The moderating effect of supply chain collaboration on servitization

Abstract

Design/methodology/approach Following a quantitative research design, data were collected from firms in pharmaceutical sector.

Purpose Supply chain collaboration (SCC) is an important element that contributes to enhanced performance. Nonetheless, there is still a need to understand its role in servitization implementation and outcomes.
This research attempts to address this gap by looking at the impact of SCC on servitization and performance when considering service levels (base, intermediate and advanced).

Findings Moderation effects were tested. Results suggest that SCC is a crucial moderator when it comes to the influence of service levels on servitization consequences and performance, particularly to advanced and intermediate services.

Originality/value This study contributes to the literature by providing further empirical evidence of the impact of intermediate and advanced services shedding light into the moderating role of SCC.

Keywords: Servitization, supply chain collaboration, performance.

Introduction

The servitization literature has highlighted that firms that engage their customers in service design strategies are more successful (Fliess and Lexutt, 2019; Johansson et al., 2019; Smania et al., 2022). Given the importance of customers' feedback and not only the feedback of the final consumers, collaboration at the supply level is key to ensuring that the designed services fit customers' needs but also to ensure the smooth delivery of these services (Morgan-Thomas, 2016; Pilon and Hadjielias, 2017; Ruiz-Alba et al., 2019; Johansson et al., 2019; Brege and Daniel Kindström, 2021; Kreye and Donk, 2021).

Referring to the introduction of services in manufacturing, servitization is not a new field of research but it still lacks consensus over its definitions, theoretical backgrounds, and impact (Pinillos et al., 2022). An examination of the servitization literature shows a limited understanding of the role of inter-firm relationships and supply chain collaboration (SCC) (Bikfalvi et al., 2013; Finne and Holmström, 2013; Galvani and Bocconcelli, 2022). In an attempt to shed light on this gap, this investigation focuses on the influence of SCC on the servitization of the pharmaceutical sector in Spain.

The Spanish pharmaceutical industry shows that suppliers have long been involved in servitization strategies in the sense that this industry sells more than just products (Ruizalba et al., 2015; 2016; 2019). In this context, servitizing firms are the pharmaceutical distributors and the servitized firms are the pharmacy stores, both having different views on the importance, development, and usage of the created services.

Nonetheless, if servitization implies the development of processes and capabilities (Baines et al., 2009; Sousa and Silveira, 2017; Manresa et al., 2021), the implementation of such a strategy will only make sense if the servitizing firms clearly understand and identify those capabilities and processes which servitized firms wish and need to develop. Hence, this definition and identification of services should be a collaborative process as previously suggested by the service innovation literature (Fliess and Lexutt, 2019; Johansson et al., 2019; Smania et al., 2022). If the servitized firms suggest that they have low levels of cooperation with suppliers, this will raise the question of whether the services provided are in fact those they actually need and if servitization strategies can be actually considered in such conditions.

As a result, this study analyses the role of SCC in the implementation of different levels of services and their impact on performance. Subsequently, this paper is structured in the following manner: first, a brief overview of the literature on servitization and SCC is provided, followed by a suggested research framework; then methodological decisions are explained, and the main findings are presented and discussed; finally, the paper concludes highlighting main theoretical and practical contributions and recommendations.

Servitization and performance

The concept of servitization was first defined by Vandermerwe and Rada (1988), but it remained an area of continuous interest and evolution since then. Servitization has been defined over the years differently depending on the discipline (strategic management, marketing, operations, service management, IT, etc.) and the time period (Pinillos et al., 2022). The most commonly agreed definition sees servitization as a means to create added value to traditional offerings by developing new capabilities (Baines et al., 2009; Baines and Lightfoot, 2013; Sousa and Silveira, 2017). Baines et al (2009) have also suggested the existence of different levels of services (base, intermediate and advanced) with different impacts on capabilities and performance (Baines, Lightfoot and Smart, 2011). Currently, many of the servitization studies focus on the impact of digitalization as one of these inherent and fundamental capabilities to be developed (Galvani and Bocconcelli 2022; Vilkas et al., 2022), but there is more to the servitization dynamics that needs investigation.

When looking at the literature on servitization and performance, various studies have shown support for the positive impact of servitization on performance (Antioco et al., 2008; Fang et al., 2008; Neely, 2008; Hultén, 2012; Vendrell-Herrero, et al., 2014; Wang et al., 2018; Sjödin et al., 2019; Queiroz et al., 2020; Zhang et al, 2019; Zhou et al., 2020; Abou-foul et al., 2021; Manresa et al., 2021). Wise and Baumgartner (1999) used a case study approach to suggest the influence of servitization on performance. Vendrell-Herrero, et al., (2014) suggested that servitization had a positive influence on firm performance. Wang et al. (2018) supported the positive impact of servitization and performance through a quantitative review of the servitization-performance relationship

using a meta-analytic approach. Sjödin et al. (2019) identified the influence on firm performance. Queiroz et al. (2020) found a positive relationship between servitization and performance in Brazilian SMEs, including an impact of offering base services. Moreover, Zhang et al (2019) demonstrated a lack of impact of servitization on performance. Using data from 143 servitized Chinese manufacturers, Zhou et al. (2020) investigated how a manufacturer's service supply network moderates the effect of performance onservitization. Their findings suggested that servitization has a U-shaped relationship with a manufacturer's financial performance. They also found U-shaped servitization-performance relationship. More recently, Abou-foul et al. (2021) found that digitalization and servitization had a positive impact on performance, supporting that in order to achieve superior bottom-line results, companies must integrate digital and service-specific capabilities that reinvent the nature of an offering. Aligned with this, using a dataset of 205 Spanish and Croatian manufacturing firms, Manresa et al. (2021) tested the capabilities–service–performance chain. These authors found that digital capabilities are important for the provision of all three groups of services (base, intermediate and advanced).

The evolution of the servitization concept (Pinillos et al., 2022) and these research trends suggest a clear move from selling products to providing solutions (Gebauer et al., 2013; Huikkola and Kohtamäki, 2017) in which more than focusing on services that add value to products, companies see products almost as additional conditions of product-service offerings. This trend has occurred across industries including the pharmaceutical industry, as analysed by Ruizalba et al. (2015, 2016, 2019). These authors applied the service levels categorisation (developed in Baines and Lightfoot, 2013) to the pharmaceutical industry, characterizing the different types of services in this industry in Spain and Portugal. They have also identified three strategic factors/reasons for pharmaceutical distributors to engage in the design and implementation of services that included: the pursuit of profitability, the pursuit of competitive advantage and the pursuit of loyalty. Continuing further from this analysis, the present study presented in this paper focuses specifically on the role of collaboration in this servitization SC dynamic.

Collaboration has already been highlighted in servitization research. Bikfalvi et al. (2013) found that servitization was positively linked with increasing service networking activities but that these require the establishment of inter-firm collaboration. Nonetheless, research in this area is scarce.

Following these findings, it is argued that to implement differentiated levels of services and successful servitization strategies, SCC is an essential condition as detailed below.

Supply chain collaboration (SCC) and servitization

Collaboration is a concept that has been studied in the context of supply chain management under many definitions (Danloup et al., 2013). Looking for partner companies to collaborate to achieve superior value is not a new concept (Corsten and Kumar, 2005). Since 1989 that Håkansson and Snehota are telling us that “no business is an island”. Nevertheless, although SCC has been investigated since the late 1980’s and early 1990’s in the supply chain literature (Bowersox and Daugherty, 1987; Ellram and Cooper, 1990), not many companies engage in actual collaboration even when they acknowledge its potential mainly due to its associated costs (Sabath and Fontanella, 2002; Fawcett and Magnan, 2004; Min et al. 2005; Chaney et al., 2022).

As such, further research is still required to understand the practical value of SCC, particularly regarding the link between SCC, servitization, and subsequent outcomes (Kumar, 2021; Chaney et al., 2022; Wang et al. 2022). SCC expected outcomes include improved demand planning (McCarthy and Golicic, 2002), inventory visibility (Sabath and Fontanella, 2002; Stank et al., 2001), in brief, higher performance than operating individually (Stern and Reeve, 1980; Anderson and Narus, 1990; Lambert et al., 1999). The measurement of SCC and clarifying of its outcomes needs attention (Lambert and Pohlen, 2001; Simatupang and Sridharan, 2004).

The marketing channels literature has frequently examined relationships and their efficiency through a relationship marketing perspective (Sin et al., 2005). Recent studies have highlighted the need for further research in this field, emphasising the significance of SCC to the business community (Fliess and Lexutt, 2019; Johansson et al., 2019; Smania et al., 2022). SCC is no longer an option but a requirement to successfully compete (Nguyen et al., 2019; Kumar, 2021). Organisations have moved from considering single market transactions to considering relational exchanges, where the roles of buyers and suppliers are no longer narrowly defined as a transfer of ownership of products, but also consider knowledge, trust, and other relational variables (Liu et al., 2019, 2021; Nguyen et al., 2019; Kreye and Donk, 2021; Sharma, 2021; Solem et al., 2022).

SCC has been defined both as a business process (e.g., Mentzer et al., 2000; Stank et al., 2001) and as a network of relationships (e.g., Bowersox et al., 2003; Golicic et al., 2003). For example, Simatupang and Sridharan (2002, p. 19) define SCC as "two or more independent companies (that) work jointly to plan and execute supply chain operations with greater success than when acting in isolation". Fawcett et al. (2008) argue that more than efficiency, SCC implies managing relationships for innovation and continuous improvement, aiming at joint problem solving and delivering expected customer value. Whipple et al., (2010) understand SCC as a long-term relationship where participants cooperate, share information, and work together towards the improvement of joint performance. Cao and Zhang (2011, p.166) define SCC as "a partnership process where two or more autonomous firms work closely to plan and execute supply chain operations toward common goals and mutual benefits". Danloup et al. (2013) define SCC in terms of cost-effective, timely, and reliable joint activities that generate customer satisfaction. In a recent paper, Kumar (2021) argues that the main idea behind SCC is to create relational rents to build dynamic capabilities and achieve distinctive advantages.

Following these definitions, SCC can be understood with two underlying major foundations: design and government of supply chain activities, and the supply chain relationships (Danloup et al., 2013; Kumar, 2021). These foundations apply to all types of collaboration. There are three common types of collaboration: vertical collaboration, horizontal collaboration, and lateral collaboration (Danloup et al., 2013).

The effect of collaboration on performance has been demonstrated by many studies such as Frohlich and Westbrook (2001), Fynes, Búrca et al. (2005), Lee et al. (2007), Sanders (2007), Silveira and Arkader (2007), Rosenzweig (2009), Cao and Zhang (2011), Gueimonde-Canto et al. (2011), Iyer (2011), Day et al. (2015), Kumar et al. (2016), Nguyen et al. (2019), Kumar (2021), Solem et al. (2022).

Frohlich and Westbrook (2001) empirically demonstrated that companies that integrate both suppliers and customers into their activities had stronger associations with performance improvements than companies that integrate only suppliers or only customers. Focusing on relationship dimensions (trust, commitment and communication), Fynes et al. (2005) suggested that the development of closer supply chain relationships could indeed improve performance outcomes, arguing that the more competitive the environment, the stronger this association would be. Lee et al. (2007) also argued that supplier collaboration was a key indicator of both performance reliability and overall performance. Sanders (2007) demonstrated empirically an indirect effect of inter-organisational collaboration through the impact of intra-organisational collaboration. Rosenzweig (2009) showed that e-collaboration was related to better operational and business performance. Cao and Zhang (2011) explored the nature of SCC and its impact on firm performance based on a paradigm of collaborative advantage. These authors found that SCC improved collaborative advantage and firm performance. Gueimonde-Canto et al. (2011) argued the importance of industry-specific and contextual factors in the analysis of collaborative practices, encountering for their sample an effect only regarding cooperation with buyers (and not with suppliers). Day, Lichtenstein, and Samouel (2015) further highlighted collaboration management measures and their impact on performance. Kumar et al. (2016) studied collaborative culture and relationship strength roles in SCC and found that culture and relationship strengthens significantly and influenced collaborative activity. This is supported by Nguyen et al.'s (2019) findings that showed that cognitive proximity facilitated SC incentive alignment. In their research, Kumar (2021) found that market-based knowledge sharing is important for SCC . Firms from the pharmaceutical, automobile and electrical/ electronic industry tended to practice higher collaboration as compared to other industries. Liu et al. (2021) examined service value chain collaboration from a systematic perspective, proposing a collaboration framework based on cloud platform for service value chain with a comprehensive consideration of coordination.. Using an action research approach, Solem et al. (2022) highlighted the underlining role of service-design to enhance servitization transformation. These authors identified the drivers of the servitization transformation as: (a) customer data acquisition, (b) smart PSS collaboration through co-creation across departments, (c) smart PSS ideation through creative forms of collaboration, and (d) effective smart PSS delivery and commercialization.

Effective SSC demands strategic management and coordination of relationships developed with partners (Day et al., 2015). But collaboration should not be seen as a panacea for all evils and SCC does not always produce the desired benefits leaving space for criticism and ambiguity (Sabath and Fontanella, 2002; Fawcett and Magnan, 2002; Daugherty et al., 2006; Kumar, 2021). Thus, research on its impact on performance has produced mixed results (Stank et al., 2001; Sinkovics and Roath, 2004; Corsten and Felde, 2005; Ruiz-Alba et al., 2020; Ruzo-Sanmartín et al., 2022).

When looking specifically at the literature on collaboration in the context of servitization, a few studies can also be mentioned (Weigel and Hadwich, 2018; Grandinetti et al., 2020; Polova and Thomas, 2020; Tronvoll et al, 2020; Wu, Liu and Bao, 2021; Chaney et al., 2022). Weigel and Hadwich (2018) influence of key factors on performance and long-term partner retention of service networks in the context of servitization. Grandinetti et al. (2020) looked at digital servitization in B2B contexts by analysing how Industry 4.0-based servitization affected the quality of supplier–customer relationships. Examining the strategic organizational shifts that underpin digital

servitization, Tronvoll et al (2020) found that organizational identity, dematerialization, and collaboration played a key role in this digital servitization transformation. Examining data collected from 175 Chinese manufacturing firms, Wu, Liu and Bao (2021) also found support for the role of value chain collaboration in business model innovation. Recently, Chaney et al. (2022) research on the adoption of additive manufacturing technologies demonstrated a positive influence on servitization.

Research Framework & Hypotheses

This brief overview of the literature suggests a lack of research on the role of SCC on servitization and their impact on performance, hence the present study and the suggested research framework detailed in Figure 1.

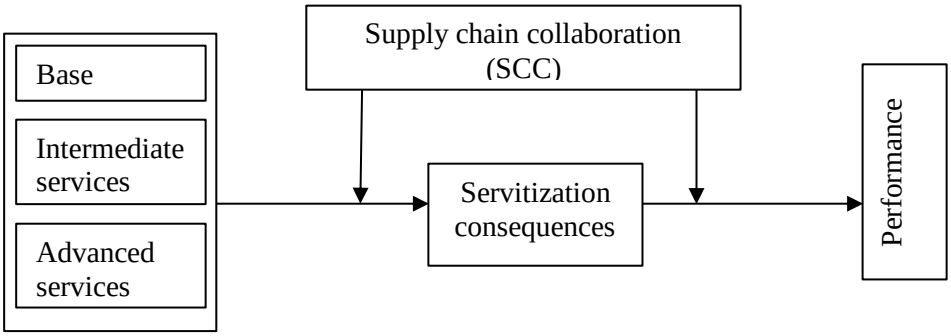

Figure 1: Suggested research framework and hypotheses.

H1: Base services have a positive impact on performance
H2: Base services have no relationship with servitization consequences
H3: Intermediate services have a positive impact on performance
H4: Intermediate services have no relationship with servitization consequences
H5: Advanced services have a positive impact on performance
H6: Advanced services have a positive impact on servitization consequences
H7: Servitization consequences have a positive impact on performance
H8: Supply chain collaboration (SCC) moderates the impact of base, intermediate and advanced on performance.
H9: Supply chain collaboration (SCC) moderates the impact of base, intermediate and advanced on servitization consequences.

Methodology

In order to investigate this, a quantitative research methodology was implemented. A model was developed and tested empircally in the pharmaceutical industry in Spain. The data collection instrument included the measurement of SCC, the relationships between the use of different levels of services (base, intermediate and advanced) as well as their impact on servitization consequences (i.e., improvement of process and capabilities – following Baines et al. (2009) understanding of servitization) and performance (financial and market performance). A total of 219 pharmacy stores returned valid questionnaires (29% response rate) and the data analysis included both exploratory and confirmatory factor analysis as well as multiple regression analyses.

SCC was measured based on the measures available in Day, Lichtenstein and Samuel's (2015) paper. The different levels of services (base, intermediate and advanced) were measured based on the categorization of Baines and Lightfoot (2013) applied to the Spanish pharmaceutical industry by Ruizalba et al. (2015, 2016). In turn, servitization consequences (i.e., improvement of process and capabilities) were measured following the Baines et al. (2009) servitization definition. And performance measures were based on Fang et al., (2008), Hultén (2012) and Vendrell-Herrero, et al., (2014).

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA)was used to validate the scales. EFA was used to test if services used by pharmacy stores were grouped according to the classification proposed by Baines et al. (2013) and Ruizalba et al. (2015; 2016). The presence of three factors was confirmed with eigenvalues higher than one that explained 58% of the variance. Factor loadings analysis allowed the interpretation of those factors into base, intermediate and advanced services. After this analysis, CFA was performed to analyse whether the scales used were valid and reliable. Robust Maximum Likelihood was the method of estimation as the sample did not followed multivariate normal distribution (b1p = 206.99; Z = 22.50; p = 0.00; b2p = 1060.81; Z = 11.19; p = 0.00; omnibus = 631.72; p = 0.00) (see Bollen, 1989; 415-424). The proposed model showed adequate global fit indicators (χ^2_{SB} = 542.71; df = 388; p-value = 0.00; GFI = 0.96; AGFI = 0.95; CFI = 0.95; NNFI = 0.94; TLI = 0.94; RMSEA = 0.04). Reliability was measured through Cronbach's Alpha and the coefficient of compound reliability showed values over 0.70 for all constructs. The average extracted variance (AVE) was above 0.50 in all cases with the exception of SCC which was 0.40. Nonetheless, the elimination of the item with the lowest individual reliability did not result in a significant increase of neither compound reliability nor AVE. Following the recommendations of Hair et al. (2014, pp. 103-104), this item was preserved not affecting content validity.

The the constructs have convergent validity (see Table 1). Discriminant validity was tested with the heterotrait-monotrait ratio of correlations (HTMT) (see Henseler, Ringle and Sarstedt, 2015) showing a value below to 0.90. All constructs have discriminant validity. Once demonstrated both the convergent and discriminant validity of the scales, seven new variables were calculated using the average of items adopted to measure each latent variable.

Table 1. Reliability and Averaged Extracted Variance (AVE)

Construct	Cronbach's alpha	Compound Reliability	AVE
Base services	0.81	0.81	0.52
Intermediate services	0.91	0.91	0.63
Advanced services	0.88	0.88	0.56
Servitization consequences	0.84	0.85	0.74
Financial performance	0.82	0.83	0.61
Market performance	0.78	0.78	0.54
Degree of co-creation	0.79	0.79	0.40
Performance	-	0.89	0.80

Source: Authors own work

Results

In order to test the suggested hypotheses, a specified model was created with two dependent variables: performance and servitization consequences. To explain performance, the following independent variables and interaction effects were used: base, intermediate and advanced services, servitization consequences, SCC, base by SCC, intermediate by SCC, advanced by SCC and servitization consequences by SCC. Similarly, to explain the servitization consequences variable, the following variables and interaction effects were used: base, intermediate and advanced services, base by SCC, intermediate by SCC, and advanced by SCC. All variables were centered on the mean to avoid collinearity effects on the estimated coefficients. The standard errors were estimated using the robust variant Eicker-Huber-White (Stock and Watson, 2012, p. 164). Finally, it was verified that the residuals followed a normal distribution.

When using performance as the dependent variable, three main effects appear as significant (see Table 2): intermediate services, advanced services, and servitization consequences. None of the other effects exhibited significant results. The intermediate and advanced services had a positive impact on performance (β_{interm} = 0.29; p = 0.00; β_{advanc} = 0.18; p = 0.01), therefore H3 and H5 should not be rejected. By the same token, servitization consequences positively impact on performance (β_{servit} = 0.15; p = 0.00), hence H7 also receives empirical support. Nonetheless, base services showed no significant influence neither on performance (H1 should be rejected), nor in any of the moderating effects proposed (H8 should also be rejected). The adjusted R^2 was 0.30.

Table 2. Estimated coefficients in the performance equation.

	Coeff	Std. err	t-stat	p-value	vif
Intercept	3.98	0.05	79.34	0.00	
Base services (BS)	-0.02	0.05	-0.48	0.64	1.00
Intermediate services (IS)	0.29	0.04	6.68	0.00	1.08
Advanced services (AS)	0.18	0.05	3.31	0.00	1.84
Servitization consequences (SC)	0.15	0.05	3.29	0.00	1.79
Supply chain collaboration (SCC)	0.00	0.05	0.01	0.99	1.17
BS x SCC	-0.06	0.04	-1.51	0.13	1.14
IS x SCC	-0.03	0.04	-0.86	0.39	1.09
AS x SCC	0.07	0.04	1.61	0.11	1.47
SC x SCC	-0.02	0.03	-0.67	0.50	1.44

Source: Authors own work

When the analysis looks into servitization consequences, a main effect and two interaction effects emerge (Table 3). As expected, the relationship between base and intermediate services is not significant (β_{base} = 0.06; p = 0.42; β_{interm} = 0.03; p = 0.63), so H2 and H4 should not be rejected. In turn, there is a positive and signifcant relationship between advanced services and servitization consequences (β_{advanc} = 0.67; p = 0.00) (H6 receives empirical support). Finally, two interaction effects exhibited significant results (IS x SCC and AS x SCC). On one hand, intermediate services, results showed that intermediate services significantly influence servitization consequences but only when the degree of collaboration is high (β_{IS_HSCC} = 0.25; p = 0.00 vs β_{IS_LSCC} = 0.06; p = 0.42)

(Figure 1a). On the other hand, advanced services significantly influence servitization consequences, and this influence is higher when the degree of collaboration is high ($\beta_{AS\_HSCC} = 0.80$; $p = 0.00$ vs $\beta_{AS\_HSCC} = 0.67$; $p = 0.00$). From the aforementioned results, it can be said that H9 only gets partial support since the interaction between base services and SCC was not significant ($\beta_{BS\_SCC} = 0.07$; $p = 0.17$) (Figure 1b). The adjusted R^2 was 0.42 in this case.

Table 3. Estimated coefficients in servitization consequences equation.

	Coeff	Std. err	t-stat	p-value	Vif
Intercept	4.62	0.08	61.60	0.00	
Base services (BS)	0.06	0.07	0.81	0.42	1.00
Intermediate services (IS)	0.03	0.06	0.48	0.63	1.05
Advanced services (AS)	0.67	0.07	10.03	0.00	1.23
Supply chain collaboration (SCC)	0.08	0.07	1.19	0.24	1.16
BS x SCC	0.07	0.05	1.36	0.18	1.12
IS x SCC	0.19	0.06	3.32	0.00	1.04
AS x SCC	0.13	0.06	2.20	0.03	1.16

Source: Authors own work

Discussion

Main findings show SCC emerging as a clear differentiating factor of performance for servitizing firms aligning with Kumar's (2021) definition of SCC as a means to create relational rents to build dynamic capabilities and achieve distinctive advantages. As suggested by the literature (Sjödin et al., 2019; Zhang et al., 2019; Zhou et al., 2020; Manresa et al., 2021), different outcomes were obtained in terms of SCC levels and their impact on services levels. Thus, the degree of collaboration exhibits a moderating effect for intermediate and advanced levels of services.

There is also a statistically significant relationship between advanced services and servitization consequences which is consistent with the literature so far discussed. Accordingly, servitization consequences also show a statistically significant effect on performance, supporting Baines et al. (2009) definition as the literature that supports the impact of servitization on performance (e.g., Fang et al., 2008; Neely, 2008; Hultén, 2012; Vendrell-Herrero, et al., 2014; Wang et al., 2018; Sjödin et al., 2019; Queiroz et al., 2020; Zhang et al, 2019; Zhou et al., 2020; Abou-foul et al., 2021; Manresa et al., 2021). Nonetheless, these effects are increased through collaboration.

Regarding the moderating role of collaboration, results showed that this effect is particularly relevant for the implementation of advanced and intermediate services.

Advanced services and servitization consequences always have an impact on performance. Advanced services also exhibit an effect on servitization consequences, but this effect is moderated by collaboration, that is, the effect of advanced services on servitization consequences is higher when the degree of collaboration is higher. This means that, although advanced services always lead to the improvement of processes and capabilities (as per the servitization definition of Baines et al., 2009), this effect will increase in the presence of collaboration.

In turn, intermediate services do not influence directly servitization consequences, but they influence performance. Intermediate services do not influence servitization consequences, unless there is a high degree of collaboration. This means that intermediate services will only contribute to the improvement of processes and capabilities when there is a high degree of SCC. This might be explained by the fact that when collaboration levels between servitizing and servitized firms is higher, this seems to enable the provision of personalized and adjusted services focusing on the needs of that specific customer which can then help in the development of their processes and capabilities (Polova and Thomas, 2020; Tronvoll et al., 2020; Chaney et al., 2022). Otherwise, the application of generalised solutions may actually hinder the organisation.

This study supports the role of a collaborative culture and relationship strength in the pursuit of performance as identified for example by Kumar et al. (2016) and Nguyen et al. (2019). Still, the literature has produced contradicting results when it comes to the impact of collaboration on performance and alert us to the fact that collaboration does not solve all problems (e.g., Sabath and Fontanella, 2002; Fawcett and Magnan, 2002; Daugherty et al., 2006; Kumar, 2021; Ruiz-Alba et al., 2020; Ruzo-Sanmartín et al., 2022).

Although previous studies (e.g., Bikfalvi et al., 2013; Nguyen et al., 2019; Grandinetti et al. 2020; Kumar, 2021; Kreye and Donk, 2021; Solem et al., 2022) have supported the requirement for inter-firm collaboration when implementing servitization, companies tend to not engage in actual collaboration even when they acknowledge its potential mainly due to its associated costs (Sabath and Fontanella, 2002; Fawcett and Magnan, 2004; Min et al. 2005; Chaney et al., 2022). However, according to Kumar (2021), firms from the pharmaceutical industry (along with automobile and electrical/ electronic companies) tend to practice higher collaboration than companies in other industries. Gueimonde-Canto et al. (2011) also argued the importance of industry-specific and contextual factors in the analysis of collaborative practices. Therefore, it is not surprising that in this study, collaboration reveals to be key to increase the effect of advanced and intermediate services. Still, empirical research is still needed to establhsi the conditions of these relationships and as argued by Sjödin et al. (2019) establish the multiple paths to achieving superior outcomes. We argue, however, that these outcomes must go beyond financial performance and focus on relational rents (Kumar, 2021) and servitization consequences to clarify the role of SCC both as a business process (as defined by Mentzer et al., 2000; Stank et al., 2001) and as a network of relationships (as defined by Bowersox et al., 2003; Golicic et al., 2003; Danloup et al., 2013).

Conclusion & Recommendations

In conclusion, due to Baines et al. (2009) definition and subsequent research it is commonly assumed that advanced services will lead to the development of processes and capabilities. Therefore, the really important question is not on whether these services influence performance but on how they do so. Moreover, it is also important to establish how intermediate services effects can be heightened. Accordingly to the findings of the present paper the answer to these questions is the need to increase supply chain collaboration.

Main findings clearly show the moderating role of SCC on the superior effects of advanced and intermediate services on servitization consequences and subsequently on performance. Hence, this paper argues that intermediate services should not be ignored

or set aside as less important in the servitization processes since their effect on servitization consequences through performance later reflects on performance improvements, which is also consistent with Baines et al (2009) definition of servitization adopted in this research.

These research findings are relevant for scholars and for practitioners when implementing servitization in the pharmaceutical industry. More specifically, two main contributions can be pointed: (1) The novelty of considering SCC in the servitization debate; (2) another novelty in regards to the lack of measurement of SCC (Lambert and Pohlen, 2001; Simatupang and Sridharan, 2004) is the empirical measurement of SCC and clarification of outcomes, in this case it was the impact of servitization consequences on performance through collaboration. Managers should work jointly with their business partners to plan and implement supply chain operations (Simatupang and Sridharan, 2002).

To sum up, collaboration is then a crucial element in the successful implementation of intermediate and advanced services. Therefore, future research should focus further on understanding: (1) the effects of inter-firm relationships on servitization; (2) Internal marketing orientation and the capabilities required to servitize.

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