.	☐	☐	☐	☐	☐	☐	☐
d)	Entendemos bem como os nossos clientes percebem o valor dos nossos serviços.	☐	☐	☐	☐	☐	☐	☐
e)	Somos mais orientados para o cliente do que os nossos concorrentes.	☐	☐	☐	☐	☐	☐	☐
f)	Para desenvolver os nossos serviços, frequentemente desenvolvemos novas competências dentro da nossa empresa.	☐	☐	☐	☐	☐	☐	☐
g)	O capital humano (especialização individual) da minha empresa é uma fonte de vantagem competitiva.	☐	☐	☐	☐	☐	☐	☐
h)	O conhecimento interno da minha empresa é considerado fonte de vantagem competitiva.	☐	☐	☐	☐	☐	☐	☐
i)	A nossa empresa é muito flexível às mudanças do mercado, sendo capaz de se adaptar rapidamente.	☐	☐	☐	☐	☐	☐	☐
j)	Os nossos serviços e produtos são desenvolvidos em simultâneo.	☐	☐	☐	☐	☐	☐	☐
k)	A área de serviços tem um papel ativo na tomada de decisões estratégicas sobre novos produtos e mercados.	☐	☐	☐	☐	☐	☐	☐
l)	As nossas diferentes áreas funcionais trabalham frequentemente em conjunto no desenvolvimento de novas soluções de produtos e serviços.	☐	☐	☐	☐	☐	☐	☐
m)	Os nossos clientes têm participação ativa no desenvolvimento de nossos novos produtos e serviços.	☐	☐	☐	☐	☐	☐	☐
n)	Outras unidades de negócios da nossa empresa são muito ativas no desenvolvimento de novos produtos e serviços.	☐	☐	☐	☐	☐	☐	☐

3. Indique por favor o grau de concordância com as afirmações abaixo, considerando as mudanças que foram feitas no modelo de negócio com a introdução de mais serviços associados à oferta de produtos durante os últimos anos:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Houve alteração nos clientes alvo da empresa.	☐	☐	☐	☐	☐	☐	☐
b)	A oferta de produtos e serviços foi mudada.	☐	☐	☐	☐	☐	☐	☐
c)	O posicionamento da empresa no mercado alterou-se.	☐	☐	☐	☐	☐	☐	☐
d)	As competências e recursos-chave da empresa mudaram.	☐	☐	☐	☐	☐	☐	☐

e)	As atividades internas de criação de valor mudaram.	☐	☐	☐	☐	☐	☐	☐
f)	O papel e envolvimento dos parceiros no processo de criação de valor alterou-se.	☐	☐	☐	☐	☐	☐	☐
g)	Houve alterações na distribuição.	☐	☐	☐	☐	☐	☐	☐
h)	Os mecanismos de receitas alteraram-se.	☐	☐	☐	☐	☐	☐	☐
i)	A estrutura de custos alterou-se.	☐	☐	☐	☐	☐	☐	☐
j)	Houve uma grande mudança nas margens praticadas.	☐	☐	☐	☐	☐	☐	☐
k)	Teve que se alterar a proposta de valor para os clientes.	☐	☐	☐	☐	☐	☐	☐
l)	Teve que se alterar o modelo de criação de valor.	☐	☐	☐	☐	☐	☐	☐
m)	Teve que se alterar a lógica de geração de receitas.	☐	☐	☐	☐	☐	☐	☐

4. Ainda sobre o modelo de negócio, considerando agora apenas os mercados internacionais em que opera, indique o seu grau de concordância com as afirmações abaixo:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Com o objetivo de adicionar serviços à venda de produtos, a minha empresa foi capaz de realizar reconfigurações internas significativas, de forma a melhorar a sua proposta de valor para os clientes internacionais.	☐	☐	☐	☐	☐	☐	☐
b)	Com a inclusão de mais serviços na nossa oferta, a empresa identificou oportunidades internacionais, tendo conseguido reorganizar rapidamente os seus processos operacionais.	☐	☐	☐	☐	☐	☐	☐
c)	A minha empresa foi capaz de reorganizar a sua rede de parceiros, de forma a melhorar a proposta de valor apresentada aos clientes internacionais com a inclusão de mais serviços associados à venda de produtos.	☐	☐	☐	☐	☐	☐	☐
d)	As novas oportunidades de servir os clientes internacionais com novos serviços foram rapidamente compreendidas pela minha empresa.	☐	☐	☐	☐	☐	☐	☐
e)	A minha empresa identificou oportunidades inovadoras para alterar os modelos de preço/*pricing* praticados em mercados internacionais, com a oferta de serviços adicionais.	☐	☐	☐	☐	☐	☐	☐

SECÇÃO D – A EMPRESA E O CONTEXTO

1. Indique por favor o seu grau de concordância com as afirmações abaixo relativas ao setor em que opera:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	A concorrência em nosso setor é muito intensa.	☐	☐	☐	☐	☐	☐	☐
b)	Existem muitas guerras promocionais no nosso setor.	☐	☐	☐	☐	☐	☐	☐
c)	Tudo o que um concorrente consegue oferecer, pode ser facilmente igualado pelos outros.	☐	☐	☐	☐	☐	☐	☐
d)	A concorrência pelo preço é uma característica marcante do nosso setor.	☐	☐	☐	☐	☐	☐	☐
e)	Ouve-se falar de novas jogadas competitivas quase todos os dias.	☐	☐	☐	☐	☐	☐	☐
f)	Os nossos concorrentes são bastante fortes.	☐	☐	☐	☐	☐	☐	☐
g)	No nosso tipo de negócio, as necessidades dos clientes mudam bastante ao longo do tempo.	☐	☐	☐	☐	☐	☐	☐
h)	Os nossos clientes estão constantemente à procura de novos produtos ou serviços.	☐	☐	☐	☐	☐	☐	☐
i)	Os novos clientes têm necessidades diferentes das necessidades dos clientes existentes	☐	☐	☐	☐	☐	☐	☐

j)	Temos testemunhado a procura pelos nossos produtos e serviços por parte de clientes que nunca os compraram antes.	☐	☐	☐	☐	☐	☐	☐
k)	As preferências futuras dos nossos clientes são imprevisíveis.	☐	☐	☐	☐	☐	☐	☐

2. A estratégia de servitização de uma empresa pode ser considerada como uma mudança da venda de produtos para a venda de uma combinação integrada de produtos e serviços que adicionam valor aos produtos.

Tendo em consideração este conceito, indique, por favor, o seu grau de concordância com as afirmações abaixo:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Muitos fornecedores adotaram estratégias de servitização.	☐	☐	☐	☐	☐	☐	☐
b)	Muitos dos parceiros adotaram estratégias de servitização.	☐	☐	☐	☐	☐	☐	☐
c)	Muitas outras empresas da indústria adotaram a estratégia de servitização.	☐	☐	☐	☐	☐	☐	☐
d)	Muitos dos nossos concorrentes adotaram estratégias de servitização.	☐	☐	☐	☐	☐	☐	☐
e)	Os concorrentes perceberam as vantagens competitivas após adotarem a estratégia de servitização.	☐	☐	☐	☐	☐	☐	☐
f)	Concorrentes conquistam mais fidelização de clientes após adotarem a estratégia de servitização.	☐	☐	☐	☐	☐	☐	☐
g)	Os clientes querem que a empresa forneça mais serviços.	☐	☐	☐	☐	☐	☐	☐
h)	Talvez não consiga reter os clientes existentes se não lhes fornecer serviços.	☐	☐	☐	☐	☐	☐	☐
i)	A sua empresa possui um grande número de clientes nesta área.	☐	☐	☐	☐	☐	☐	☐

3. Ainda sobre o modelo de negócio, considerando agora apenas os mercados internacionais em que opera, indique o seu grau de concordância com as afirmações abaixo:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Ajudamos os nossos clientes a antecipar desenvolvimentos nos seus mercados.	☐	☐	☐	☐	☐	☐	☐
b)	Tentamos continuamente descobrir necessidades adicionais dos nossos clientes que eles desconhecem.	☐	☐	☐	☐	☐	☐	☐
c)	Incorporamos em novos produtos e serviços soluções para necessidades não articuladas dos clientes.	☐	☐	☐	☐	☐	☐	☐
d)	Fazemos brainstorming sobre como os clientes usam os nossos produtos e serviços.	☐	☐	☐	☐	☐	☐	☐
e)	Inovamos mesmo correndo o risco de tornar os nossos próprios produtos obsoletos.	☐	☐	☐	☐	☐	☐	☐
f)	Procuramos oportunidades em áreas onde os clientes têm dificuldade em expressar as suas necessidades.	☐	☐	☐	☐	☐	☐	☐
g)	Trabalhamos em estreita colaboração com os principais utilizadores que tentam reconhecer as necessidades dos clientes meses ou até anos antes da maioria do mercado as reconhecer.	☐	☐	☐	☐	☐	☐	☐
h)	Extrapolamos as principais tendências para obter insights sobre o que os usuários do mercado atual precisarão no futuro.	☐	☐	☐	☐	☐	☐	☐
i)	Monitoramos constantemente o nosso nível de compromisso e orientação para atender às necessidades dos clientes.	☐	☐	☐	☐	☐	☐	☐
j)	Comunicamos livremente informações sobre as nossas experiências de clientes bem-sucedidas e malsucedidas em todas as funções do negócio.	☐	☐	☐	☐	☐	☐	☐

k)	A nossa estratégia para obter vantagem competitiva é baseada na nossa compreensão das necessidades dos clientes.	☐	☐	☐	☐	☐	☐	☐
l)	Medimos a satisfação do cliente de forma sistemática e frequente.	☐	☐	☐	☐	☐	☐	☐
m)	Estamos mais focados no cliente do que os nossos concorrentes.	☐	☐	☐	☐	☐	☐	☐
n)	Acredito que este negócio existe principalmente para servir clientes.	☐	☐	☐	☐	☐	☐	☐
o)	Os dados sobre a satisfação dos clientes são divulgados regularmente em todos os níveis desta unidade de negócio.	☐	☐	☐	☐	☐	☐	☐

4. Indique por favor o seu grau de concordância com as afirmações abaixo, tendo em consideração as atividades internacionais da empresa:

		1 = Discordo totalmente			*4 = Nem concordo nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	A vontade de crescimento é uma forte motivação para a expansão das atividades internacionais.	☐	☐	☐	☐	☐	☐	☐
b)	A possibilidade de aumento dos lucros é uma forte motivação para a expansão internacional.	☐	☐	☐	☐	☐	☐	☐
c)	Vemos o mundo, e não apenas Portugal, como o mercado da nossa empresa.	☐	☐	☐	☐	☐	☐	☐
d)	Achamos que é melhor expandir as nossas atividades de exportação sempre que possível.	☐	☐	☐	☐	☐	☐	☐
e)	A nossa cultura organizacional é caracterizada pela exploração ativa de novas oportunidades de negócio nos mercados de exportação.	☐	☐	☐	☐	☐	☐	☐
f)	Temos uma forte capacidade para desenvolver e adaptar produtos/serviços novos e existentes para mercados internacionais.	☐	☐	☐	☐	☐	☐	☐
g)	Enfatizamos a todos os nossos colaboradores a importância de ter sucesso nas atividades de exportação.	☐	☐	☐	☐	☐	☐	☐
h)	Enfatizamos o desenvolvimento de recursos humanos e outros que possam contribuir para atividades de exportação bem-sucedidas.	☐	☐	☐	☐	☐	☐	☐

SECÇÃO E – DESEMPENHO DA EMPRESA

1. Avalie o desempenho que a sua empresa durante os últimos anos, indicando seu grau de concordância com as afirmações abaixo:

		1= Discordo totalmente			*4 = Nem concordo Nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	O programa de desenvolvimento de novos produtos na empresa superou as nossas expectativas em termos de desempenho geral.	☐	☐	☐	☐	☐	☐	☐
b)	A iniciativa de desenvolvimento de novos produtos na empresa tem sido um sucesso em termos de rendibilidade geral.	☐	☐	☐	☐	☐	☐	☐
c)	O nosso esforço de desenvolvimento de novos produtos é mais bem-sucedido do que o dos nossos principais concorrentes.	☐	☐	☐	☐	☐	☐	☐
d)	O nosso ciclo de desenvolvimento de novos produtos tem sido menor que o de nossos principais concorrentes.	☐	☐	☐	☐	☐	☐	☐
e)	A nova iniciativa de desenvolvimento de serviços desta empresa é inovadora.	☐	☐	☐	☐	☐	☐	☐
f)	Esta empresa é boa em criar novos conceitos de serviço.	☐	☐	☐	☐	☐	☐	☐
g)	Os clientes consideram as ofertas de serviços desta empresa criativas.	☐	☐	☐	☐	☐	☐	☐
h)	A qualidade do produto/serviço da empresa é competitiva.	☐	☐	☐	☐	☐	☐	☐
i)	A empresa é competitiva em alcançar a satisfação do cliente.	☐	☐	☐	☐	☐	☐	☐
j)	A empresa é competitiva na obtenção de uma boa imagem pública.	☐	☐	☐	☐	☐	☐	☐

2. Avalie o desempenho dos novos serviços que a empresa foi associando aos produtos durante os últimos anos, indicando seu grau de concordância com as afirmações abaixo:

		1= Discordo totalmente			*4 = Nem concordo Nem discordo*			*7 = Concordo totalmente*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Os novos serviços da minha empresa geralmente atingem os objetivos de quota de mercado.	☐	☐	☐	☐	☐	☐	☐
b)	Os novos serviços da minha empresa geralmente atingem os seus objetivos de vendas e de utilização pelo cliente.	☐	☐	☐	☐	☐	☐	☐
c)	Os novos serviços da minha empresa geralmente atingem os objetivos de crescimento das vendas.	☐	☐	☐	☐	☐	☐	☐
d)	Os novos serviços na minha empresa geralmente atingem os seus objetivos de lucro.	☐	☐	☐	☐	☐	☐	☐
e)	Os nossos novos serviços atingem os objetivos de desempenho definidos para eles.	☐	☐	☐	☐	☐	☐	☐
f)	No geral, nossos novos serviços são bem-sucedidos.	☐	☐	☐	☐	☐	☐	☐

3. Qual o seu grau de satisfação com os aspetos referidos abaixo para avaliar o desempenho da vossa empresa nos mercados internacionais nos últimos 3 anos?

		1 = Nada importante			*4= Mais ou menos importante*			*7 = Muito importante*
		1	**2**	**3**	**4**	**5**	**6**	**7**
a)	Crescimento das vendas;	☐	☐	☐	☐	☐	☐	☐
b)	Valor das vendas;	☐	☐	☐	☐	☐	☐	☐
c)	Retorno sobre o investimento;	☐	☐	☐	☐	☐	☐	☐
d)	Lançamento de produtos/serviços;	☐	☐	☐	☐	☐	☐	☐
e)	Quota de mercado;	☐	☐	☐	☐	☐	☐	☐
f)	Melhoria no tempo de chegada ao mercado de produtos/serviços;	☐	☐	☐	☐	☐	☐	☐
g)	Sucesso de lançamento em relação à concorrência	☐	☐	☐	☐	☐	☐	☐
h)	Alcance global;	☐	☐	☐	☐	☐	☐	☐
i)	Reputação internacional;	☐	☐	☐	☐	☐	☐	☐
j)	Posição consolidada em mercados internacionais.	☐	☐	☐	☐	☐	☐	☐

4. Questões Finais

	1 = Muito reduzido			*4 = Nem reduzido nem elevado*			*7 = Muito elevado*
	1	**2**	**3**	**4**	**5**	**6**	**7**
Indique, por favor, o seu grau de conhecimento sobre as questões apresentadas.	☐	☐	☐	☐	☐	☐	☐
Indique, por favor, o seu grau de conhecimento sobre o ISEG.	☐	☐	☐	☐	☐	☐	☐

Muito obrigada pela sua participação!

O questionário chegou ao fim

A sua colaboração é essencial para o nosso estudo.

Com os melhores cumprimentos,

Nuno Fernandes Crespo e Inaara Vali

Appendix 2: Descriptive Analysis of Measures

Table II: *Descriptive Statistics of Measures*

Construct	Items	Mean	Standard	Skweness	Kurtosis
Competitive Intensity	Comp_Intens_it1	5,80	1,327	-1,265	1,297
	Comp_Intens_it2	4,99	1,720	-0,649	-0,503
	Comp_Intens_it4	5,73	1,358	-1,071	0,683
	Comp_Intens_it5	4,56	1,776	-0,395	-0,657
	Comp_Intens_it6	5,21	1,432	-0,588	-0,082
Market Turbulence	Mkt_Turb_it1	4,76	1,654	-0,399	-0,658
	Mkt_Turb_it2	4,86	1,639	-0,483	-0,441
	Mkt_Turb_it3	4,55	1,675	-0,391	-0,559
	Mkt_Turb_it4	4,79	1,617	-0,592	-0,306
	Mkt_Turb_it5	4,87	1,587	-0,415	-0,613
Servitization	SERV_Serv_Off_it1	5,29	1,622	-0,853	0,061
	SERV_Serv_Off_it2	5,17	1,698	-0,859	-0,007
	SERV_Serv_Off_it3	5,24	1,547	-0,947	0,582
	SERV_Serv_Off_it4	5,35	1,445	-1,061	1,055
	SERV_Serv_Off_it5	5,45	1,399	-0,752	0,138
	SERV_Serv_ResBase_it1	5,09	1,564	-0,724	-0,005
	SERV_Serv_ResBase_it2	5,51	1,377	-0,973	0,689
	SERV_Serv_ResBase_it3	5,67	1,319	-1,232	1,625
	SERV_Serv_ResBase_it4	5,33	1,376	-0,802	0,463
	SERV_Serv_Act_it1	5,06	1,525	-0,758	0,257
	SERV_Serv_Act_it2	4,62	1,739	-0,544	-0,472
	SERV_Serv_Act_it3	4,87	1,642	-0,705	-0,115
	SERV_Serv_Act_it4	4,78	1,624	-0,682	-0,203
	SERV_Serv_Act_it5	3,93	1,900	-0,193	-1,016
Business Model Innovation	BMI_voi_it1	4,21	1,893	-0,359	-0,976
	BMI_voi_it2	4,19	1,872	-0,360	-0,908
	BMI_voi_it3	4,26	1,813	-0,399	-0,778
	BMI_vai_it1	4,19	1,755	-0,378	-0,729
	BMI_vai_it2	4,19	1,731	-0,426	-0,680
	BMI_vai_it3	4,02	1,683	-0,295	-0,636
	BMI_vai_it4	3,71	1,863	-0,009	-1,014
	BMI_rmi_it1	3,92	1,820	-0,174	-0,943
	BMI_rmi_it2	4,43	1,779	-0,486	-0,632
	BMI_rmi_it3	4,37	1,739	-0,361	-0,631
	BMI_bmi_it1	4,38	1,744	-0,518	-0,533
	BMI_bmi_it2	4,13	1,718	-0,279	-0,638
	BMI_bmi_it3	4,10	1,764	-0,258	-0,766
Product Innovation Performance	ProdInnPerf_it1	4,64	1,418	-0,594	0,517
	ProdInnPerf_it2	4,74	1,465	-0,685	0,457
	ProdInnPerf_it3	4,48	1,363	-0,449	0,608
Service Innovation Performance	ServInnPerf_it1	4,50	1,567	-0,425	-0,125
	ServInnPerf_it2	4,49	1,604	-0,415	-0,223
	ServInnPerf_it3	4,66	1,513	-0,464	0,024
Firm´s Size	-	54,24	93,848	5,519	39,643
Firm´s Age	-	37,00	22,471	1,896	5,817
Family Onwership	-	0.76	0.425	-1,245	-0,453
B2B Turnover	-	82,60	25,553	-1,713	2,107

Appendix 3: Common-method Bias

Table III: *Results of Harman's one factor test*

Factor	Eigenvalues	% Of Variance	% Cumulative
1	16,563	33,802	33,802
2	5,118	10,445	44,247
3	3,352	6,841	51,088
4	2,317	4,729	55,817
5	1,661	3,390	59,207
6	1,424	2,907	62,114
7	1,228	2,506	64,621
8	1,121	2,288	66,909
9	1,021	2,084	68,993

Appendix 4: Convergent Validity and Reliability

Table IV: *Measure Factor Loadings*

Measures	Number of Final Items	Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Competitive Intensity	5	0,694 ~ 0,878	0,859	0,895	0,632
Market Turbulence	5	0,700 ~ 0,862	0,846	0,891	0,621
Servitization	14	0,733 ~ 0,891	0,944	0,951	0,581
Business Model Innovation	13	0,845 ~ 9,972	0,960	0,965	0,679
Product Innovation Performance	3	0,879 ~ 0,937	0,905	0,941	0,841
Service Innovation Performance	3	0,909 ~ 0,950	0,916	0,947	0,856

Appendix 5: Items Factor Loadings

Table V: *Items Factor Loadings*

Items		Description	Standardized Factor Loadings	T-Value
Competitive Intensity (α=0,859; CR=0,895 AVE=0,632) **To what extent do you agree with the following statements:**	Comp_Intens_it1	Competition in our industry is cutthroat.	0,779	6,810
	Comp_Intens_it2	There are many promotion wars in our industry.	0,878	10,620
	Comp_Intens_it3	Anything that one competitor can offer, others can match readily. [a]	-	-
	Comp_Intens_it4	Price competition is a hallmark of our industry.	0,740	5,871
	Comp_Intens_it5	One hears of a new competitive move almost every day.	0,867	9,944
	Comp_Intens_it6	Our competitors are relatively strong.	0,694	3,407
Market Turbulence (α=0,846; CR=0,891 AVE=0,621)	Mkt_Turb_it1	In our kind of business, customers' needs change considerably over time.	0,799	12,585
	Mkt_Turb_it2	Our customers tend to look for new offerings all the time.	0,862	16,246
	Mkt_Turb_it3	New customers tend to have needs that are different from those of our existing customers.	0,819	13,012
	Mkt_Turb_it4	We are witnessing demand for our products and services from customers who never bought them before.	0,750	13,109
	Mkt_Turb_it5	Our customers' future preferences are unpredictable.	0,700	10,708
Servitization (α=0,944; CR=0,951 AVE=0,581)	SERV_Serv_Off_it1	The service offering in my company is considered a strategic aspect of our competitiveness.	0,858	33,126
	SERV_Serv_Off_it2	We compete primarily in service differentiation.	0,830	28,535
	SERV_Serv_Off_it3	Our services are offered spontaneously when customer needs are identified.	0,793	25,627
	SERV_Serv_Off_it4	We understand how our customer perceives the value of our services.	0,875	30,580
	SERV_Serv_Off_it5	We are more customer-oriented than our competitors.	0,765	26,761
	SERV_Serv_ResBase_it1	To develop our services, we frequently develop new competences within our company.	0,831	27,991
	SERV_Serv_ResBase_it2	The human capital (individual expertise) of my company is a source of competitive advantage.	0,891	46,820
	SERV_Serv_ResBase_it3	The internal knowledge owned by my company is considered a source of competitive advantage.	0,888	52,497
	SERV_Serv_ResBase_it4	Our company is very flexible to market changes, being able to adapt quickly.	0,846	38,393
	SERV_Serv_Act_it1	Our services and products are developed together and simultaneously.	0,816	30,103
	SERV_Serv_Act_it2	The service area plays an active role in making strategic decisions about new products and markets.	0,866	30,520
	SERV_Serv_Act_it3	Our different functional areas often work together in the development of new products and solutions.	0,882	32,955
	SERV_Serv_Act_it4	Our customers actively participate in the development of our new products and services.	0,733	23,992
	SERV_Serv_Act_it5	Other business units of our company are very active in new product and service development.	0,735	22,441
Business Model Innovation (α=0,960; CR=0,965 AVE=0,679)	BMI_voi_it1	Target customers have changed.	0,906	53,538
	BMI_voi_it2	The product and service offering has changed.	0,925	57,099
	BMI_voi_it3	The firm's positioning in the market has changed.	0,918	53,089
	BMI_vai_it1	The firm's core competences and resources have changed.	0,925	57,640
	BMI_vai_it2	Internal value creation activities have changed.	0,937	56,701
	BMI_vai_it3	Role and involvement of partners into the value creation process has changed.	0,907	53,374
	BMI_vai_it4	Distribution has changed.	0,845	49,160
	BMI_rmi_it1	Revenue mechanisms have changed.	0,885	32,043
	BMI_rmi_it2	Cost mechanisms have changed.	0,919	47,919
	BMI_rmi_it3	There has been a big change in the margins charged.	0,867	42,662
	BMI_bmi_it1	The value proposition towards the customers has changed.	0,929	61,719
	BMI_bmi_it2	The value creation architecture has changed.	0,972	75,104
	BMI_bmi_it3	The logic how revenues are generated has changed.	0,957	65,138
Product Innovation Performance (α=0,905; CR=0,941 AVE=0,841)	ProdInnPerf_it1	Our new product development programme has exceeded our expectations in terms of overall performance.	0,933	34,495
	ProdInnPerf_it2	Our new product development initiative has been a success in terms of overall profitability.	0,937	37,498
	ProdInnPerf_it3	Our total new product development effort is significantly more successful than that of our big competitors.	0,879	29,086
	ProdInnPerf_it4	Our total new product development cycle time has been less than that of our major rivals.[a]	-	-
Service Innovation Performance (α=0,916; CR=0,947; AVE=0,856)	ServInnPerf_it1	This company's new service development initiative is cutting-edge.	0,909	29,034
	ServInnPerf_it2	This company is good at coming up with fresh service concepts.	0,950	40,239
	ServInnPerf_it3	Customers consider this company's service offerings to be creative.	0,917	37,025

Note: a - This item was deleted during the scale purification process.

Appendix 6: Discriminant Validity

Table VI: *Correlation Matrix and Discriminant Validity*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. B2B Turnover	**n.a.**	*0,137*	*0,102*	*0,013*	*0,073*	*0,158*	*0,108*	*0,155*	*0,065*	*0,137*
2. Business Model Innovation	-0,133	**0,824**	*0,374*	*0,032*	*0,063*	*0,585*	*0,482*	*0,468*	*0,483*	*0,035*
3. Competitive Intensity	-0,095	0,366	**0,795**	*0,037*	*0,053*	*0,588*	*0,169*	*0,207*	*0,230*	*0,057*
4. Family Ownership	0,013	0,020	0,007	**n.a.**	*0,063*	*0,030*	*0,073*	*0,076*	*0,043*	*0,013*
5. Firm Age	0,073	0,062	0,042	0,063	**n.a.**	*0,101*	*0,061*	*0,037*	*0,084*	*0,227*
6. Market Turbulence	-0,148	0,531	0,516	-0,010	-0,074	**0,788**	*0,486*	*0,532*	*0,442*	*0,037*
7. Product Innovation Performance	-0,102	0,451	0,171	-0,070	0,058	0,437	**0,917**	*0,813*	*0,643*	*0,116*
8. Service Innovation Performance	-0,148	-0,441	0,208	-0,073	-0,035	0,474	0,739	**0,925**	*0,691*	*0,077*
9. Servitization	-0,038	0,462	0,230	0,019	0,071	0,403	0,597	0,646	**0,762**	**0,093**
10. Firm Size	0,137	-0,034	-0,018	-0,013	0,227	0,021	0,111	0,073	0,041	**n.a**
Mean	84,884	4,161	5,257	0,760	37,00	4,765	4,619	4,548	5,098	54,24
Standard deviation	23,420	1,469	1,223	0,426	22,501	1,289	1,298	1,447	1,180	93,974

Notes: the diagonal values in bold show the square roots of the AVE; the values below the principal diagonal are the correlation values; the values above the principal diagonal are the heterotrait-monotrait (HTMT) ratios; n.a. = not applicable.