Perfect replenishment

Extending the Perfect Order all the way to the consumer

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Beyond the Perfect Order

Advances in technology, process and organization now enable consumer goods companies to manage the supply chain through to the consumer. Core supply chain metrics need to keep pace and continue to drive greater performance. A new set of supply chain measures, called the Replenishment Index, can help drive the next decade of supply chain improvements.

Executive summary

Fifteen years after introduction, use of the Perfect Order metric has delivered a profound impact and significant performance gains to the consumer supply chain. At the time of introduction, few could have foreseen the dramatic impact this new measure would help deliver. The Perfect Order stands as a hallmark example of the power of targeted performance measurement.

In recent years, technology advancements have created the opportunity to power additional gains. With wider availability of social media and point-of-sale data, supply chain visibility has moved outside of the four walls of the enterprise, extending all the way to the retail shelf and the consumer.

- Technology drivers have largely moved past the benefits of transactional enterprise resource planning (ERP) into a post-ERP era. Large ERP vendors are extending their footprints to capture and integrate these external data sources.
- Emerging analytics capabilities using new data sources enable a more predictive view of the end-to-end supply chain. Predicting demand patterns through real-time market and sales data can optimize inventory deployment and out-of-stock levels at the shelf. These are just two examples where increased predictive capabilities are present today.

As technology advances in these new areas, old questions emerge: How do you measure the business value of these new capabilities? How do companies allocate capital investment effectively across these new initiatives? How can organizations provide the right focus and drive the right behaviors to optimize ROI?

To adequately respond, this paper presents a new set of supply chain measures designed to keep pace with industry advances. These new measures comprise a new index—the Replenishment Index—which focuses on store-level replenishment that complements the Perfect Order and can spur further advances.

Perfect order rates have increased from 58% to 84%

Three new measurements support the Replenishment Index

This index can drive the next decade of supply chain improvements

The Perfect Order: Measuring the final result

The Perfect Order is a measure that monitors a manufacturer's ability to fulfill a delivery specification matching the requirements of a customer's original order. The measure has long been applied as a standard by which supply chain and customer service performance is measured. Over and above in importance to many other key metrics, the Perfect Order is viewed by many as an indication of the final result of supply chain system performance. With the Perfect Order, a comprehensive metric is available measuring the effectiveness of goods distribution at the transition point between the manufacturer and the retailer supply chain. It is the end and primary output of all fixed assets, processes and labor employed to deliver product to a retail customer. From the view of its customers, the perfect order answers the fundamental question: did the manufacturer deliver what was ordered when it was expected?

Although methods and definitions vary, a common view of the perfect order for consumer packaged goods (CPG) manufacturers comprises four supporting metrics.[1,2,3]

The following metrics are measured after product delivery by a manufacturer to a retailer warehouse:

- *Case fill rate (or other similar measures)*
  This is the percentage of the customer order, at the individual product level, supplied on the first delivery.
- *Invoice accuracy*
  Each line item in the bill delivered to the customer is accurate.
- *On-time delivery*
  Although there are variations, the most rigorous definition of on-time delivery measures conformance to a delivery date based upon the original customer requested data of delivery.
- *Damage free*
  Each item delivered is received by the customer as a quality, sellable product at the agreed upon price.

These four metrics are often combined into a function used as a consolidated measure for the perfect order.

Perfect Order =
ƒ (fill rate, invoice accuracy, on-time delivery, damage free)

Many companies multiply each of these metrics into a single Perfect Order measure.

Perfect Order =
(case fill rate) X (percent of accurate line items on invoice) X (on-time delivery) X (percentage damage free)

Subsequent investments and technology advancements have made more robust measures—and new ways of working—visible for the first time.

More than a decade of improvement

Since its inception by a joint FMI and GMA industry team more than a decade ago, numerous industry benchmark studies have demonstrated significant improvement to the Perfect Order (see Figure 1). The measure has become a powerful source of supply chain improvement and a testament to the value created through targeted performance measurement.

The Perfect Order metric has helped create a common framework for measuring the transition point between manufacturer and retailer supply chains. Customer service teams from consumer goods manufacturers use these measures in a way that promotes a common language of performance. The measure has been widely adopted and acted as a catalyst for significant improvement.

Since that time, the supply chain landscape has changed substantially. Subsequent investments and technology advancements have made more robust measures—and new ways of working—visible for the first time. By incorporating these advances, new measures have emerged that complement the Perfect Order and act as a catalyst for the next decade of supply chain improvement.

Figure 1

Perfect Order rates, 1999, 2010, 2012

Source: 2003 GMA Logistics Study, The GMA 2010 Logistics Benchmark Report, IBM Benchmarking. 2015.

Industry advancements set the stage for new measures

New capabilities and significant investments have been made across the entire spectrum of the supply chain since the inception of the Perfect Order measure.

Replenishment responsiveness. Consumer product manufacturer supply chains have become much more responsive and agile. As one example, replenishment lead times into retail distribution centers have improved dramatically. According to the GMA, approximately 50 percent of all manufacturers have the capability to replenish within 5 days.[4] This capability places manufacturers in much closer proximity to consumer demand, providing increased responsiveness.

"Leading CP companies that align their finished goods (FG) inventory deployments to replenish retail customer orders with actual downstream demand—that is, with what consumers are buying—are able to reduce FG inventory while providing high service.[5] Some companies use this downstream data to facilitate vendor-managed inventory (VMI) replenishment to key accounts."[6] As another of many examples, manufacturers have targeted greater ability to run much smaller production run sizes of each stock keeping unit (SKU). Techniques such as single minute exchange of dies (SMED), originally pioneered as part of the Toyota production system, have been widely adopted by consumer products manufacturers. Application of lean manufacturing and distribution techniques have purged waste and increased flexibility of the supply chain.

Technology triggers. Technology improvements during this time have also been vast. Investments in point-of-sale (POS) systems have led to pervasive availability in consumer purchase data. Just at the starting point of harnessing this data, manufacturers can use available demand signal repository (DSR) technology to monitor the movement of goods all the way through to the register. Analytical techniques make a cost-effective out-of-stock measure at the store-level possible and enable supply chain measurement through to the

With the dramatic increase in data now available, including POS, CPG account teams are increasingly adding specialization and fact-based analytics to create additional value in their retailer relationships.

point-of-purchase. The availability of social media analytics has also become widespread, where companies can gain visibility beyond the point-of-purchase to consumer satisfaction. Companies are moving past the ERP age, extending technology investments far beyond the back office to optimize each point in the chain.

These technology triggers have increased visibility and transparency. Manufacturers now have visibility of product movement through to point-of-purchase and then beyond point-of-purchase to consumer satisfaction at point-of-use. Organizations also now have transparency across key functions, so that marketing, sales and supply chain can make cross-functional decisions more rapidly around a single connection point to the consumer.

Organizational strength and specialization. Manufacturer's organizations have changed as well, bringing more resources to bear to serve a more consolidated downstream retail customer base. As retail customers have consolidated, the more successful manufacturers have increased the size of key account teams by more than 30 percent.[7] One driver of this increase is the addition of specialists to account teams in areas such as supply chain and consumer insights. With the dramatic increase in data now available, including POS, CPG account teams are increasingly adding specialization and fact-based analytics to create additional value in their retailer relationships.

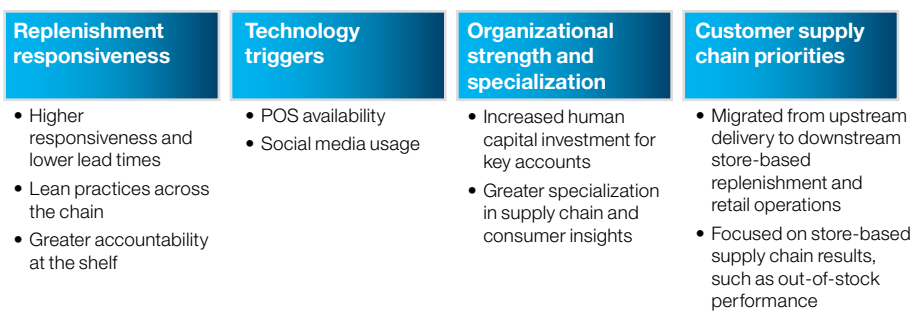
Retailers and other customers downstream from manufacturers have changed their management priorities as well. Their technology advances have enabled retailers to focus their suppliers' attention towards managing out-of-stock levels and overall inventory costs.

Consumer goods manufacturers now work much more closely with their retail partners in all facets of the consumer experience including merchandising, store operations and replenishment. Today, retailers' top supply chain priorities have turned to store-level replenishment and reducing chronic out-of-stock levels. Indeed, manufacturers seeking a competitive advantage are actively taking on these additional responsibilities.

Figure 2 summarizes a few examples of the many changes occurring since the Perfect Order was introduced and adopted by the industry. They illustrate significant change and a path towards new metrics to manage the supply chain as it operates today.

Figure 2

Major supply chain advances since inception of the Perfect Order measure



New measures have emerged that can complement the Perfect Order and be a catalyst for the next decade of supply chain improvements.

The existing Perfect Order measure answers the question, "How well did the manufacturer deliver against an order?"

These new metrics – a Replenishment Index – answer an additional and equally important question, "How effective was the recent delivery in fulfilling consumer demand?"

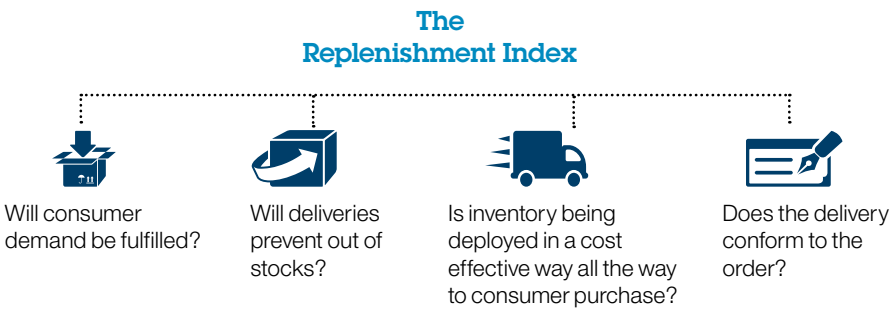
The Replenishment Index: A new measurement approach

Given these recent advances, new measures that complement the existing Perfect Order metric are now available to lend insight and increased rigor to three important supply chain management activities:

- *Integration of replenishment with consumer demand.* The lean concept of smooth product flow consistent with demand, pulled by a Kanban demand signal is a key supply chain innovation whose application can now be measured.
- *Analysis and prediction of out-of-stock conditions.* Despite the tremendous progress shown through the Perfect Order measure, shelf out-of-stock conditions remain at high levels. Technology provides the ability for not only a cost-effective out-of-stock measurement, but also the ability to link the proportion of out-of-stocks resulting from inefficient product in the supply chain.
- *Conformance to inventory parameters.* The ability of an order, combined with existing inventory, to match upcoming consumer demand can now be evaluated as well.

Focused at the retailer distribution center (DC), a combination of measures in these areas can be used to monitor the ability to replenish against consumer demand. The existing Perfect Order measure answers the question, "How well did the manufacturer deliver against an order?" These new metrics, which comprise the Replenishment Index, answer an additional and equally important question, "How effective was the recent delivery in fulfilling consumer demand?" Combined, the two sets of metrics provide a powerful ability to move towards higher performance levels.

Figure 3
The combined power of the Perfect Order with the Replenishment Index answers questions that can power future supply chain improvements



To adequately address the questions highlighted in Figure 3, three additional metrics, which comprise the Replenishment Index, can enable additional performance gains:

- The *iScore* measures supply chain integration between consumer, customer and manufacturer. This score is calculated where the numerator is the unit quantity in delivery. The denominator is the forecasted store level order demand for the time period from delivery date until the next date of DC replenishment. This metric measures how well product is flowing into the retail distribution center as compared with demand for store-level replenishment.[8,9]

The Replenishment Index is a second set of measures now available that can be used to catalyze the next round of supply chain improvement.

- Contributing *out-of-stocks measures* out-of-stocks that stem from product shortages in the retailer DC. This percentage would be measured after the next delivery of product.
- *Customer distribution center inventory effectiveness* measures the variance between the value of actual existing downstream inventory in the customer distribution center and a calculated inventory target level.

These three metrics can be combined into a function used as a measure for the "Replenishment Index:"

Replenishment Index =
ƒ (iScore, contributing out-of-stocks, inventory effectiveness)

Like the existing Perfect Order metric, each performance area can be multiplied into a single Perfect Replenishment measure:

Replenishment Index =
(iScore) X (contributing out-of-stocks) X (inventory effectiveness)

The following "Replenishment Index example" provides an illustrative example to show the concept in practice.

A Replenishment Index example

A manufacturer is replenishing a customer distribution center with the following parameters:

- Delivered cases = 110
- Order cycle time = 5 days
- Average target inventory = 45 cases
- Out-of-stock rate at end of order cycle = 5%
- Total consumer demand measured through POS data during evaluation period = 85 cases
- Pre-delivery inventory level = 15 cases
- Out-of-stocks caused by product shortage at retail DC = 2%

Based upon these parameters, end-of-period metric values are:

- iScore = [1-ABS(110-85)/85] = 71%
- Contributing out-of-stocks = (1—2%) = 98%
- Customer DC inventory effectiveness = [ABS(125-85)/45] = 89%

This equates to a **Replenishment Index** = 71% X 98% X 89% = **62%**

Figure 4

Components of the Replenishment Index

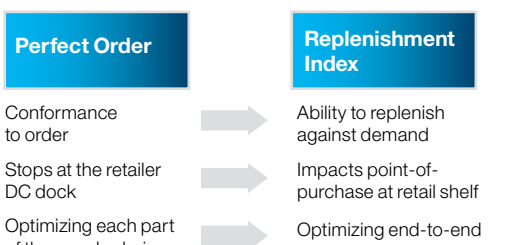
	iScore	Contributing OOS	Customer inventory effectiveness	Replenishment index
Definition	Delivery measured against consumer demand (POS)	Percent of OOS caused by product shortages at retailer distribution center	End-of-order cycle inventory levels compared with the pre-defined target	Overall effectiveness of delivery, or set of deliveries, in-store replenishment
Inputs	Delivery = 110 cases Store orders = 85 cases	Total shelf OOS = 5% OOS due to RDC product shortages = 2%	Target inventory = 45 cases Delivery = 110 Beginning inv = 15 Store orders = 85	
Calculation	[1-ABS(110-85)/85]	[1-2%]	[ABS(125-85/45)]	71% x 98% x 89%
	71% X	98% X	89% =	62%

Extending the Perfect Order

Figure 5 outlines the main differences between the Perfect Order measure and the Replenishment Index.

Figure 5

Extending the Perfect Order measure with the Replenishment Index



Reaping the rewards of better synchronization

The Replenishment Index works in tandem with the existing Perfect Order metric. Together, they can be used to manage a more effective supply chain, one not only focused upon delivery conformance, but also the ability to effect better store-level replenishment for a better consumer experience.

With the Replenishment Index:

- Delivery excellence from manufacturer to retailer DC can be directly tied to reduction of out-of-stocks
- Over the long-term, deliveries from the manufacturer supply chain into the retail supply chain can be managed better to align with consumer demand, eliminating the disruptions that increase cost
- As orders come into greater alignment with demand, safety stocks can be lowered, generating annuity savings in working capital.

By delivering these results, manufacturers can create more value for their retail customers using the Replenishment Index. Figure 6 outlines the operational impact of lower calculated scores, actions that can be taken to raise performance and the improvements that can result.

Figure 6

Corrective actions to raise Replenishment Index performance

Replenishment Index measure	What low scores indicate	Available corrective action	Result
iScore	Goods moving into the retailer DC have high variance to consumer demand, as measured through POS . Lean principles suggest goods along the supply chain move in alignment to demand.	Analyze forecast accuracy. Forecast accuracy of aggregated store orders may be outside of tolerances. Revisit inventory levels. Safety stock in the retailer DC could be used beyond its purpose, which is to absorb unanticipated demand variance. Doing so causes wide swings in DC replenishment. Compare store orders to POS patterns. Large variances in only a small subset of total stores could lead to inefficient replenishment.	High iScores over time indicate high correlation between product movement into the retailer DC and consumer purchase. High performance increases confidence to lower inventories and gain working capital savings.
Contribution to out-of-stock	Low scores indicate a high proportion of in-store out-of-stocks stemming from product shortages at the retailer DC.	Compare POS data to determine imbalances to actual consumer demand. Determine if specific SKUs may be chronically out-of-stock. Adjust forecasting and ordering to accommodate. Revisit inventory target parameters if an increased service level is needed.	Higher in-stock position at both the retailer DC and store shelves. Greater focus toward out-of-stock reduction stemming from retail execution and store merchandising.
Retail DC inventory to target	Low scores indicate inventory levels have a high variance to target levels, based upon the parameters needed to assure a specified service level for in-store replenishment.	Confirm that algorithms used to generate DC replenishment orders correctly account for desired target inventory. Determine if human intervention has resulted in ordering too much product for replenishment into the retail DC. Adjust ordering behavior.	Small variances in actual inventory to target levels maximize cost-effective inventory deployment.

The Replenishment Index works in tandem with the existing Perfect Order metric. Together, they can be used to manage a more effective supply chain.

Manufacturers can create more value for their retail customers using the Replenishment Index.

Recommendations

Introducing new metrics into any organization can be challenging and often controversial. Behaviors follow incentives and incentives follow metrics. Reconfiguring technology, process and organizations that are often "purpose built" around currently designed outcomes can be difficult. Yet, the marketplace is moving towards these new metrics and its pace demands adoption. We offer the following recommendations based on experience gained working with clients to help them meet these challenges head on.

- *Deal effectively with fragmentation.* Two key areas—data and definition—must be dealt with to implement these new measures effectively. Data sources of external data sets are often fragmented, spanning a broad spectrum of providers, systems and sources. Quality and depth of these data sources differs across a wide range. The second area is definition of these new metrics. Measurement definition can often seem straightforward until its interaction with existing incentive structures and process sophistication are taken into account. While data access and standards are improving every day, organizations can prioritize their efforts on particular brands, regions, customers and channels to both drive benefits and gain needed experience. Organization experience, performance gains and technology can all advance together, using an agile "test and learn" approach.

- *Incorporate differences between developed and emerging markets.* While the Replenishment Index targets the same areas of performance, pragmatism and different degrees of emphasis requires a tailored approach between mature and growing markets. For developed, mature markets, greater retailer concentration and a more robust IT infrastructure means a greater degree of sophistication and higher emphasis on resource productivity and profitability. For emerging economies, greater volumes moving through third-party distributors, lower market penetration of modern trade and greater emphasis on revenue growth and market expansion means a less rigorous approach to definitions and greater reliance on syndicated data providers.

- *Embed external data into internal processes to fuel gains.* Tapping new capabilities with new measures also means inserting new capabilities in the operations of the business. Investments in new measures need to be complemented by new decision support tools that bring external demand information to the desktops of those that plan campaigns, execute promotions and demand planners. In our experience, more focus is needed to drive these new data sets into the front lines of today's supply chain organizations. It is the combined power of new measures and enhanced processes that drive improvement gains.
- *Apply an upfront and more detailed focus on use case development.* Cross-functional teams are often challenged to envision new capabilities that can affect the Replenishment Index. While teams intuitively sense the potential in the Replenishment Index, details on the path towards capturing those improvements are often elusive. We have found that it is helpful to first focus on developing these capabilities in line with the Replenishment Index through process analysis and prototyping as a way to then determine performance targets and overall benefits. This can be a bit counterintuitive. Managers often ask the questions like "How big are the benefits?" and "What is the high-level plan?" before taking deeper dives into use cases and process mapping. While an initial overall benefits assessment makes sense, we find a better approach is to develop a clearer understanding of enhanced operations that can ultimately lead to a more tangible commitment towards performance improvement.

For more information

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- *Increased visibility of new metrics can help companies move faster.* Once definitions are decided and data is sourced, reporting should not be bound to a few. Providing ready access at all levels of the organization to new measures promotes accountability and focus that can accelerate progress. As an example, we recently worked with a large manufacturing client to develop an enterprise scorecard for the senior management team that incorporates new metrics and provides an end-to-end view of the supply chain. Management intends to drive a renewed focus on the consumer through this view, which the same measures linked and driven through reporting at all levels of the company.

Adoption of the Perfect Order measure helped spark more than a decade of supply chain improvements. Now new, additional measures comprising the Replenishment Index are needed to keep pace with advances and drive perfect replenishment. Together, the two indexes complement one another and can drive the next generation of supply chain performance.

Ready or not? Ask yourself these questions

- Does your business have a plan to collect and embed external data into your processes?
- Is your company using increased visibility from external data to define new metrics? Are your internal incentives aligned with these new metrics?
- Has your company used new capabilities to break down silos and encourage cross-functional teams?
- How does your organization use external data to improve the way you engage channel partners?
- Does your company take a “use case first” approach in these new areas? Do you employ an agile approach to “test and learn?”

About the author

Dave Holloman brings over 20 years of leadership in the consumer products and retail industries and is currently an Associate Partner in IBM's Enterprise Applications practice. Dave is a pioneer in the use of analytics to drive collaboration between consumer products companies and retailers in the areas of sales, retail operations, and supply chain. In 2013, Dave authored *China Catalyst: Powering Global Growth By Reaching The Fastest Growing Consumer Market In The World,* published by John Wiley & Sons.

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