Retailers that offer a range of collection and delivery services to consumers must forecast consumer usage to continually improve their order fulfillment performance. This research helps retail supply chain leaders establish the capabilities needed to create and sustain supply chain excellence.

Overview

Key Findings

- Retailers offering a variety of collection and delivery services to online shoppers tend to measure the performance of these services in isolation from each other rather than in a more holistic manner.

- Typically, retailers’ demand forecasting activities provide limited opportunities for accuracy improvement due to a limited set of data inputs, such as historical inventory and product price.

- The most granular level at which retailers perform demand forecasting provides only insight as to whether the consumer payment takes place in store or online. This provides insufficient accuracy as to where inventory needs to be positioned within the retailer’s network.

Recommendations

Retail supply chain leaders responsible for strategic leadership should:

- Develop holistic order fulfillment by using a portfolio approach to measure the profitability of fulfillment services.
Introduction

This is the second of a series of three reports that define operational excellence across key components of a contemporary retail supply chain. For their fact base, these documents use the results of questionnaires from, and interviews with, over 50 Gartner retail clients conducted during 2021. This second report focuses on order fulfillment and forecasting.

While most retailers manage their order fulfillment and demand forecasting operations independently, Gartner's view of retail supply chain excellence is that these topics are inextricably linked. We say this because when consumers place an online order they choose how, where and when they wish to receive that order, and these choices can be forecast to improve inventory positioning and order fulfillment performance.

Most retailers’ demand forecasting activities focus on predicting the timing and method consumers will use to purchase products. Although retailers don’t refer to this as payment forecasting, it essentially is just that. The very best retailers go beyond this level and forecast the choices consumers make as part of their purchase, namely how, where and when they choose to receive their order. Gartner refers to this activity as fulfillment forecasting; when mapped against a retailer’s order orchestration policy, it results in improved inventory positioning. This, in turn, leads to orders being fulfilled more often from the most optimal node within the distribution network, resulting in higher levels of fulfillment performance and the most efficient costs (see Figure 1).
Leading retailers also take a holistic view of their order fulfillment operation. They look at fulfillment performance from two angles. First, the level of profitability of each fulfillment service by comparing the revenue from each service with the cost of providing that service. Second, and this is key, they also look at the profitability of the portfolio of services as a whole, focusing on basket size, shopping frequency and the extent to which services can cannibalize each other.

**Analysis**

**Use a Portfolio Approach to Measure the Profitability of Fulfillment Services**

Measuring the profitability of a portfolio of order fulfillment collection and delivery services becomes both more difficult and more crucial as the number of individual services within the portfolio expands. The findings from our survey that informed the fact base of this research note illustrated the extent of the availability of the services currently offered by our client respondents (see Figure 2).
Unsurprisingly, the most available service is home delivery from a distribution center, with 95% of respondents currently offering this as a method of online order fulfillment, with the remaining 5% planning to do so in the next two years.¹ The COVID-19 pandemic rapidly accelerated the number of retailers bringing curbside collection to market, with 55% now offering this option, the same number as those offering ship from store for home delivery. In-store pickup is the most widely available collection service for consumers, with 75% currently offering this option and a further 15% planning to launch this within the next two years.

The Gartner survey data also shows how retailers will add greater complexity to their fulfillment operation by 2023, and by doing so would benefit from adopting a portfolio profitability approach.

The portfolio profitability approach requires retailers to measure their profitability performance from four perspectives, to drive decisions that will enhance customer lifetime value, not just today’s profit.
Basket Value — The average spend-per-consumer order for each service, both walk-in store shoppers and online shoppers.

Shopping Frequency — How many times the average consumer uses a service over a given time frame. Typically, this would be measured over a full calendar year to allow for shopper frequency patterns to emerge.

The Cost to Serve of Fulfillment — The cost to the retailer of providing each fulfillment service.

Cannibalization — This occurs when consumers shift their usage, either temporarily or permanently, from one service to another.

Figure 3 illustrates the breadth of a typical portfolio profitability model. It encompasses three key shopping options — walk-in to the store and make a planned or spontaneous purchase, use one of a number of delivery options, or one of a number of collection options.

**Figure 3: Portfolio Profitability**

The portfolio profitability approach is designed to provide an all-encompassing view of retail profitability and to avoid a retailer having a partial perspective of performance, which in some cases can be misleading, and in others, irrelevant.
For example, we frequently hear retailers report that the average in-store pickup basket size can be larger than the average walk-in shopper purchase. While that may be true, without understanding the frequency at which those types of baskets are created or the cost to the retailer of providing them, it's not possible to determine the relative profitability of each service.

Another example relates to curbside collection, the use of which may cannibalize walk-in shopper visits, which may be less costly to provide, making the addition of a curbside service have a reducing effect on profitability. However, portfolio profitability should not just be an internal accounting exercise. Consumers also want a broad selection of fulfillment methods as part of their desired shopping experience. So the challenge for retailers becomes not offering only services that generate acceptable profit, but to offer the required width of services and to make the overall portfolio profitable.

**Establishing a Portfolio Profitability Model**

In complete transparency, developing a portfolio profitability model is a very difficult undertaking. It requires access to detailed individual consumer shopping transactional data and an analytical capability to extract insights, but the results provide exceptionally valuable insight into consumer behaviors that can inform retailer strategy.

This holistic view of consumer behaviors also allows retailers to determine the sweet spot of optimal profitability across their fulfillment services, and tellingly, offers opportunities to shape demand. By this, we mean how retailers could move to incentivize consumers to choose fulfillment services, thus optimizing fulfillment profitability without impacting consumer experience or loyalty.

For example, if the optimal profitability level for the retailer depended on consumers increasing their use of in-store pickup, then an incentive such as money off a future purchase or additional loyalty points could be offered for in-store pickup.

A starting point for understanding how consumers use different fulfillment services is to measure the revenue generated from each service. This will also require assessing the extent to which fulfillment speed and the associated shipping fees can influence usage.

To illustrate this, Figure 4 shows data from our surveyed retailers. More than 70% of respondents offer two-day, three-day and four-day and longer shipping speeds. These three services combined generate just over 80% of total consumer online spend. Conversely, although 20% of respondents offer same-day and 45% offer next-day services, they only contribute 1.4% and 18.2% of revenue, respectively.
This view of availability versus usage is important because it provides direction as to how consumer behavior can be shaped. Should a retailer wish to ship more from their distribution centers, which typically takes two days or longer, then reducing the shipping fees associated with those services may achieve that goal. It will also reduce the consumer usage of a perhaps more costly next-day fulfillment service.

Establishing a portfolio profitability model is an achievement in itself, but long-term value will only be realized through ongoing assessment and analysis, and the continued pursuit of optimal profitability.
Optimize the Accuracy of Demand Forecasting by Including Additional Data Inputs

A key strategic element in reducing inventory holdings to more commercially efficient levels requires greater accuracy in positioning inventory to match demand in each fulfillment node of a retailer’s network. To do so, two significant changes are required to generate demand forecasts at the most granular level:

- Move away from using time-series-based statistical forecasting methods to a more granular machine-learning-oriented process.
- Expand the forecast beyond how consumers pay for products, in stores or online, to include how, where and when they wish to receive their orders.

This second point is covered in the next section. Here, we will look at the changes required to use machine learning rather than time series statistical forecasting as the key algorithmic approach.

Time series approaches have been the standard for predicting demand for many years. Their limitation in predicting today's consumer fulfillment choices arises from their use of relatively limited historical data inputs, most notably inventory, price, sales volumes, known events and seasonality.

In today's retail climate, a consumer's decision to purchase is influenced by many factors for which older time series statistical forecasting was not designed to support. Machine learning technology needs to be used to produce a more accurate forecast of future demand.

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**Optimizing demand forecasting accuracy is dependent on a retailer’s ability to use machine learning to recreate the environment in which historical sales occurred.**

Machine learning can be used to receive a series of data elements that represent the factors that influenced historical demand and can therefore be used to create a forecast of future demand.
A retailer’s historical demand can be influenced in different ways and by different factors, some key ones will be common to all retail scenarios:

- Competitor pricing
- Shipping and returns policies
- Weather data
- Social commentary, consumer reviews and sentiments
- Demand transfer between similar products

Bringing these additional inputs into the machine learning algorithms, along with the traditional inputs of historical inventory levels compared to optimal targets, price and actualized demand, will allow for the production of a more accurate forecast.

**Obtain insight into consumers’ future fulfillment choices by developing more granular forecasts.**

As outlined in the previous section, retailers must make two significant changes to how they generate demand forecasts at the most granular level. The first — a move away from time series statistical forecasting and toward machine learning — has been described above.

The second significant change relates to what activities need to be forecast. Retail supply chain excellence, in this regard, is to not just forecast whether consumers pay for products in stores or online, but to forecast how, where and when they wish to receive their orders. This is the essence of fulfillment forecasting — the ability to predict not just when and where consumers may buy, but the choices they will make regarding the receipt of their purchase.

For every online order received, retailers see the choices that consumers make regarding their order fulfillment decisions. The vast majority of retailers use this data in their order orchestration activities, but they do not retain the data for use in forecasting the pattern of choices that could provide indications as to future consumer decisions. For fulfillment forecasting to be viable, this raw data needs to be used to not only position inventory more accurately across the network, but to balance resources and fulfillment operational capacity at each node.
The type of order orchestration system used by retailers is not a key requirement for establishing a fulfillment forecasting model. In fact, our survey showed that retail respondents use a variety of systems for orchestrating order fulfillment (see Figure 5):

**Figure 5: Types of Order Orchestration Systems Used by Retailers**

- One-third of retailers use either an externally sourced distributed order management system or a combination of their ERP and a homegrown order management system.
- One-sixth of retailers use either their ERP or a homegrown order management system.

It should be noted that the market direction is heading toward greater investment in distributed order management systems to replace ERP and homegrown alternatives, and this trend has been accelerating in recent years (see Market Guide for Retail Distributed Order Management Systems).
Online consumers make fulfillment choices without any knowledge of, or consideration for, the internal systems of retailers. Their choices still generate the same transactional data and this is the source for fulfillment forecasting.

To illustrate how retailers can move from forecasting demand, based on where and how the consumer pays to one that forecasts their fulfillment choices, we will use a theoretical example. This exercise considers a product that is forecast to sell in stores and online in the next week. A retailer’s existing statistical forecasting generates a demand for each assorted store and the website of 1,000 units to be sold next week, splitting the total for stores and for the online channel.

So while this demand helps with understanding sales projections, it lacks accuracy as to where inventory needs to be positioned. Remember, not all online consumers will make the same fulfillment choice, so their orders will need to be fulfilled from different network nodes. Fulfillment forecasting provides this insight.

The concept behind fulfillment forecasting is that a series of increasingly granular forecasts are generated through machine learning applications to predict how consumers will use the fulfillment services available to them. The historical data that drives these predictions are extracted from the order orchestration application and turned into a forecast.

Bear in mind that this forecast is using all of the data inputs from the previous recommendation in this research. This means elements such as short-term weather forecast, demand transfer, shipping and returns policies, and inventory-level projections are all being used by the machine learning engine.

The questions that fulfillment forecasting sets out to answer are:

- How and where consumers wish to receive their orders?
  - How many will want to take the product from the store in which they have purchased it versus requesting it to be delivered to them?
  - How many will wish to collect from store and from which stores?
  - How many will choose home delivery and in which cities and towns will that demand emerge?
  - How many will wish to collect from a remote location, such as a locker box or a parcel shop, and in which cities and towns will that demand emerge?
What order fulfillment lead time will consumers choose?

- How many will choose and likely have to pay a shipping fee for fast same- or next-day delivery, if available from the retailer?
- How many will choose perhaps an expedited two- to three-day shipping speed?
- How many will accept a longer lead time, perhaps with a view to avoid shipping fees?
- How many may even be incentivized to choose the slowest lead time for nonurgent products? This especially applies where they may be open to accepting incentives for order consolidation with other local residents, or for more environmentally friendly and less frequent shipments to their community.

A more detailed explanation of the fulfillment forecast model can be found in *Fulfillment Forecasting: The Key to Optimizing Retail Inventory Positioning*, but to summarize the output of the model, fulfillment forecasting is intended to produce an output of the granular nature shown in Figure 6.
In the above example, fulfillment lead times are indicated as fast (F), medium (M), slow (S) and very slow (VS), typically ranging from the same day to a week or more.

The machine learning application will use the retailer’s historical data of choices that consumers made in the past and apply the relevant inputs. This will produce a forecast of the number of units to be collected or delivered for each delivery speed. The output of this forecast is then matched to the retailer’s fulfillment policy — where in the retailer’s network it would ideally prefer to fulfill these orders from. This output is then overlaid to the fulfillment rules for each forecast quantity to determine how much inventory needs to be available in each of the network locations, and is placed there by the retailer’s allocation and replenishment systems.

Fulfillment forecasting will not need to be carried out for all products in a retailer’s assortment.

There are two guiding principles for determining which products fulfillment forecasting will add value to the forecasting and inventory process.
First, products need to have a sufficiently high daily or weekly rate of sale to have enough demand volume to produce meaningful results at the new and more granular fulfillment forecasting levels.

Second, a variety of fulfillment options must be provided by the retailer and be used in a varied way by different consumers.

Using fulfillment forecasting means that inventory positioning will be more accurate, as it is directly linked to how consumers may choose fulfillment services rather than simply where they pay.

**Table 1: Key Activities and Actions**
(Enlarged table in Appendix)

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■ Determine the average consumer order value, the frequency at which consumers use each service, and the pattern by which consumers use each service to understand how services can cannibalize each other over time.  
■ Create a holistic view of the profitability of your fulfillment services portfolio by bringing all of the analyzed data into a single view of total profitability. |
| Optimize the accuracy of demand forecasting | ■ Extend the volume of data inputs beyond historical inventory, sales and price by including structured and unstructured data, and insights that influence consumer purchasing decisions.  
■ Shift away from time-series-based statistical forecasting toward machine learning algorithms to optimize and increase forecasting accuracy. |
| Obtain insight into consumers’ future fulfillment choices | ■ Forecast product demand for each store and online selling location independently as a base forecasting capability.  
■ Extend forecasts to a more granular level to capture the choices consumers make as to how, where and when they wish to receive their orders in order to forecast consumer fulfillment choices.  
■ Match this forecast to order orchestration fulfillment policies to improve inventory positioning accuracy. |

Source: Gartner
Evidence

1 More than 50 Gartner clients were surveyed from March to August 2021. A combination of written questionnaires and telephone interviews were conducted to provide the evidence for this report. The output of these interactions have been summarized to provide a statistical fact base that underpins the findings presented in this report. These clients represent all sectors of the retail industry and trade in North America, Western Europe and the Asia/Pacific regions.

Recommended by the Author

Some documents may not be available as part of your current Gartner subscription.

The Contemporary Guide to Retail Supply Chain Excellence: Part 1 — Inventory and Assortment

Fulfillment Forecasting: The Key to Optimizing Retail Inventory Positioning

Market Guide for Retail Distributed Order Management Systems

Dead Ends, Diversions and New Directions: How Retail’s Last Mile Needs to Adapt to a Post-COVID World

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