

The Application of Big Data Technology in Supply Chain Cost Control: The Case of IKEA

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Abstract: Supply chain management is important in all aspects of business processes. With the advent of the information age, big data technology has become important in developing all aspects of our country. Appropriate use of big data technology in supply chain cost management by enterprises can not only improve their ability to analyse and master data but also timely control the cost expenditure issues in different links of the supply chain, improve management systems, and enhance the company's core competitiveness. In order to improve the efficiency and accuracy of supply chain management, this study explores the application of big data technology in enterprise supply chain cost control and data analysis. This study uses big data as the background to analyse the costs of several important links in the supply chain of IKEA. It combines the discovered problems with big data technology to improve them, hoping to be helpful to the development of IKEA and related industries.

Keywords: Supply Chain Management, Cost Control, Big Data Technology, IKEA

1. Introduction

In recent years, supply chain management has played a great role in managing different aspects of enterprises. Due to the continuous and rapid development of the economy, to ensure that the enterprise's business on a global scale can operate smoothly and sustainably and remain in the global market, A uniquely affordable and fashionable brand image requires efforts to build an efficient, flexible and low-cost global supply chain. The construction of this supply chain must be connected to the continuous optimisation and improvement of enterprise managers in management and operation to cultivate the enterprise's competitive advantage and better meet market demand. However, traditional accident data analysis methods require a lot of human resources and time and can only analyse a few data variables, limiting the depth and breadth of data analysis. In order to improve the efficiency and accuracy of supply chain management, big data technology is applied in enterprise supply chain cost control and data analysis and processing. Big data technology can organise and analyse large amounts of data, summarise the specific information hidden behind large amounts of data, help business managers more accurately discover characteristics and patterns in the decision-making process, and provide a scientific basis for the causes and solutions of high-cost phenomena.

Supply chain cost control involves costs within the entire chain domain and covers a wide range. Optimisation is an extremely difficult project. Some companies can use the supply chain model to help reduce costs and enhance competitiveness [1]. Cost control occupies an important position in enterprise management, and cost control from the perspective of supply chain management is an effective means to standardise enterprise management processes and improve management levels to achieve cost control over the entire process of enterprise procurement, production, and sales. It is an important way for enterprises to reduce cost investment and improve economic benefits. However, some companies need help and drawbacks in supply chain cost control. Although most companies have controlled supply chain costs, the cost control system still needs to be comprehensive, resulting in the control failing to reach expectations. The effect also affects the long-term operation and sustainable development of the enterprise.

This article takes IKEA as an example for research. After reviewing relevant literature, it is found that although IKEA occupies a relatively broad market in today's furniture industry, with the continuous development of science and technology, digital management models are entering different industries. However, in the face of this situation, IKEA is still relatively weak in some aspects, and related strategies need to be rectified. In addition, in today's era, companies spend more human, material and financial resources in the supply chain, but controlling their costs within an appropriate range is very important. Self-development plays a crucial role, so the author introduces big data technology to study the different advantages of supply chain cost control. The author below analyses several issues. There are many suppliers in the IKEA supply chain, and the current global situation is quite different. Its procurement is easily affected by regional political and economic instability, and due to currency differences between different suppliers, Exchange rate differences cause procurement costs to fluctuate easily, and it is not easy to control procurement costs. IKEA has nearly 9,500 types of products and 1,600 global suppliers. If we want to analyse product supply and sales specifically, we can only study the types of products under each material category. It cannot be optimised only by traditional methods to achieve specific refinement. This requires the introduction of big data technology. Therefore, the first existing problem is that IKEA needs more suppliers in terms of procurement. Greater risk.

The second existing problem is that although IKEA has implemented cost control measures regarding warehouse costs, its supply chain still needs to overcome considerable challenges. IKEA requires suppliers to ship products directly to self-selected stores, making inventory cost issues difficult to control. At the same time, to save logistics costs, IKEA has increased the pressure on inventory costs, which is also an urgent problem that needs to be solved.

Therefore, this article first briefly describes the operation of IKEA and supply chain management in today's era, then talks about the implementation of the supply chain model in the enterprise and some problems that arise, as well as subsequent optimisation measures for the problems in the enterprise, and finally summarises What implications does the IKEA case have for the development of other industries?

2. IKEA and Supply Chain Cost Control

In today's era, industry and academia consider sustainable supply chain management (SSCM) increasingly important with today's ever more complex and fragmented supply chains due to global sourcing [2, 3]. Enterprise managers carry out enterprise cost control activities based on supply chain management theory, prompting the enterprise's cost control system to be constantly updated and improved, enabling enterprises to utilise their costs effectively. In addition, supply chain management theory can provide enterprises with more real, accurate and efficient cost information during its implementation.

2.1. IKEA Supply Chain

IKEA was founded in 1943 in Sweden by Ingvar Kamprad. Headquartered in Sweden, this multinational conglomerate designs and sells easy-to-assemble and quality home furniture, appliances, and accessories at an affordable price. According to data released by IKEA and Statista 2022, it has been the world's largest furniture retailer since 2008. It continues to be the most valuable furniture retail brand as of 2021, with a value of over \$21 billion. The company is currently with over 466 stores worldwide in 63 markets. 275 of its stores are in Europe, with Germany having the most in the world.

IKEA's supply chain management can provide customers with high-quality, low-price and fashionable products to "create a better daily life for many people." IKEA's design philosophy has always believed that there is no inevitable connection between the beauty of a product and its price. Designers use the simplest lines to design the best furniture products. However, while providing global customers with both design and practical home products, it also reduces the cost of the products to a minimum, allowing the general public to purchase freely at IKEA retail stores without being surprised by the price of the products [4].

IKEA's supply chain consists of three sectors, which are about the different phases of the value chain. The primary sector is for acquiring raw materials, the secondary sector is for manufacturing the products, and the tertiary sector is for disseminating goods and retail positioning. By organising the operations within each of the sectors, the objective of having a sustainable supply chain is met with positive implications for the environment [5].

2.2. IKEA's Purchasing Strategy

Adopt global sourcing. Literally means "global sourcing", which means purchasing from a global strategic perspective. The reason why IKEA adopts a global sourcing strategy is mainly due to price factors. Labour costs in developing countries are much lower than those in developed countries. Many suppliers in Asia are labour-intensive enterprises. When selecting suppliers for the production of new products, the IKEA Trade Purchasing Office will select multiple suppliers for simultaneous quotation based on cost factors and then select a lower-priced manufacturer for cooperation after comprehensively considering other IKEA requirements [4]. From a geographical perspective, the company's procurement activities cross national boundaries and systematically formulate procurement policies in the global resource market. IKEA products can be purchased from various retail stores, shipped to 26 distribution centres worldwide, and then shipped to IKEA stores worldwide. IKEA has opened 46 offices in 32 countries and regions in 16 shopping areas worldwide. Staff in the sales office will evaluate suppliers based on IKEA's best purchasing concepts, coordinate with headquarters suppliers, implement product procurement plans and manage bidding costs. The lower product cost is related to the sales and purchasing areas. When purchasing, it is necessary to comprehensively consider the various costs of the product from the purchasing area to the sales area. Different locations will pay different currencies and tariffs, which may change the product's final selling price. IKEA inputs various cost factors into the matrix, uses the matrix method to define and select procurement areas, weighs procurement costs against rates, and then selects the procurement scope for each retail space. IKEA's belief in supplier evaluation standards and purchasing direction is largely based on the following four aspects: continuous price improvement, strict delivery, high-quality and healthy products, environmental protection and social responsibility [6].

2.3. IKEA's Logistics

As IKEA continues to develop in the market, the logistics sector in the supply chain is also constantly optimised. From single distribution to a nationwide network, IKEA has gradually found a logistics

operation model that suits itself. IKEA's internal supply chain development department specialises in a research team dedicated to logistics network optimisation that uses advanced computing tools to establish data models to regularly study and review IKEA's logistics network from the perspective of "full logistics costs" to ensure that IKEA's supply chain is the most efficient and energy-saving. The total distance between logistics nodes and the transportation volume of each logistics node are the two most important calculation variable elements in the data model. Because of such regular logistics network research reviews, IKEA can continuously find optimisation opportunities for its logistics network. As one of the important logistics nodes in the IKEA supply chain, the distribution centre assumes the important responsibility of storing safety inventory for IKEA stores and supplying supplies to the stores. In order to ensure high transportation efficiency and low transportation costs, a network of distribution centres is established. Continuously optimise as the network of shopping malls and manufacturing suppliers changes. One of the key considerations is that the distribution centre should be close to the delivery address, that is, the shopping mall; at the same time, the sum of the distances between all logistics nodes in the supply logistics network, mainly composed of product manufacturers, distribution centres and shopping malls is ensured to be the shortest, to achieve the most efficient transportation between logistics nodes and the lowest transportation cost. Pan Xuhua said that based on the literature of Sara Mashhur¹ and Ahmed Attia², common logistics problems at the IKEA branch are related to order cycle time, lead time, and stock availability. These problems affected the store's logistics performance, leading to customer dissatisfaction. Customer satisfaction was affected by logistics problems and performance, as customers waited for a long time to receive their orders. Besides, customers were dissatisfied with stock availability, dealing with IKEA staff, and long waiting times for checkout [7].

3. Problems in Supply Chain Cost Control

Supply chain cost control and management play a very important role in the development of enterprises. From a broad perspective, supply chain cost management includes all material costs and labour costs incurred by enterprises in the procurement, production, and sales processes to support the operation of the supply chain. , transportation costs, equipment costs, warehouse costs, etc., the ultimate goal of an enterprise is to obtain profits, so the enterprise's control and optimisation of supply chain costs determine the enterprise's income [8]. Taking IKEA as a case, we summarised and summarised four problems existing in IKEA's supply chain cost control, as follows:

3.1. Problems in Procurement Cost Control

As a large global enterprise, IKEA adopts a global procurement model, which is not limited to a certain country or region. The adoption of a global strategy requires comprehensive consideration on a global scale. Procurement activities cross national boundaries, and different countries often have different policies. Currency and tariffs will, in turn, lead to fluctuations in procurement costs. IKEA's procurement costs could be more stable. They depend more on the political and economic stability of the country where their suppliers are located. Supplier credit issues also affect IKEA's procurement costs. To better select suppliers that are beneficial to itself, IKEA is very strict in its assessment of suppliers from different countries and regions. IKEA has its unique indicators for purchase prices. IKEA focuses on the current purchase price and compares the purchase price with the historical purchase price in the past three years. The current purchase price is generally set as a ratio of 0.7, and the historical purchase price in the past three years is set as a ratio of 0.3. IKEA attaches great importance to its selected suppliers. The ability to control product cost is worth learning from all companies [9]. Still, its overly cumbersome processes often increase costs, requiring more time and money to assess suppliers and inadvertently increasing procurement costs.

3.2. Problems in Logistics and Warehouses

It depends on IKEA's warehouse management, logistics distribution, and warehouse management system (WMS). IKEA's logistics system consists of supply chain management, a distribution centre, a distribution service and a logistics information system [6]. No mistakes can be made in every process; otherwise, it will lead to chaos in IKEA's logistics system. IKEA also faces the same problem as other furniture companies. It cannot fully control the accuracy of inventory. As a furniture retail company, it must pay attention to its products. It is very important to understand the inventory fully. IKEA has many suppliers and supplies many products, so errors are inevitable. However, IKEA's current inventory and distribution are all done manually, making data omissions easier. And errors. If the product the customer wants is not in inventory but has yet to be entered into the warehouse management system, it will affect the company's potential sales. If the customer accumulates too much disappointment, it will inevitably affect the company's sales in the future and invisibly increase the sales. It increases the cost of logistics management [10]. Therefore, IKEA's over-reliance on the WMS system will make it easier to eliminate it when the system fails or human problems occur. Humans cannot compare themselves to machines; people will feel tired and have problems. Memory errors. If warehouse managers make inventory statistics errors due to fatigue, the distribution centre's judgment on inventory and the entire warehouse management system will be affected. At the same time, the solution to overflow inventory will also affect the entire inventory cost management. Overflow inventory will seriously affect warehouse efficiency and workflow and increase inventory management costs among the originally designed cost savings.

4. Case Analysis

4.1. Strategic Procurement Measures

To survive and continue to develop in the fiercely competitive market, companies must focus on improving the "open source" level and "reducing expenditures." The third source of "open source" is the "reduction of expenditures", and the reduction of procurement costs becomes the third. Source of profit [11]. Through IKEA's global sourcing strategy, the company establishes factories in developing countries where land prices and labour costs are relatively low and ships products worldwide. Through the "production in developing countries and sales in developed countries" model, we can achieve a global procurement strategy to reduce costs and increase profits.

Regarding source procurement, due to IKEA's large scale, it can obtain more favourable prices and conditions through bulk procurement. Through economies of scale, IKEA can gain greater advantages in purchasing and obtain more competitive prices from suppliers. Due to the global nature of this enterprise, changes in exchange rates between currencies must be addressed, and formulating appropriate currency strategies will also impact cost control. Through the application of the Internet of Things, artificial intelligence and big data technology in material supply and procurement, we can integrate material dispatching, quality testing, data prediction and other links to comprehensively improve the supply chain's risk monitoring, data analysis and early warning capabilities. This intelligent process aims to reduce misjudgments, improve work efficiency, and shorten the time to obtain key information and respond to risks. Improve the effectiveness of risk management and control decision-making through automated and intelligent means [12]. Through these procurement measures, IKEA better controls costs, improving procurement efficiency, product quality and sustainability.

4.2. Warehouse and Logistics Revolution

Warehousing systems are based on big data systems. IKEA introduces automation technology, such as PLC (programmable logic controller) control, with a central processing unit (CPU) as the core, supported by the power supply and storage modules, to achieve precise and intelligent warehousing and logistics system control. This technology provides efficient processing and logic operations to improve warehouse efficiency. This reduces manual operation costs, reduces errors and increases warehouse throughput [13].

The picking of orders is an important step in the delivery of goods. The parts-to-picker system uses the automatic access system (AS/RS), mainly implemented through cranes moving in the aisle [14].

Application of artificial intelligence in warehousing. Physical labour, such as the entry and exit of goods in the warehouse, requires many human resources and machinery. Therefore, personnel are an important part of warehouse operations, but with the development of artificial intelligence, robots can replace humans. Robots are becoming important in large factories and warehouses because of their low cost, low errors, and rest time advantages. Role.

Through these measures, IKEA has effectively achieved cost control in warehouse management, improved operational efficiency, and reduced inventory and transportation costs.

5. Management Implications

Business development needs to follow the pace of society. In different industries, the success of an enterprise is directly related to its sensitivity to the changing times. Paying close attention to social development trends, continuously improving the original management measures, and introducing high-end technologies favourable to the enterprise are the keys to achieving multi-faceted development based on the existing foundation of the enterprise. By shaping better management systems and strengthening operational models, companies can adapt to dynamic changes in the market, improve competitiveness and ensure sustainable and healthy development.

Digital technology leads the way to international markets. IKEA's sourcing model provides useful insights for other enterprises, especially when applying big data technology. By using big data technology, enterprises can accurately screen among many suppliers, expand the scope of procurement, and select the goods that best meet their corporate philosophy and design standards. This digital strategy not only enhances the ability to search and sort but also enables the enterprise's products to expand into the international market better and enhance the enterprise's international influence.

Risk reduction, cost reduction and efficiency improvement are important paths for long-term business development. IKEA's logistics and cross-border transport model provides an effective experience for enterprises, especially in reducing costs and improving efficiency. By upgrading the level of automation in the transport of goods, enterprises can comprehensively improve their ability to resist and anticipate risks and reduce losses in terms of human, material and financial resources. This continuous improvement attitude helps companies control their supply chains, reduce overall costs, and maximise benefits.

6. Conclusion

This paper takes IKEA, a representative company in the furniture retail industry, as the research object and analyses its strategies in four aspects: supply chain, procurement, logistics, and transnational corporations, as well as its problems in transnational markets, procurement costs, logistics, and warehousing. Research IKEA's big data technology application and supply chain cost control.

It is concluded that big data technology plays an important role in IKEA's supply chain management. By collecting, analysing and utilising large amounts of data, IKEA can better predict demand, optimise inventory management, improve production efficiency and optimise logistics distribution, thereby reducing supply chain costs.

Authors Contribution

All the authors contributed equally, and their names were listed alphabetically.

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