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Postponement and logistics flexibility in retailing: The moderating role of logistics integration and demand uncertainty

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ABSTRACT

Dynamic capabilities such as flexibility are considered influential in achieving superior performance, especially under uncertain circumstances. Among others, postponement is a well-established concept in operations and supply chain management (OSCM) and has been regarded as a key concept in managing supply and demand while increasing flexibility. This study investigates the effect of postponement on logistics flexibility, and that of the latter on retail firm performance. In addition, the moderating roles of logistics integration and demand uncertainty on these relationships are investigated. The study utilizes a quantitative survey and draws on a sample of 261 retailers in Sweden. Logistics flexibility proves to have a mediating role in the postponement–performance relationship. Furthermore, we provide support for the direct effect that postponement can have on logistics flexibility, and the subsequent effect of logistics flexibility on retail firm performance. We contribute by simultaneously studying postponement and logistics flexibility in the retailing context. We find conditional support for the moderating roles of logistics integration and demand uncertainty. The results show that for medium levels of uncertainty, the positive relationship between postponement and logistics flexibility, as well as logistics flexibility and firm performance, are intensified. From a practical standpoint, the findings underline that in the presence of high or low demand uncertainty, applying postponement may not always be beneficial in achieving logistics flexibility, and subsequently better performance. Moreover, if retailers prioritize logistics integration, they should not always expect superior performance gains from the flexibility benefits of postponement.

1. Introduction

To survive in a time-based competitive market in which extensive variety, better quality and service are taken for granted, retailing firms can capitalize on improving their capabilities (Fisher et al., 2019; Duclos et al., 2003). The unprecedented increase in demand uncertainty calls for improved dynamic capabilities, such as flexibility, in logistics operations (Sandberg, 2021; Zinn, 2019). Operations and Supply Chain Management (OSCM) scholars have generally regarded flexibility as being instrumental in employing the initiatives leading to higher performance (Tummala et al., 2006; Fayezi et al., 2017). Specifically, since supply chains are subject to variability in delivery due to long distances, lead-times, and time-lags (Prater et al., 2001), flexibility in logistics could be of significant relevance in achieving better performance in meeting customer or firm objectives (Liao, 2020).

In the retail industry, a major challenge is in striking a balance between offering a variety of products, timely on-shelf availability, and quality service, while avoiding stockpiles of inventory caused by over-anticipating the customer demand. As an alternative to sales forecast-based planning, delaying product differentiation and/or inventory placement, termed postponement, has proven to be effective in improving the cost – customer service trade-off, especially under demand uncertainty (Zinn, 1990, 2019; Boone et al., 2007; Van Hoek, 2001). Meanwhile, recently, further attention has been given to the application and relevance of postponement in downstream supply chains, notably in light of the global competition and digitalization (Prataviera et al., 2020). Nevertheless, the direct impact of applying postponement on firm performance has long been an area of debate (Lee and Tang, 1997). While scholars often regard postponement in causal conjunction with flexibility (Waller et al., 2000; Li et al., 2006;

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Stevenson and Spring 2007; Tang and Tomlin, 2008; Sreedevi and Saranga, 2017), questions arise as to how firms can benefit from the advantages of postponement without incurring the risk of stock-outs, with respect to demand uncertainty.

Researchers have called for more studies on understanding what drives firms to be flexible, with specific consideration to the effect of postponement (Pagell and Krause, 1999; Nair, 2005; Yang and Burns, 2003; Sandberg, 2021). While substantial literature has been devoted to postponement and flexibility as individual constructs, there is paucity in studies that consider both simultaneously (e.g., Nair, 2005). Additionally, integrating operations with other supply chain actors is considered strategically important in the logistics flows (Bernon et al., 2013; Frohlich and Westbrook, 2001). Richey et al. (2012) maintain that integrative and collaborative activities, with the contribution of suppliers, benefit retailers concerning timeliness. Nevertheless, while the direct performance gains from integration has been an area of argument (Fabbe-Costes and Jahre, 2008; Flynn et al., 2010), integration can play a non-negligible contingent role in the effectiveness of logistics practices (Luu, 2017). As Saghiri and Barnes (2016) highlight, close coordination and integration with suppliers is a key supporting element in implementing postponement, since that may involve last-minute changes or commitments to product configurations or location. Although some scholars have shed light on the interplay between integration and flexibility in terms of increasing firm performance, they have done so without considering postponement or other contextual factors (e.g., Kim, 2009). More importantly, the majority of the existing research on both postponement and flexibility has been in the context of the *manufacturing industry* to the extent that many have criticized the body of literature for neglecting industries such as retailing and e-commerce, wholesale, and services (Boone et al., 2007; Stevenson and Spring 2007; Moon et al., 2012; Jafari et al., 2016; Prataviera et al., 2020). Most of the studies on postponement are also considered to be of conceptual nature; and therefore, empirical contributions especially involving quantitative surveys are even more relevant and timely (Yang et al., 2005; Zinn, 2019).

Against this backdrop, our study seeks to investigate the relationship between postponement, logistics flexibility, and firm performance in the retailing industry. Subsequently, we also study the moderating impacts of demand uncertainty and logistics integration. By testing the proposed hypotheses, this paper contributes to literature and practice by building insights from a survey study on Swedish retailing firms by focusing on the connection between applying postponement and logistics flexibility. The Swedish retail market has shown a consecutive steady growth in sales over the past two decades (Statistics Sweden, 2021). Also, Sweden is ranked number 2 in the World Leading Logistics Infrastructure Index, just behind Germany (World Bank, 2019). Furthermore, given the dearth of appropriate literature, this study offers a more exhaustive understanding of the different situations wherein the impacts of postponement on logistics flexibility, and that of the latter on performance are realized. Also, by drawing on the dynamic capability view, this study strives to unearth the situations which can help recognize when capabilities can lead to better outcomes by specifically considering the contingent effects of demand uncertainty and logistics integration. Moreover, the study investigates the mediating role of logistics flexibility, as a dynamic capability, in the postponement – performance relationship, which addresses the debate on how postponement can indirectly – via dynamic capabilities – impact firm performance.

2. Theoretical framework and hypotheses

2.1. Dynamic capabilities

Generally, ordinary capabilities are "the set of abilities and resources that go into solving a problem or achieving an outcome" (Zahra et al., 2006: 921). In a broader perspective, these could be manifestations, bundles, or deployment of firms' resources; a cornerstone in the resource-based view (RBV) (Ambrosini and Bowman, 2009; Amit and Schoemaker, 1993). Outpacing competition in acquiring resources could have significant cost and performance implications (Wernerfelt, 1984). Lado et al. (1992) reflect on how sustainable competitive advantage might be achieved by discussing the *strategic selections* that firms make in creating and seizing opportunities. Under conditions of high uncertainty and market dynamics, firms need to re-adjust their capabilities. Therefore, in such markets, developing *dynamic capabilities* to create and reconfigure competencies is of high relevance (Teece et al., 1997). Such dynamic capabilities, which can be internally developed or externally acquired, could potentially impact firm performance, and hence competitiveness, in the long-run (Teece, 2007).

Various "dimensionalization" frameworks have been developed to differentiate between various different, yet closely related, levels or hierarchies of capabilities (Schilke et al., 2018). Stalk et al. (1992) trichotomize capabilities depending on the orientation and the focus of the defining processes. In their view, the capabilities that are deployed from the inside-out and are activated by market requirements, competitive challenges, and external opportunities are on one side of the spectrum. On the other side, are capabilities whose focal points are almost exclusively outside the organization. Finally, spanning capabilities are those that are needed to integrate the two former capabilities. From this perspective, several business logistics activities could be considered "inside-out" capabilities, such as order fulfillment or cross-docking (Day, 1994). Lado et al. (1992)'s conceptualization includes resource-transformation-, and output-based competencies. Along similar lines, Ambrosini and Bowman, 2009's framework classifies dynamic capabilities in hierarchies. Based on this, lower level dynamic capabilities deal with continuously improving and adapting the resource base, while higher level dynamic capabilities are concerned with the methods that firms use to change their resource base (Ambrosini et al., 2009). Drawing on the dynamic capability view, we posit that postponement, as a lower-order inside-out capability, impacts the higher-order *dynamic* capability of logistics flexibility. Our motivation is in line with the reasoning of Upton (1994: 75) in dichotomizing capabilities. Accordingly, postponement is an "internal" capability which entails "what we can do", rather than an "external" capability which involves "what the customer sees". From this perspective it is the latter external capabilities which are the sources of competitive advantage, and hence superior performance. For instance, delaying product assembly or labelling may not be visible to customers, but its manifestation, such as customized products, or flexible delivery solutions are (e.g., Jafari et al., 2015).

The dynamic capabilities view has been widely applied by OSCM researchers to address the complexities and dynamics in the marketplace. Among some of the important aspects of certain supply chain capabilities is "timeliness" (Richey et al., 2012). Both postponement and flexibility are among the major time-based capabilities discussed in OSCM literature (Yang et al., 2004b; Waller et al., 2000; Aslam et al., 2018). Stalk et al. (1992) maintain that companies that compete effectively on time tend to be good at other things as well; hence, drawing attention to capabilities-based competition. It should be noted that scholars have called for investigating several dynamic capabilities simultaneously or have stressed their roles to be necessary but insufficient in impacting performance (Eisenhardt and Martin, 2000; Barreto, 2010). According to Paulraj (2011), the synergistic nature of resources and/or capabilities leads to them being more valuable when combined with others, both internal and external. Supply chain capabilities and resources are the building blocks for supply chain strategy and a potential source of competitive advantage (Morash and Lynch, 2002; Mentzer et al., 2004). We use this line of reasoning based on the dynamic capabilities view to explain how postponement and logistics flexibility can have a synergetic role in improving firm performance, and hence should be studied cohesively in explaining the gains provided by a bundle of supply chain capabilities.

2.2. Logistics flexibility

Flexibility, a prevalent dynamic capability for tackling uncertainty, represents the ability to accommodate major changes in the internal or external environment (Schilke et al., 2018). Broadly, "flexibility is the ability to change or react with little penalty in time, effort, cost, or performance" (Upton, 1994: 73). From the dynamic capability and RBV perspectives, the fact that resources can be deployed, coordinated, and bundled to form capabilities is considered to be the fundamental premise of flexibility (Liao et al., 2010; Hartmann and De Grahl, 2011). Moreover, *speed* is widely considered as a characteristic of flexibility (Grawe et al., 2011; Lummus et al., 2005; Nair, 2005; Duclos et al., 2003; Abrahamsson and Brege, 2004). Following this reasoning, some scholars underline "quickness" in reconfiguring resources for responding to demand to be intrinsic in flexibility (e.g., Wright and Snell, 1998).

Among various types of flexibility, flexibility in logistics operations stands out as a means to improve both responsiveness along supply chains, and competitiveness in product delivery flows in the short and long run, respectively (Liao, 2020; Swafford et al., 2006). In the broader sense, Duclos et al. (2003: 451) define logistics flexibility as the "ability to cost effectively receive and deliver product as sources of supply and customers change". According to them, these sources of changes could relate to customer location, globalization, or *postponement*. In this study, the conceptual framework originally developed by Zhang et al. (2005, 2003, 2002, 2006) is used, which goes beyond flexibility in the physical flows of products. It rather involves flexibility in purchasing and demand management. This further underlines the importance of integration of logistics activities and process with external supply chain actors as a supporting mechanism. Based on this framework, logistics flexibility is broadly dichotomized into upstream- and downstream-facing competencies and capabilities, respectively. The former includes physical supply and purchasing flexibilities which deal with inbound transportation, warehousing, and supply. The latter deals with physical distribution and demand management flexibilities including customer fulfillment via inventory adjustment, packaging, outbound transportation, and order-tracking.

2.3. Postponement

Conventionally, inventory has been considered by scholars and practitioners as a buffer for tackling demand uncertainty (Newman et al., 1993). Buffers enable higher flexibility in offering a broader product range, and, in doing so, increase responsiveness to change in customer requirements (Pagell and Krause, 1999). However, increasing inventory levels due to buffers not only increases inventory carrying costs, but also increases several major risks including risk of obsolescence and the "bullwhip effect" (see Lee et al., 1997). In this regard, postponement, or delayed configuration, aims at delaying certain supply chain activities (e.g., assembly, packaging, labelling, distribution, design, purchasing) until more accurate information regarding customer order is realized (Pagh and Cooper, 1998; Yang et al., 2004a; Zinn, 2019). As a well-established principle rooting back to the early works of Alderson (1950), postponement has been practiced since the 1920s. In global downstream supply chains, postponement becomes even more relevant in light of the differences in customs and duties, regulations, or geographical preferences or requirements in product packaging, brands, tastes, language, etc. (Prataviera et al., 2020).

Postponement, an alternative to forecast-based systems in supply chains, has been proven to help improve product availability, variety, and quality (Zinn, 1990; Zinn and Bowersox, 1988). Catalan and Kotzab (2003) highlight the role of postponement in creating better demand transparency and reducing uncertainty. However, the benefits of postponement should be balanced with the potential costs associated mainly with geographical dispersion and risk of unmet demand or stock-outs. For instance, postponement has been criticized for merely "displacing the responsiveness problem" or shifting risks, since inventory needs to be held at some point (Hedenstierna et al., 2019). Therefore, the benefits of postponement can be improved by having a highly efficient and speedy supply and distribution system, and logistics integration (Choi et al., 2012; Jafari et al., 2016). Although postponement can be applied at different levels of the supply chain or at an aggregate or item level of products (Saghiri and Barnes, 2016), its implementation may involve actors beyond the conventional "focal firm". In light of the new digital paradigm in supply chains, postponement may further engage downstream actors such as retailers or consumers in the logistics activities (Zinn, 2019; Stank et al., 2019; Rouquet et al., 2017). For instance, retailers or consumers can partake in not only the last-mile logistics but also the design or final assembly and modification of products (Jafari et al., 2015).

2.4. Relationship between postponement and flexibility

The prevalence of theoretical and managerial interest in increasing flexibility has contributed to the popularity of postponement (Jafari et al., 2016; Nair, 2005). Postponement facilitates firm's flexibility in meeting changing customer needs by enabling the development of different versions of products, adapting of distribution solutions, and modifying the demand rate along price points (Waller et al., 1999; Prasad et al., 2005). Basically, finalizing product configurations or locations limits firms' flexibility in reacting to demand changes. In other words, flexibility of firms will be limited if they rely on speculative, as opposed to postponement, strategies. Li et al. (2005) discuss how postponement could lead to flexibility in new product development, customization, and differentiation. Various types of postponement, including logistics postponement, increase relying on demand information, and therefore, lead to higher flexibility in inbound and outbound logistics (Stevenson and Spring 2007). As firms delay certain value activities along the supply chain (e.g., retailers shipping products to specific stores from regional or central distribution centers), a window of time is opened during which they can quickly adapt and react to the signals they receive from the market (reallocate inventory to other stores). By taking a dynamic capability perspective, Sandberg (2021) also underlines the role of other capabilities, such as postponement, in achieving logistics flexibility. Following the lines of scholarly argumentation about the antecedents of dynamic capabilities and their causal relationships (Zahra et al., 2006; Eriksson, 2014; Teece, 2007), we maintain that postponement can be regarded as a capability that could enable logistics flexibility, another dynamic capability (Waller et al., 1999; Deligonul et al., 2006; Feitzinger and Lee, 1997). Hence, we hypothesize that:

H1. Application of postponement is positively associated with logistics flexibility.

2.5. Relationship between logistics flexibility and performance

In a time-based competitive environment, flexibility increases performance at various levels. Several studies have investigated the impact of flexibility on retail firm performance (Nair, 2005; Swafford et al., 2006; Fayezi et al., 2017). Flexibility gives firms a competitive advantage by enhancing firms' capability to provide better quality products. The meta-analysis provided by Yu et al. (2015) elucidates the drivers and sources of manufacturing and supply chain flexibility, and the resulting performance at the firm and supply chain levels. Particularly, the flexibility attained by collaborating with suppliers enables firms to offer products with a swift response and achieve a time-to-market advantage (Jin et al., 2014). This is since flexibility is vital for quickly reacting to rapidly changing markets. Some literature has observed that there is a trade-off between this benefit and cost (Gerwin, 1993), particularly regarding the entire supply chain (Olhager, 1993). Nonetheless, as flexibility influences the competitive posture of the organization, there is a justifiable need to further investigate the relationship

between flexibility and other aspects of firm performance, such as quality and market share. The meta-analytic study by Fainshmidt et al. (2016) confirms the positive effect of dynamic capabilities on firm performance. In line with the established contribution on the performance outcomes of dynamic capabilities (Zahra et al., 2006; Eisenhardt and Martin, 2000; winter, 2003), we hypothesize the following:

H2. Logistics flexibility has a direct positive relationship with performance.

2.6. The mediating role of logistics flexibility

The mere reliance on postponement does not necessarily directly lead to better performance for all firms (or industries), as firms need to find a balance between postponement and speculation in their flows. As an example, if retailers delay shipping standard or perishable products to their stores and not rely on available historical transaction data for forecasting, they might end up with stock-outs, which could subsequently result in lost sales and customers, as well as lower GMROI. In this regard, no studies have shed light on what other resulting capabilities could fall in between the relationship between postponement and performance, specifically in the retailing industry. To the best of our knowledge, only Nair (2005) has reported support for the mediating role that flexibility in the value chain can play in the relationship between postponement (manufacturing and place), and performance. Given the well-established literature on the effect of postponement on logistics flexibility as well as that of logistics flexibility on firm performance, we argue that the impact of postponement on firm performance is mediated via logistics flexibility. Based on the mediating role of dynamic capabilities (Eriksson, 2014), applying postponement as a capability could impact performance only if it is manifested in some sort of dynamic capability; in this case, logistics flexibility. That is to say, higher performance as an indirect result of postponement could be achieved providing the presence of higher logistics flexibility. Therefore, we hypothesize:

H3. Logistics flexibility mediates the effect of postponement on performance.

2.7. The moderating role of logistics integration

Logistics integration refers to the bundle of operational activities and practices that entail flow (of materials, information, products, etc.) and coordination between supply chain actors (Vanpoucke et al., 2017; Frohlich and Westbrook, 2001). Logistics integration can be seen as a capability which helps minimize the build-up of inventory, improve asset utilization rate in transportation and warehousing, and ultimately reduces costs (Prajogo and Olhager, 2012; Danese et al., 2020). Hence, according to Tan (2001), integrated logistics could support replacing inventory with information as much as possible, which is one of the key reasons for postponement.

In a review of literature, Van Hoek (2001) argues that the scope of postponement research should be widened to simultaneously investigate related concepts such as supplier integration. In an earlier work, he had counted external integration as a factor – among other logistics operating contexts – that favors postponement feasibility by improving supply chain transparency (Van Hoek, 1998). In fact, applying certain types of postponement such as logistics postponement in having centralized inventories and direct distribution (Pagh and (Pagh and Cooper, 1998) would be impossible without the presence of integration with suppliers. Similarly, in manufacturing postponement, to meet tight deadlines and executing last-minute changes, integration and coordination with suppliers plays a major supporting role (Saghiri and Barnes, 2016). Furthermore, since postponement could involve longer lead times, higher risk of order fulfillment and increased costs (e.g., holding, processing and transport), without an effective management of the supply chain, its flexibility outcomes would be negligible (Zinn and Bowersox, 1988; Van Hoek, 1997, 1998; Waller et al., 2000). The implementation of different types of postponement can be better realized by involving and coordinating with suppliers at various levels and areas, which in turn can widen the knowledge-base across the supply chain (Saghiri and Hill, 2014; Saghiri and Barnes, 2016). Yang and Burns (2003) contend how applying postponement at different levels goes in conjunction with an increase in the level of integration along the supply chain.

H4a. The positive effect of postponement on logistics flexibility is stronger when firms adopt a more logistics integration approach

In addition, we assume that the degree to which increased logistics flexibility improves performance is augmented by incorporating logistics integration. From this perspective, achieving effective outcomes from logistics flexibility is supported by having an integrative logistics-related relationship between a firm and its suppliers (Wiengarten and Longoni, 2015). In fact, relational characteristics in the form of integrating inbound and outbound distribution as well as information and material flow may enable firms to provide products with a rapid response to market. Similarly, some have suggested that collaborating with partners could be beneficial in responding to environmental contingencies (Richey et al., 2012). Moreover, prior research suggests that the overall firm performance can be improved via logistics integration (Droge et al., 2004; Paulraj and Chen, 2007a, 2007b; Braunscheidel and Suresh, 2009). According to Sánchez and Pérez (2005), without the information processing approach that results from integration with suppliers, logistics flexibility may become less beneficial. By leveraging on information sharing through mutual planning and goal setting activities, retailers can proactively prepare for addressing changes in demands, and enhance their operational and financial performance (Luu, 2016; Sangari and Razmi, 2015). Thus, we posit that logistics integration serves as a moderating force on the relationship between logistics flexibility and retail firm performance.

H4b. The positive effect of logistics flexibility on performance is stronger when firms adopt a more logistics integration approach

2.8. The moderating role of uncertainty

Sousa and Voss (2008) maintain that contextual factors may affect the way operations management practices lead to superior business performance. In fact, uncertainty has been regarded as one of the main contributors to failure (Yang et al., 2004a). Customer demand and its amplification as well as uncertainty linked to disruption and natural disasters have been addressed in the OSCM literature (Simangunsong et al., 2011). In general, those firms that find a better fit between internal and external variables are expected to achieve superior performance (Wagner et al., 2012). In fact, based on contingency theory, firms should find a good fit with their contexts given their significance in impacting intra- and inter-organizational initiatives (Blome et al., 2014).

Postponement has widely been considered as a prominent strategy to tackle uncertainty and achieve higher flexibility (Yang et al., 2004a; Catalan and Kotzab, 2003; Cholette, 2009; Zinn, 2019). Sales and demand uncertainty may be regarded as one of the key conditions for justifying postponement (Zinn and Bowersox, 1988; Li et al., 2005). In fact, demand variability is contingent to the implementation of postponement (Van Hoek, 1998), and postponement should be used to different extents based on the level of uncertainty (Yang et al., 2004a). Carbonara and Pellegrino (2018) maintain that the resulting flexibility from postponement increases in the case of higher uncertainty and risk in demand. For instance, retailers could increase their overall flexibility by moving the customer-order decoupling point further upstream (e.g., logistics postponement) and shipping more frequently in smaller batches when the nature of demand is uncertain, as opposed to carrying stockpiles of inventory in their rather costly store facilities. In the case of

lower uncertainty, the benefits of speculation strategies might have an edge.

H5a. Demand Uncertainty will positively moderate the effect of postponement on logistics flexibility.

Flexibility is widely regarded as a path to gain higher performance while coping with uncertainty (Liao, 2020; Merschmann and Thonemann, 2011). In line with contingency theory, Luo and Yu (2016) shed light on the fit of flexibility to uncertainty and find two asymmetric impacts on performance. They contend that high flexibility under high uncertainty results in better performance as opposed to fitting low flexibility with low uncertainty. Furthermore, the adoption of flexibility should be matched with environmental contingencies (Yi et al., 2011), i.e., certain flexibilities could cope better with certain types of uncertainty. Chang et al. (2003) study the relationship between flexibility in a manufacturing context and firm performance under various business strategies. They contend that being more flexible is not necessarily justifiable under all circumstances. For instance, according to Gerwin (1993), firm performance is influenced by how the firm matches demand uncertainty and flexibility. Blome et al. (2014) reflect on the complexity in upstream activities resulting from market dynamics as well as the extant and reliability of suppliers. While Snoeck and Winkenbach (2020) highlight the role of physical distribution flexibility in coping with demand uncertainty in urban last-mile distribution, they also underline the room for further exploration regarding the interconnectedness of flexibility and uncertainty. On the other hand, studies such as Pagell and Krause (2004) did not provide support for the proposition that by reacting to uncertainty, firms could necessarily achieve better performance resulting from flexibility. Along similar lines and based on contingency theory, some scholars have argued how higher firm performance could be achieved by matching demand uncertainty with supply chain flexibility (see Merschmann and Thonemann, 2011; Sreedevi and Saranga, 2017). Therefore.

H5b. Demand Uncertainty will positively moderate the effect of logistics flexibility on performance.

3. Research methods

3.1. Data collection

We used a cross-sectional survey to collect data via telephone and online. The Amadeus database which includes information about private and public European companies was used to draw the sample. The Swedish Standard Industrial Classification (SNI, 2007) three-digit codes ranging from 471 to 479 (excluding 478) were used to filter out retailers, after sorting them based on revenue and availability of valid contact information. In this research, the total design method by Dillman (2011) was utilized as a guideline to increase the likelihood of response. High ranking supply chain executives were sought as potential respondents. Therefore, specifically, the target "key informants" held positions such as executives within logistics, supply chain, purchasing, or retail. Seven-point Likert scales were used to measure the questions, with extreme points of "strongly high" and "strongly low".

First, potential respondents were contacted via phone, and were then provided with the options to participate in the study via telephone or online. Those deciding to partake in the online version, were sent an e-mail with a link to the questionnaire including the project description clarifying the purpose of the survey. In total, 1000 retailers were contacted. Out of the retailers contacted, 261 completed the survey, thereby resulting in a response rate of 26.1%. Table 1 shows a profile overview of the retailers participating in the study.

To evaluate the likelihood of non-response bias, two approaches were taken. First, the early and late responses were tested to identify any statistically significant changes since late respondents can be viewed as potential non-respondents (Armstrong and Overton, 1977; Lambert and Harrington, 1990). The complete sample was split into two groups of "early" and "late" based on the dates the corresponding responses were recorded, consisting of 102 and 159 firms respectively. To access the similarities between groups, 25 variables were randomly selected besides the 5 demographic variables; we found no statistically significant differences at the 99% confidence level. In the second attempt, group comparison tests were carried out between a group of 250 randomly selected retailers that had not responded and the responding firms regarding number of employees and operating revenue. Again, at the 99% confidence level, the *t*-test failed to show any significant differences. Therefore, we did not notice any specific issue pertaining to non-response bias.

Table 1
Profile of retailers participating in the survey.

Metric	Number	%
SNI Code (Industry Classification)		
471 (Retail sale in non-specialized stores)	21	8.05
472 (Retail sale of food, beverages and tobacco in specialized stores)	9	3.45
473 (Retail sale of automotive fuel in specialized stores)	10	3.83
474 (Retail sale of information and communication equipment in specialized stores)	19	7.28
475 (Retail sale of other household equipment in specialized stores)	60	22.99
476 (Retail sale of cultural and recreation goods in specialized stores)	35	13.41
477 (Retail sale of other goods in specialized stores)	76	29.12
479 (Retail trade not in stores, stalls or markets)	31	11.88
Number of Employees		
<5	37	14.18
6–10	52	19.92
11–20	50	19.16
21–50	50	19.16
51–100	21	8.05
>100	51	19.54
Operating Revenue (million €)		
<2	34	13.03
2–10	130	49.81
10–50	64	24.52
>50	33	12.64
Title of Respondent		
Presidents/Vice Presidents	104	39.8
SCM/Logistics Executives	98	37.6
Purchasing Executives	34	13.0
Others	25	9.6

Surveys that collect information merely from a sole participant in each firm are prone to common method bias (CMB). In order to evaluate common method bias, Harman (1976) suggested what is known as "single factor" test. This test holds that in case of a CMB existence, either one factor emerges once all survey items are included in a factor analysis, or one general factor emerges accounting for the larger share of the common variance in the data (Podsakoff and Organ, 1986; Doty and Glick, 1998). Following this approach, exploratory factor analysis (EFA) was used consisting of all variables. Considering eigenvalues larger than one in un-rotated factor analysis, five different factors emerged which accounted for almost 53% of the variance. Also, the first factor just estimated for 12% of the variance in the data. This result shows that CMB does not appear to be an issue.

3.2. Measurement instrument

The measurement items were used from previous literature, thereby ensuring content validity. In this regard, prior to the survey design, separate literature reviews were conducted on postponement and logistics flexibility to recognize the relevant items to be used in their operationalization. The initial measurement instrument included multiple modified questions on postponement based on Li et al. (2005) and Van Hoek (2001) consisting of packaging and labelling, assembly, design, logistics, and purchasing. Logistics flexibility items were

extracted from the instruments developed and utilized by Zhang et al. (2002, 2003, 2005) including four sub-constructs of physical supply, purchasing – capturing upstream – as well as physical distribution and demand management – capturing downstream – flexibility. Logistics integration was operationalized in the study of Chen and Paulraj (2004) including the following items: close coordination of inter-organizational logistics activities, good integration of logistics activities with those of the suppliers, good integration of the inbound and outbound distribution of products with suppliers, and smooth flow of information and materials with supplier firms. The performance (perceptive) items were derived from Wisner (2003) including overall product quality, average sell price and market share compared to the competition. These measures primarily relate to strategic and/or market aspects of performance widely used in the OSCM literature (e.g., Golicic and Smith, 2013; Tan et al., 2002; Arend and Wisner, 2005). Contingency variables used in the instrument were based on Zhang et al. (2002) and Rabinovich and Evers (2003), and included demand uncertainty pertaining to instability, unpredictability and dissimilarity.

In this study, we used several control variables. The first control variable is related to the retailer size which is gauged by the number of employees. The second control variable corresponds to the total asset of retailer firms which has been retrieved from Amadeus and used in the form of natural logarithm. Prior studies have used size and assets for controlling how flexibility in retailing could be impacted (Obayi et al., 2017; Kortmann et al., 2014). Generally, larger firms, due to their access to resources, may have superior supply chain capabilities, and firm performance (Li et al., 2020). However, some research shows that smaller retailers may outcompete large retailers by means of strategic flexibility, whereas, larger retailers may have greater economies of scale which can result in superior operational efficiency (Park and Luo, 2001). In addition, we also controlled for the type of industry by dividing the firms into eight groups based on their NACE code of 47×. In this analysis, NACE 479 was used as the baseline. Furthermore, we controlled for the company ownership. According to Simangunsong et al. (2016) family ownership is a key determinant for smaller retailers to the level that their success could impact the social and economic sustainability of their respective stakeholders in supply chains. In fact, "familiness" has been recently emphasized to be considered in OSCM research due to its significance in affecting firm performance and SCM capability (Maloni et al., 2017; Jayaram et al., 2014). Family firms are associated with higher levels of trust in their relationship commitments with their partners, which could have significant implications for fostering or hindering their supply chain capabilities, as well as performance (Smith et al., 2014; Panayides and Venus Lun, 2009). We also used vertical integration as another control variable to assess the effects of retailer activities in upstream activities (Anderson and Weitz, 1986). The more vertically integrated retailers are, the more they are directly involved in upstream activities primarily through ownership.

A team of experts and executives were involved in pre-testing the instrument by providing feedback on the structure, completeness, and refinement of the questions (Dillman, 2011). Five SCM researchers along with twenty retailers agreed to partake in the pre-test. We excluded the aforementioned executives and their respective firms from the data collection. This face validation processes resulted in minor changes to the initial instrument. Since the original instrument questions were in English, they were translated into Swedish to provide the respondents with a choice between either language. Table 2 presents the constructs used in this study with the respective indicators.

Table 2
Constructs and indicators.

Measurement Items (1 = Extremely Low, …, 7 = Extremely High)	SFL
Postponement (extent of application of the following types)	
Packaging	.68
Labelling	.72
Assembly	.69
Design	.80
Purchasing	.66
Logistics Flexibility	
Purchasing Flexibility	
We can quickly obtain multiple kinds of products that meet our specifications	.66
We can obtain multiple batch sizes of products from suppliers quickly	.60
Purchasing can fill multiple requests quickly	.65
Purchasing keeps close communications with suppliers	.62
Physical Supply flexibility	
Our inbound supply systems is effective for all shipments	.53
We can use multiple transportation modes to meet schedule for deliveries	.68
We can quickly and accurately label the products	.54
Distribution Flexibility	
We can provide multiple kinds of product packaging effectively at the warehouse	.58
We can use multiple transportation modes to meet schedule for deliveries	.63
We can quickly and accurately label the products	.53
Demand Management Flexibility	
We can effectively respond to multiple requirements in terms of services	.72
We incorporate downstream requirements in terms of prices and delivery time effectively through long-term relationships	.69
We involve stores and/or customers to improve our services effectively	.79
Logistics Integration	
Inter-organizational logistics activities are closely coordinated	.83
Our logistics activities are well integrated with the logistics activities of our suppliers	.76
The inbound and outbound distribution of goods with our suppliers is well integrated	.65
Information and materials flow smoothly between our supplier firms and us	.60
Demand Uncertainty	
Demand instability	.72
Demand unpredictability	.65
Demand heterogeneity	.68
Performance (Relative to Competition)	
Market share	.84
Average selling price	.54
Overall product quality	.87

4. Results

4.1. Measurement model

To evaluate the validity and reliability of the constructs, we have used both exploratory (EFA) and confirmatory factor analysis (CFA). Regarding exploratory factor analysis (using principal component extraction), the Barlett test of sphericity and Kaiser–Meyer–Olkin measure of sampling adequacy were conducted to determine the homogeneity and adequacy of the data. By using these statistical measures, we have been able to remove the items with lower factor loading or cross loads with other constructs. The results were satisfactory as KMO = .820, $\chi 2 = 3697.512$ and df = 820 indicating sufficient intercorrelations. Moreover, the exploratory factor analysis including the Varimax rotation test grouped the items into the respective constructs, as anticipated by the proposed model. The results show a significant construct validity as described 63.90% of the total variance with eigne value higher than 1. In addition, we have used AMOS 27 to assess the confirmatory factor analysis of our survey data. Regarding model fit, four measures were utilized consisting of comparative fit index (CFI), root mean square error of approximation index (RMSEA), chi-square test and the Tucker–Lewis Index (TLI) (Gebring and Anderson, 1992). The result of fit for CFA was acceptable ($x^2/df = 1459$; $\times 2 = 486$ ($p < 0.000$); RMSEA = 0.042; TLI = 0.91; CFI = 0.92; NFI = 0.80). In addition, construct reliability was checked by using composite reliability (C.R.) (Cronbach, 1951; Nunnally, 2010). As shown in Table 3, C. R. values of factors are all above the cut-off value of 0.70. Convergent validity is evaluated by finding if items in a scale converge or load together (Garver and Mentzer, 1999). Average variance extracted (AVE) values were estimated to assess convergent validity. Generally, the constructs meet the recommended threshold of 0.50 suggested by Fornell and Larcker (1981), hence convergent validity could be supported. While the AVE for one of the moderating constructs – Demand Uncertainty – is close to the threshold (0.47), given the factor loadings, this could indicate the complexity and

Table 3
Validity and reliability of the model.

	Mean	C.alpha	S.D.	C.R.	AVE	LF	PO	LI	DU	PE
Logistics Flexibility (LF)	4.99	0.69	0.51	0.814	0.523	**0.723**				
Postponement (PO)	3.81	0.82	1.40	0.837	0.508	0.15	**0.713**			
Logistics Integration (LI)	4.18	0.80	1.37	0.803	0.509	0.18	0.652	**0.714**		
Demand Uncertainty (DU)	4.63	0.70	0.84	0.726	0.469	0.045	0.089	0.012	**0.685**	
Performance (PE)	4.83	0.69	0.77	0.794	0.573	0.194	0.074	0.103	0.188	**0.757**

multidimensionality of the concept, which may require further item refinement in future studies. Also, discriminant validity was examined by comparing the AVE values from each construct with its squared correlations with the remaining constructs (Fornell and Larcker, 1981). As illustrated in Table 3, the AVE's for each construct were larger than their respective correlations. In reflective latent constructs, individual item loadings should also be inspected. Generally, 0.7 is regarded as an acceptable minimum threshold for ensuring indicator reliability, and loadings between 0.4 and 0.7 were considered for removal only if deletion led to increasing AVE and composite reliability above the suggested cut-off points (Hair et al., 2014: 107).

4.2. Hypothesis testing

Table 3 includes the descriptive statistics along with the bivariate correlation values. We used OLS-based regression to test our hypotheses. The regression results for the different models evaluated are provided in Tables IV and V; Table 4 includes the results for the direct and moderation effects on logistics flexibility and Table 5 includes the results for the direct and moderation effects on performance. As evident from the results of Model 1 in Table 4, postponement was found to be significantly related to logistics flexibility ($b = 0.156$; $t = 2.596$; $p < 0.05$), thereby providing support for hypothesis H_1. The effects of logistics flexibility on firm performance (please refer to the results for Model 2 from Table 5) was found to be significant ($b = 0.160$; $t = 2.416$; $p < 0.05$), thereby providing support for hypothesis H_2. The mediation effect was tested using the bootstrapping method; this method is considered far better than the widely used Baron and Kenny (1986) approach as well as the Sobel test (Preacher et al., 2007; Zhao et al., 2010). The mediating effect of logistics flexibility in the relationship between postponement and performance (95% CI = 0.0016–0.0355) was found to be statistically significant at $p < 0.05$; this provides adequate support for hypothesis H_3. Additionally, we found the direct effect of postponement on firm performance to be insignificant ($b = 0.017$; $t = 0.467$; *n.s.*), suggesting that the effect of postponement on firm performance is fully mediated by logistics flexibility.

Table 4
Results of Regression Analysis. **(Dependent variable:** Logistics Flexibility**).**

Factors	Model 1	Model 2	Model 3	Model 4	Model 5
Family Business	−0.057	−0.065	−0.062	−0.061	−0.057
Number of Employees	0.186	0.217	0.187	0.218	0.190
Total Assets	−0.283*	−0.279*	−0.254+	−0.277*	−0.253+
Vertical Integration	0.027	0.041	0.049	0.041	0.050
Industry 1	0.072	0.047	0.050	0.040	0.039
Industry 2	−0.249**	−0.280**	−0.273**	−0.273**	−0.270**
Industry 3	0.066	0.028	0.031	0.030	0.027
Industry 4	0.254+	0.226	0.237+	0.215	0.221
Industry 5	0.175	0.141	0.165	0.140	0.159
Industry 6	0.222	0.160	0.175	0.153	0.163
Industry 7	0.248*	0.208+	0.223+	0.205+	0.214+
Postponement (PT)		0.156*	0.090	0.152*	0.084
Logistics Integration (LI)			0.103		0.106
Demand Uncertainty (DU)				0.004	−0.004
PT * LI			0.144*		0.142*
PT * DU				0.056	0.050
F-value	4.791***	5.055***	5.122***	4.376***	4.508***
R-Square	0.175	0.197	0.226	0.199	0.228
N	261	261	261	261	261

The other four hypotheses tested different interaction effects; we mean-centered the variables before creating the interaction terms so as to eliminate multicollinearity. Hypothesis H_{4a} suggests that the effect of postponement on logistics flexibility will be moderated by logistics integration. As evident from Model 3 (in Table 4), we found logistics integration to positively moderate the effect of postponement on logistics flexibility ($b = 0.144$; $t = 2.535$; $p < 0.05$), thereby providing support for hypothesis H_{4a}. With the ambition of providing a nuanced interpretation of this moderation effect, we assessed the conditional effect of postponement on logistics flexibility at different levels of logistics integration. The significance of this conditional effect was evaluated using the bootstrapping approach employing 5000 bootstrap replications (Preacher et al., 2007). The bias corrected confidence band using the Johnson-Neyman technique (Spiller et al., 2013) for this conditional effect is presented in Fig. 1. Though the effect of postponement on logistics flexibility increased with an increase in logistics integration, this effect is significant only when logistics integration is greater than a threshold value (4.6828).

Alternatively, hypothesis H_{4b}, suggests that logistics integration will moderate the effect of logistics flexibility on performance. As evident from Model 3 (in Table 5), we found this moderating effect to be insignificant ($b = 0.102$; $t = 1.641$; *n.s.*); this result does not provide support for hypothesis H_{4b}. Though the moderation effect was insignificant, the conditional effect of logistics flexibility on performance need not be insignificant at all levels of the moderator (i.e., logistics integration). Accordingly, we still assessed the conditional effect of logistics flexibility on performance at different levels of logistics integration using the bootstrapping approach employing 5000 bootstrap replications (Preacher et al., 2007). The bias corrected confidence band using the Johnson-Neyman technique for this conditional effect is presented in Fig. 2. Interestingly, as anticipated, we find the conditional effect to be significant when logistics integration is greater than a threshold value (4.2323).

Hypotheses H_{5a} suggested that the effect of postponement and logistics flexibility is positively moderated by demand uncertainty. As evident from Model 4 (in Table 4), we found this moderating effect to be not significant ($b = 0.056$; $t = 0.940$; *n.s.*); this result does not provide support for hypothesis H_{5a}. The bias corrected confidence band using the Johnson-Neyman technique for the conditional effect of postponement on logistics flexibility at different levels of demand uncertainty is presented in Fig. 3. We find the conditional effect to be significant when demand uncertainty is between 3.0391 and 5.2132. Alternatively, as per hypotheses H_{5b}, the effect of logistics flexibility on firm performance is suggested to be positively moderated by demand uncertainty. As evident from Model 4 (in Table 5), we found the moderating effect of demand uncertainty to be insignificant ($b = 0.008$; $t = 0.129$; *n.s.*); this result does not provide support for hypothesis H_{5b}. The bias corrected confidence band using the Johnson-Neyman technique for the conditional effect of logistics flexibility on performance at different levels of demand

Table 5
Results of Regression Analysis. **(Dependent variable:** Performance**).**

Factors	Model 1	Model 2	Model 3	Model 4	Model 5
Family Business	−0.032	−0.023	−0.031	−0.010	−0.018
Number of employees	−0.010	−0.040	−0.040	−0.022	−0.020
Total Assets	0.073	0.119	0.124	0.106	0.112
Vertical integration	−0.264***	−0.268***	−0.248***	−0.252***	−0.229***
Industry 1	0.149	0.137	0.132	0.090	0.081
Industry 2	0.115	0.155+	0.148	0.124	0.115
Industry 3	0.099	0.089	0.090	0.037	0.034
Industry 4	0.227	0.186	0.200	0.122	0.132
Industry 5	0.159	0.131	0.141	0.082	0.089
Industry 6	0.229	0.194	0.197	0.127	0.125
Industry 7	0.117	0.077	0.074	0.017	0.010
Logistics Flexibility (LF)		0.160*	0.127+	0.158*	0.124+
Logistics Integration (LI)			0.062		0.069
Demand Uncertainty (DU)				−0.125*	−0.133*
LF * LI			0.102		0.108+
LF * DU				0.008	0.018
F-value	2.151*	2.496**	2.466**	2.439**	2.468**
R-Square	0.087	0.108	0.123	0.122	0.139
N	261	261	261	261	261

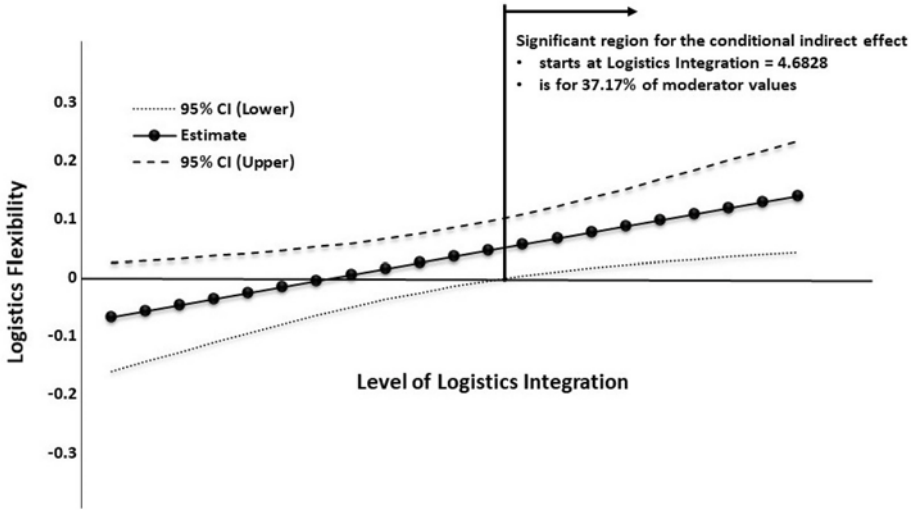

Fig. 1. Conditional indirect effects of postponement on logistics flexibility at different levels of logistics integration.

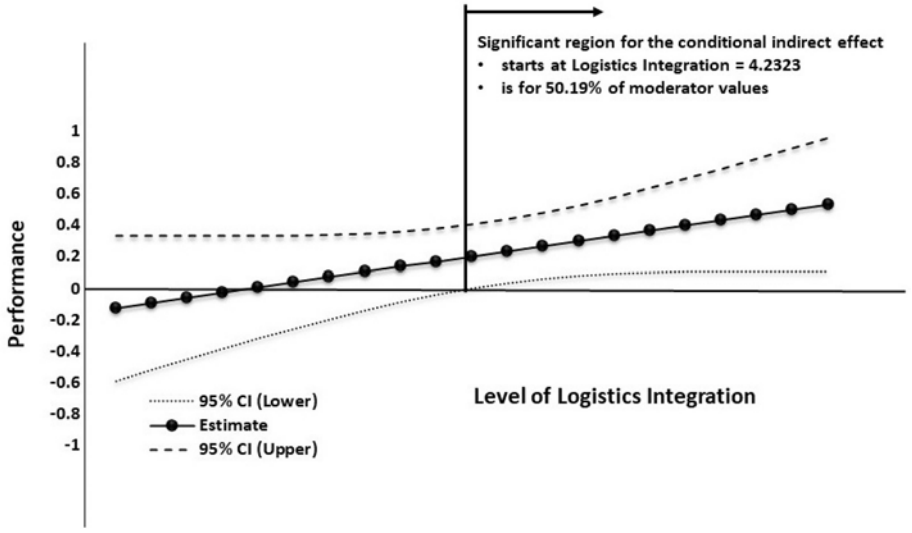

Fig. 2. Conditional indirect effects of logistics flexibility on performance at different levels of logistics integration.

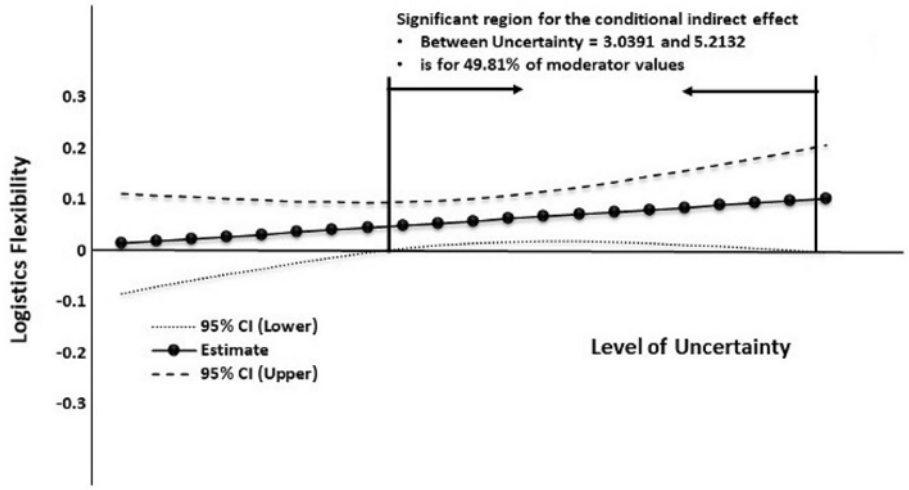

Fig. 3. Conditional indirect effects of postponement on logistics flexibility at different levels of demand uncertainty.

uncertainty is presented in Fig. 4. We find the conditional effect to be significant when demand uncertainty is between 2.7941 and 4.1168.

Additionally, we also generated the confidence bands for the combined effects of the two moderators on the relationships between postponement and logistics flexibility (Fig. 5) as well as logistics flexibility and performance (Fig. 6). When both the moderators (logistics integration and demand uncertainty) are present, then logistics integration seemed to have a significant effect on both these relationships (please refer to Figs. 5 and 6). The results of the hypotheses are illustrated in Fig. 7.

5. Discussion and implications

This paper aimed to empirically investigate the relationship between postponement, logistics flexibility, and firm performance in a retail setting. The results of this research contribute to the overall OSCM research in retailing. It also offers relevant implications for retail decision-makers. Specifically, it elucidates how certain capabilities could lead to other dynamic capabilities, and how performance can be impacted in the light of uncertainty in the market as well as integration in logistics operations.

5.1. Theoretical implications

Our findings contribute to the OSCM literature in several ways. *First*, we address the call for studying the relevance of postponement in the retailing industry (Sandberg, 2021; Prataviera et al., 2020; Zinn, 2019; Boone et al., 2007; Richey et al., 2012), while most prior studies have considered the manufacturing industry. It appears that Swedish retailers apply postponement to an average degree. This further underlines the importance of striking a balance between postponement and speculation in OSCM research. While the logistics postponement item was dropped in our analyses, it seems interesting to realize the rather open approach of retailers to manufacturing-related postponement (design, packaging, labelling, and assembly). This further underlines the importance of reaching out to and relying on collaborative and integrative logistics with supply chain actors. Following the lead of Zhang et al. (2005), we conceptualize logistics flexibility as a multidimensional construct as opposed to some prior research (Rexhausen et al., 2012; Vachon et al., 2009). We consider four sub-dimensions in this regard; physical supply, purchasing, physical distribution, and demand management, which capture both upstream and downstream facing logistics flexibilities.

Second, the general contention in OSCM research regarding the impact of postponing certain activities on increased flexibility was put to test. This, we believe is a clear application and contribution to the theory in the dynamic capability view and RBV arguing for the

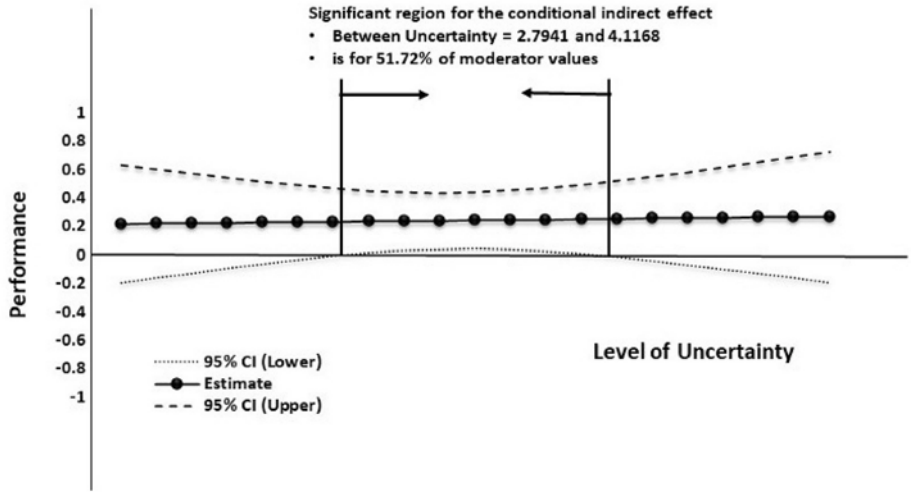

Fig. 4. Conditional indirect effects of logistics flexibility on performance at different levels of demand uncertainty.

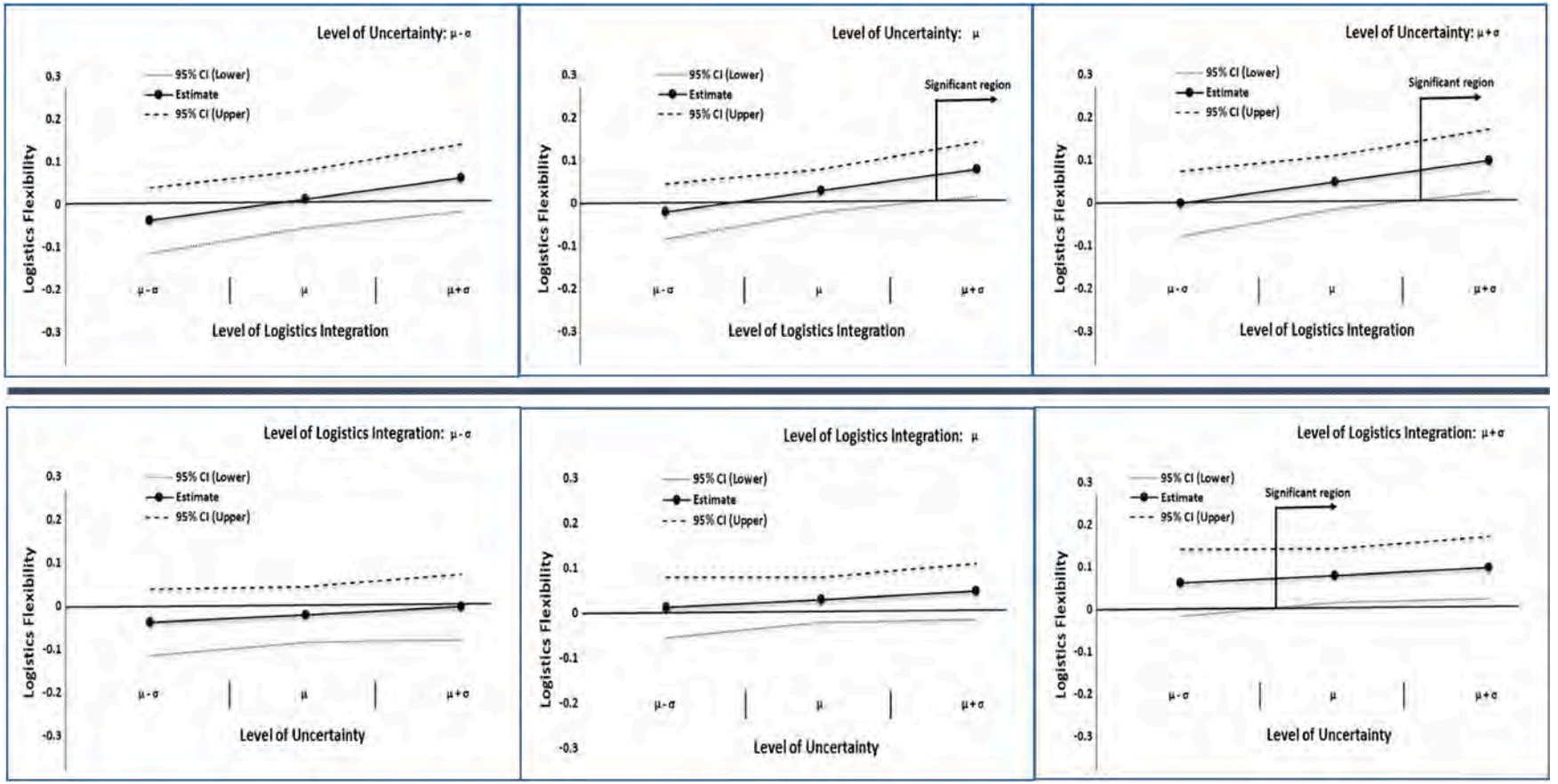

Fig. 5. Conditional indirect effects of postponement on logistics flexibility at different levels of logistics integration and demand uncertainty.

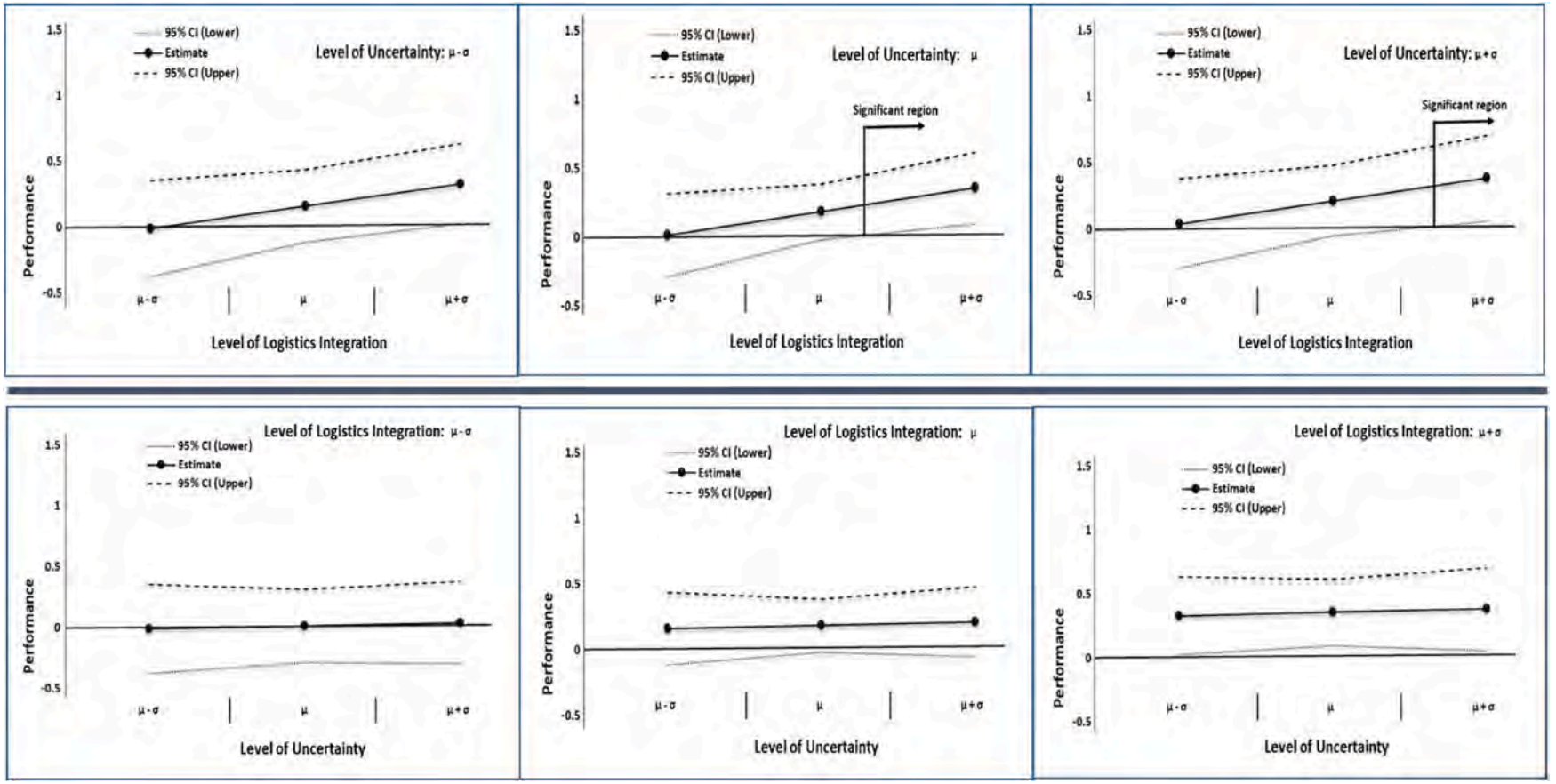

Fig. 6. Conditional indirect effects of logistics flexibility on performance at different levels of logistics integration and demand uncertainty.

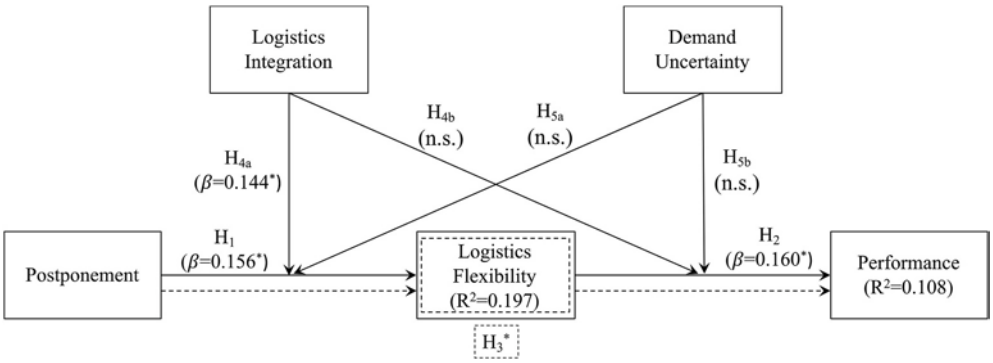

Fig. 7. Hypotheses results.

interrelationship between different types, levels, or hierarchies of capabilities (Sandberg, 2021; Ambrosini and Bowman, 2009; Upton, 1994). The results provide empirical support for such relationships in retailing firms; thus, extending the contributions of Deligonul et al. (2006) as well as Swafford et al. (2006) who see postponement as a determinant of adaptability capability. Therefore, by applying postponement, retailers can expect increased logistics flexibility. Similarly, logistics flexibility appears to have a positive effect on retail firm performance. This is in line with the overall expectations from the resulting performance outcomes of dynamic capabilities (Teece, 2007).

Third, our study sheds light on the mediating role of logistics flexibility in how the performance benefits of postponement could be realized. This can be used as a basis to explain the concerns raised in literature regarding how the benefits of postponement could result in better firm performance (Hedenstierna et al., 2019). Following the lead of Nair (2005), our results show that applying postponement in retailing could be justified from a performance standpoint if it leads to higher logistics flexibility. In fact, this further supports the notion that the benefits of postponement and speculation should be considered simultaneously. As noted by Zinn (2019), with the advancements of artificial intelligence (AI) analytics, anticipatory approaches to inventory management, in retailers such as Amazon, could result in holding products closer to consumers to ensure shorter delivery times. Our findings support the results of the meta-analytic study by Fainshmidt et al. (2016) that underlines the stronger impact of higher-order dynamic capabilities on performance compared to lower-order ones.

Fourth, when it comes to the moderating effect of logistics integration, we found support for its positive effect on the postponement – logistics flexibility relationship. This means that in the existence of higher logistics integration, retailers can enhance the flexibility capability outcomes resulting from applying postponement. Therefore, seamless integration with suppliers enhances the adaptability gains from applying postponement. However, logistics integration did not show a moderating effect on the relationship between logistics flexibility and firm performance. Though the moderating effect was not significant, the result of our study (Fig. 2) shows that logistics flexibility could have a significant positive impact on firm performance only when the level of logistics integration is high. This nuanced finding could provide support for prior studies indicating the potential benefits of coordinating with upstream supply chain actors in achieving higher performance as a result of dynamic capabilities (Sánchez and Pérez, 2005). Thus, we engage in the ongoing debate on the superior performance impacts of logistics integration (Fabbe-Costes and Jahre, 2008; Blome et al., 2014; Braunscheidel and Suresh, 2009). Furthermore, in line with RBV, we underline the fact that resources and/or capabilities could have a more valuable synergetic effect if bundled or combined with others (Paulraj, 2011; Chahal et al., 2020).

Fifth, our results did not support the moderating role of demand uncertainty. However, at medium levels of demand uncertainty, we found significant conditional indirect effects (Please refer to Figs. 2 and 5). In other words, high and low demand uncertainty did not appear to intensify the effects of postponement on logistics flexibility or logistics flexibility on firm performance. In line with the findings of Carbonara and Pellegrino (2018), this shows that in relatively stable demand, firms pursuing postponement are able to quickly rearrange or reconfigure their products. For instance, this could mean that by applying postponement, retailers facing disruptions, can reconfigure [or reallocate] products, or target other customers rather quickly. Our results also confirm those of Wagner et al. (2012) who advise "positive misfit" over "negative misfit". They contend that some firms might need to invest in measures to increase efficiency (e.g., by inventory reductions) rather than overinvesting into measures such as postponement to increase flexibility. Therefore, although we did not discover support for the moderating effects of high demand uncertainty in our model, we provide good support for why retail firms should match their capabilities with moderate levels of uncertainty (Chang et al., 2003; Gerwin, 1993). In line with the dynamic capability view, our findings empirically support the opinion that matching logistics flexibility with demand uncertainty leads to higher performance (Luo and Yu, 2016; Yi et al., 2011). In this case, it would mean that the performance benefits from logistics flexibility could be enhanced only if demand uncertainty is at a medium level. Theoretically, this can be linked to the strategic selection reasoning by Lado et al. (1992) regarding proactiveness in influencing performance by grasping and creating opportunities internal and external to the firm. We further controlled for several variables including family ownership, number of employees, total assets, level of vertical integration, as well as industry classification, which contributes to the generalizability of our results.

5.2. Managerial implications

From a practical standpoint, our findings offer five main relevant implications for retail decision-makers. *First*, retailers can expect to increase their flexibility in upstream and downstream logistics activities if they consider postponing certain activities. Therefore, from a strategic point of view, if retailers intend to be quick and capable in reacting to uncertainty in their logistics, they should investigate means to delay certain value adding activities. Specifically, there seems to be potential for retail practitioners to explore means to apply postponement in activities typically associated with upstream actors such as design, assembly, labelling and packaging, as well as purchasing. In this there may exist opportunities for engaging the consumers in the value-adding processes. The practices of leading retailers such as IKEA could be an example of this, in which consumers are involved in the assembly, and even design or last-mile logistics. Moreover, those opting for increasing logistics flexibility can expect superior firm performance. This means that the strategic prioritization of logistics flexibility can ultimately result in better performance for retailing firms. *Second*, our findings show that merely relying on postponement does not guarantee better firm performance in retailing. Retailers who intend to gain better

performance from postponement, should balance the benefits of postponement and speculation. In other words, postponement could lead to better firm performance, if its application is manifested in higher logistics flexibility, i.e., if retail managers opt for prioritizing logistics flexibility initiatives in their firm. *Third*, the resulting logistics flexibility and firm performance prove to slightly differ depending on the extent of logistics integration, as well as demand uncertainty. Retailers considering postponement, could expect to increase their logistics flexibility even further if they integrate their logistics activities with their suppliers. From a resource standpoint, although logistics integration with suppliers is resource-draining, the investments would pay off for retailers applying postponement, by increasing their flexibility in upstream and downstream logistics. Therefore, retail managers should find a fit between delaying value adding activities and integrating with their suppliers to increase their flexibility capability. *Fourth*, the investments (or lack thereof) on achieving logistics integration cannot be justified from a performance standpoint for those retailers pursuing logistics flexibility. This indicates that retailers pursuing logistics flexibility with moderate levels of logistics integration could be better off not over or under investing on integration activities with their suppliers. Otherwise, this could offset any positive gains in firm performance resulting from logistics flexibility. *Fifth*, if the market is characterized by high or low levels of demand uncertainty, retail managers should not consider postponement or logistics flexibility, and perhaps should direct their investments towards developing other capabilities. Our findings show that it is only in moderate levels of demand uncertainty that relying on postponement leads to higher logistics flexibility. In such cases, retail managers should perhaps opt for other alternatives such as speculation. Similarly, managers should strategically consider logistics flexibility if demand is rather stable. Otherwise, the resulting performance cannot be guaranteed. This could help managers in retailing, an industry characterized by extremely low margins, to prioritize their budgeting decisions regarding different capabilities.

6. Conclusion and future research

By reflecting on contemporary literature, and drawing on the dynamic capability view, we developed a model focusing on the nexus of postponement, logistics flexibility and retail firm performance. Our findings underline that logistics flexibility resulting from applying postponement could lead to better firm performance. Specifically, we provide insights regarding the role of demand uncertainty and logistics integration for retail firms considering postponement and logistics flexibility. Our study could provide valuable learnings for managers within the retailing industry, an industry associated with razor-thin margins and high risks. We contribute to the overall body of research on retail SCM which is often perceived as having a paucity of contributions, especially regarding postponement and dynamic capabilities (Boone et al., 2007), as well as the effect of flexibility on performance (Purvis et al., 2014), especially under different contextual conditions (Sandberg, 2021).

Nevertheless, like other empirical studies, this study has a few limitations that could serve as a springboard for future investigation. Although our sample covered a wide range of retailers' sizes, formats, and groups, generalizing of results should be taken with caution. First, we have only gathered data on the retailing industry in Sweden, which could in turn be a limitation. Future studies could consider including other industries such as services or manufacturing to see if the results would be significantly different. Also, cross-country comparisons could be another arena for future research. Triangulation as well as other study designs, such as case studies, could contribute to the improvement of validity and reliability of the results of this research. Furthermore, a general concern with using self-assessed questions could be a potential bias which could be avoided by looking into the possibility of gathering information from various sources or employing objective measures such as public financial data. Also, this study considered retail firms as the unit of analysis. By including multiple firms along the supply chain, further studies could better benefit from the theoretical lenses of the RBV and the network perspective (see Kotzab et al., 2014) to investigate how interconnected organizations create sustainable competitive advantage.

Another noteworthy issue is that although we had included an item for measuring logistics/distribution postponement, that item was dropped due to low loading during our factor analysis. We contend that this may be linked to the profile of the investigated firms in our study, as most of the firms (roughly 90%) are SMEs, and may have a local presence and coverage. It is widely discussed that SMEs are increasingly considering outsourcing logistics operations, and as a result may not be directly involved or have complete information (Solakivi et al., 2011). In the omni-channel retailing context, outsourcing appears to be prevalent depending on the dominant channel or type of product (Joong-Kun Cho et al., 2008). This, per se, underlines the importance of logistics integration with key suppliers to further support the application of postponement in increasing logistics flexibility, as we have hypothesized. Nevertheless, this may still have some interesting implications regarding the application and relevance of other types of postponement, in line with prior research (Lowson, 2001; Yang et al., 2004b; Appelqvist and Gubi, 2005; Jafari et al., 2015). Although not all types of postponement are always included in conceptualizing postponement in empirical research (e.g., Saghiri and Barnes, 2016 excluded logistics/dirtribution postponement), we believe that logistics/distribution postponement – as a key type of postponement – is still a highly relevant area for further investigation in future research, considering the developments in the last-mile.

An area of interest in retailing, especially, regarding the application of postponement, would be to engage consumers in the value-adding processes. A promising body of literature is evolving regarding how value can be co-created together with consumers; from engaging them in design, and assembly to last-mile logistics (Jafari et al., 2015; Rouquet et al., 2017); an area where logistics flexibility is of utmost importance (Snoeck and Winkenbach, 2020). Furthermore, when it comes to environmental contingencies, we only considered the role of demand uncertainty in our model. Future studies could include other sources of uncertainty, including, technology, competition, or supply. Especially, in light of the COVID-19 pandemic, and its massive consequences for retailers, other studies could consider other dynamic capabilities, such as resilience, to respond to disruptive events in value chains. Moreover, in line with the suggestions of Zinn (2019), we call for investigating the role of digital technologies, AI, and big data analytics to replace inventory, and what that would imply for a balanced approach to postponement and speculation. Moreover, globalization seems to be a missing link in postponement research although it was brought to focus by Van Hoek (2001) as an area for further research. The disruptions brought forward by the pandemic, as well as the ongoing challenges in the supply of semi-conductors, once again highlighted the interconnectedness of contemporary supply chains at a global scale. It would be interested to investigate whether applying postponement in conjunction with modern supply chain analytics could help improve supply chain resilience. Finally, there have been recent indications on how applying postponement could have positive implications for sustainability, especially in reverse logistics (Rau et al., 2021). We believe that this opens up an extremely promising domain to shed light on.

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