



## Warehousing trends and challenges in omni-channel logistics

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**Abstract.** Retail companies increasingly shift to an omni-channel strategy, allowing consumers to interact through a single seamless interface of integrated channels. This omni-channel trend put pressure on logistics and, particularly, warehousing activities, which need to combine fulfilment of retail store-replenishment and web-based consumer orders in an effective and efficient way. This explorative study discusses trends and challenges related to omni-channel warehousing, based on data from 19 Swedish retailers. Differences between retailers perceiving themselves as high performers and low performers are illustrated. The study also highlights current practice versus retailers' predictions of development over the next five years.

### 1 Introduction

Although e-commerce is growing, predictions suggest that 80% of retail sales will be in the physical store by 2020. A majority of retailers will use multiple sales channels [1] where traditional retailers invest in e-solutions and e-tailers introduce physical stores [2, 3]. This approach is often referred to as multi-channel retailing and implies that sales channels are not integrated [4, 5].

Currently many retailers seem to integrate their physical stores and e-commerce channels with the aim to enable a seamless world of shopping; a concept often referred to as *omni-channel retailing* [6]. Omni-channels involve only one logistics interface where inventories and order fulfillment are conflated [3, 5, 7]. Customers can place their orders in one channel, pick up or receive through another and return products in a third [8].

Recent studies show that the omni-channel landscape is continuously changing and highly competitive, with difficulties of designing a distribution system that supports effective and efficient order fulfillment and returns handling [see, e.g., 7, 9, 10]. Warehouses are now increasingly regarded a strategic component for omni-channel success [10, 11].

The purpose of this study is to explore current trends and challenges in omni-channel warehousing.

### 2 Method

For investigating a recent phenomenon, an exploratory survey using field experts is appropriate [12]. We invited major Swedish (non-food) retail companies (with physical stores and on-line sales) to participate in three exploratory and descriptive web-surveys on the topic of omni-channel retailing and logistics. This paper reports selected findings from one of the surveys, which is focused on omni-channel warehousing.

The survey contained multiple detailed questions regarding warehousing activities (from receiving to pack & ship, as well as returns handling), processes and resources as well as background data of each company. To grasp future aspects and trends, we researched retailers' perceptions of how they (i) work today, and (ii) will work five years ahead. The survey was pre-tested with two company representatives for general appropriateness and functionality.

A total of 19 retailers, representing a wide range of products, responded to the survey (table 1). The respondents were primarily logistics/SCM managers; one was CEO. Seven of the retailers worked with an omni-channel strategy, while 12 retailers were in a transformation toward fully integrated omni-channels within five years. Of these,

11 represented multi-channels, while one currently only had one physical store ("Other").

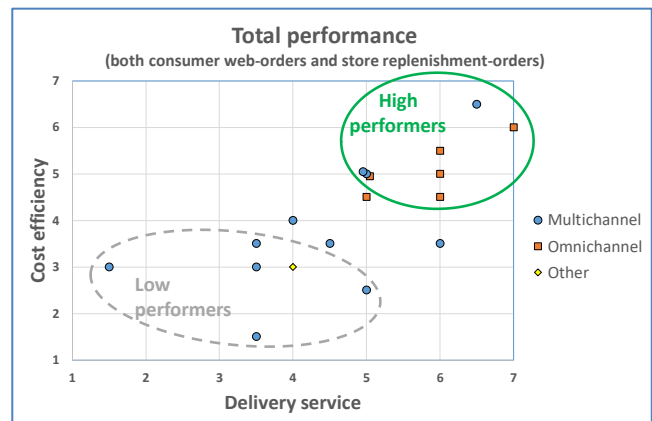
**Table 1.** Respondents

Product type	Multi-channel	Omni-channel	Other	Total	Low perf.	Mid perf.	High perf.
Fashion and jewellery	1	2		3			3
Sport equipment	1		1	2	2		
Home interior and furniture	2	1		3	1	1	
Consumer electronics	1	1		2	1		1
Spare parts and accessories to vehicles	1			1	1		
Building materials (DIY)	2	1		3			3
Books	1	1		2		1	1
Drugs		1		1		1	
Department Store	2			2	1	1	
<b>Total</b>	<b>11</b>	<b>7</b>	<b>1</b>	<b>19</b>	<b>6</b>	<b>4</b>	<b>8</b>

Having too few respondents to draw statistical significant conclusions, we instead develop insights by a more qualitative analysis and illustrative pattern matching, reporting at least qualitative tendencies and trends.

We are looking for general patterns as well as potential differences between channel type, or between perceived high and low performers (figure 1). To divide high performers from low performers, we used their own perceptions of performance in two aspects: cost efficiency and delivery service, both for web-orders and store deliveries, compared to industry competitors. This approach makes it possible to observe what retailers perceiving themselves as leaders do differently from retailers perceiving themselves as laggards.

A Likert scale from 1 ("agree to a very low degree") to 7 ("agree to a very high degree") was used to understand their perceptions. High performers (average performance above 5) were mostly omni-channel companies (OC), while low performers (average performance below 3,75) were multi-channel companies (MC) together with the "other" company.



**Figure 1.** Respondents' perceived performance.

### 3 Findings

Two trends are already described: the trend toward omni-channel (all respondents' aim within five years), and the tendency that OCs seem to perform better in cost and service than MCs. In five years, all companies plan to increase performance to be better than industry competitors.

But respondents find challenges related to omni-channel warehousing (figure 2). A major challenge (especially for MC, and low performers) will be to use retail stores as material handling/logistics nodes. Besides, more challenging activities (for all type of retailers) are packing & shipping, picking, and returns handling. (Return handling especially for low performers).

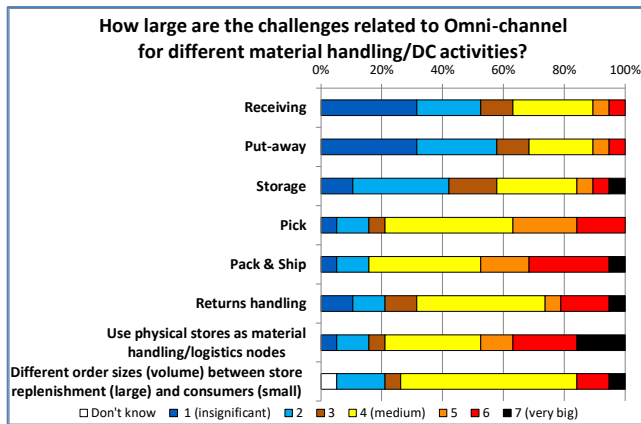


Figure 2. Omni-channel warehousing challenges.

Today, most respondents perceive to perform warehousing activities related to store-replenishment better than competitors, but being less competitive for web-orders (to consumers). The weakest performance relates to picking and packing, especially gift-wrapping and other consumer adaptations. Low performing areas include handling a mix of orders for e-commerce and store replenishment (e.g. related to packing & shipping), and having a Warehouse Management System (WMS) to better plan and control the warehouse activities.

For many of the detailed warehousing activities, today's OC perceive themselves better (figure 3) than MC. Clear tendencies can, for example, be observed for receiving, layout for web-orders, picking consumer orders, and WMS.

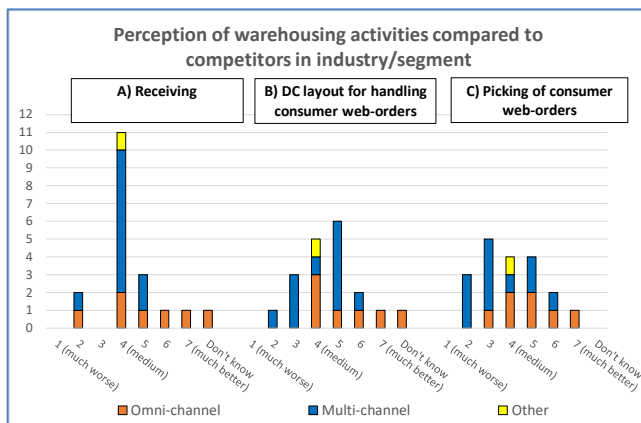


Figure 3. Perceived performance/channels.

High performers perceive themselves relatively better on, for example, receiving, layout for both web-orders and mixed orders, all types of picking, packing & shipping, and WMS for all types of orders (figure 4).

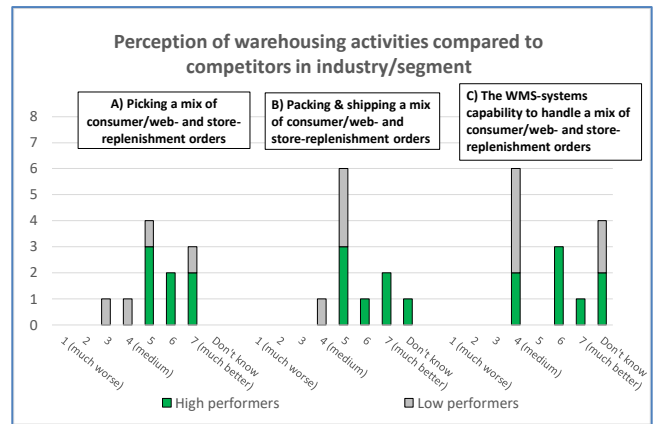


Figure 4. Perceived performance/performers.

Important for omni-channel logistics is whether activities should be integrated or separated. High performers separate receiving and quality control activities related to goods *flows from suppliers* and *return flows* (figure 5) to a higher degree (6-7), working both with separated zones and different personnel.

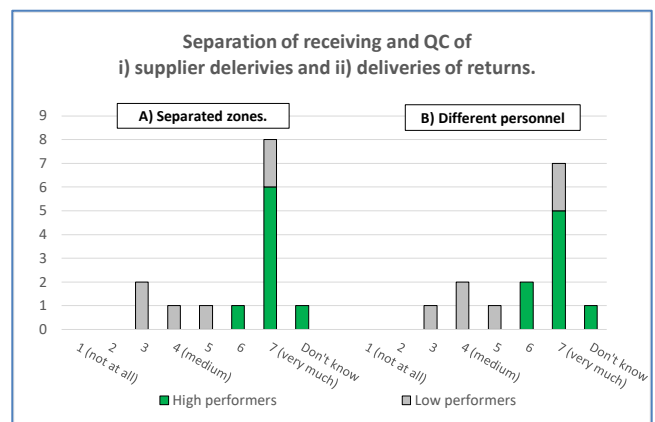


Figure 5. Separation of supplier deliveries and returns flows.

Another issue is, for what activities *store-replenishment orders* and *consumers' web-orders* should be *integrated or separated*. Most respondents seem to integrate orders both for bulk storage and picking storage. However, a few high performers use separation.

In picking, the two most common methods are *synchronized picking*, and *pick-by-sort*. Many seem to *prioritize picking and sorting of web-orders* before *store-replenishment orders*. Another pattern is *picking to packages and not to pallets*. More detailed, the tendency is that high performers (figure 6) have implemented many activities to a higher degree, for example *sort-while-pick*, *picking to parcels*, working with separate time windows for web- and store-orders, and more clearly prioritizing web-orders.

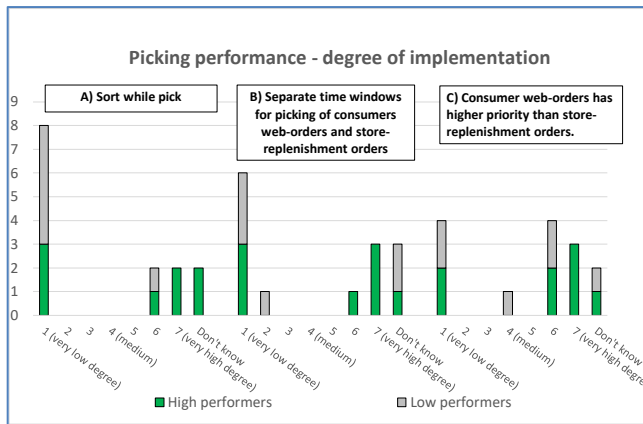


Figure 6. Implementation of picking practices.

Another decision reflects manual work or automation. Automation is low today (figure 7), with a clear trend toward more automated processes, especially for sorting, picking, packing and put away (figure 8).

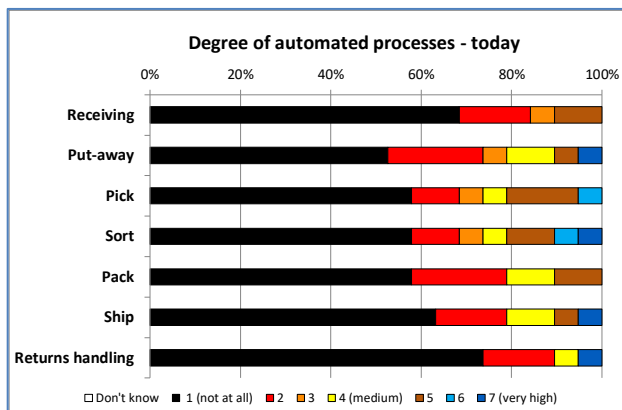


Figure 7. Automation today.

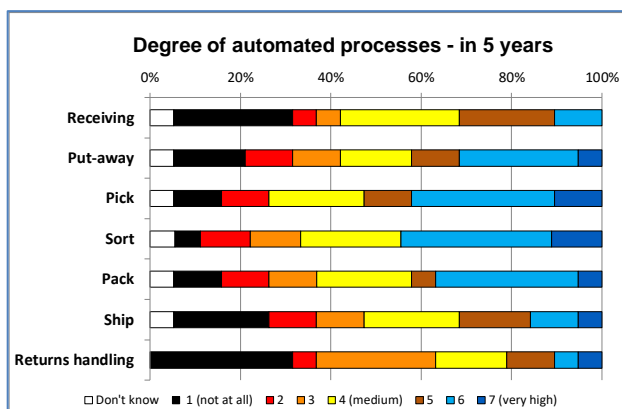


Figure 8. Automation in five years.

Shipping and returns handling will be least automated. OC will have highest increase of automation in five years. Already today, high performers are using automation more than low performers (figure 9). For packing, the tendency is unclear as also many high performers will continue to do it manually.

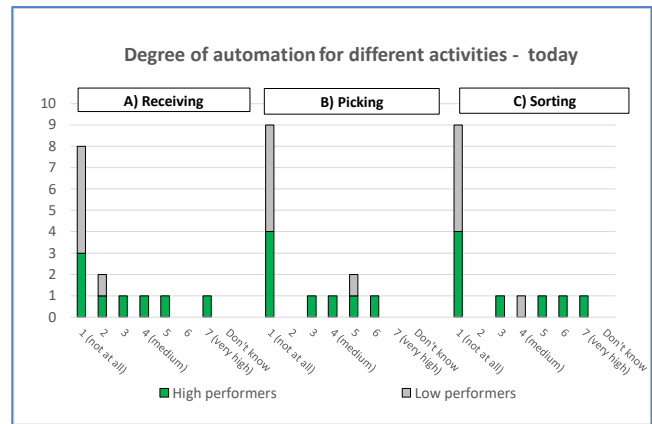


Figure 9. Automation of different activities.

Retailers must have capacity to handle fluctuating demand, both related to seasons (e.g. Christmas, Black Friday) and weekly peak days. Respondents had strong peaks on Mondays and Tuesdays, both for customer web-orders and store replenishment-orders. The general use of outsourcing (3/4PL) was most common for MC, and even stronger for demand peaks (both seasonal and peak days), while less used of OC and high performers. Both channel types are mainly using temporary workers to handle peaks. OCs try to a higher degree to influence the capacity need by shipping other days than requested (figure 10). In five years, retailers will work as today with personnel capacity, but slightly less with 3/4PL and increased use of extra shifts.

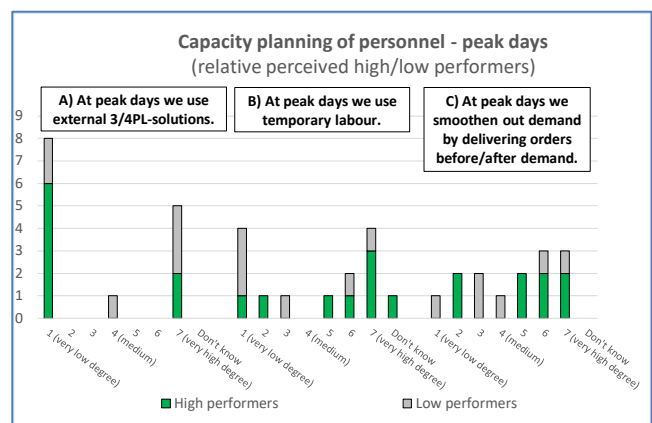


Figure 10. Capacity planning relative peak days.

Regarding click-and-collect, OCs are most developed today. But the changed role of physical stores in future retail channels, with more click-and-collect and click-and-reserve (figure 11 and 12), will present challenges and implications for materials handling.

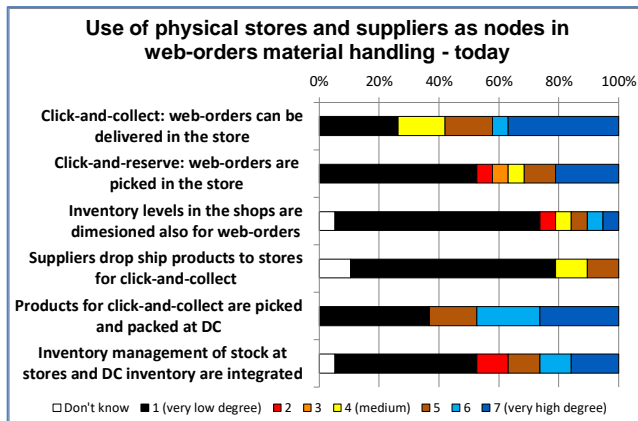


Figure 11. Use of nodes for materials handling - today.

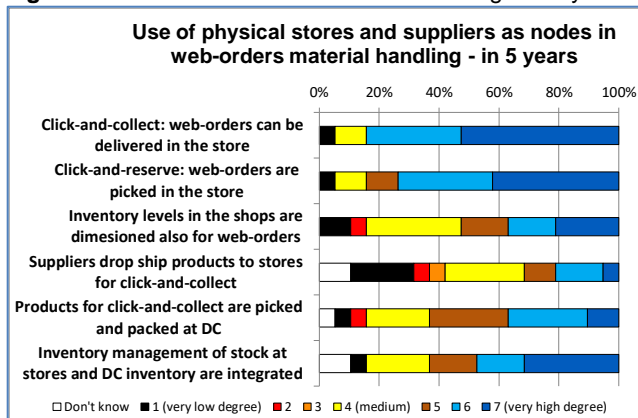


Figure 12. Use of nodes for materials handling - in five years.

Also drop-shipments from suppliers to stores (to supply web-orders) will increase. But as today, most products for click-and-collect will be picked and packed at the DC – especially of high performers. These trends imply that inventory management must be more coordinated between warehouses and other handling nodes (e.g. retail stores) for web orders. Today, high performers are more integrating inventory management. Regarding in-store picking, low performers struggle with the need of integrated ERP-systems and specific area needs.

## 4 Conclusions

The strong trend toward omni-channel retailing, with stores increasingly used as handling nodes for web-orders, creates challenges related to material handling (especially in packing & shipping, and picking). Automation will increase, but many will still handle material manually. Most respondents that perceive themselves as overall high performers have implemented omni-channel strategy. They also assess themselves better in many warehousing activities, seem to have implemented more developed practices and thought more regarding separation or integration. High performers also seem to perform warehousing more in-house: maybe they find warehousing an important capability to control and develop to be competitive in future omni-channel retailing.

With limited number of respondents from only one country, this study should only be used to develop hypothesis. As omni-channel warehousing transforms, more research should explore and analyse what is developed in practice and what works well in different contexts.

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