# A configurational approach to last mile logistics practices and omni-channel firm characteristics for competitive advantage: a fuzzy-set qualitative comparative analysis

Received 19 April 2022
Revised 9 September 2022
11 November 2022
28 December 2022
14 March 2023
Accepted 20 March 2023

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## Abstract

**Purpose** – The purpose is to explore how the configurations resulting from the interplay of last mile logistics practices and firm characteristics are associated with firm performance in an omni-channel context.

**Design/methodology/approach** – Drawing on configuration theory (CT), the authors use fuzzy-set qualitative comparative analysis (fsQCA) to analyze data on 72 Swedish omni-channel retailers.

**Findings** – Four configurations are identified—store-oriented small and medium-sized enterprises (SME's), online-oriented SME's, large store-oriented retailers and large online-oriented retailers. The results show that while offering a wide range of delivery options is necessary to achieve high performance, it is not sufficient, and that returns and fulfilment should be simultaneously considered. For instance, large high-performers leverage their stores and warehouses for fulfilment and returns in an integrated way irrespective of sales channel-mix. However, SME's appear to focus on fulfilment simplicity with less-costly delivery alternatives, where store-oriented SME's leverage stores and the online-oriented counterparts leverage warehouses. Consequently, the authors develop a configurational taxonomy and discuss a set of recipes which provide insights for researchers and practitioners.

**Research limitations/implications** – The study provides a more comprehensive understanding of the pathways to success, and potential pitfalls, in the last mile logistics context.

**Originality/value** – This study applies a novel methodology in the field, namely fsQCA, to explore the paths to competitive advantage. It covers a wide range of stages in the LM including back-end fulfilment, delivery and returns. It also provides insight into the logistics practices of both SME's and large omni-channel retailers.

**Keywords** Omni-channel, e-commerce, Last mile logistics, Fuzzy-set qualitative comparative analysis (fsQCA), Firm performance, SME

**Paper type** Research paper



The authors would like to thank the e-Merge research project (20201932) co-financed by the European Regional Development Fund, and Dr. Mohsin Malik for sharing his extensive QCA knowledge.

International Journal of Physical Distribution & Logistics Management
Vol. 53 No. 11, 2023
pp. 53-70
Emerald Publishing Limited
0960-0035
DOI 10.1108/IJPDLM-04-2022-0123

## Introduction

The race towards omni-channel and digital transformation has dramatically challenged the retail industry. The developments have often led to re-strategizing and revisiting formats, requiring substantial investments, technological capabilities and expertise (Grewal *et al.*, 2021; Davis-Sramek *et al.*, 2020). In the last mile (LM) which spans from the order penetration point to the customer's preferred destination point, offering a variety of delivery and returns options – e.g. home delivery, click-and-collect (C&C) and in-store returns – makes omni-channel logistics complex and multi-fold (Lim and Winkenbach, 2019; Shen and Sun, 2021). While the design and configuration of LM logistics is a crucial determinant of competitiveness (Lim and Winkenbach, 2019), overwhelmingly, experimental approaches have been prioritized (Eriksson *et al.*, 2019; Lim and Srai, 2018) much due to the practice- and solution-based nature of logistics as a discipline (Aastrup and Halldórsson, 2008).

Recently, the operations and supply chain management (OSCM) literature has enjoyed noticeable advancement regarding LM logistics classification frameworks (e.g. Lim and Winkenbach, 2019; Marchet *et al.*, 2018; Hübner *et al.*, 2016b). We build on the existing contributions to provide further practical and theoretical relevance, with regards to the following: first, while identifying the LM decision-making parameters is essential *per se*, these parameters should not be considered in isolation due to their potential interplay. A recent study by Jones *et al.* (2021) revealed how omni-channel retailers bundle their service offering in forwards and reverse logistics to stay competitive. In practice, retailers face intertwined and often opposing alternatives, which would have significant implications for their performance. For instance, offering a wide range of options in delivery and returns could result in significant complications in logistics and incur costs, while improving responsiveness (see Lim *et al.*, 2016). As such, there is much to be explored in *how* a wider range of underlying and often interrelating parameters should be bundled and leveraged. The resulting insight could be practically valuable in prioritizing or balancing the alternatives in delivery responsiveness, convenience provision, or assortment planning to stay competitive (Jindal *et al.*, 2021). Second, organizational aspects, such as specific firm characteristics, should also be incorporated together with the LM design parameters (Lim *et al.*, 2016; Ishfaq and Bajwa, 2019). For instance, LM logistics configurations may or may not result in competitiveness depending on the profile of the firm. In this realm, the problem of matching LM strategy with contingencies, including the characteristics of the firm, the product range and the operating environment has long been a challenge in both theory and practice (Lee and Whang, 2001). Hence, there is potential in complementing the earlier attempts in addressing the problem of bundling the LM parameters (e.g. Jones *et al.*, 2021) in accordance with internal contingencies.

Therefore, we posit that the interaction between firm characteristics and approaches to LM logistics should be considered more closely to advance knowledge in this realm. Following Ishfaq *et al.* (2016), we contend that omni-channel firms may follow multiple paths to a steady-state logistics in omni-channel to be competitive. Hence, we take a configurational approach to address the complex relationship between firm characteristics, LM logistics practices and firm performance in an omni-channel context (Ketchen *et al.*, 2022). Configuration theory (CT) is relevant for identifying which constellations of decision-making parameters—in strategizing, structures, processes and contexts—are feasible under specific circumstances and has proven effective in explaining business outcomes (Miller, 1986; Ketchen *et al.*, 1997). Against this backdrop, this paper aims to explore how the configurations resulting from the interplay of LM logistics practices and firm characteristics are associated with firm performance in an omni-channel context. At a broad level, we address the recent calls to apply qualitative comparative analysis (QCA) in configurational theorizing (Ketchen *et al.*, 2022), since it enables the explanation of how different configurations of variables could lead to an outcome. We argue that the insight resulting from this approach could have high practical potential in leveraging existing configurations,

or moving quickly to a new configuration, to sustain competitive advantage (Miller, 1986; Cao *et al.*, 2021). In an adjacent vein, we also discuss which combinations of approaches to LM logistics parameters could undermine performance.

Here, to measure performance, we use ROA as it captures the income, cost and capital perspectives and has been deemed suitable in addressing performance in retailing logistics (Martens and Dooley, 2010). We consider logistics practices in three stages of the LM: back-end fulfilment (LMBF), delivery (LMDe) and returns (LMR) (Marchet *et al.*, 2018; Hübner *et al.*, 2016b). The decisions made in these three stages have been argued to be among the top determinants in balancing logistics costs with service levels (over which retailers have higher control), as opposed to volumes and customer density (Vanelslander *et al.*, 2013). We also incorporate two key firm characteristics, namely, size and sales channel-mix in our analysis.

E-commerce sales has been growing steadily in Sweden at 15% per annum from 2006 to 2019, followed by a staggering 40% in 2020 and 20% in 2021 (Handelsrådet, 2022). The e-commerce share of total retail sales in Sweden was 16% in 2021, and the consensus projection is that this market share will continue to increase over the coming years. Our study sets to provide timely theoretical and managerial implications by drawing on a large sample of Swedish omni-channel firms covering multiple sectors within the retail industry and a wide range of firm sizes. While we acknowledge that omni-channel logistics broadly involves intertwined flows of information, products and funds (Chopra, 2016), we primarily consider the parameters relating to product flows here.

The rest of the manuscript is organized as follows. First, an overview of the literature is provided in the frame of reference, mainly focusing on the logistics parameters included in this study. Then, the methods section explains how the data collection and analyses were carried out and includes an overview of the fsQCA methodology, and subsequently, the results are presented. Afterward, in the Discussions section, we develop a configurational taxonomy based on which the research and practice implications are reflected upon. Finally, some concluding remarks are presented followed by the potential areas for further investigation.

## Frame of reference

### *Configuration theory (CT)*

Configurations represent commonly occurring clusters or groups of firms which share a similar profile of strategies, practices, activities, characteristics, or processes (Ketchen *et al.*, 1993). As such, organizational configurations are useful for identifying dominant patterns in complex or largely unknown contexts (Zhao *et al.*, 2006). OSCM scholars have applied the configurational approach to define, evaluate and explain taxonomies, based on the premise that, due to the potential synergetic effects between practices, they should be considered simultaneously (Flynn *et al.*, 2010; Kalchschmidt, 2012). For instance, Wollenburg *et al.* (2018b) apply CT to identify taxonomies of LM logistics practices in grocery retailing based on warehousing, picking, internal transportation and LMDe.

Beyond providing richness and insight into complex phenomena, CT has great potential in explaining how performance outcomes can be achieved depending on specific configurations (Ketchen *et al.*, 1997, Ketchen *et al.*, 2022). According to CT, constellations of practices are particularly relevant when identifying particular outcomes or competitive advantage (Miller, 1986). The theory is based on the notion of equifinality, which underlines the possibility of achieving similar outcomes via a variety of different paths from several configuration patterns (Fiss, 2007). In the LM context, CT has been used to define distribution configurations, using dimensions such as network structure, network flow, relationship governance and service architecture to explain competitive advantage (Lim and Srai, 2018).

The theoretical premise of CT is complementary to that within the resource management perspective holding that value is created by structuring, bundling and leveraging resources

(Sirmon *et al.*, 2007). For instance, Jones *et al.* (2021) followed this reasoning in examining how omni-channel retailers bundle their service offerings in forward and reverse logistics with their resources (mainly the level of operational integration) to be competitive. In fact, the notion of resource bundling has been extensively used in the OSCM literature to explain how logistics capabilities can be built and translated into competitive advantage (Sandberg and Abrahamsson, 2011). While bundling relates to how the resources or practices are combined, leveraging entails how the resulting capabilities are applied to create value (Sirmon *et al.*, 2007).

Here, we build on the existing taxonomical and configurational contributions by including a wider range of LM logistics practices, including those practices that relate to the pick and pack operations (LMBF) and are hence "invisible" to customers. While in resource management, the focus is primarily on how resources can be orchestrated, we maintain that CT provides a suitable lens to investigate how bundling LM logistics practices in LMBF, LMDe and LMR can be relevant in achieving competitive advantage. Therefore, we assert that via the lenses of the CT, a more realistic understanding of bundling and leveraging can be provided. Moreover, following Cao *et al.* (2021), we posit that understanding how such practices can be bundled depends on the fit with the specific firm characteristics (including internal contingencies such as size). Therefore, in line with the extant literature relying on CT reasoning in examining LM configurations (Lim and Srai, 2018; Lim *et al.*, 2016; Srai and Gregory, 2008), and based on the concept of equifinality (Fiss, 2007), we maintain that the pathways to firm performance can be explored by simultaneously considering the LM practices as well as firm characteristics.

In the following sections, we provide an overview of the LM practices, as well as the firm characteristics considered in this study, as illustrated in the conceptual model (Figure 1).

*Last mile back-end fulfilment*

Fulfilment is regarded as complicated and costly in modern omni-channel retailing since it involves processing individual customer orders in a complex structure (Agatz *et al.*, 2008). Firms must choose from a multitude of alternatives ranging from adapting existing distribution centers, stand-alone e-fulfilment centers, suppliers' facilities, existing retail outlets and /or pickup points (Lummus and Vokurka, 2002; Eriksson *et al.*, 2019). As such, it is from the inventory location where the fulfilment process is activated by the customer order (decoupling point) (Lim and Winkenbach, 2019). While establishing stand-alone fulfilment centers for different channels requires significant investment of resources, capitalizing on existing stores or distribution centers may provide support for rapid expansion, minimizing the risk or cost incurred (Hübner *et al.*, 2016b). Some suggest that fulfilling online orders from

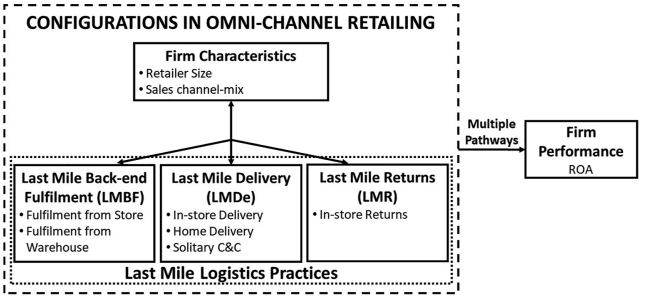



**Figure 1.**
Conceptual model with parameters

**Source(s):** Figure by authors

stores yields lower performance outcomes than fulfilment from distribution and fulfilment centers (Ishfaq and Bajwa, 2019), and that an increased number of online orders drives warehouse fulfilment capabilities in the grocery sector (Wollenburg *et al.*, 2018b). Therefore, the benefits and disadvantages of the choices in fulfilment should be balanced to optimize of customer service, costs, product availability and capital employed in assets and inventory. Another alternative, which has proven more relevant for large and established retailers, is to complement warehouse-based fulfilment of online orders with fulfilment from stores (Davis-Sramek *et al.*, 2020; Ishfaq *et al.*, 2016; Millstein *et al.*, 2021).

*Last mile delivery*

LMDe refers to the activities and processes involved in serving consumers by handing over the ordered parcels at their location of choice. It is estimated that LMDe accounts for almost 50% of the total shipping costs (Peppel *et al.*, 2022), while the demand for LMDe is expected to grow globally by 78% by 2030 (World Economic Forum, 2020). Many omni-channel retailers capitalize on the resources already provided by their established stores, a concept known as *buy-online–pickup-in-store (BOPS)* or *in-store C&C*. Gao and Su (2017) questioned the effectiveness of BOPS for products which already sell well in physical stores, or for existing customers, especially since fulfilment from store may incur higher costs. Other C&C delivery options include solitary C&C, in which the pick-up point is not the physical store – e.g. a courier office, or parcel and locker terminals, or attached C&C, in which the pick-up point is adjacent to the store – e.g. a drive-through. Solitary C&C options cost less than home deliveries since consumers collect their orders by themselves (Buldeo Rai *et al.*, 2019). Also, shoppers might perceive solitary C&C deliveries as more convenient, since they do not need to wait for the courier at home, and that the C&C location is (typically) conveniently located and has longer opening hours. Home delivery has also gained more traction, especially considering societal responses to the pandemic and the multitude of LMDe and urban actors.

*Last mile returns*

Managing omni-channel LMR flows is proven to be complex and costly, primarily due to consumer freedom resulting from generous returns policies (e.g. cashback guarantees) and the lack of touch-and-feel product engagement when shopping online. Thus, for example, apparel merchandise typically has a higher rate of returns compared to groceries (Marchet *et al.*, 2018; Bernon *et al.*, 2016). Therefore, given the high omni-channel return rates, the LM may have to be "bridged" for another time, potentially undermining the cost viability of such design (Agatz *et al.*, 2008). For instance, managing returned items involves further travel, transport, picking, [un-]packing and sorting, which also enlarges the environmental footprint (Mangiaracina *et al.*, 2015).

As with delivery, returns could be affected via various paths. While returns from home may be more convenient from a consumer standpoint, in-store returns can be double-edge swords. While they are viable for luring consumers in for the possibility of cross-shopping, they may be complicated due to infrastructure or skill requirements for processing (Hübner *et al.*, 2016a). In addition, since this option may reduce the cost of transport to the central distribution centers, it can be financially and environmentally attractive, especially if returned items can be sold at the same store with minimal effort (Mangiaracina *et al.*, 2015, De Leeuw *et al.*, 2016; Wollenburg *et al.*, 2018b). An alternative would be to return items to a remote location, typically operated by a courier, express and parcel (CEP) solution provider. Generally, the greater the distance between consumers and the point where the returned items are processed, and the more actors are involved, the higher the costs will be (Lim and Winkenbach, 2019). Offering a variety of return choices positively influences customer satisfaction (De Leeuw *et al.*, 2016).

*Firm characteristics*

Generally, internal organizational factors are considered influential in how firms approach e-commerce. These micro-level contingency factors may include firm size, readiness, innovativeness, investment level, human resources, information intensity (Sanchez-Torres and Juarez-Acosta, 2019). Size is widely recognized as a critical dimension among firm characteristics, given its implications for sustained competitive advantage (Cao *et al.*, 2021). SME's are commonly associated with having limited resources, being more vulnerable, relying on how the CEO perceives market forces, having weaker bargaining power and relatively higher capital and transaction costs compared to large enterprises, and their fit with certain SCM initiatives is debated (Arend and Wisner, 2005; Sallnäs and Björklund, 2020). As a result, SME's could be more prone to the long-term risk of losing competitive power (Vaaland and Heide, 2007). Large firms typically enjoy a cost advantage due to their effective transport systems and distribution centers, which challenges SME's to optimize their variable and fixed costs (Rawwas and Iyer, 2013).

Moreover, there is consensus among scholars that the aggregated number of online transactions is a key determinant of how LM logistics is configured. In the omni-channel grocery context, for instance, Wollenburg *et al.* (2018b) underline how central warehouse fulfilment capabilities are reinforced with the increase in total online sales. Similarly, Ishfaq *et al.* (2016) discuss how omni-channel configurations, in terms of fulfilment and delivery, differ based on how large the online sales are. They found that, with an increase in online sales, physical stores become more engaged in the distribution processes. Hence, the extent to which omni-channel firms utilize their different channels may have implications for how their LM practices are bundled (Risberg and Jafari, 2022a).

In this study, we posit that both firm size and online sales share of total sales (here referred to as "sales channel-mix") should be considered to provide a more realistic picture of the LM practices. Drawing on the CT and relying on the idiosyncratic nature of firm characteristics, we argue that the paths to achieving competitiveness can be explained by investigating the resulting configurations of LM practices and firm characteristics.

## Methods

*Study design*

This study is part of a large research project which involved a systematic literature review and several interviews with decision-makers in omni-channel logistics to identify and prioritize key firm characteristics (size and channel sales-mix) and LM logistics practices (*LMBF*, *LMDe* and *LMR*) (Risberg, 2022; Risberg and Jafari, 2022a). FsQCA is used to identify causation in complex systems by identifying the multiple configuration solutions that lead to a certain outcome (Salonen *et al.*, 2021; Fiss, 2011). The effect of interest here is high performing retailers – *so-called 'high performers'* – indicated by return on assets (ROA). The study also explores what combinations of these conditions lead to inferior retailer performance (henceforth referred to as "low performers") (Malik *et al.*, 2021). Here, the fs/QCA (fuzzy-set/ qualitative comparative analysis) software, version 3.0, was utilized to analyze the data (Ragin and Davey, 2016).

*Operationalization*

The recent literature highlights that LMBF evolves towards fulfilment from warehouse complemented with fulfilment from store (Davis-Sramek *et al.*, 2020). Hence, retailers that integrate fulfilment from store and warehouse tend to outperform their contenders (Millstein *et al.*, 2021; Ishfaq and Bajwa, 2019; Ishfaq and Raja, 2018). This study therefore includes fulfilment from warehouse and fulfilment from store as LMBF conditions. Jones *et al.* (2021)

argue that retailers with highly integrated omni-channel services – *in-store delivery, in-store return and fulfilment from store* – have better performance than less-integrated retailers. Following this lead, this study includes in-store delivery, in-store return and fulfilment from store as LM conditions, in conjunction with firm characteristics. Lim and Winkenbach (2019) claim that offering a wide range of delivery alternatives might contribute to large retailer growth. Hence, in operationalizing *LMDe*, we include in-store delivery, solitary C&C and home deliveries as the LM conditions to explore whether large and SME high performers offer consumers a wide range of delivery options. Since ROA captures both the income and cost perspectives as well as the capital perspective, it seems relevant in analyzing logistics practices, especially regarding inventory performance in the retailing context (Martens and Dooley, 2010). LM logistics practices in omni-channel retailing influence the income and cost side in the profit and loss statement through the delivery and return offering as well as the balance sheet through inventory pooling and capital expenses. Furthermore, ROA has been widely used as an outcome variable in fsQCA research (e.g. Malik *et al.*, 2021). ROA for the year 2020 was extracted from Amadeus.

*Case knowledge and selection*

The dataset covers 72 purposively selected SME and large omni-channel retailers – *all omni-channel retailers have both online and store sales* – with different sales channel-mixes from various sectors representing the Swedish retailing population. The dataset is part of a larger study covering 200 e-tailers and omni-channel retailers sampled from a list of 10,000 retail-engaged Swedish firms from the Amadeus database (Risberg and Jafari, 2022b). The omni-channel retailers included in this study have annual turnovers exceeding €2m in 2020. Here, the firms with incomplete financial information, or lacking e-commerce activity, were excluded. The firm size category draws on the turnover-based definition (European Commission, 2020). The resulting study sample consists of 35 large and 37 SME retailers, whereof 51 are store-oriented and 21 are online-oriented. This ensured an equal share of large and SME retailers even though most of the retailers in Sweden are SME's. The participating firms were ensured anonymity in the research process.

Randomizing the data collection within each stratum enabled covering various sectors and firms with different sales channel-mixes, which link was absent in prior research. The five largest sectors in the study sample — *clothes and shoes, furniture and home decoration, sports and outdoor, construction and hardware* and *home electronics* — represent 63% of the retailers, mirroring the top sectors in the Swedish retail population (Postnord, 2021). The online- and store-oriented membership threshold, of 30% online sales share of total sales, was identified during the calibration. Similar to the population (Handel, 2020), the majority of the included retailers are store-oriented (70%). It is worthwhile mentioning that most store- and online-oriented SME retailers have a limited number of stores in Sweden, and that some large online-oriented retailers have a wide store network with as many as 70 stores in Sweden.

*Calibration*

All logistics practices conditions shown in Figure 1 are binary – *nominal with a two-point measurement scale* – since a retailer either applies the conditions or does not. Firm size is also treated as a binary condition; a retailer is either a large retailer or a SME. The last condition, sales channel-mix, is represented using an ordinal 6-point scale. Finally, a ratio measures ROA. The seven binary conditions do not need calibration since the only options are full membership and full non-membership. For calibrating sales channel-mix, we followed the principle suggested by the extant literature (Cao *et al.*, 2021; Ragin, 2008). For this ordinal condition the crossover point was calibrated by taking the 95th percentile as the threshold for full membership, the median score as the crossover point and the 5th percentile as the

threshold for full non-membership (Russo and Confente, 2019). The sales channel-mix crossover point turns out to be 30%. Here, store-oriented retailers are defined as having up to 30% online sales share, while online-oriented retailers are defined as having more than 30%. The full membership threshold value is 94.5% and full non-membership value 10%. The 'outcome" variable was calibrated by setting full non-membership at the 25th percentile, the crossover point at the 50th percentile and full membership at the 75th percentile (Galeazzo and Furlan, 2018). This means that 18 out of the 72 retailers are classified as high performers based on the ROA full-membership calibration. The ROA full-membership threshold value is 14.7%, cross-over point 5.3% and full non-membership value −1.5%. High performers represent 31% of all large retailers and 19% of the SME's are high performers. Meanwhile, the sales channel-mix does not influence the share of high performers. Interestingly, high performers can be found in each retailer group. Therefore, it is beneficial to explore how high performers compete through their logistics practices. However, the dataset contains a different number of high performers per retailer group – *8 large store-oriented retailers, 5 SME store-oriented retailers, 3 large online-oriented retailers and 2 SME online-oriented retailers*. The analysis underlines the commonalities and differences in configurations between high performers in the groups.

### *Truth table*

Eight conditions, as the maximum number in fsQCA, allow 256 possible configurations. The truth table contains 34 empirical configurations after grouping the 72 empirical cases. That 222 "remainder" configurations are not empirically observed occur in fsQCA is due to the limited diversity of reality. Not including rare configurations comes at the cost of more parsimonious findings, so a decision was made to include more empirically observed configurations even though the complex solution might contain rare configurations. Therefore, the frequency threshold of one case was used (Greckhamer *et al.*, 2018). A consistency score is calculated for each configuration to assess whether the groupings lead to the studied outcome – here, *high and low performers* – as well as on the solution level. The consistency score ranges between 0 and 1. Following the recommendations by Greckhamer *et al.* (2018) and Bell *et al.* (2014), the consistency cut-off of 0.8 was used.

## Results

### *Logical minimization*

The shortest and simplest solution formula leading to the outcome is identified in the logical minimization step (Fiss, 2011). The overall solution, the so-called *minimal formula*, normally consists of several solution terms representing different configurations that all lead to the desired outcome. Each solution term contains a sufficient condition or sets of sufficient conditions leading to a certain outcome and the term includes present and absent conditions without redundant conditions. Necessary conditions needed for the studied outcome to occur are also identified during this process; however, a necessary condition alone is not sufficient to produce the outcome. It is therefore important to consider the complete sufficient solution when analyzing high and low performing solutions, since solid conclusions cannot be drawn by simply relying on certain parts of the sufficient solution. Necessary conditions in fsQCA are usually identified by a consistency above the threshold of 0.9 (Greckhamer *et al.*, 2018).

Deciding which solution to present depends on the nature of the study (Rubinson, 2019). While the complex solution may be hard to interpret, the parsimonious solution might not be realistic. As this study is exploratory, we present the complex solution based on the 34 empirically observed configurations. Since the resulting coverages and consistencies are high considering few solutions, the complex solution is preferred over the intermediate solution.

Hence, four configurations in the complex high-performer solutions are presented; these have two or more cases with membership above 0.5.

Presence of in-store and home delivery is identified as necessary conditions for high performance – so called *common denominators* in all solution terms. Also, since the consistency score for solitary C&C is close to the threshold of 0.9 (0.85), it is deemed a necessary condition. This demonstrates that high performers offer a wide delivery palette. Although the consistency for home delivery exceeds 0.9, it is considered a redundant condition in the first configuration since backtracking the cases reveals that there exists one high-performing SME within home decoration which offers only solitary C&C deliveries. This firm does not offer home delivery of bulky products possibly due to the lack of economies of scale. This shows that there does not exist any one superior last mile solution which would fit all high performing retailers (equifinality), and that other factors not included here, such as product characteristics might also influence performance.

### *Illustration of the results*

Fizz configuration charts provide an overview of the complete solution with various solution terms, including both core and peripheral conditions (Ragin and Fiss, 2008; Fiss, 2011; Rubinson, 2019). Here, we present the Fizz configuration charts for the high and low performers. Two important parameters when evaluating and interpreting solutions are *solution coverage* and *solution consistency*. The solution coverage, and each solution configuration coverage, indicate how much of the outcome can be explained by the configuration and the solution as a whole. To serve the purpose of our study, it is required that each of the groups contains a different number of total and high performers influencing the coverage of each solution term (Table 1). Our solution consistency exceeds the 0.8 threshold (Greckhamer *et al.*, 2018). The cases that are part of each solution term are analyzed individually to better understand each retailer group.

The complex solution coverage for high performers is 0.58 with a consistency of 0.89, based on 7 solution terms. There are four solution terms that have two or more cases with membership greater than 0.5 (Table 1). The firm characteristics group is the only group of conditions that exhibits at least one core condition in every success configuration, and both retailer size and sales channel-mix are core conditions in half of the success configurations. Here, 12 out of the 15 cases in the third configuration are large retailers. The solution terms representing different configurations in both charts are therefore labeled according to the four retailer groups – *store-oriented SME's, online-oriented SME's, large store-oriented retailers* and *large online-oriented retailers*.

The complex solution for low performers, consisting of 10 solution terms, has a coverage of 0.50 and consistency of 0.97. Here, we found three times as many low-performer configurations as high-performer configurations. Therefore, we selected to present the five low performers solutions that have three or more cases with membership exceeding 0.5 (Table 2).

## Discussion

### *Configurational taxonomy*

The results of the configurational analysis provide support for the relevance of firm size and sales channel-mix for how the LM logistics practices are leveraged. By considering the two dimensions of firm characteristics used in this study, the resulting configurations are illustrated in a $2 \times 2$ matrix (Figure 2). In all the four groups, offering a wide range of delivery options (including home delivery, solitary C&C and in-store delivery) appears to be a necessary (but not sufficient) condition for competitiveness. Therefore, such delivery

| | High Performers | | | |
|---|---|---|---|---|
| **Description** | **Store-oriented SME** | **Online-oriented SME** | **(Large) Store-oriented** | **Large online-oriented** |
| **Configuration** | **1** | **2** | **3** | **4** |
| **Last Mile Back-end Fulfilment** | | | | |
| Warehouse | ○ | ● | ⬤ | ● |
| Store | ● | ○ | ⬤ | ● |
| **Last Mile Delivery** | | | | |
| In-store Delivery | ● | ⬤ | ● | ● |
| Home Delivery | | ● | ⬤ | ● |
| Solitary C&C | ⬤ | ● | ⬤ | |
| **Last Mile Returns** | | | | |
| In-store returns | ● | ○ | ● | ⬤ |
| **Firm Characteristics** | | | | |
| Size | ○ | ○ | | ⬤ |
| Sales channel-mix | ○ | ● | ○ | ⬤ |
| Raw Coverage | 0.12 | 0.05 | 0.29 | 0.16 |
| Unique Coverage | 0.12 | 0.05 | 0.20 | 0.07 |
| Consistency | 0.88 | 1.00 | 0.84 | 0.85 |
| # retailers with greater than 0.5 membership | 6 | 2 | 15 | 4 |

⬤ / ● = Core / peripheral condition present ○ / ○ = Core / peripheral condition absent □ = Redundant condition ▨ = Necessary condition

**Table 1.**
Fizz chart of high performers configurations

**Sources(s):** Table by authors

alternatives, if combined with proper fulfilment and returns alternatives, could result in superior performance. Here, we provide an overview of the "recipes" for the resulting configurational taxonomy.

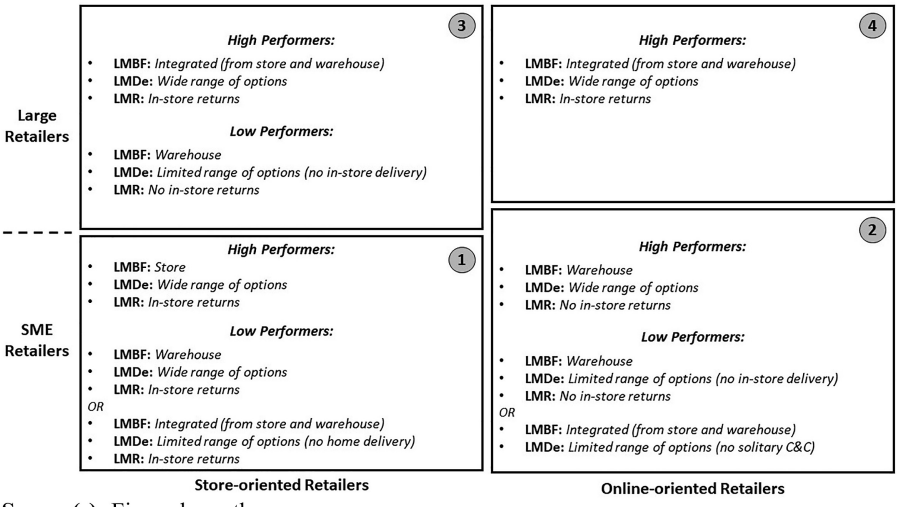
For SME's providing a wide range of delivery alternatives reveals to be the necessary entry door to competitiveness. Successful store-oriented SME's (Quadrant 1) capitalize on their stores to provide in-store return options and fulfill online orders. However, given similar range of delivery options and in-store returns, they avoid utilizing their warehouses for online order fulfilment. If they opt for an integrated system in LMBF, not offering a wide range of delivery alternatives could make a recipe for low performance, even conceding that they accept in-store returns. As SME's become more online-oriented (Quadrant 2), in attaining higher performance, they appear to utilize their warehouses instead of the stores for LMBF and not offer in-store returns. Moreover, handling integrated or parallel fulfilment systems, may cause complexity in bundling such resources for SME's, making leveraging resources unrealistic (Jones *et al.*, 2021). This can be evident from the low performers in Quadrants 1 and 2 which offer a limited range of options in LMDe and deploy integrated LMBF. Contrary to the general contention that SME's suffer from lack of resources in broadening their range of options in LM logistics, our results reveal that high-performing SME's in our sample manage to provide a wide range of delivery solutions. Therefore, we argue that offering a wide range of options in LMDe, if bundled with simple LMBF and LMR alternatives, is indeed the proper bundling alternative for SME's. Based on this and by comparing Quadrants 1 and 2, it appears that high-performing SME's tend to provide a wide range of delivery options, where a) store-oriented SME's utilize their stores for

| Description | Low Performers | | | | |
|---|---|---|---|---|---|
| | Store-oriented SME | (Store-oriented) SME | Online-oriented SME | (Online-oriented) SME | (Large) Store-oriented |
| Configuration | 1 | 2 | 3 | 4 | 5 |
| **Last Mile Back-end Fulfilment** | | | | | |
| Warehouse | ● | • | ● | • | • |
| Store | ● | ○ | ● | ○ | ○ |
| **Last Mile Delivery** | | | | | |
| In-store Delivery | ● | ● | • | ○ | ○ |
| Home Delivery | ○ | • | • | ● | ● |
| Solitary C&C | | ● | ○ | • | • |
| **Last Mile Returns** | | | | | |
| In-store returns | ● | ● | | ○ | ○ |
| **Firm Characteristics** | | | | | |
| Size | ○ | ○ | ○ | ○ | |
| Sales channel-mix | ○ | | ● | | ○ |
| Raw Coverage | 0.05 | 0.08 | 0.09 | 0.08 | 0.06 |
| Unique Coverage | 0.05 | 0.05 | 0.09 | 0.06 | 0.04 |
| Consistency | 1.00 | 1.00 | 0.97 | 0.97 | 1.00 |
| # retailers with greater than 0.5 membership | 3 | 3 | 4 | 3 | 3 |

● / ● = Core / peripheral condition present ○ / ○ = Core / peripheral condition absent □ = Redundant condition

**Sources(s):** Table by authors

**Table 2.** Fizz chart of low-performer configurations




**Source(s):** Figure by authors

**Figure 2.** High- and low-performer configurations by omni-channel retailer groups

LMBF and LMR and b) online-oriented SME's capitalize on their warehouses for LMBF and do not offer in-store returns.

As in the case of SME's, offering a wide range of delivery options appears to be a core condition for success for large retailers (Quadrants 3 and 4). However, irrespective of whether they are store- or online-oriented, our results indicate that large firms tend to utilize their

stores in LML. Backtracking the high performing firms in Quadrant 3 reveals that most of these retailers have dozens of stores in the larger cities in Sweden, with a total annual turnover above €100 m. Hence, they capitalize on their extensive store network and offer a complete remote delivery service range in LMDe. Reversely, the low performers do not utilize their stores for LMDe or LMR and only rely on their warehouses for LMBF. The large online-oriented high performers (Quadrant 4), have a similar configuration to large store-oriented retailers, even though this group is more diverse. Yet again, our results stress the importance of capitalizing on the stores even for the omni-channel firms which are online-oriented (higher share of online sales), which is in line with prior findings (Ishfaq *et al.*, 2016). The retailers belonging to Quadrant 4 in our sample have a turnover above €100 m, but their store network varies from 4 stores up to 70 stores. This provides further empirical support for the established literature suggesting that integrated fulfilment from store-and-warehouse is a path to success for large retailers if combined with a wide range of delivery options and in-store returns (Davis-Sramek *et al.*, 2020; Ishfaq *et al.*, 2016; Millstein *et al.*, 2021). We further complement prior contributions – e.g. Mangiaracina *et al.* (2015), Wollenburg *et al.* (2018a), Gallino and Moreno (2014) – regarding when and how high performers offer in-store returns. For instance, to stay competitive, high performers offer in-store return possibilities if they also fulfill online orders in the store, while for omni-channel retailers, aligning store return modes with fulfilment locations would be relevant (cf. Jones *et al.*, 2021). We argue that, since the returned product can be delivered to online customers directly from the store, this could reduce the risk of obsolescence and minimize the reverse logistics costs and possibly reduce environmental footprint.

*Theoretical implications*

We draw on CT to empirically explain how competitiveness could be achieved by uniquely bundling and leveraging a series of LM decision parameters and firm characteristics (Ketchen *et al.*, 2022; Ketchen and Hult, 2011). Whereas prior studies mainly provide implications for successful firms, we also provide insights regarding low performers. Therefore, following the consensus in the retailing literature (Kembro and Norrman, 2021), we stress that there is no best practice that fits all by comparing both retailer groups' success commonalities and differences. Hence, we argue that CT provides a suitable lens to explain not only which LM parameters should be bundled but rather how they should be synergistically matched with certain contingent firm characteristics for leveraging (Jones *et al.*, 2021; Fiss, 2007). For instance, while earlier findings suggested that physical stores become more involved in the distribution processes with increase in online sales (Ishfaq *et al.*, 2016), our results stress the importance of taking firm size into consideration for more precise insight into the configurations (Ketchen *et al.*, 2022). As an illustrative example based on our sample, even the large high-performing online-oriented retailers tend to capitalize on their physical stores. Consequently, we engage in the debate regarding whether and how the changes in firm characteristics (e.g. change in sales channel-mix or sales growth) would interplay with the LM logistics practices (Millstein *et al.*, 2021). For instance, evolving from dedicated fulfilment from warehouse *or* store to integrated fulfilment from warehouse *and* store as sales grows, would contribute to high performance. Following Davis-Sramek *et al.* (2020), who suggest that large retailers gradually transition towards integrated fulfilment from store-and-warehouse in the long run, we provide support for this being a recipe for large high performers.

*Managerial implications*

The findings of this article could provide relevant practical insights on how competitive edge (or lack thereof) could be attained as a result of bundling the LM logistics practices in LMBF, LMDe and LMR. While the LM practices are interrelated, our findings indicate that in practice not all alternatives in LML are simultaneously necessary to be competitive. Hence, our

findings could provide managerial insight in deciding on the appropriate options. At a broad level, we believe that retail executives can benefit from the findings if their respective firms are undergoing growth, expansion, or transformation of sales channel-mix, or are transitioning to omni-channel (Chopra, 2016; Hübner *et al.*, 2016a). This could be of outmost relevance given the unprecedented uncertainties and disruptions in the marketplace since omni-channel executives constantly develop and test different practices, especially with the prevalence of actors in the urban logistics (Kembro and Norrman, 2021).

Moreover, we draw the attention of practitioners in considering the peculiarities of their firms and finding the right synergetic fit with their LM practices in strategizing. Specifically, the study reveals the best practices among high-performing store-oriented SME's, online-oriented SME's, large store-oriented retailers and large online-oriented retailers, as well as the most common pitfalls leading to low performance. We provide mixed, yet interesting, support for the common notion that offering a wide range of deliveries might drive sales. It appears that developing a myriad of options in delivery is the common denominator among high performers and could pay off in planning for delivery. Hence, we recommend executives to consider developing a range of delivery options, if only they simultaneously match them with the appropriate fulfilment and return policies. Moreover, based on our findings, retail executives in SME's ought to consider keeping fulfilment simple, where store-oriented firms should use their stores for fulfilling online orders, and online-oriented firms should instead use their warehouses in LMBF. Large firms, on the other hand, given their access to more resources (e.g. potentially integrated IT systems), could benefit from utilizing both stores and warehouses (e.g. fulfilling online orders in the warehouse complemented with fulfilment from their stores). Interestingly, the success recipes are similar for large store- and online-oriented high performers.

## Conclusions

### *Closing remarks*

Our study set out to explore how the configurations resulting from the interplay of LM logistics practices and firm characteristics are associated with firm performance in an omni-channel context. Building on the contemporary omni-channel logistics literature, we used firm size and sales channel-mix as influential firm characteristics alongside several LM logistics practices in fulfilment, delivery and returns. Acknowledging that there is a myriad of pathways to competitive advantage, our study points to a few significant configurations. Specifically, we found four groups of firm practices depending on whether the retailers are store- or online-oriented, both for SME and large firms. Hence, we provide a configurational taxonomy which has relevance for practitioners and researchers. Hence, we delineate the recipes for different outcomes for both large retailers as well as SME's, which enables a more comprehensive understanding of their differences and similarities. Rather than focusing on specific retail sectors (e.g. groceries), our broad sample, which covers multiple retail sectors, provides a more realistic picture of the omni-channel retailing industry. Our results indicate that while wide range of deliveries is a common denominator of competitive edge, specific recipes for different levels of performance could be mapped out by utilizing stores and warehouses for online order fulfilment and returns depending on the firm characteristics. Surprisingly, our findings show that large high-performers fulfill online orders in stores and warehouses in an integrated way irrespective of sales channel-mix, while their SME counterparts focus on fulfilment simplicity with less-costly delivery alternatives.

### *Limitations and further opportunity for research*

While providing timely contributions, our study opens up several potential areas for future research. We reiterate that this study focused on omni-channel retailers, and pure online

players were excluded. Since this study focuses on omni-channel retailers, it would be beneficial to understand how high-performing pure e-tailers configure logistics practices to succeed when competing with omni-channel firms that leverage the already existing services via their stores. It should be noted that none of the large omni-channel high performing retailers in our sample had an online sales share of total sales above 90%, nor a store network of fewer than four stores. Also, we see great potential in more comprehensively capture competitive advantage in future research, such as via growth in ROA or via multiple indicators. We encourage future studies to complement our findings by empirically testing the recipes following the configurational taxonomy. Given this, it should also be noted that other logistics practices or contingencies (e.g. product types, outsourcing, technology intensity, environmental uncertainty and network density) may be influential in forming different configurations in the LM, which opens up directions for further investigation. We acknowledge that possibly due to technical or financial constraints, certain LM practices may not be viable. Hence, future studies could benefit from rigid theoretical reasoning to explain such intricacies. We also see great potential in exploring the complexities, implications, as well as the solutions, resulting from the increase of actors in urban logistics, as well as crowdsourcing.

We also see multiple potential areas for further contributions on the methodological front. While we believe that our chosen method is appropriate in exploring the equifinality of LM practices, we contend that it has delimitations in explaining how exactly LM practices are leveraged, especially given environmental uncertainty. Perhaps, our results could be further complemented by possible in-depth qualitative case studies in this regard. Moreover, given the contingencies in the marketplace, we encourage future researchers to consider longitudinal studies to provide a better understanding of how bundles of logistics practices evolve over time. While the study has employed a diverse data sample, interpretation should allow for the contextual factors. This study was performed in Sweden, where a high percentage of firms sell online and have long online experience serving mature, environmentally aware e-consumers. Blue-collar labor costs are high, and Sweden has a low population density. While it is projected that e-commerce will continue to grow after the pandemic, albeit at a slower pace, future studies could consider the long-term effects of the pandemic on competitiveness or complement the findings during the post-pandemic "recovery" phase.

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