Research on the Optimization Strategy of HAVI Group's Operation Model

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Abstract. With the development of market globalization and digitization, supply chain management become more and more important for the success of a company. HAVI Group, McDonald's main logistics supplier in China, focuses on cold chain logistics and temperature-controlled delivery services. With the development of digital technology, the traditional logistics operation model faces the opportunity of transformation and upgrading. This paper aims to explore how to use digital technology to optimize the operation model of HAVI Group to improve efficiency and reduce costs. Through case studies and data analysis, this paper identifies the key optimization points in HAVI Group's operation model and proposes a series of innovative optimization strategies. The results show that by use big data models for logistics path planning, inventory management, and customer service improvements, HAVI Group can significantly improve its operational efficiency and customer satisfaction. This study provides valuable optimization strategies and suggestions for HAVI Group and the entire logistics industry.

Keywords: Supply Chain Management, Big Data Model, Logistics path planning

1. Introduction

1.1. Worldwide

This study focuses on HAVI Group, a global enterprise named in honor of the founders, Harriette and Vivian. As a third-party logistics (3PL) provider, HAVI specializes in the execution and management of its clients' supply chains(Selviaridis & Spring, 2007). Over the past several decades, HAVI has experienced significant growth, both in terms of geographic expansion and service diversification. The company initiated its operations in 1974 by delivering to McDonald's establishments in Chicago. In1975, HAVI had commenced packaging services for McDonald's orders.

1.2. China

HAVI entered China with McDonald's opening its first store in Hong Kong in 1981. By 2004, McDonald's logistics had formed a national network. With distribution centers established in Beijing, Shanghai and Guangzhou, HAVI successfully supplies goods to 580 McDonald's restaurants in China and 215 in Hong Kong. It can be said that HAVI Logistics is McDonald's "royal" third-party logistics company. This unique partnership is not only based on loyalty but also because HAVI can provide McDonald's with high-quality cold chain logistics services. McDonald's requirements for logistics services are very strict. In food supply, in addition to basic food transportation, McDonald's requires HAVI to provide other services, such as information processing, inventory control, production and quality control, etc(LI, 2006). Due to McDonald's agency model, HAVI Group has become not only McDonald's third-party logistics company but also a supplier of McDonald's, playing an indispensable role in the whole supply chain operation.

1.3. Operational model

Moreover, McDonald's requires HAVI to provide a "one-stop" logistics service for manufacturing, inventory, distribution, and management, including McDonald's using the logistics center established by HAVI to provide a series of logistics services such as ordering, storage, transportation, and distribution for its restaurants (Trappey et al., 2016). Through HAVI's "3+1" logistics centers in Beijing, Shanghai, Guangzhou, and Wuhan, the material needs of thousands of McDonald's restaurants in China are guaranteed(ZHANG, 2011).

1.4. Project description

As a leader in cold chain logistics, the HAVI Group's operating model has a significant impact on the efficiency and safety of the entire supply chain industry. With the development of artificial intelligence technology, the traditional logistics operation model is also facing the challenges and opportunities of transformation and upgrading(Coe & Hess, 2013). Therefore, the research on the optimization of the operating model of HAVI Group needs to find a new supply chain model in the traditional model, which can help the entire industry to play a role model(Graves et al., 1998).

2. Method

2.1. Literature review

This paper adopts the method of literature review to study the operation mode of HAVI logistics. The literature review will be published in various journals, and the authors have obtained more than a dozen related papers and papers by searching for data on Google Scholar and Web of Science. At the same time, based on these documents and data, there is more understanding.

2.2. Case study

This paper adopts the method of case study to conduct a more detailed study of HAVI Logistics. A typical case study will use a case study of the content involved to help the reader understand the content more easily. This paper selects the case of the supply chain logistics model between HAVI Logistics and McDonald's to conduct in-depth research to find out the unique operation model and optimization methods between them.

2.3. Data analysis

This paper uses the method of data analysis to conduct research, queries the data of HAVI logistics on transportation efficiency, inventory turnover rate, cost efficiency, etc., and analyzes the outstanding points of HAVI logistics in the operation mode.

3. Result

In the entire food supply chain of McDonald's, HAVI Group plays a pivotal role. Its uniqueness lies in the fact that it not only assumes the role of a third-party logistics company but also takes on the responsibilities of a supplier. On one hand, it can be said that McDonald's employs a 3PL agency to provide services such as manufacturing, inventory, distribution, and management; on the other hand, it can also be viewed as fully adopting a supplier agency model, where HAVI Group controls McDonald's inventory and procurement, thus transforming their relationship into a complete partnership. Regardless of whether HAVI is acting as a third-party logistics company or a supplier, it undoubtedly plays an indispensable role throughout the entire logistics operation process(Whipple et al., 2010).

3.1. Core technology

From order reception and processing to the procurement of food raw materials, and then to transportation, storage, and distribution, all the way to the receipt of goods at McDonald's stores, HAVI Group continuously provides high-quality cold chain logistics services for McDonald's throughout the entire supply chain process. It ensures the quality of McDonald's food to meet the demands of each store. In this operational model, HAVI Logistics primarily uses the Vendor Managed Inventory management method and tactical routing plan at McDonald's.

3.1.1 Vendor Managed Inventory

Vendor Managed Inventory (VMI) is a cooperative approach that aims to reduce costs for both the supplier and the retailer under a shared agreement. The supplier oversees managing the inventory, and they maintain ownership until the retailer sells the products(Marquès et al., 2010). The retailer, however, has the duty to take care of the inventory and is responsible for any damage or loss.

Implementing VMI comes with several benefits. Firstly, with the supplier in control of inventory, the retailer can eliminate the need for an ordering department, automate manual tasks, and simplify the process by cutting out unnecessary steps. This leads to lower inventory costs and better service levels. Additionally, the supplier, being in charge of inventory, is motivated to manage it more effectively. They can coordinate production and distribution for multiple retailers, which can lead to overall cost reduction.

Suppliers can use sales data to make more accurate demand forecasts, determine order quantities more precisely, and thus minimize safety stock levels. This results in lower storage and supply costs, and allows for a quicker response to customer needs, enhancing service levels and reducing the inventory levels of the customers.

In VMI, the supplier's delivery performance can be measured by the relative inventory levels, with set minimum and maximum stock points. For example, having no inventory is very risky; having inventory below the minimum level is quite risky; while having inventory above the maximum level reduces the risk of running out of stock but increases the risk of obsolete inventory. By analyzing these scenarios, we can assess the supplier's delivery performance. By predicting future material needs and the supplier's supply schedule, we can forecast the future trajectory of inventory points, allowing us to set specific inventory targets at specific times.

The VMI model is based on the concepts of Quick Response and Efficient Customer Response (Overkempe, 2020). It encourages suppliers to share current inventory and actual usage data with their customers. This information is then used to make informed decisions about when and how much to restock. This approach moves both parties away from traditional independent forecasting, which can be uncertain and lead to waste in commerce, logistics, and information flow. By working together, both suppliers and retailers can reduce the total costs along the supply chain.

3.1.2 Benefits of using VMI mode

The implementation of VMI has streamlined the ordering process for McDonald's stores, which now only need to place orders with HAVI Logistics, reducing the ordering cycle to a single day. HAVI Logistics assists McDonald's stores in more accurately forecasting orders, thereby reducing management costs associated with order fluctuations and enhancing workforce efficiency. By employing a multi-temperature co-distribution approach, HAVI Logistics can meet all the needs of a store with a single delivery trip, increasing the efficiency of store receipt and reducing the cost of multiple deliveries, as well as saving on labor costs. The on-time and accuracy rates of HAVI Logistics' distribution have reached over 97% and 99%, respectively, significantly reducing processing costs.

The "3+1" distribution model adopted by HAVI Logistics has effectively reduced the number of days that McDonald's stores hold inventory, decreasing the financial costs associated with capital occupation. Additionally, HAVI Logistics can accurately forecast orders for McDonald's stores, ensuring that stores maintain an optimal inventory level, reducing losses due to product expiration, and guaranteeing that stores do not experience stockouts or shortages.

McDonald's only needs to continuously and promptly convey demand information to its suppliers, with HAVI Logistics taking charge of the actual procurement transactions. This not only simplifies McDonald's workflow but also liberates McDonald's from burdensome procurement tasks, increasing work efficiency and effectively reducing capital occupation.

McDonald's has centralized some daily operational tasks of its stores under the control of HAVI Logistics, which provides order quantities and store feedback issue reports, assisting McDonald's in

managing its outlets and reducing operational costs. At the same time, this ensures that issues from franchised stores can be promptly feedback and addressed.

HAVI Logistics maintains an average inventory level that is significantly lower than that of its competitors, which helps to reduce the costs of holding inventory and other related expenses.

3.1.3 Tactical Routing Plan

When discussing how HAVI Logistics can maintain its leading position in the field of cold chain logistics, the role of its Tactical Routing Plan(TRP) cannot be ignored. HAVI's tactical route planning covers seven consecutive days of delivery routes, which forms the basis for a weekly period of several months(Dror & Ball, 1987). Among the already identified delivery routes, the route planner needs to plan the exact route for the next day every day, when the quantity to be delivered has been determined(Dror et al., 1985). At this time, planners need to consider the volume of deliveries in different places and the distance traveled. The route planner's task was to improve the efficiency of HAVI Logistics' transportation by solving the Daily Vehicle Routing Problem (VRP) while adjusting for as few overall tactical route planning variances as possible.

In addition, HAVI Logistics regularly updates their tactical route planning throughout the year to adapt to seasonal changes and market changes. When formulating tactical route planning, the delivery pattern at this time is not fixed, so route planners can only make predictions based on contemporaneous data and make rough route planning. The newly developed tactical route plan again serves as the basis for seven consecutive days, which is repeated on a weekly basis.

This tactical approach to route planning not only demonstrates HAVI's ability to adapt to market changes, but also demonstrates its innovation in logistics planning. In this way, HAVI is able to flexibly respond to changes in customer needs while maintaining high efficiency, which is an indispensable core competency in the supply chain of fast-food chains such as McDonald's.
This raises the question, how to determine the delivery volume in advance?

4. Discussion

In this chapter, we answer research question : ‘how to determine the delivery volume in advance?’

This section discusses in detail how artificial intelligence (AI) and big data models can help determine delivery volumes in advance, and how these technologies are applied to VMI and tactical routing plans.

4.1. The application of AI and big data in delivery volume forecasting

4.1.1 Data-driven predictive models

Using machine learning algorithms, AI can analyze historical sales data, seasonal trends, market dynamics, and other relevant factors to predict future delivery demand. This predictive model helps HAVI plan resources and adjust distribution volumes in advance to meet customer demand. For example, through the application of deep learning in transportation route planning, AI can optimize transportation routes and capacity allocation, reduce transportation costs, and improve transportation efficiency.

4.1.2 Real-time data analysis

The system is capable of monitoring point-of-sale data and other market metrics in real-time, providing instant updates on inventory and distribution needs. This real-time data analysis helps HAVI quickly respond to market changes and adjust delivery plans.As can be seen in figure 1.

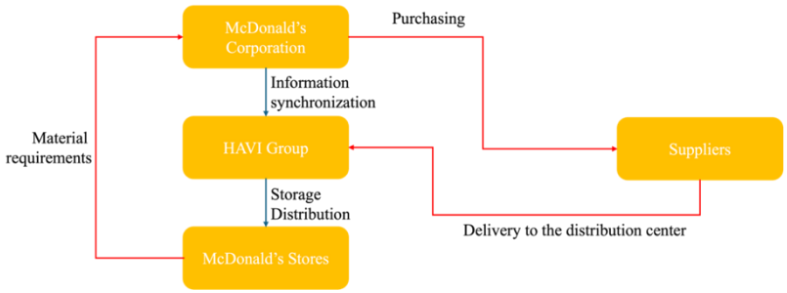

Figure 1. McDonald's operating model figure.

Alt Text for the figure:According to the image, the McDonald's Corporation syncs information with the HAVI Group after purchasing ingredients from suppliers. The HAVI Group will receive the delivery from the suppliers. The system delivers the material to the store when it detects a need.

4.1.3 Optimize inventory management

AI can help optimize VMI systems to reduce the risk of excess or stockouts through intelligent replenishment and inventory control. For example, suppliers can use point-of-sale data to forecast demand, more accurately determine order quantities, reduce forecast uncertainty, and thus reduce safety stock and storage and supply costs.As can be seen in figure 2.

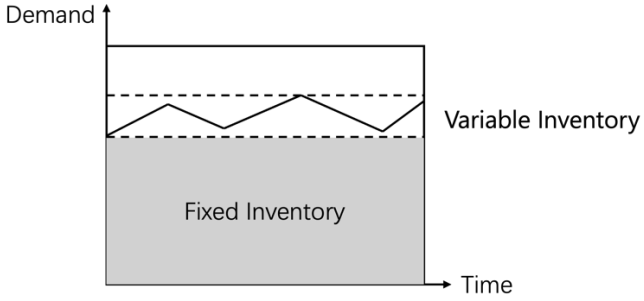

Figure 2. Caption of a typical figure.

Alt Text for the figure:The picture shows that the shaded part is the fixed demand quantity calculated based on each month's data, which represents the amount of inventory that will be required stably each month, and the line part represents the variable inventory of each month. This means that the demand will fluctuate between this range each month.

4.2. Application of AI in VMI and TRP

Transportation planners can use AI to solve VRP and improve distribution efficiency while making as few adjustments to tactical route planning as possible. Route planners can calculate the most suitable delivery route based on the order volume and distance. HAVI logistics uses the "3+1" distribution model, which can better save transportation costs. For example, if you need to deliver to McDonald's restaurants in Beijing, HAVI Logistics can deliver a fixed amount of food from a distant warehouse, and then deliver variable inventory from a relatively close warehouse to respond to sudden order demand in a short time(Pan et al., 2002). Using this approach can help reduce distribution costs and time while increasing customer satisfaction. Combined with tactical route planning, AI can dynamically adjust delivery plans based on real-time data to respond to unexpected events or changes in market demand. This flexibility is a key advantage in the modern logistics industry. At the same time, AI and big data models can improve the transparency of the supply chain, allowing HAVI to better monitor inventory levels and distribution progress. This transparency helps to enhance trust and cooperation with partners such as McDonald's.

4.3. Strengths and weaknesses of AI and big data

4.3.1 Strengths

AI can effectively use data analytics to provide new insights and understandings to assist planners in segmenting and customizing transportation routes, providing better decision-making and greatly improving transportation efficiency. At the same time, according to AI and big data, the inventory quantity of each store and the inventory quantity of the warehouse are fed back in real time, and if there is a shortage of inventory, big data can also be found in time, and timely distribution can be carried out through coordination. Avoid overstocking in one warehouse and reduce costs. At the same time, the data analysis provided by AI is used to visualize the data, and the prediction model of AI can help the management make better decisions.

4.3.2 Weakness

The reliance on AI by employees and decision-makers can lead to a loss of thinking and judgment skills, ignoring the importance of human judgment and market intuition. Protecting the privacy and security of customer and enterprise data becomes an important challenge as the amount of data in the database increases, which may increase the risk of data breaches. At the same time, with the development of AI technology, employees may be replaced by AI, which may hit the morale of employees, and at the same time, employees need to go through a lot of investment and training for the use of AI, which also increases the cost of use of enterprises.

All of the strengths and weakness can be summaried in table 1.

Table 1. Strengths and weaknesses of AI..

Strenghts	Weakness
Provide new insights	Over-reliance
Fed back in realtime	Data security
Data visualization	Investment cost

5. Conclusion

5.1. Key conclusions

This study mainly uses case studies and literature review research methods to study the operation mode and supply chain model of HAVI Logistics, and understand the unique supply chain model of HAVI Logistics. Through the above research process, this paper introduces two models, one is the concept of VMI model and its advantages, and the other is the concept of TRP strategy and its application effect in supply chain logistics. In the current era of rapid development of digital technology and big data, this study suggests that logistics companies with a series of supply chain models, such as Xia Hui Logistics, can optimize their traditional models, develop supply chain dynamic models, and combine AI and big data to predict and feedback data in real time.

5.2. Limitations

In this study, literature review and case analysis were mainly used, and the data information covered was small. Knowledge of the VMI model and TRP strategy is based on the current discussion of the state of the art at the point in time, and no model has been established. At the same time, in the discussion part, the advantages and disadvantages of AI analysis knowledge at the current node are analyzed, and the dynamic perspective is not used to analyze.

5.3. Research prospects

In future research, the use of data can be increased, and the model can be further established, and the theoretical knowledge can be used to establish a data model to support the research thesis. At the

same time, SWOT analysis methods can be used in future surveys to analyze things from a dynamic point of view and analyze AI opportunities and crises.

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