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Supply Chain Management Optimization Based on Bigdata Analysis

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Abstract: Contemporarily, in the context of big data, enterprises need to continuously optimize and innovate the supply chain, change the traditional supply chain management process pattern as well as optimization the whole supply processes. These actions are able to strengthen the actual effect level of supply chain process operation and achieve more benefits for the enterprise. Under the background of big data, more information management technologies are widely used, and supply chain management needs to clarify the deficiencies in its own operation, and reengineer and adjust the deficiencies. This paper will systematically discusses the implementation of the state-of-art bigdata analysis techniques in SCM. According to the analysis and evaluations of the measures, the usage of advanced big data technology will help increase the cultivation and establishment of management talent resources, so as to optimize the supply chain management process. Overall, these results shed light on guiding further exploration of supply chain management optimization.

Keywords: bigdata, supply chain, smart logistics

1. Introduction

With the rapid development of economy and technology, the application of big data is becoming more and more extensive, especially for supply chain management, where big data technology can greatly improve business performance. In the process of carrying out supply chain management, the rational application of big data technology can mainly involve various aspects (e.g., unstructured data and structured data). From a practical point of view, the full application of big data technology is conducive to optimizing the effect of supply chain management [1]. For the development of the contemporary information market in particular, big data technology can provide impetus for the improvement of the market competitiveness of enterprises, and it needs to be fully applied in the whole process from the beginning of production to the demand. The reason is that this technology can greatly improve the flexibility and visibility of related analysis work, and can more accurately capture changes in customer demand and cost, thereby optimizing the effect of supply chain management [2]. Big data analysis can effectively solve the "bullwhip effect" caused by information lag in the supply chain and promote the development of the supply chain to be lean, shared, and intelligent [3].

Nowadays, the development of the enterprise economy has entered the era of big data. In the era of big data, relying on technical means, various management work of the enterprise is transformed into a brand-new model, which greatly improves the quality and speed of management [4].

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Information technology plays an important role in the development of management work. In the context of big data, the reengineering of the supply chain management process is an important task for management innovation and quality improvement. Besides, it is also an important way to promote enterprise supply chain management to meet the development of the enterprise big data era [5].

This paper is going to give an overview discussion of supply chain management optimization based on big data analysis, including trade cost and JIT, warehouse setting, monitoring and so on. Some recommendations will also be given to discuss how enterprises can use digital technology, Internet technology, etc. to achieve innovative development of supply chain management.

2. Basic Descriptions of Big Data Analysis

The basis of big data analysis is analytics, which can help companies make optimal decisions based on data. It can help companies to gain unique insights, which will help them improve the accuracy of predictions (seen from Fig. 1) [6]. Although the specific application is still relatively confusing, which directly leads to the fact that the analysis process cannot really touch the essence of the data. The use of big data by enterprises is mainly based on the analysis and application of data from the aspects of corporate culture, corporate culture, and corporate characteristics.

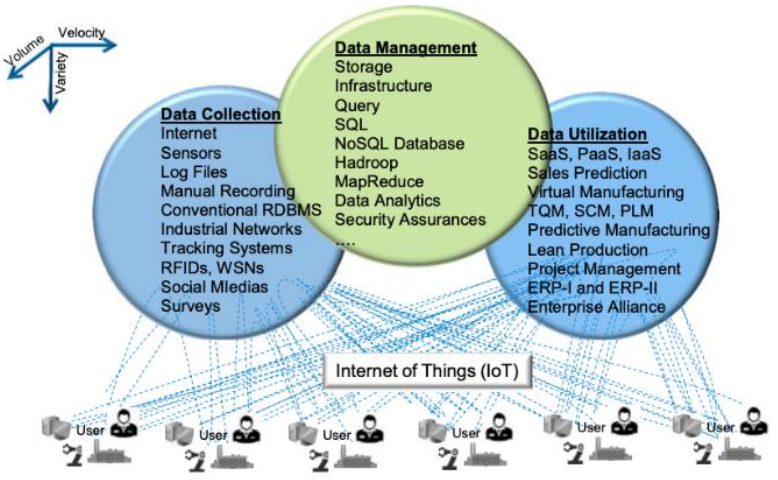

Figure 1: IoT, the Cloud and Big Data.

On the other hand, the volume and types of data processed by big data technology are very large, and the calculation speed is also very fast, which can meet people's more diverse needs. The application of big data technology can realize data collection, data mining and data visualization of information. These functions are also very valuable for economic operation monitoring and analysis. Through the collection and information mining of economic operation monitoring information, it can more accurately reflect the economic development trend and more accurately locate problems in economic operation. In recent years, the most popular big data analysis tool is Python, which can provide data analysts with various development kits to help data analysts process data through machine learning, visual analysis, and other functions [7].

3. Applications in Trade-off of Cost and JIT

With the advent of the era of information sharing, the supply chain includes the upstream and downstream cooperative entities of the enterprise. Based on the cooperation of various cooperative entities, it provides the basis for the refined management of the enterprise. The supply chain has the characteristics of complexity, dynamics, and intersection. Supply chain costs include upstream costs

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(opportunity costs, transaction costs, transportation costs, procurement costs), internal costs (operation costs, management costs, financial costs) and downstream costs (opportunity costs, service costs, transportation costs, sales costs). The total cost of the supply chain includes three types: total operating cost, total management cost, and hidden cost [8].

In addition, there are applications involving big data in traditional procurement, but the applications in traditional procurement are mostly limited to data decomposition and analysis, and fail to make full use of big data to create value. Although JIT procurement started later than traditional procurement, JIT procurement is more suitable for big data. Firstly, unlike traditional procurement, JIT procurement maintains inventory. Factors such as changes in production plans and consumption of production materials change in real time and affect procurement and production, so strict logistics tracking is always required [9]. Big data is used as a support, and predictive analysis is carried out through the collected procurement and production information to provide more guarantees for JIT procurement. Secondly, in the procurement and production process, any decision is made and issued by humans. Using big data to count, screen, and analyze some information can describe the facts more objectively and avoid the influence of subjective factors when making decisions manually.

Big data technology is conducive to enterprises to obtain external information from multiple channels, effectively integrate information on various business activities within the enterprise, optimize resource allocation, realize data information sharing, ensure efficient connection of various operational links, avoid redundant costs, and expand corporate profits space. Big data technology is applied to the cost management of enterprise supply chain, which can realize the allocation of costs according to the operation, and can incorporate all aspects of operation into the cost management process that has a certain degree of foresight [10]. It improves the management and decision-making efficiency of each operation link in the supply chain, and promotes the whole process of the supply chain to be more standardized and normalized.

4. Applications in Warehouse Setting

In the past, the determination of the enterprise logistics center was realized based on the experience of the management personnel and advanced GIS, GPS, and RS technologies [11]. The logistics center that has come down cannot meet the actual situation of logistics companies. With the support of big data technology, it can help enterprise decision makers understand the impact of various external factors on the location of the enterprise center, and scientifically determine the suitable location for the development center through calculation.

Through intelligent storage design and information application in warehouse setting, it can greatly reduce land costs, save human resources, and reduce labor costs. It is more beneficial for operations in special environments such as dark, low temperature, and poisonous. Intelligent warehousing mostly uses computers for management and automatic control. The intelligent warehouse management system can achieve the synchronization of accounts, and the enterprise only needs to establish a reasonable inventory to ensure the smooth production process [12]. Combined with the in-depth application of the information Internet of Things and big data, intelligent warehouse can greatly improve work efficiency, save costs, and obtain greater economic benefits.

As a mechanized and informatized means of warehousing management, intelligent warehousing has a positive role in promoting traditional warehousing management. Applying intelligent warehousing on-site intelligent operation mechanism, a self-service application mode of unattended intelligent warehousing has been constructed. It works with real-time data collection of WMS interface material management system, timely warehouse inventory of mobile operation terminals, wireless communication network realization, and real-time data transmission technology [13]. These can provide effective data support, tool support, and management support for material security work, and can improve the level of material operation management.

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5. Applications in Monitoring

The role of big data in logistics monitoring is mainly reflected in the use of Internet of Things monitoring, video monitoring, real-time data collection and system interaction. This enables real-time monitoring of logistics-related links such as vehicles, personnel entry, transportation routes, parking lot management, plant cargo loading and unloading, vehicle driver services, and epidemic prevention and control in the region, to grasp the operating situation information of major logistics links, and to detect and avoid potential risks in a timely manner [14]. The logistics problem has changed from a passive post-event response to a new logistics management model that combines pre-prevention and post-event response.

The big data logistics security monitoring and anti-theft system is a smart logistics monitoring and anti-theft system project (e.g., seen from Fig. 2) [15]. It is a logistics intelligent system integrating a smart cloud platform, GPS positioning system, intelligent detection system, automatic alarm system, and mobile phone App. During the logistics transportation, through the secondary packaging of the mail and the installation of detachable and reusable terminal equipment, functions such as automatic monitoring of the opening of the mail, anti-theft alarm, and real-time positioning are realized. Once the email is opened, the system automatically records the time and location of the email opening, and transmits the information to the cloud platform through the 4G module [16]. If the opened location does not match the preset receiving location, the system will automatically alarm and send the alarm signal to on the sender's mobile phone. This system can effectively solve the problems in the current logistics industry that damage the rights and interests of consumers and damage the reputation of logistics companies, such as theft of items, fakes, delays in logistics information, and difficult accountability for compensation disputes, and focus on solving the problem of bag loss and repacking of valuables under the huge pressure of logistics distribution.

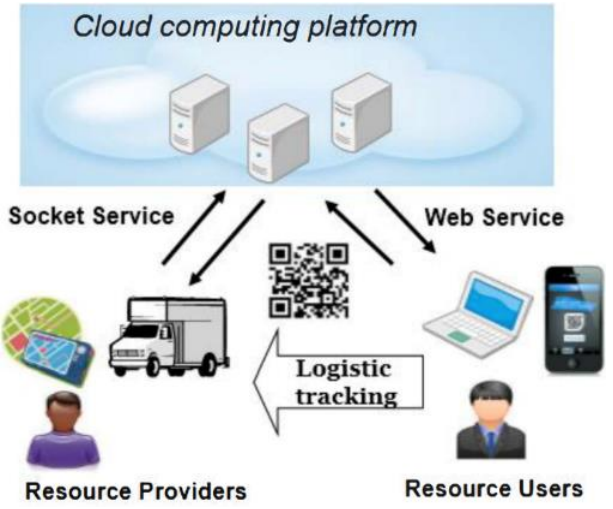

Figure 2: Cloud-enhanced system architecture for logistics tracking service.

6. Limitations & Prospects

Under the background of big data, the biggest obstacle facing enterprise supply chain management is the lack of effective communication between supply chain units, low efficiency of logistics management, and poor connection ability between various links, resulting in extremely low work efficiency of each link. If the world-class supply chain management standards prevail, most enterprises have many defects. The reason is that in the process of supply chain management, there is a lack of connection between the relevant links involved in the chain, so that the efficiency of the

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entire supply chain is low, and then a series of problems such as backlog of goods in stock and low turnover rate of materials appeared. Supply chain problems will affect the overall capital chain operation level of the enterprise. In the era of big data, higher requirements are placed on enterprise supply chain management, which needs to further improve operational efficiency and accuracy. However, due to the low degree of connection between supply chain chains, it seriously hinders the innovation and development of enterprise supply chain management, and makes it impossible for enterprises to adapt to the concept of big data development with the help of supply chain management.

Enterprise supply chain management is highly systematic, so there are high requirements for cooperation among different enterprises or between different departments of the same enterprise. This hinders the rapid sharing of inter-departmental information involved in supply chain management and affects the information transmission and communication between departments. This will cause serious problems in all links in the supply chain management process. For example, some products need to be transported to remote places. When it is in a certain area, because the information is not smooth, it is easy to cause mistakes in the transportation process of products, which not only damages the rights and interests of customers, but also reduces the adaptability of enterprises in the market. In the end, when enterprise operations cannot meet the needs of social development, the social and economic benefits of enterprise supply chain management cannot be reflected.

The degree of connection of enterprise supply chain management is directly related to the overall supply chain management ability and level. In order to achieve the level of enterprise supply chain connection management in the era of big data, it is necessary to continuously optimize the logistics business process and improve the efficiency of logistics transportation in the future. This can also minimize the backlog of goods, improve the turnover rate of goods inventory, and significantly improve the efficiency and quality of enterprise supply chain management. Under the background of big data technology, enterprises can use information technology to strengthen the management of each link of the supply chain, conduct in-depth modeling and other analysis of their data information, and capture truly useful information from the actual supply chain management process. They can find corresponding countermeasures and partners in a short period of time to ensure that enterprises can achieve perfect connection during supply chain management.

7. Conclusion

With the continuous and rapid development of globalization, Internet and informatization of supply chain operations, data is gradually infiltrated in all walks of life and business functional areas, and data has gradually become an extremely important factor of production. A large amount of data can generate certain value using various methods. The application of big data based on supply chain management can not only greatly improve the competitiveness of enterprises, but also realize the long-term development of the supply chain. Meanwhile, in order to ensure the use of big data in the supply chain operation process, it is necessary to continuously analyze the model of big data to ensure that the operating cost of the supply chain can be greatly reduced. Moreover, the application of big data in supply chain management can greatly improve the business performance level of the entire supply chain.

If big data technology wants to achieve long-term development and develop more functions, it needs to have stronger value and create more economic benefits in various fields. This is the original intention of big data construction. If today's supply chain management work can make full use of big data technology to innovate the management model, improve management efficiency, and further optimize the management effectiveness to make the service industry and the overall function more perfect, the overall value of big data technology can also be enhanced. However, in many industries today, the value density of big data technology is still low. The main reason is that many companies have not fully developed big data technology and have not completed management work. The

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existence of this phenomenon hinders the development of big data to a certain extent. It is difficult for enterprises to improve economic efficiency under this model and seize the opportunity in the fierce market competition. Only in this way can the management work of the enterprise be on the right track, the development trend of the enterprise can be seen more clearly, and the managers of the enterprise can keep abreast of their internal operating status and improve their management functions. Overall, these results offer a guideline for SCM upgrading in the bigdata era.

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