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The Perfect Order Index and Ways to Improve Using Technology

Sathvik K R[1], Suma B[2]

[1]B.E Student, Department of Computer Science and Engineering, RV College of Engineering, Bengaluru, Karnataka, India

[2]Assistant Professor, Department of Computer Science and Engineering, RV College of Engineering,Bengaluru, Karnataka, India

Abstract –*The growing retail industry has numerous metrics to measure the performance of the organization. The Perfect Order Index is a long-standing and extensively used indicator that attempts to account for both logistical and customer service excellence. Every retail business nowadays is equipped with oncloud, on-edge technology, allowing them to push the frontiers of competitiveness among themselves. The application of technology opens up new avenues for development across the supply chain. Statistical analysis, machine learning, and deep learning are just a few of the technology techniques used to discover and improve supply chain problems. The technology utilised in the retail business redefines the perfect order index, allowing for a better understanding of customer needs and thereby increasing supply chain performance.*

Keywords: Perfect Order Index, Drive, On-cloud, On-edge, Supply chain

1. Introduction

Covid-19 pandemic has paved the way for innovations and advancements in all aspects of life and has closed a few ways of life. The retail industry has undergone a complete restart to supplement the needs of the people. The e-commerce industry is thriving like never before. The FMCG market has forced itself to move to cloud or online space. United States has seen the closing of more supermarkets than ever before as customers tend to have a safer space of shopping. The time calls for improvement of service in the retail industry as the competition crawls in the retail space.

As the organisation grows, the supply chain becomes more complex, diverse and compartmentalised. With increase in complexity, it is easy to lose track of performance. The consequence of poor sales and operation planning(S&OP) is missed deliveries, reduced brand image, inability to compete effectively, higher working capital in inventories, lost customers, higher labor costs, and reduced operational and financial performance [1]. To ensure a high level of service multiple organizations have developed metrics which monitor various components of the supply chain. To summarise the overall behaviour, the performance of retail stores must be measured considering all the phases of the order. Each phase of an order has its own contribution to the service provided to the customer. A metric which considers all the phases into consideration helps to measure the overall performance of the retail store.

“On Time In Full” is one of the critical logistics measures. It indicates how many customer deliveries were on time and fulfilled 100% (or at an agreed upon % and time delay). Although it appears to be straightforward, assessing OTIF continues to be a challenge for many firms. OTIF is mostly concerned with logistics. To help companies quantify OTIF, the American Productivity and Quality Center (APQC) introduced the notion of “perfect order” [1]. Perfect order index metric considers different factors or criteria for assessing the performance. The perfect order index has an edge over other metrics because these criteria cover all phases of an order’s life cycle.

In an era when data powers every life-supporting and motivating technology, there is room for improvement in perfection of order. A data-driven system that thoroughly analyses the supply chain can provide recommendations or provide feedback to improve the efficiency of the supply chain. Modern technology is capable of not only identifying but also solving problems in S&OP. Technology is the key to the retail industry’s resurgent e commerce sector. This paper attempts to provide an overview of perfect order index definitions and provides methods for improving POI through supply chain technology integration

2. Look at Supply Chain Management

Supply chain management (SCM) is the process of synchronizing the flow of physical goods and associated information from the production line of low-level component suppliers to the end consumer. In other words, it is a network of autonomous or semi-autonomous business entities collectively responsible for procurement, manufacturing, and distribution activities associated with one or more families of related products [2]. SCM is the brain which is not just necessary for competitiveness but also for the mere survival of the organization.
Connecting the order from the source of origin of the product to the door of the customer requires a design which fulfils the need of the customer and optimises the cost incurred on the organization. The SCM can be divided into four components:

- Source: The inventory system which holds the products forms the source of the whole supply chain.
- Generate: The warehouse which constantly packs or ships the orders forms the generate component of the supply chain.
- Deliver: The logistics system capable of delivering to the doors of the customer.
- Return: Delivery does not necessarily confirm the end of the order life cycle. Return creates a feedback loop in the system [3].

Virtual and physical phases are incorporated in all of the above components. This interaction between the virtual and physical phases aids in optimising the performance of each component. At the same time, they can be responsible for the drop in the performance of the retail organisation. Improving the entire service is the result of enhancing each of these elements. Because each component is powered by technology, it gives businesses a head starts in developing solutions that can increase component performance. Data-driven systems can effectively identify problems and offer solutions.

3. Perfect Order Index

The On Time In Full (OTIF) measure looks at a logistics perspective, the order delivered at the right place and at the right time. But this constitutes only the final phase of the supply chain or order life cycle. There is a need for considering all the phases of the order to measure the overall supply chain performance. The American Productivity and Quality Centre (APQC) created the concept of" perfect order" to help business organizations quantify OTIF. The perfect order index (POI) is now a standard by which any organization can measure their supply chain performance.

The Warehouse Education and Research Council (WERC) established a widely accepted definition of perfect order. WERC defines a perfect order as:

- Complete
- Delivered on time
- Damage free
- Correct Documentation and Pricing/Invoicing.

Perfect Order Index is a popular performance metric that is calculated by multiplying each of the four perfect order components. Perfect Order measure answers the question, "How well did the manufacturer deliver against an order?"

The definition of this metric is tweaked according to the needs of the organization. An extra measure of quality of the delivered products can be considered. The perfect order index can be written mathematically as

POI = DL * CM * DM * QM * CD

Where,
POI - Perfect Order Index
DL - Percentage of non-delayed orders
CM - Percentage of complete orders
DM - Percentage of non-damaged orders
QM - Percentage of orders that met the quality expectations
CD - Percentage of accurate documentation and invoicing [4]

Below is a summary of each category examined for the POI definition.

- Complete: The orders which are shipped with all the ordered items within the first shipment are considered complete. The factor is dependent on the inventory system which manages the products available at the warehouse. Orders consisting of multiple products sometimes are shipped in different containers increasing the cost of shipment and also decreasing the service provided to the customer. Hence, the completeness of the order is essential to improve the performance of supply chain
- Delivered on Time: This is the factor on which most customers rank the service, hence it's the easiest to reflect in a customer review. Customer satisfaction is one of the most important aspects of a healthy, growing organisation. Delivering on the promised data forms the essential factor in POI.
- Damage Free: The need to return the merchandise can only be because the product was damaged. Return orders are both an added cost to the company and a negative mark on the customer's experience. Delivering the right, non-damaged product begins at the inventory where the products are obtained from the manufacturer.
- Correct documentation: Invoicing is the most important part of transactions that happen between the organization and customer. Accurate documentation of the purchase order is essential as it is an assurance for the customers of a healthy business.

A few other aspects are taken into account in order to increase performance. Customer call volume, return order volume, and customer feedback or reviews are all factors to consider. The Perfect Order Index isn't always a constrained metric. It opens up opportunities for improvement in a variety of areas of the business. We'll look at how we can improve POI in the next section.

4. Improving POI using technology

Perfect order index is an open business metric widely used in the retail industry. The genuine need for POI can be justified based on the organisation improvement plan. The business justification behind the POI is enormous and can be simply stated as positive growth. Increase in the POI leads to increase in NPS (Net promoter score), increase in customer retention, increase in customer attention and decrease in return orders.

Using modern day technology, various sectors or methods can be implemented which improves the POI. Below are a few such areas or methods that can be used.

4.1 Weighted average approach

The mathematical notation of POI is the product of each feature or bucket under consideration. When deciding how to calculate the POI score, it's critical to assess whether the criteria employed supports the business plan or growth. One such tweak in the POI definition is to consider the weighted average approach.

In this approach, each factor under consideration is given a weight for its contribution in the final POI score. Many statistical methods can be used to derive the weighted score of each factor. The weighted average or weighted sum ensemble is a machine learning strategy that aggregates predictions from several models, with each model's contribution weighted according to its capability or skill.

These weights can be calculated by taking into account the reasons for the return of the orders, major concerns in the customer calls, and major review factors obtained in the customer feedback. This data used along with models like the voting regressor [5] or any weighted average ensemble model can yield accurate weights. The business can prioritise few factors if found essential in the decision making for improvements.

This approach of calculating the POI aids in the prioritisation of customer requirements. Any business solution that aims to improve the POI will boost customer service and satisfaction immediately. The weights utilised do not need to be fixed and can be adjusted in real time, making the procedure more robust. As a result, the weights will be associated with temporal factors, reflecting the wants of customers at various times throughout the year.

4.2 Study of demand patters

An order's completion is determined by the amount of inventory available. The order may be dispatched multiple times owing to insufficient inventory. The expense of shipping an order multiple times can add up quickly, and it can also affect customer service. A model capable of suggesting and assuring inventory fill is necessary to ensure the inventory offers all products at all times. The statistical analysis of the demand patterns of the various commodities will indicate the correlation between demand and the temporal variables or geographical variables. Machine learning or deep learning models are capable of comprehending these correlations and detecting the requirement for various products considerably earlier in time, which can increase order completeness.

4.3 Optimised routing systems

The growth of a retail organization leads to more demand, more orders, more customers to service. Delivering the orders to the customers becomes more and more complex as the number of customers increases and cost can grow out of hand. The objectives with the delivery system are two fold, one, to ensure the order reaches the destination within a given time and second, to ensure the expense in delivering the orders is minimum.

There is a need for methods which meet the level grounds for both the above objectives. Optimised routing systems will help in reducing the maintenance cost, fuel consumption and improving the carrying capacity of the transport vehicle. Route optimization problem is an NP-hard problem. The solution can be approached in multiple ways. One such approach is clustering the destination points over time and space. Meaning grouping of locations which are close with respect to distance and time required to deliver. Clustering algorithms like K-means clustering, DBSCAN [6, 7] can give excellent results. Along with clustering, load balancing, time and various factors can be considered to build an optimised routing system.

4.4 Improved Inventory Management System

A robust, dependable inventory management system is required, which ensures not only the quantity but also the quality of products filled at the inventory. The majority of companies are switching to barcode labels, which are more reliable and simpler to use. These labels can be scanned in any orientation which gives the ease of operations at the inventory. The process of automating the inventory database update from just the barcode scan is more efficient, time saving and reliable. These reliable systems working alongside demand predicting models give a boost to improve the POI.

4.5 Usage of IoT devices

Carrying orders through various transit systems might have an impact on the products delivered to customers. Perishable items distributed over time, sensitive products exposed to tremors, and other factors might cause product quality to deteriorate. The use of IoT devices to monitor systems inside the transit systems can improve the service provided to customers.

Transporting medicine, for example, necessitates careful monitoring of various parameters such as temperature and pressure. Such an environment can be created for medications or any other products using an Automator and IoT devices. IoT devices and on-edge or on-cloud services provide a platform for developing such solutions. These solutions will enhance POI as well as customer service.

4.6 The Replenishment Index

This measure is an extension of the perfect order index. Perfect order index focuses on the optimization of each part of a supply chain but replenishment index focuses on optimizing end to end. The Replenishment Index is a second set of measures available that can be used to catalyse the next round of supply chain improvement [8]. The Replenishment Index – answers an additional and equally important question, "How effective was the recent delivery in fulfilling consumer demand?". Both POI and RI can work in tandem to provide a more effective supply chain.

The above-mentioned fields or solutions are a few out of many that can be used to improve the POI. Technology driven or data driven systems can be used at all locations of the supply chain. Integration of tech into the supply chain is a necessity in the modern-day retail chain.

5. Conclusion

Technology is a life enriching solution which has integrated in every sphere of life. Usage of technology will improve the ease of work in all industries. Organisations under the retail industry have grown tremendously in the past decade with the technology. E Commerce, which has been the way of life, is undergoing continuous renewals to attract customers. Measures such as the Perfect Order Index can only improve the service provided by these organizations. Improved metrics or completely new metrics will surface in the retail industry as there is no limit to customer demand or needs.

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