MICRO-FULFILLMENT

MEETING CUSTOMER'S FUTURE EXPECTATIONS TODAY

White paper written by
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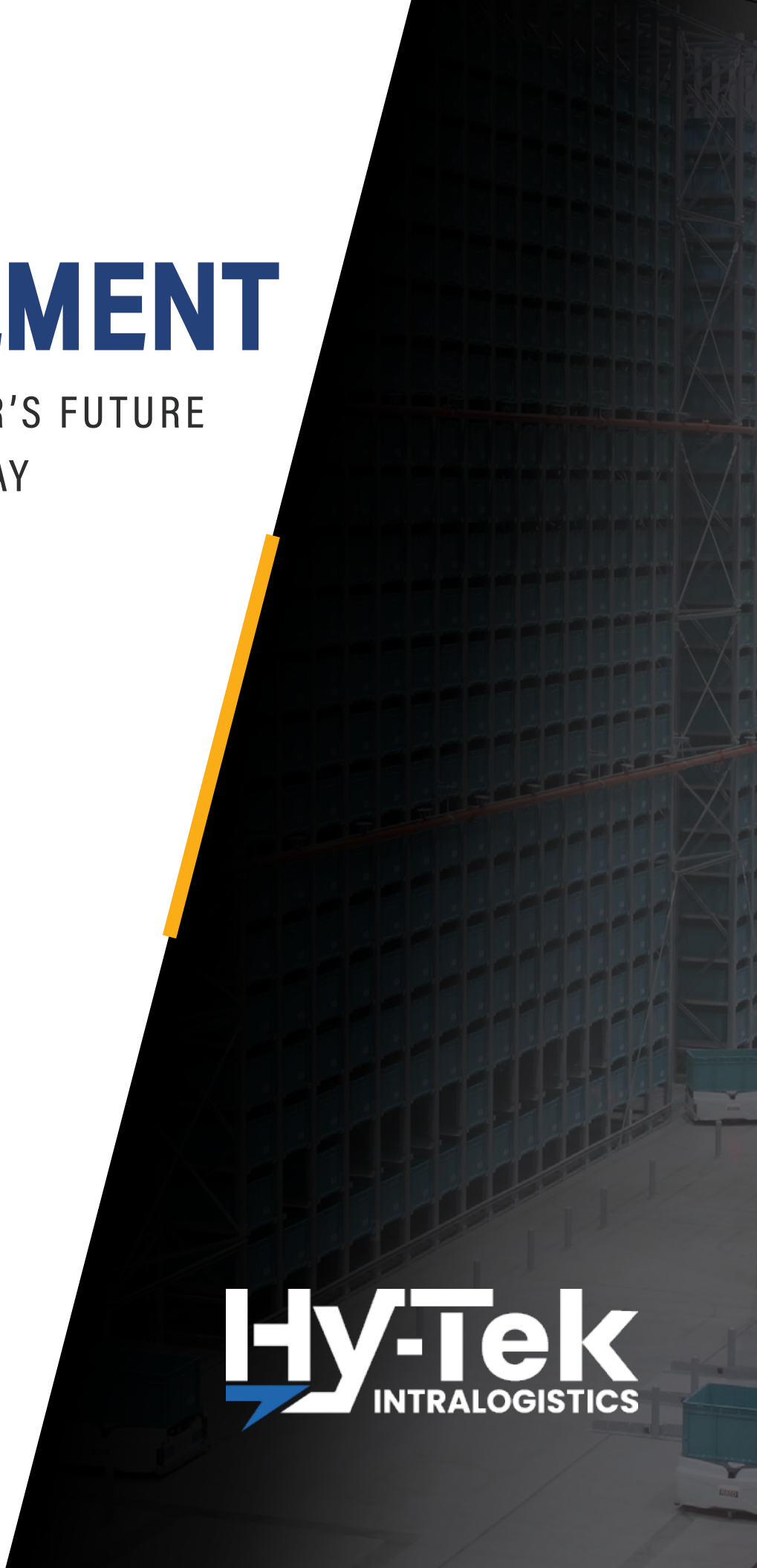

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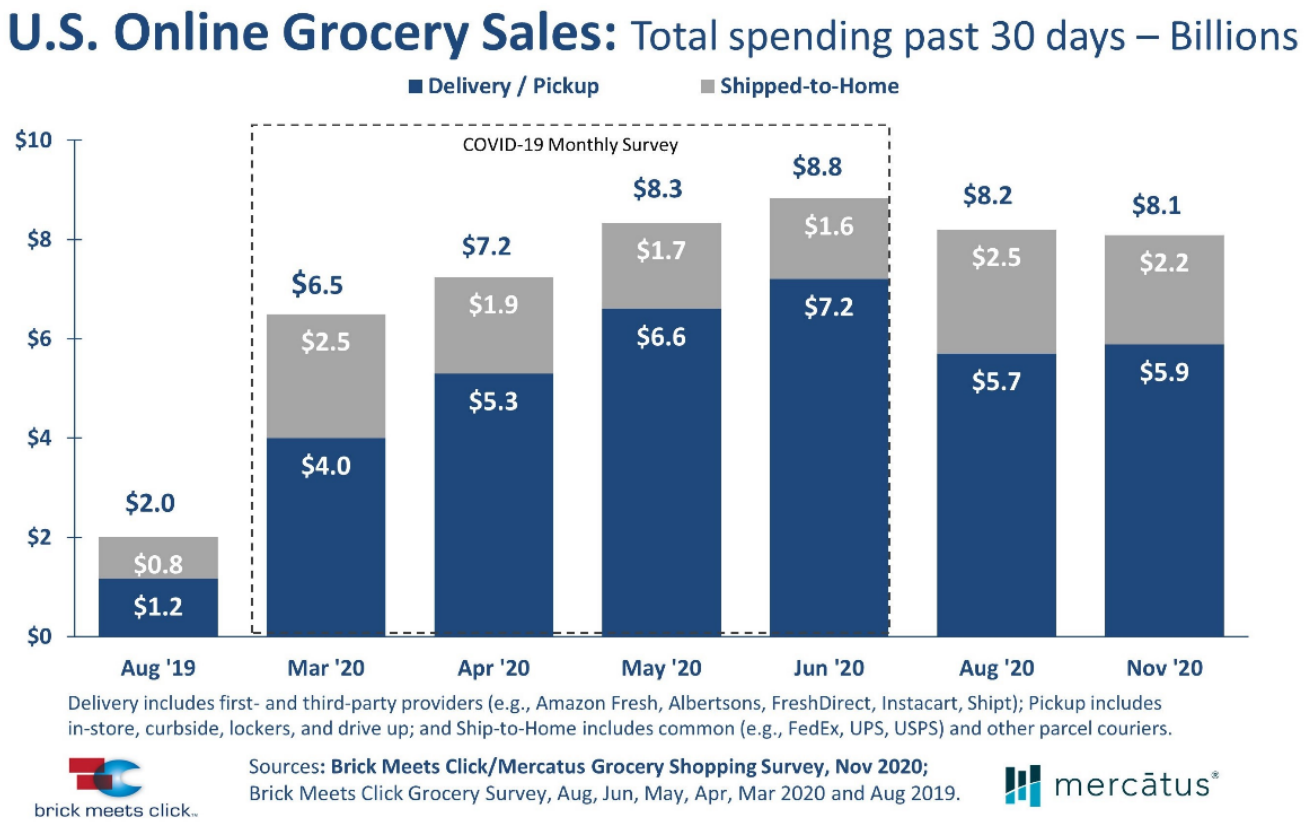
BACKGROUND

Much has been written recently about the concepts of micro-fulfillment and some of the early adopters that are starting to implement this technology. The grocery industry seems to be at the forefront of this trend because of the global pandemic. The desire to avoid personal interactions possible with in-store shopping has led to increased use of online home delivery or curbside pickup. In fact, the pandemic accelerated the expected growth of online grocery shopping three to five years faster than anticipated.

The trend towards micro-fulfillment may have been given a boost by the pandemic but it was already a force gaining momentum. The growth of online ordering has been continuing for years throughout all sectors. Accompanying this increased growth is the growing expectations of online customers. Retailers such as Amazon and Walmart have set the bar with same-day deliveries. This has put pressure on all retailers to meet or exceed this level of service or risk losing business. Price is a motivator for the consumer, but delivery can be the difference between landing or losing a sale if pricing is close enough that it no longer is the main decision criteria. Micro-fulfillment can be the solution that provides this faster delivery.



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WHAT IS MICRO-FULFILLMENT?

The best way to think of micro-fulfillment is to pick up a distribution center, shrink it down in size, and put it close to where the consumer lives. This shortens the delivery time for filling a customer's order by bringing the order processing closer. Since the order fulfillment is now more localized (a city or community), it does not have to be as large as a traditional distribution center that services multiple states. Micro-fulfillment centers are also likely to be in more densely populated areas where land is more expensive, so it is important to minimize the footprint.

The term micro-fulfillment describes a distribution strategy but comes in several forms. **In-store**, also known as back-of-store, is the model typically being implemented in the grocery industry today. The concept is to utilize a building footprint within an existing store that is inaccessible to the public for fulfilling online or pick-up orders. This space today would normally consist of loading docks, office space, and racking/shelving used to store reserve product not ready for the selling floor. Some of this space would be re-allocated to allow for the installation of a compact, automated goods-to-person system. Currently, this automated system is used to fulfill online orders for delivery or pick-up. Using this system to partially fill an order for an in-store customer while they are shopping for other items that they may prefer to select themselves (such as meat or produce) is on the horizon.

Another concept for micro-fulfillment is what is known as a "**dark store**". Some of the larger retailers are starting to implement this concept as well. A dark store is a small, centrally located distribution center that processes online orders only and is not open to the public. It may utilize the same automated goods-to-person technology as an in-store micro-fulfillment center or lower-cost automation but in a dedicated facility. A dark store will typically be larger than an in-store micro-fulfillment center and have the capability to process more orders. Dark stores can be created by building a free-standing facility or by converting underperforming stores or abandoned storefronts.

WHAT ARE THE BENEFITS?

As mentioned earlier, the biggest benefit of micro-fulfillment is faster delivery times for online orders but that is not all. Some additional benefits that a micro-fulfillment system can offer are:

Lower cost to pick an order – automation can provide a four times or higher productivity increase versus manually picking each unit.

Less aisle congestion – most in-store, on-line orders picked today are done manually by store employees from the selling floor. Automation eliminates this activity.

Lower "last mile" delivery cost – last mile delivery costs can be reduced by moving the source of the fulfillment closer to the customer. Pick-up service at the store reduces this even further as delivery to the customer's home is eliminated.

Asset recovery – converting underperforming stores into dark stores can allow an asset to continue to provide value.

Potential for increased sales – providing fast, convenient delivery of online orders can be the deciding factor in a customer's choice of where to shop and may drive more business.

Delay or eliminate DC (distribution center) upgrades – by moving more online business to regional micro-fulfillment centers, any upgrades to existing large-scale DCs may be avoided or eliminated.

I AM INTERESTED, NOW WHAT?

As good as micro-fulfillment sounds, it may not be the best solution for every business. Like all smart business decisions, there are factors to be considered before deciding on a strategy. Some of the primary factors to consider are:

Competitors - what advantages/disadvantages differentiate us and would micro-fulfillment provide the competitive advantages I need to stay in close competition?

Customer needs – through customer surveys and feedback, determine the customer's cycle time expectations from order placement to delivery. Do the systems in-place meet that need today? Will micro-fulfillment meet that need?

Available space – does the back-of-store area provide adequate footprint and height for an automated solution? Would modifications to existing stores be required? Could selling floor space be sacrificed?

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Location - it is important to understand the population statistics of the customer base and how well they are currently aligned with the location of existing stores and distribution centers. This can reveal areas where opportunities exist to improve deliveries through micro-fulfillment and help to avoid placing micro-fulfillment centers in locations where no benefit will be gained.

Installation cost – implementing an automated goods-to-person pick system is expensive whether it is in a large distribution center or a micro-fulfillment center. The cost of a typical system ranges from $2M to $4M, so it is important to strategically implement micro-fulfillment centers where they make sense.

Order activity - does adequate online order activity exist to justify the cost of the equipment and utilize it effectively?

Order profile – the order profile and SKU base will help to determine which SKU's will work best in an automated system and which will not. Factors such as physical size or environment (e.g., temperature, humidity, hazardous) may require some portion of an order to be filled from the automated system and the remaining items manually picked. This order would then have to be consolidated prior to pick-up and delivery.

Inventory management – micro-fulfillment centers are responsible for taking a part of the online order burden from large distribution centers. This means that inventory normally located in the distribution center will now reside in the micro-fulfillment center. The splitting and management of inventory will become more challenging as it is spread across multiple locations.

Store performance - Are there any underperforming stores or vacant properties that would provide better use of the space by converting them into dark stores?

Order reactivity – order reactivity is the amount of time that it takes to pick the order and may or may not have an impact on delivery time. As customer demand for quicker turnaround time grows, this will become more important. It will also be important in a hybrid in-store micro-fulfillment model where a customer is selecting some of the items for their order while the automated system is picking the rest. These two events must ideally take the same amount of time so that the customer is not waiting.

WHAT TECHNOLOGIES ARE AVAILABLE?

The same technologies and automation available in a large, regional distribution center are also available in a micro-fulfillment center. It is important to note, however, that a micro-fulfillment center can be ten to one hundred times smaller, so space is at a premium. The technology usually implemented is designed just to handle pick-related activity. Picking is the most labor-intensive and time-consuming function in order processing and provides the greatest opportunity for decreasing order cycle time and returning a payback on technology investment.

There are many different picking solutions available that provide high throughput, but since space is at a premium, the system must also be designed to consider some of the challenges – e.g., available footprint, ceiling height, utilization of cubic space – that a micro-fulfillment center might face.

Order picking can be classified into two broad categories:

Person-to-goods: As the name implies, a person-to-goods system can incorporate some level of technology into the process of manually travelling to a pick location to fulfill an order. This technology could be light or voice directed picking or the use of lead-me or follow-me autonomous mobile robots. All these methods require a person to manually travel some distance to pick the order as well as the use of wide-aisle shelf level pick zones for product storage. Unlike a large distribution center which has the advantage of space, these methods do not translate as well into a micro-fulfillment center.

Goods-to-person: There are several distinct categories of goods-to-person systems, but they all rely on the same concept, namely, bringing the product to a person so they can fulfill the order. The main categories of goods-to-person systems are shelf level goods-to-person, bin/tote level goods-to-person, vertical/horizontal carousels, and shuttle type systems. Each technology has its advantages and disadvantages, and the best solution can only be determined by understanding the processing capabilities of each method and how well they conform to the physical constraints presented. The high throughput capabilities of goods-to-person systems make them ideal candidates for a micro-fulfillment center. They also offer more compact storage of products, which is another major benefit. Deployment of these technologies can range from months to longer than a year and have capital expenditure costs under $1M to several million dollars per site.

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HOW DO I CHOOSE THE RIGHT TECHNOLOGY?

The process for selecting the right technology for a micro-fulfillment center requires a considerable amount of data analysis. It is important to understand the order velocity requirements and individual order profiles that will be required of the automated system. Other factors such as SKU characteristics, service level requirements throughout the day, projected growth, and the consolidation of automated and non-automated processes must also be considered. The objective is to completely understand the system requirements throughout the design year timeframe and which technologies meet or exceed those requirements while also adapting to any physical constraints of the facility. When multiple technologies all meet the design criteria, a comparative analysis between the technologies should be conducted. Prioritizing system criteria and other factors such as physical constraints, capital costs, scalability, and implementation timelines allow for a forced ranking process to narrow in on one technology. A return on investment (ROI) and labor impact assessment should also be completed after a technology is selected to determine the financial impact.

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In many cases, ROI and labor analysis will quickly reveal a financial justification for proceeding with micro-fulfillment utilizing automated goods-to-person technology. However, companies should not rule the investment out if the financial analysis determines that it exceeds corporate guidelines. There may be other qualitative factors, such as the risk of losing customers or gaining a competitive advantage by providing faster service, that may be considered more important. Therefore, a SWOT (strengths, weaknesses, opportunities, threats) analysis should be conducted after the data and financial analysis to determine if the micro-fulfillment solution being considered is the best course of action.

WHAT ARE SOME EXAMPLES?

Hy-Tek represents two automated goods-to-person systems that work well for micro-fulfillment order processing: Exotec and Caja. Exotec is a 3D bin level pick system that combines the dense storage capabilities of an AS/RS with a robotic tote delivery system. The ASTAR software system directs the Skypod robots to retrieve a tote containing the desired SKU from the storage racks. The robots not only travel in the X-Y direction to where the tote is stored but also "climb" the racks to provide 100% SKU accessibility up to forty feet in height. Once the tote is retrieved, the robot exits the storage area and travels to a software-directed pick-to-light picking station. After the appropriate units are retrieved from the tote and placed in order specific totes, the robot returns the tote into storage. The built-in ASTAR software optimizes inventory management and the movement of the Skypods and can be easily integrated into an existing WMS (Warehouse Management System) system to provide a seamless automated pick process.

Caja provides a 2D automated goods-to-person solution that works

well in existing brownfield facilities because it adapts to the existing infrastructure. By utilizing existing shelving racks, vendor cartons, and mezzanines a lower capital investment and shorter deployment time can be achieved. Caja works especially well in dark store micro-fulfillment applications where existing, vacant storefronts (such as a mall anchor store that has shuttered) are used. The system utilizes two types of robots: a lift robot that allows cartons or totes to be retrieved from shelving up to eleven feet in height and a cart robot for retrieving from ground floor locations. After the carton is retrieved, the robot travels to a pick station where the appropriate number of units is picked and placed in outbound order cartons. The carton is returned to storage once the pick is complete. The Caja system also provides the ability to batch pick cartons for staging to fulfill orders in the system queue which minimizes transactions. Fleet management software utilizes advanced algorithms to optimize inventory and order management and can easily be integrated into an existing WMS system.

Both Exotec and Caja provide flexibility and scalability to grow with demand – keeping initial capital outlay low and

adding robots and storage only when needed. Their relatively short deployment time (6 months or less) allows for a quick transition to a micro-fulfillment strategy.

I AM SOLD, WHAT'S NEXT?

As with any major business decision, considering whether to pursue a micro-fulfillment strategy and which technology to implement requires doing your homework. An in-depth data analysis is required to develop the framework for structuring a plan and identifying technology options. Understanding market dynamics and trends is also important in determining what type of micro-fulfillment strategy makes sense for your organization. Most importantly though is partnering with the right company to assist with this discovery process every step of the way. The solutions professionals at Hy-Tek have the experience and technologies to guide your organization through this process. Give us a call at 1-800-891-5504 or email us today at info@hy-tek.com.