

Survey on Logistics Service Mode Based on Cloud Computing

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Abstract. A survey on cloud logistics service mode is proposed according to the new characteristics and new connotation of logistics services based on cloud computing from the view-point of management. In the logistics service under cloud computing environment, the logistics service mode is described from the different periods, different functions and different objects. Firstly, this paper analyzes the related concepts and features of the cloud logistics service mode. Then the system model and the business architecture of cloud services are summed up. In the logistics service, logistics methods of resource matching are the important problems of service resource management. Furthermore, optimization and coordination for logistics service process are concluded later on. At last, according to the current requirement of logistics service, future research direction and application perspectives are suggested.

Keywords Cloud computing • Cloud logistics • Service mode

1 Introduction

With the rapid development of economic and trade globalization, especially the rapid development of e-commerce, logistics is not only playing a more and more important status in national economy, but also becomes the bottleneck of economic development. Logistics service mode becomes the important factor of logistics and

the whole society by improving the operational efficiency of logistics and reducing the cost of the logistics.

In-depth investigation of the domestic logistics enterprises, we found that logistics service mode of manufacturing industry in our country which represented by the third party logistics has a lot of problems. There are the following problems:

(1) In current manufacturing mode, car manufacturers have not considered supplier's production process and logistics transportation and distribution process systematically. At the same time, there is lack of coordination mechanism among car makers, parts suppliers and the third-party logistics providers. For these reasons, there are key-problems in car manufacturing supply chain which as follows: Information sharing is not sufficient, planning schedule is not reasonable, the synchronization ability of producing is poorer, and timely distribution ability is not strong.

(2) There is disharmony between the modern logistics supply and demand which is shown as "total surplus" and structural shortage of logistics resources. Total surplus refers to the warehouse free and vehicle idle phenomenon, structural shortage refers to the short supply for rapid, accurate, professional modern logistics demand, which is due to the small scale and the bad management of logistics companies and the lack of effective integration of the whole social logistics resources.

(3) The informatization level of the logistics is low and there is a phenomenon that all of the enterprises in the supply chain are information isolated islands. The cost of the logistics is high, logistics is not efficiency and competitiveness for the lack of information sharing collaborative support platform and logistics service mode.

In order to solve these problems, the enterprises should promote the integration of logistics resources effectively, improve logistics operation efficiency, reduce logistics costs by establishing the modern logistics service mode and operation mechanism based on Internet of things and cloud computing. Therefore, the research how to make use of the Internet of things and cloud computing and other emerging information technology to meet the rapid development of economy is an extremely important work with high theoretical value and practical value.

2 The Concepts and Features of the Cloud Logistics Service Mode

Logistics service is geared to the needs of logistics tasks and users. It is the process to provide the service to meet the requirements of users. It is the set of a series of logistics activities to meet customers' needs. Logistics service mode is combined with advanced information technology, network technology and logistics technology. Logistics tasks based on the division of labor and cooperation realized a high share of logistics resources, rapid response and cost optimal comprehensive logistics service system. It realized the height of the collaboration between enterprises and the whole social logistics resources on-demand deployment to provide customers with professional and personalized logistics services which is efficient, high quality and low cost.

The Internet of things provided logistics information source for cloud computing platforms through the perception of logistics facilities and all kinds of information resources. Cloud logistics service mode virtualized the logistics resources to form cloud services. Finally, it provide modern logistics service mode by logistics resources information sharing of cloud services, cloud service discovery, service resource combination and coordination.

Logistics service mode under cloud computing has completely different characteristics with the existing logistics service modes, main shows are as follows:

(1) The openness of the logistics environment makes users get the service according to their needs. Cloud computing is the combination of data sharing computing mode and shared services computing mode. Unlike traditional information service mode, cloud computing perception from the source of the information. It changed from desktop information service to the cloud service execution, from data intensive to service intensive, from fixed monotonous service content to rich customizable service content, and can be combined according to the needs of decision makers or extension to support the logistics task.

(2) Logistics resource virtualization makes logistics resources using in the form of cloud services. Through the perception, virtualization, encapsulation, release and registration of all kinds of logistics resources and customer resources, the entity

logistics resources are expressed as cloud logistics services. All kinds of resources are not together, but located in different servers. And the resources are provided to decision makers by a form of cloud services to allow decision-makers to any location in the cloud using a different terminal to obtain corresponding cloud logistics services.

(3) Logistics tasks are complex and different, and the logistics task may performed by multiple enterprises. Different logistics task subjects complete the task through cooperation. Logistics task collaborative is an important issue. Cloud service composition is the process to meet user needs and complete the logistics task by dynamically discover from various cloud services and assembling into a more value-added, large-granularity of the service or system. For complex logistics tasks, a single cloud service is difficult to meet the requirements of complex logistics tasks independently. So we need a variety of different levels of cloud services by combining together to complete the task.

3 Key Technologies of Cloud Logistics Service Model

3.1 The System Model of Cloud Logistics Service

Traditional Logistics Service System Models. Modern logistics service mode is varies with the development of the service content, different stages of development have different development patterns. There are mainly five kind of service model appeared in the process of development.

1) The first party logistics services. 2) The second party logistics services. 3) Single function logistics service mode. 4) The third party logistics service mode. 5) The fourth party logistics service mode.

Differs from the traditional logistics service mode, however, cloud computing is complete, open service environment. It does work with cloud services which are formed by virtual logistics resource. So the existing logistics service mode is not applicable. It still needs further analysis about the new features and designing a new applicable to logistics service model.

Cloud System Model of Logistics Service. As cloud computing is put forward, it offers new way and method for the research of logistics service mode.

Over the years, scholars have some innovation research on modern logistics service mode. Lin Yun put forward an innovation model of logistics service oriented to supply chain called logistics cloud service (LCS). And also proposed the business architecture and technology architecture, the discussed key technologies and problems for implementing LCS^[1].

At the same time, Other studies about the cloud computing have also provides basis and reference model for cloud logistics service mode research. Li Bo-huput forward a new service-oriented networked manufacturing model called Cloud Manufacturing (CMfg), defined the concept of CMfg, discussed differences among CMfg, application service provider and manufacturing grid, proposed CMfg architecture, studied key technologies for implementing CMfg and introduced preliminary research results^[2].

These research works establish logistics service through the information means only. It has not constructed logistics service system of cloud systemically for specific characteristics of the cloud logistics.

3.2 The Business Architecture under Cloud Logistics Service

Cloud computing environment is a completely open service environment. Its architecture, standards, system platform, software services and so on is all open. And these services are not concentrated in one place, but located in different servers across tens of thousands of. Virtualization enables users to various resources in the cloud anywhere using different terminals to enjoy services, without the need to understand or grasp the specific situation of logistics resources and the calculation process. These characteristics of cloud computing environment put forward new requirements to cloud logistics service mode.

As a new computing mode and service mode, Cloud computing can also carry for requirements of multi-source logistics service and collaborative computing in logistics system. Holtkamp et al. described an approach for the development of a logistics cloud as a “vertical cloud”. In contrast to a generic or “horizontal cloud”

components of the cloud platform are custom tailored to the specific needs of the logistics application area ^[3].

These research works mainly focused on the aspects of the cloud computing platform construction. It has not yet build cloud applications business architecture for the cloud logistics.

3.3 The Allocation Method of the Logistics Resource under Cloud Logistics Service Mode

The connotation of logistics resources is very broad, including operations, customer resources, human resources, information resources and system resources, suppliers and distributor resources, etc. Diversification of the logistics system and logistics infrastructure will cause the logistics resources serious waste, it is necessary to carry out its integration and configuration.

Traditional Allocation Method of the Logistics Resource. Wang et al. proposed the organization boundary resource oriented tasks to optimize logistics distribution method, and design the logistics resources optimization allocation process ^[4]. Bosona and Gebresenbet integrated logistics resources of the regional food supply chain by clustering manufacturers ^[5]. According to the RBV theory, Wong and Karia pointed out that the logistics service provider can improved logistics competitive advantage by identifying and logistics resources integration strategy ^[6].

The Resource Allocation Methods under Cloud Service. Cloud logistics service resource allocation is the process of finding out the logistics service which matches different logistics tasks from a large number of cloud services resource and combinatorial optimization to complete the task.

Leukel, J. adopts the basic idea of Cloud Computing and takes a Cloud perspective on supply chain systems: It proposes to represent supply chains as a set of service offerings and customer demand as service requests; coordination is then a problem of determining optimal service compositions. Research of cloud service portfolio mainly focused on two aspects of service composition and combinatorial auction ^[7]. However, they have not design service portfolio and management issues from view

of cloud services in multi-level.and cloud service portfolio market mechanism is lack of systemic.

Therefore, in view of decomposability of the logistics task, the research of resource optimization configuration can not only solve the problem of logistics service from physical resources and information resources, but also improve service quality of customers.

3.4 Cloud Collaboration Mechanism under the Logistics Service Mode

The design and optimization of the coordination mechanism under the modern logistics service mode became an important problem to countries around the world. Modern logistics system is the organic whole system of subject flow and information flow. The establishment of efficient coordination mechanism can not only reduce logistics costs and improve production efficiency, but also impact development of the whole society's economy.

With the globalization of modern logistics service, the logistics enterprises are facing increasingly fierce international competition. It is impossible to rely on a single resource or company to meet the efficient, intensive demands. Many new logistics mode based on emerging technologies and collaborative logistics are presented. Weichhart pointed out that it requires enterprises to carry out effective logistics synergy in a dynamic and changeable global competition market environment to improve enterprise's service efficiency and international competitiveness ^[8].

These works mainly solved the collaboration problems of imperfect competition. They have not considered the cloud service mode where logistics tasks are highly sharing. At the same time, the enterprise network of the cloud service mode has strong dynamic, they have not established the dynamic network and discussed the dynamic network collaboration.

4 Conclusion

Currently, the relevant research works explored the framework of logistics information system construction and implementation plan which based on emerging information technology mainly from the perspective of elevated logistics system information technology. They solved the logistics data center design, logistics oriented application of RFID technology, centralized logistics service such as scheduling and optimization problems partially.

However, these studies are lack of the consideration of the innovation of modern logistics service model, modern operating mechanism under the cloud computing and the joint mechanism of the Internet of things and cloud computing for the modern logistics service mode. Also they ignored the innovation of the modern logistics resource configuration which is based on cloud services. Therefore, there are the following possible research directions on logistics service mode under the cloud computing.

(1) In terms of cloud logistics service mode, the existing logistics service mode has a larger shortage, and it can't meet the requirements of modern information technology and integration services effectively. The Internet of things provided logistics information source for cloud computing platforms through the perception of logistics facilities and all kinds of information resources. Cloud logistics service mode virtualized the logistics resources to form cloud services. Finally, it provide modern logistics service mode by logistics resources information sharing of cloud services, cloud service discovery, service resource combination and coordination.

Therefore, from the view-point of systematicness, these are basic issues in cloud logistics research to discuss the organization and structure of the logistics service mode and establish the system model, business model of the logistics service mode under the cloud computing which can accelerate a new technological change of logistics services in the cloud platform.

(2) In terms of Cloud service platform, Cloud logistics service platform enables users to access to services as needed through the open environment of logistics services, which is the foundation of the development of cloud logistics cloud logistics rapidly. Researching the technology of cloud service platform and establishing cloud

logistics service platform can realized logistics services in the cloud. The cloud service platform can completed the distributed logistics tasks effectively and realized combined logistics services and value-added services. And it will become the hot spot and focus in the research of cloud logistics service.

(3)In terms of integration method of the Cloud logistics resources in logistics service mode, integration of logistics resources is task-oriented and customer-oriented. Logistics resources integration under cloud logistics service mode is according to different task requirements such as transportation requirements, packaging requirements and delivery requirements. We can achieve the task completion of high efficiency, low cost of logistics resources by the research in the integration method of the logistics resources on the platform. It is an important issue to research the matching relationship between cloud logistics services and logistics tasks, study the integration method of the logistics resources on the cloud logistics service mode.

(4)In terms of Cloud collaboration method on logistics service mode, it is able to achieve the synergistic effect of the service resources, and bulid an effective security for service optimization. And it is an important question to research services collaborative approach in the cloud logistics service mode, set up cloud logistics service collaboration mechanism combined with the research of the cloud logistics service mode.

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