Demonstration of Supply Chain Management in Big Data Analysis from Walmart, Toyota, and Amazon

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Abstract. With the advent of the era of big data, social production and lifestyle have undergone tremendous changes. The traditional supply chain management system has high storage costs and poor timeliness. In contrast, the application of big data technology in the supply chain management system will provide customers with more personalized services, so that the supply chain can achieve lean production and lean management, and the supply and demand response is more rapid. This thesis gives examples of three different companies to analyze the big data technology that they are using, which are Walmart, Toyota, and Amazon. After a series of comparative processing, it can be found that big data technology promotes production efficiency and plays an increasingly important role in the process of enterprise management. Although in the early stage of big data technology, enterprises will experience many unknown difficulties, such as loss of confidence, and the tools for processing data are not efficient enough. However, by using the data center constructed by big data technology, it can better explore the hidden value of various data and provide a stable and efficient platform for enterprise development. These results shed light on guiding further exploration of implementation of bigdata analysis into supply chain management.

Keywords: Big data technology; supply chain management; Walmart; Toyota; Amazon.

1. Introduction

The change and development of the big data era are more sudden from the perspective of time, which has a greater impact on social production and lifestyle, and it spreads faster. It shortens the production section and consumption terminal of the supply chain, greatly improves the ability of information acquisition at both ends, and the supply and demand response is more rapid. The application of big data in the supply chain has different reflections in different links [1]. The first step is the application in the marketing link [2].

Through the data analysis platform, the customer's needs can be accurately predicted, analyzed, and calculated directly. At the same time, it brings a more real user experience to customers, and meets the diversified consumer needs. The second step is reflected in the purchasing process [3], by using big data technology to purchase multiple channels, optimizing the cost of goods to meet the minimum requirements, and optimizing the procurement process to make it more specialized and technical. It also improved the efficiency of suppliers and costs in the supply operation process. The data types as well as chanllenges of implementation the bigdata analysis in SCM is shown in Fig. 1.

The next step is product design and development which is a particularly important link. Big data technology provides enterprises with independent predictive analysis technology to understand people's preferences and needs, once again rationally allocating and integrating the existing resources of enterprises, so it can design goods that meet people's aesthetics. To make enterprises more aware of the current situation of supply chain data analysis and realize what strategies should be adopted in the field of big data analysis, this thesis helps enterprises find and solve difficulties while carrying out data analysis. The rest part of the paper is organized as follows. The second part is the application of big data. The author gives three examples of companies to analyze, they are Walmart, Toyota, and Amazon. The third part is the limitation. The end part is the conclusion.

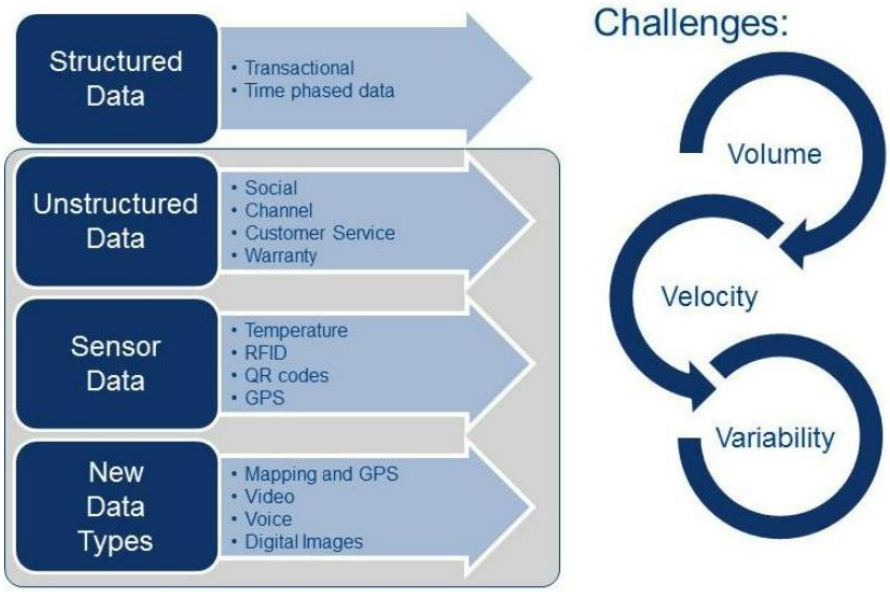

Fig. 1 Types of data and challenges for implemention of BDA in SCM

2. The Implemenation of Big Data Analysis in SCM

2.1 Walmart

First and foremost, the use of the production process may be seen in the creation of plans, such as resource allocation, inventory management, equipment optimization, and material requirements. Enterprises establish the production schedule in accordance with the various factory plans, work with manufacturers to modify the construction of the production line, cut down on resource waste, and guarantee an efficient and consistent production process. The manufacturing process is then rationally set up in accordance with the strategy to maximize the usage of inventories and reduce costs. In 2014, Walmart surpassed all other retail-led supply chain companies in size. A flow chart of Warmart is shown in Fig. 2.

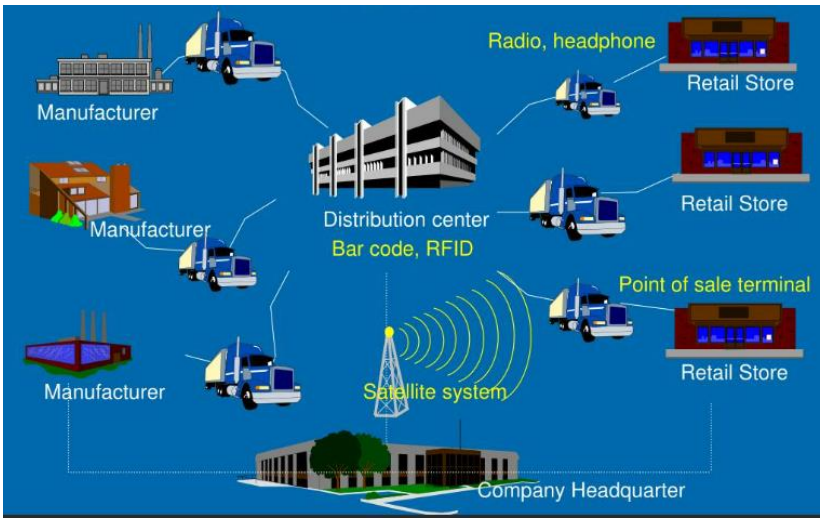

Fig. 2 The flow chart of SCM with bigdata analysis of Walmart.

The most crucial aspect of Walmart is its scale. It hopes to link customers, regardless of their size or the size of the consumer group. It aims to link customers and products through transactions, regardless of its size or the size of the consumer group. After then, when the big data sector was still relatively unknown, Walmart started using big data analysis technology to offer a better user

experience. For instance, the Walmart map software HDFS (Hadoop distributed file system) uses Hadoop to track the most recent locations of more than 1000 Walmart stores throughout the world [4]. It can even provide the precise position of an item in a Walmart store.

Users identify the terms of the Walmart website through search engines and use the analysis results of these keywords to investigate customer wants, and to plan the promotion strategy of products in the upcoming quarter. Hadoop is used to study the behavior of customers searching for goods. Walmart has also created the extremely challenging search engine Polaris to process social data. Social data has two main obstacles [5]. The first is the abundance of unstructured data, and the second one is that social data is mostly in complex semantics.

To give a simple example. If someone sends a group of friends a video of Maroon 5 singing "Sugar," the Polaris engine can detect whether that is a song or sugar because it is built on a semantic search engine. The ability to leverage the user's shopping preferences to better target recommendations is even more crucial. In order to learn about famous web celebrity products, semantic analysis technologies can even follow the dynamics of social media in real time.

A strong information management system and cutting-edge information technology are also features of Walmart's global procurement center. It performs a crucial management function in everything from supplier selection to cargo processing to data analysis. The selection of suppliers is targeted. Before working with Walmart's Global Purchasing Centre, each supplier is required to submit to the Purchasing Centre's database information indicating the basic condition of the supplier, which will be subject to an analytical examination by the Purchasing Centre. Supplier management is more scientific and effective [6].

Through the tracking and summary of supplier data, the purchasing center can always grasp the important data of supplier's delivery status, sales record, after-sales service, and customer feedback. The application of Walmart's big data has solved many problems, whether in data collection and processing or in exploring the needs of users, it has made great contributions, and Walmart's use of big data technology has also led to the widespread use of big data technology.

2.2 Toyota

Toyota's use of big data technology has further improved the safety of driving, predicted demand and market trends, more satisfying customer needs, and enriched customer experience. Toyota Nissan's Propilot 2.0 system [7], which enables autonomous driving on highways on a single-lane route, allows the driver to take his hands off the steering wheel. Through 3D high-precision map data, 360°C sensing around the vehicle, intelligent interface, and intelligent highway route driving is realized. A sketch of the Toyota bigdata analysis of smart center is shown in Fig. 3.

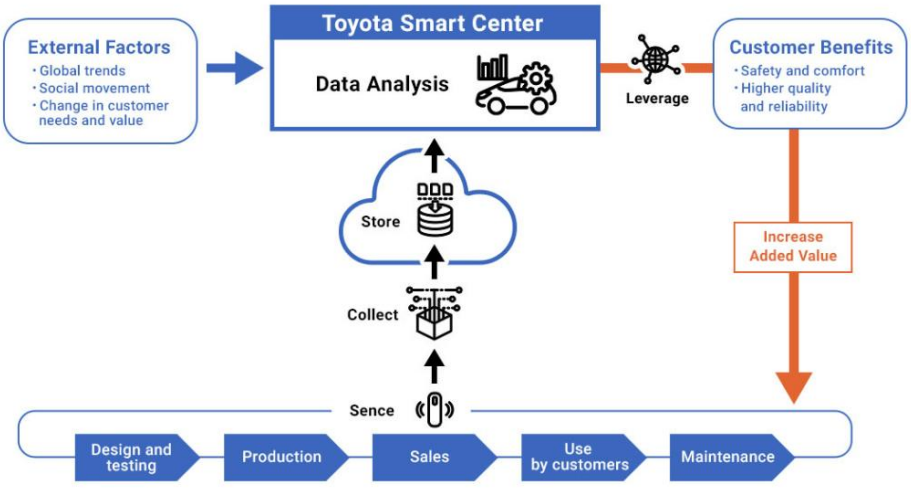

Fig. 3 A sketch of bigdata analysis in Toyota.

In 2019, Toyota equipped the in-vehicle data communication template (DCM) in the newly listed models. The modified template can upload the vehicle data to the cloud server with the user's consent and use big data technology to analyze the data, to plan a better and safer driving plan for the user. In the cooperation between Toyota and Amazon cloud services, Toyota Interconnection completed the development of the Toyota Big Data Center China project in only five months. Under the high-end data processing technology of Amazon, Toyota has greatly reduced the cost of data storage and data processing and improved operational efficiency [8].

The cost savings of Toyota interconnection are mainly reflected in two aspects. The first is the cost savings of cloud resource use. On the other hand, the use of AWS serverless architecture and other technologies can achieve the architecture of automatic flexible expansion and reduce costs. The second is that the operation and maintenance cost of the system is greatly reduced. The business system based on AWS realizes highly automated operation and maintenance. It can understand when drivers might be sleepy or stressed. Then it will adjust the lighting, music, and the corresponding seat [9].

2.3 Amazon

Amazon's big data analysis technology is much more mature than other e-commerce platforms. Some consumer behavior habits, browsing records, and prices provides consumers with satisfactory product recommendation. Amazon has established many artificial intelligence systems with big data technology, such as predictive delivery of products, efficient cross-regional cross-border distribution, and global cross-border cloud storage services. The motivations and aims of amazon is shown in Fig. 4.

Fig. 4 The motivations and aims of Amazon SCM.

The Amazon platform has also launched an intelligent reservation service [10], which can reserve the arrival time and storage of goods. At the same time, it has also developed an intelligent storage system, which analyzes and extracts goods in the background, and stores goods efficiently and reasonably, which greatly improves the work efficiency of the Amazon platform.

In addition, the Amazon platform uses big data technology to analyze the purchasing power and consumer demand of consumers who do not pass through the region for certain types of goods. If the inventory of goods is found to be insufficient in advance, the platform will optimize the inventory of goods in advance and remind the staff to dispatch goods. The efficient intelligent logistics service system of the Amazon platform can also precisely monitor the warehouse, allowing sellers to understand the characteristics of inventory, and greatly improving the safety of warehousing.

Amazon also often subdivides customer groups to recommend group products. One way to increase sales is to push advertisements for each type of consumer that they interested in based on

BDA scenarios and approaches with various features and models [11]. Moreover, Amazon uses big data technology to enable every customer to have a personalized online store. This radical innovation is based on user interest. Amazon uses the algorithm to find similar products based on the customer's previous purchase history and product field. Generation of a list of product recommendations that customers may be interested in.

3. Limitation & Prospects

It can be seen from the survey results that many enterprises have carried out big data projects, but their satisfaction with big data analysis and the expected results have declined. Enterprises seem to have insufficient confidence in developing and investing in this technology. The beginning of any emerging technology implementation will go through this stage, and these processes will gradually wear down the enterprise's patience and expectations, it can be said that this confusion and obstacles are an indispensable part of the growth process [12]. Secondly, enterprises need to invest a lot of time and energy to clean up data and expand other types of analysis. To obtain more reliable data, enterprises not only need to have a central data repository, but also need to find a cross-organizational partner for data collection and analysis, and jointly establish a cooperation mechanism. Only in this way can we better help enterprises through difficult stages. Afterwards, companies will gradually realize that the analysis tools they use are not complex enough to provide them with timely and informed decisions and insights. They need to invest in new software and solve the problem of change management processes. Although there will be various problems in the early stage of big data technology, big data technology provides a more realistic assessment of the future path of enterprises. At present, the combination of big data analysis and artificial intelligence is the most suitable solution, so big data technology on the future path is essential for enterprises.

4. Conclusion

The application of big data in the supply chain makes industrial production more efficient and convenient, greatly improving people's quality of life. This paper mainly analyzes the analysis and application of big data technology in Walmart, Toyota, and Amazon. Walmart mainly uses the HDFS system to locate products and stores and uses the Polaris search engine to understand customer needs and mine users' shopping needs. Toyota Nissan uses propilot 2.0 system to realize automatic driving. At the same time, Toyota Internet also uses Toyota Big Data Center China to complete the high analysis and processing of data under the processing of Amazon's high-end data technology. Greatly improve work efficiency. The big data technology of the Amazon platform is more mature. It can recommend products through consumers' habits. It also provides intelligent reservation service and intelligent storage service, which greatly improves the security of storage. However, most enterprises have no confidence in the development of big data technology and do not have perfect systems and databases to help them tide over difficulties. In general, big data technology still provides a lot of help and guidance for enterprises in the future development path.

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