

# E-commerce and logistics systems of the future

M I C R O - F U L F I L L M E N T



- ◆ Mega-Trends & Social Discourses
- ◆ Fulfillment strategies at a glance
- ◆ Micro-Fulfillment Center (MFC) as the ideal type
- ◆ Practical examples from food to electronics

## Abstract

The expectations of customers are always based on the non-plus-ultra in terms of **availability, delivery time and price**. The benchmark for this today is Amazon in many areas. Even if unique selling points such as regional or ecological responsibility influence the market, the customer desire for fulfillment that is as uncomplicated as possible, fast and reliable remains and **is at least subconsciously oriented towards the market leader**.

**Rising space prices** in urban centres and their **traffic congestion** are an additional obstacle, but one that can be countered by a clever logistics system in order to be not only competitive, but also one step ahead. Indeed, the changing market conditions in the retail sector offer great **potential**. For years, the share of e-commerce has been growing steadily – additionally fueled by the Corona crisis. In 2020, e-commerce already accounted for 18.5% of retail sales (excluding groceries).<sup>1)</sup> From the completely manual to the highly automated process, the solution that best meets the requirements can be individually selected.

*For a large proportion of medium-sized businesses, Micro-Fulfillment is an ideal solution. Micro-fulfillment centers are automated, high-density warehouses in a small area, close to the end customers.*

- ◆ Significant shortening of delivery times
- ◆ Strong space optimization
- ◆ Efficient cost reduction
- ◆ Individual adaptation to existing buildings
- ◆ Simultaneous use as a pick-up station
- ◆ Reduction of the "Last Mile"
- ◆ More sustainability

System solutions such as **AutoStore®** combine these advantages and offer an innovative and dynamic **system solution**. Maximized storage density and the flexibility to adapt to any inventory building are crucial. This results in individually tailored opportunities for retailers from a wide range of industries such as food, clothing, electronics retailers and many more. Omnichannel presence can be realized and planned **more cost-efficiently**. In addition, there is a great deal of scope for adaptation and individual model solutions in order to become **more competitive** overall and to meet the challenges of social and economic change – not least the **demanding, digitized customer behavior**.

# Content

- Introduction..... 4
- 1. Societal developments and global trends ..... 4**
- Digitization & Automation ..... 4
- Urbanization ..... 5
- Sustainability & Environmental Responsibility ..... 5
- 2. Overview and evaluation of different fulfillment strategies ..... 6**
- In-Store Fulfillment..... 6
- Dark-Store Fulfillment ..... 6
- Micro-Fulfillment Center (MFC) ..... 6
- Customer Fulfillment Center (CFC) ..... 7
- Comparison of Fulfillment Strategies..... 7
- 3. The Micro-Fulfillment Center in the Detailed Perspective ..... 8**
- 4. Micro-fulfillment center with AutoStore® ..... 9**
- Examples of possible applications in various industries ..... 10
- Food retailing ..... 10
- Electronics retailers ..... 11
- Sporting goods trade ..... 11
- Shopping malls ..... 1
- ..... 2
- Conclusion ..... 13

Credits ..... 14  
.....  
Contact ..... 15  
.....

## Introduction

Since 2016, the annual growth of e-commerce in the retail sector has been around 9%. Due to the Corona crisis, the market grew by more than 15% in 2020, accounting for **13% of the total retail market**.<sup>2)</sup> The main reasons for consumers to shop online are the simple and straightforward processing, the time savings and the positive experiences with it.<sup>3)</sup> Consumers say they **want to use Click & Collect even after the pandemic** and, for example, have food delivered to their homes.<sup>4)</sup>

Consumers' expectations for **ever faster deliveries**, coupled with an ever-increasing **awareness of sustainability**, pose a particular challenge to logistics.<sup>5)</sup> Most supply chains are not designed for same-day delivery of orders and therefore often cannot meet customer expectations.<sup>6)</sup> In addition, global trends and social developments have put the environment in a **state of constant change**. In order to still be able to meet consumer expectations, the use of innovative fulfillment strategies is a good idea.

In order to gain a deeper insight into this area of tension and the decisive influencing factors, these are examined in more detail below. The focus is on **micro-fulfillment** and is put in relation to other strategies before **AutoStore®** shows a concrete solution based on practical examples.

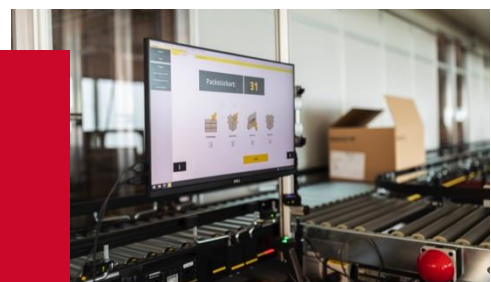
## 1. Societal developments and global trends

Societal developments determine customer needs and purchasing behavior. It is important for retailers to recognize these market changes and to align themselves **strategically at an early stage** in order not only to react, but **also to actively shape** them and thus open up opportunities and potential.

### Digitization & Automation

With digitalization, we are in the midst of entering a new era that is still in its infancy despite its already massively noticeable changes. Consumer behaviour has already adapted strongly to these new forms of everyday life and has developed routines that in turn determine expectations.

*More convenience leads to ever-increasing expectations of retail performance. The yardstick is always the market leader.*



Products reach customers **whenever, wherever and in what way they want**, while the demands on delivery times and shopping convenience continue to increase.<sup>7) 8)</sup> This is made possible, among other things, by increasingly dynamic and intelligent automation and robotics. In order to remain competitive in this environment in the future, it is therefore essential to **evaluate one's own options** for optimizing the fulfillment process and to develop a suitable **strategy** for one's own business **in good time**.

## Urbanization

Already today, 55% of the world's population lives in urban spaces. A UN study predicts that this proportion will rise to 68% by 2050.<sup>9)</sup> As a result, the **already limited space for logistics in urban areas is becoming even scarcer**, while the last mile to the customer is made even more difficult by increasing sales.<sup>10) 11)</sup> Together with the increasing expectations of customers, logistics is facing ever greater challenges.

*Rising prices for urban space and transport also increase the costs of logistics – especially the last mile.*



Alternative solutions are increasingly being sought in the context of modern urban and transport planning. For retailers, it is **both a necessity and an opportunity to help shape this change** and to operate more efficiently, while at the same time contributing to problem solving from a socio-economic point of view.

## Sustainability & ecological responsibility

Consumers' sensitivity to ethical and environmental issues is increasing,<sup>12)</sup> although they **do not yet** exceed the convenience of an overwhelming majority.

*Customers demand sustainable solutions for all areas related to production and supply chains. Final delivery is no exception.*



This development can already be seen in the supermarket through an ever-increasing range of fairly produced goods and organic products. In the future, sustainability will not only be an image issue, but will **also have a say in the core business of the retail sector**.<sup>13)</sup> The demand for ecological solutions and fair working conditions will also grow for logistics. The reduction of emissions in delivery traffic in particular is an important aspect that can also **be proactively advertised** by HÖRMANN customers.

## 2. Overview and evaluation of different fulfillment strategies

Differences arise from the **degree of automation and location**.

These require individual advantages, depending on the order quantities a retailer has to process and the delivery times that customers accept for the goods.

*In-store fulfillment:  
Picking by employees  
in addition to the  
normal customers in  
the store*

Under **In-Store Fulfillment** If you understand the **Kommissio-Coordination of online orders in the store**, in addition to the regular face-to-face business. This creates the problem that inventories are not always up-to-date. Customers can already buy the last Pro in the store.-Product added to their shopping cart but haven't paid yet. As a result, the stocks are temporarily incorrect, goods ordered online are no longer available and **need to be substituted** become. In addition, the shopping experience for normal customers can be affected by delivered aisles and the "competition". Professional-nellen buyers.

*Dark-store fulfillment:  
Employees commigate  
orders in warehouses  
that are not accessible  
to customers*

By the **Dark-Store Fulfillment** As with in-store fulfillment, the goods are picked by hand by employees. In contrast to the in-store Fulfill-Ment are **Dark stores but not accessible to normal customers** and thus allow a more efficient Inventory and picking.

**Micro-Fulfillment Center** are small, flexible warehouses,

*Micro-fulfillment  
center: Automated  
, small warehouses  
close to customers for  
picking  
Orders*

which are located on the outskirts of urban areas or directly in the city. They are characterized by a **high degree of automation and storage density** from. This saves personnel and space. However, the main objective is to reduce the distance to the end customer, which will reduce logistics costs and speed up the process.- Delivery allowed. **Micro-fulfillment centers can be flexibly installed in the storage rooms of existing retail stores-shops are set up** and therefore offer the possibility to use an existing branch network to fulfill online orders.

*Customer fulfillment centers: Large automated logistics centers that Can provide and commission a wide variety of products*

Than **Customer Fulfillment Center** are large automated logistics centers that can provide a very wide variety of products. Due to their size, they are located far outside urban areas, which means that the **Logistics costs on the last mile are rising** and the delivery time is extended. The initial investment is very high, but also allows significantly larger quantities of online orders for a larger catchment area.

## Comparison of fulfillment strategies

The large differences between the fulfillment strategies described mean that there is no one ideal strategy for everyone, but that the ideal strategy depends on the respective requirements. The following evaluation matrix is intended to provide an overview and help with the evaluation by **comparing various properties with regard to their suitability**.

| Categories            | In-Store | Dark Store | MFC | CFC |
|-----------------------|----------|------------|-----|-----|
| E-Commerce Sales      | -        | -          | o   | +   |
| Investment            | -        | -          | o   | +   |
| Picking speed         | -        | o          | +   | +   |
| Personnel costs       | +        | +          | -   | -   |
| Automation            | -        | -          | +   | +   |
| Implementation effort | -        | -          | o   | +   |
| Footprint             | -        | o          | -   | +   |
| Storage density       | -        | -          | +   | +   |

Impact: - low, o medium, + high // Rating: **positive** neutral *negative*

The table shows that **micro-fulfillment centers have no drawbacks**. Only investment and implementation costs are in the medium range, **but can be well compensated for by higher sales with reduced running costs**.

Due to the very high investment costs, customer fulfillment centers are reserved for a few large retailers, while the manual variant is only suitable for industries without significant online trading, but this is only true for a few.

If the focus is on fast delivery and proximity to the customer, **micro-fulfillment centers are the ideal solution**. They can be set up with comparatively little effort and thus also offer smaller retailers access to automated fulfillment strategies. Likewise, due to their proximity to the customer, they address consumers' expectations for ever faster and at the same time ecological deliveries.



### 3. The Micro-Fulfillment Center in the Detailed Perspective

*The model pays off even at extreme space costs. Using New York City as an example, it was shown that the delivery of orders from an urban fulfillment center is cheaper than that from outside. The reason for this is the significant reduction in costs on the last mile due to proximity to the end customer.*

**Micro-fulfillment is characterized by very high storage density, flexible integration into existing buildings and a high degree of automation.**

However, due to its compact size, the range of products is limited. Likewise, only a few items per item type can be stored, which makes regular delivery necessary.

At the same time, an MFC can be used as a location for **Click & Collect**, as you are already close to the customer. This means that the consumer is not forced to be at home at the time of delivery and can obtain the goods from a locker, for example. On the one hand, this is an **additional service**, while at the same time the dealer can **save effort and costs**. The proximity to the customer also allows flexible, environmentally friendly delivery options such as cargo bikes or, in the future, autonomous delivery robots. The customer's desire for fast, convenient and individually selectable delivery is fulfilled.

**Examples of possible product groups and forms of retail:**



## 4. Micro-Fulfillment Center with AutoStore®

AutoStore® is a modern and innovative system for **automatic storage and picking** of small parts in plastic containers and was developed by the Norwegian company Jacob Hatteland Computer AS. The system was born from the idea of optimising the degree of volume utilisation, dynamics, energy efficiency, expandability, use of materials and connection of picking stations compared to conventional automated small parts warehouses (AKL) or shuttle systems. With its compact storage solution that eliminates aisles and racks, **AutoStore reduces space requirements by 75%.**

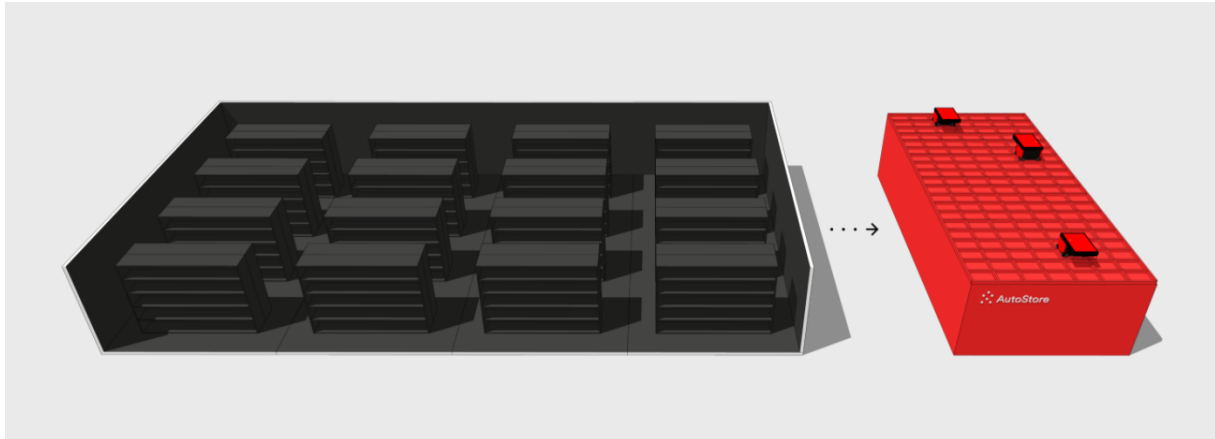


Fig. 1: Space-saving potential through AutoStore

The containers are placed on top of each other in stacks on the floor. About the container-stacking is a rail system (Grid) on which the high-speed robot moves. They tirelessly pick up containers, rearrange them and **deliver them to the directly connected ports** for incoming goods and order picking. **AutoStore is a completely Modular system**, where the number of robots and workstations determine the throughput.

### **AutoStore Benefits**

- ◆ *High degree of volume utilization due to compact storage*
- ◆ *High dynamics*
- ◆ *Simple, flexible integration into existing building structures*
- ◆ *Modular design of the overall system*
- ◆ *Capacity increase through expansion of the grid*
- ◆ *Increased performance through the use of additional robots and ports*
- ◆ *Low energy consumption due to low power consumption & high efficiency*
- ◆ *Highest Availability due to system-immanent redundancies*
- ◆ *Maximum security against theft*

These features make **AutoStore ideal for micro-fulfillment centers**. It can be flexibly integrated into existing buildings and, if necessary, expanded during operation. Due to its high storage density, the existing **storage space in existing stores can be used more efficiently and the micro-fulfillment center can be integrated directly into the store warehouse**. At the same time, the system is very energy-efficient, for which it was awarded the Green Supply Chain Award for the third time in a row in 2020 .<sup>15)</sup>

## Exemplary applications in various industries

In order to give an exemplary overview of various possible applications and uses, four concepts are briefly presented below. However, the principles presented can be **transferred to other industries and applications at will and** can be adapted to individual needs in a particularly uncomplicated manner.

### Food retail trade

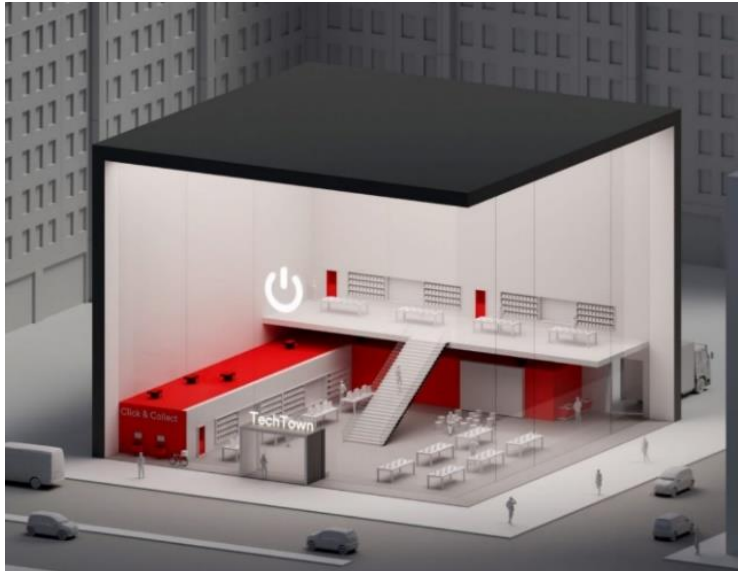
The **market share of online grocery retailing in Germany is expected to increase at least fivefold by 2030**.<sup>16)</sup> The integration of micro-fulfillment centers into existing stores picks up on this. Customers can then decide whether they want home delivery or a pre-picked order at the pick-up station. In addition, customers can manually select fresh products in the store without having to collect all their purchases themselves. Auto-Store can take care of this process for him if he submits his order before or at the beginning of his purchase. AutoStore was **named Product of the Year in 2020 as a micro-fulfillment solution for food retailers**.<sup>(17)</sup>



Fig. 2: Grocery store with combined warehouse for chain stores and onlineOrders

### Electronics retailers

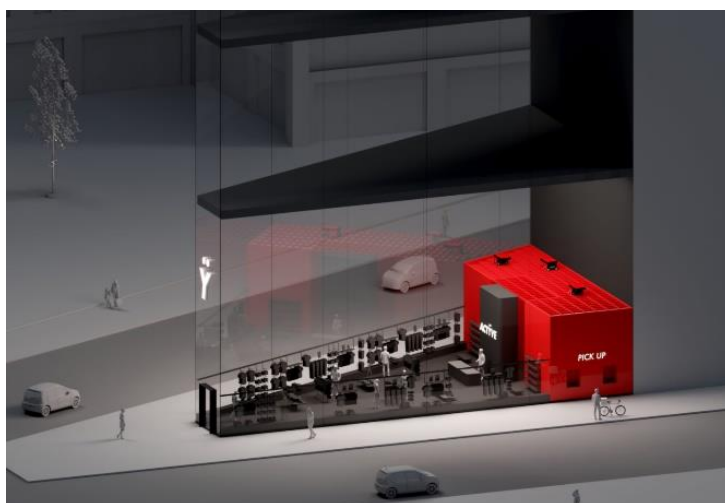
**Electronics are highly competitive online.** In order to remain competitive, the immediate collection of an order in the store (Click & Collect) can be a differentiating factor from the competition, in addition to very fast delivery. In addition to servicing **online purchases, parts of the store warehouse** can also be integrated into AutoStore . As a result, storage space can be saved and ideal protection against theft can be achieved.



*Fig. 3: Electronics store with plenty of space for a stay and shopping experience*

### **Sporting goods trade**

Through Click & Collect, customers have the opportunity to **pick up their goods 24/7** and are no longer dependent on store opening hours. In addition, parts of the store warehouse can also be stored in AutoStore, leaving **more space on the sales floor for the presentation of goods and the shopping experience**. In this way, digital and analogue trade are optimally combined.



*Fig. 4: Sporting goods store with optimized store space and compressed warehouse*

## Shopping centres

Shopping malls offer special opportunities for micro-fulfillment. Due to their urban location, they are usually already ideally located in the vicinity of many consumers. The large number of dealers in the United Kingdom can **AutoStore as a central common warehouse** and thus also fulfill online orders together. **For the customer, this offers the advantage of being able to order his goods collectively from different dealers.** In return, retailers save storage space and can also use joint personnel to pick online orders. **Save costs.**



*Fig. 5: Highly compressed central warehouse for several retailers below a shopping mall*

## Result

The digital revolution is massively changing the market environment. In addition, **there are growing consumer expectations for speed, flexibility and sustainability**, which pose additional challenges for retailers. This dynamic environment must be taken into account by every retailer when developing strategies for the future.

A special focus should be placed on the fulfillment of the **constantly increasing number of online orders**. By choosing the right fulfillment strategy, **customer expectations** can be met and profitability can be optimized at the same time. An exact analysis of the requirements and a comparison of different fulfillment strategies with regard to their suitability for one's own situation are the key to success.

*Micro-fulfillment offers particularly great potential for a wide range of applications. Due to the physical proximity to the end customer, it is precisely the consumer's expectation for fast and sustainable deliveries that can be met.*

*In addition, it offers the possibility of integration into existing branches, which greatly facilitates and accelerates implementation.*

If you need help choosing the right strategy for you or developing your individual micro-fulfillment solution, we will be happy to assist you with our expertise. With our many years of experience in the conception, planning and implementation of countless projects for a wide variety of industries, we are the ideal **partner** for the development and implementation of **your individual fulfillment strategy**.

## Source and image credits

- 1) [https://www.bevh.org/fileadmin/content/05\\_presse/Pressemitteilungen\\_2021/210126\\_-\\_Pra\\_\\_sentation\\_bevh\\_Jahrespressegesprach\\_2021\\_-\\_Webseite.pdf](https://www.bevh.org/fileadmin/content/05_presse/Pressemitteilungen_2021/210126_-_Pra__sentation_bevh_Jahrespressegesprach_2021_-_Webseite.pdf)
- 2) [https://www.bevh.org/fileadmin/content/05\\_presse/Pressemitteilungen\\_2021/210126\\_-\\_Pra\\_\\_sentation\\_bevh\\_Jahrespressegesprach\\_2021\\_-\\_Webseite.pdf](https://www.bevh.org/fileadmin/content/05_presse/Pressemitteilungen_2021/210126_-_Pra__sentation_bevh_Jahrespressegesprach_2021_-_Webseite.pdf), own calculations
- 3) <https://www.ifhkoeln.de/produkt/corona-consumer-check-vol-8/>
- 4) <https://www.mckinsey.com/industries/retail/our-insights/adapting-to-the-next-normal-in-retail-the-customer-experience-imperative>
- 5) <https://www.pwc.de/en/retail-and-consumer/study-consumers-want-fast-sustainable-shopping.html>
- 6) [https://www.mckinsey.com/~media/McKinsey/Industries/Retail/Our%20Insights/Future%20of%20retail%20operations%20Winning%20in%20a%20digital%20era/McK\\_Retail-Ops-2020\\_FullIssue-RGB-hyperlinks-011620.pdf](https://www.mckinsey.com/~media/McKinsey/Industries/Retail/Our%20Insights/Future%20of%20retail%20operations%20Winning%20in%20a%20digital%20era/McK_Retail-Ops-2020_FullIssue-RGB-hyperlinks-011620.pdf)
- 7) <https://www.mckinsey.com/industries/retail/our-insights/reviving-grocery-retail-six-imperatives>
- 8) <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-urban-fulfillment-centers.pdf>
- 9) <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>
- 10) <https://www.cushmanwakefield.com/-/media/cw/emea/united-kingdom/insights/download-pdfs/2017-cushman-wakefield-urban-logistics-report.pdf>
- 11) <https://www.jll.de/en/trends-and-insights/cities/logistics-inner-city-hubs>
- 12) <https://static.ottogroup.com/media/docs/de/trendstudie/Otto-Group-Trendstudie-zum-ethischen-Konsum-2020.pdf>
- 13) <https://zukunfdeseinkaufens.de/einkaufen-in-2036-teil-5/>
- 14) <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-urban-fulfillment-centers.pdf>
- 15) <https://www.sdexec.com/awards/green-supply-chain/article/21198202/sdce-green-supply-chain-award-2020-sustainability-requires-accountability>
- 16) <https://www.oliverwyman.de/media-center/2020/feb/e-food.html>
- 17) [https://www.materialhandling247.com/product/micro\\_fulfillment\\_center\\_for\\_grocery](https://www.materialhandling247.com/product/micro_fulfillment_center_for_grocery)

### Picture credits AutoStore:

Fig. 1: <https://autostoresystem.com/define/de/einkaufszentren-und-malls/>

Fig. 2: <https://autostoresystem.com/define/de/lebensmittelgeschäft/>

Fig. 3: <https://autostoresystem.com/define/de/elektronikfachhandel/>

Fig. 4: <https://autostoresystem.com/define/de/sportartikelhandel/>

Fig. 5: <https://autostoresystem.com/define/de/einkaufszentren-und-malls/>



# HÖRMANN Intralogistics

Gneisenaustraße 15 | D-80992 Munich  
T +49 89 149898 0

[info@hoermann-intralogistics.com](mailto:info@hoermann-intralogistics.com)  
[www.hoermann-intralogistics.com](http://www.hoermann-intralogistics.com)

A member of the HÖRMANN Group  
[www.hoermann-gruppe.de](http://www.hoermann-gruppe.de)

