

Innovation and Development Strategy of Logistics Service based on Internet of Things and RFID Automatic Technology

Jiafei Geng^{1,*} and Zhanglei He²

¹ Hefei college of finance & economics, Hefei 230601, China

² Anhui Technical College of Industry and Economy, Hefei 230051, China

*Corresponding Author: Jiafei Geng, gengjiafei@163.com

Abstract

Internet of things is a major change in the development of science and technology; it combines the virtual information with the physical world, so that economic activity and social activities are more intelligent, convenient and efficient. In this paper, the author research on the innovation and development strategy of logistics service under the internet of things. The essence of modern logistics is to take the information technology as the core competitiveness, pay attention to the integration of resources and the whole process of logistics optimization, it is the ablest to play the advantages of Internet of things technology applications. The application of communication and network technology in real-time transfer of information, it can realize the logistics operation agility and integration.

Keywords: *Internet of things, Logistics service, RFID, Logistics visualization*

1. Introduction

The Internet is after the mobile communication network, Internet, computer science and technology development is a major change, it will be the virtual information with the physical world closely, make economic and social activities more intelligent, convenient and efficient [1]. The essence of modern logistics is to take the information technology as the core, pay attention to the integration of resources and the whole process of logistics optimization, is the ablest to play the advantages of Internet of things technology applications [2-3]. Although China's logistics industry is in a stage of rapid development, but because the information development lags behind, most enterprises can only provide the basis of the traditional logistics business, profitability is limited, and the overall operation efficiency is not high, the huge consumption of resources, sustainable development, these problems restrict the logistics industry [4]. Therefore, in the era of things will be approaching, should grasp the application of IOT technology innovation opportunities of China's logistics enterprises, accelerate the information and intelligent upgrade process, to achieve leapfrog development [5-6].

Logistics industry is the first contact with the concept of things industry, but also the development of things in advance and is expected to be an industry. As early as 1998 before and after the logistics industry that began to introduce RFID technology, starting in 2003 to promote the comprehensive RFID/EPC based networking technology applications, in 2004 -2006 also experienced a boom in the application of the Internet of things [7]. At present, the successful case of local logistics industry has a lot of networking applications, but due to the limitation of the development of Internet technology, after the boom stage of logistics industry networking technology popularization and application of a new round of performance was very honest and calm in the face. However, with the rapid development of networking technology, in the global tide of things coming after Enlightenment, speculation, rational development of the logistics industry will face unprecedented transformation [8]. The whole process of local

infiltration of key networking technology in the field of logistics and the comprehensive application will affect the operation of logistics enterprises. Networking technology can not only realize the exchange and transmission of information between people, but also through a variety of sensing equipment acquisition real information, and this information real-time transmission and interaction, after processing to extract feedback application of valuable information to the corresponding node of the network application [9-10]. So, the logistics enterprises can easily monitor real-time operation and management of network nodes of various goods, more precise operation of the logistics JIT management and rational planning application, and to realize the intelligent management of the goods, the quality and level of logistics service is greatly improved.

In the coming era of things now, innovation and application of in-depth study of networking technology in the field of logistics, information of logistics service model in the supply chain, how to scientifically and reasonably priced, so more can improve the overall revenue of logistics enterprise and logistics demand, motivation of logistics enterprise information innovation, promote integration and the collaborative development of the logistics industry, the research value has a strong practical significance and high.

2. Logistics System based on Internet of Things

2.1. Internet of Things

With the continuous development of information technology, people's research on the Internet of things has been gradually deepened, and the definition and connotation of the Internet of things is constantly expanding. The Internet is an RFID device through (RFID) and bar code scanning equipment sensor information sensing and scanning of the entity items, then connect these information and wide area networks, intelligent identification and management of physical information formed by the network. This definition is mainly emphasizing the fusion of RFID technology and network technology, networking technology is the early application of the connotation of reaction. Networking is the further extension of the Internet and mobile network, and emphasize the information interactive technology has been developed to target can be connected to any "entity" stage, and all things with the formation of the Internet of things. Although the report does not propose a new definition of Internet of things, but it is to a certain extent, to expand the content of the Internet of things. The information interaction between the object and the object, the human and the object is the core of the Internet of things, through the connection information sensing equipment, and processing, transmission and use of the information obtained. As a result, a distributed heterogeneous cooperative network will be built up. Generally, the composition of the Internet of things is generally composed of three parts, such as the perception of the physical information and the collection, transmission, price and application. Therefore, the industry generally characterized by the characteristics of the Internet of things: "the comprehensive perception of information", "reliable transmission of information" and "intelligent processing and application of information" in the three parts.



Figure 2. Internet of Things RFID

2.2. Application of Internet of Things Technology in Logistics

The application of Internet of things technology in the development of logistics industry is mainly used in the four technologies, such as radio frequency technology, GPS/GIS technology, video and image sensing technology, sensor technology and so on. Specifically, RF technology is mainly used for the use of RFID tags and smart handheld terminal sensing process tracking, positioning, sorting and sorting goods, information collection. GPS/GIS technology is mainly used in the transport and distribution of logistics vehicles and goods for positioning, tracking, monitoring and management. Sensor's sensing technology is combined with GPS, radio frequency and other technologies, which should be used in hazardous logistics, grain logistics and cold chain logistics. Video and image sensing technology is often used in the logistics of the security monitoring process, mainly used in the security system. In addition, scanning, infrared, laser, Bluetooth and other sensing technology in the logistics industry, there are sporadic applications.



Figure 3. GPS Technology in Logistics

At present, most of the domestic logistics system is the network operation, the single line management and optimization of the point is rare. Logistics companies face a wide range of goods logistics operations, often in real time mobile state, and distributed in different geographical locations, the network information management system for the

integration of the Internet will be the logistics operation and management of enterprise lan. In practice, some enterprises use local area network technology, such as in the logistics park network construction is the use of local area network technology and wireless LAN technology to form a new logistics information system. Data communication, logistics enterprises will use wireless communication and wired communication, and some enterprises have begun to use 3G communication technology. At present, China's logistics information system can realize the case of intelligent control and management process of logistics enterprises is still relatively small, only part of the enterprise or the seamless part can realize intelligent logistics operation and operation process. Generally speaking, the actual application of the Internet of things and logistics information technology is more performance for automatic positioning, online tracking, process tracing, automatic sensing, automatic identification, online scheduling and other general applications. Data mining, expert system, intelligent scheduling and line automation adjustment management, network integration and information sharing and optimization of intelligent management technology applications are still few successful cases.

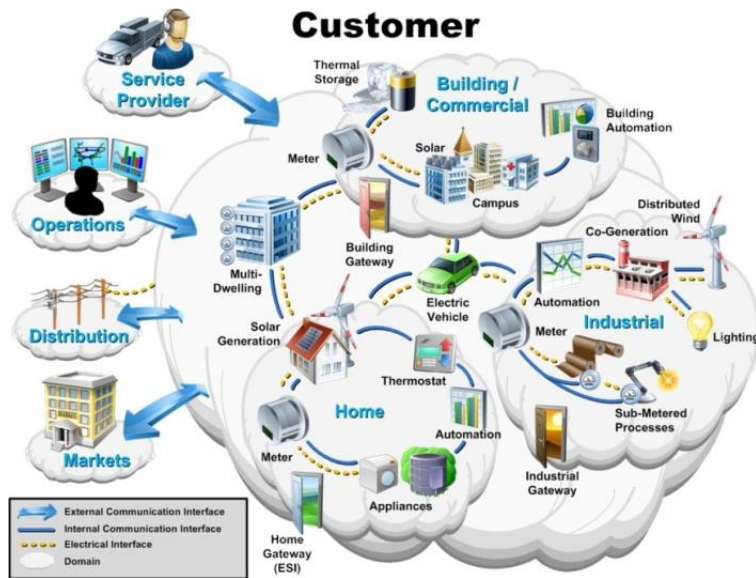


Figure 4. Application of Internet of Things Technology in logistics System

3. The Influence of Internet of Things Technology on Logistics

3.1. The Influence of the Internet of Things Technology on the Transformation of the Traditional Logistics Operation

The realization of the intelligent interaction between the object and the object of Internet of things needs to be integrated with the theory and technology of several subject areas, and it is the most representative one in the future. Such as collecting real information to use radio frequency, infrared and video sensing equipment, transmission and interactive information to develop advanced ubiquitous network access, intelligent processing and extraction of information needs to be distributed super computing system. In the field of Internet of things, these devices and technical means also have a strong flexibility to adapt to the new requirements from different areas of application. The application of Internet of things is very wide, and it is widely used in various economic and social activities of human beings. The essence of modern logistics is based on information technology as the core, through

the supervision and the flow of information on the real goods to achieve effective coordination, resource integration and optimization of supply chain logistics process, which is the most application fields can play the advantages of things. Internet of things sensing technology, network technology and intelligent information processing technology, such as the gradual application of the three core technologies in the logistics operation process, will stimulate the emergence of a large number of logistics services innovation.

1) Using the information of the comprehensive collection of the sensing technology to realize the digitalization and visualization of the logistics operation. Internet of things sensing technology is mainly applied to a variety of sensing devices for information collection and preliminary identification. In a variety of sensors installed in the operation of physical objects, state attributes, environmental attributes and behavior of property and other important information can be real-time acquisition and recognition of distribution in different geographical areas and location of goods, so that goods for conversion entities on the network can convenient transmission of digital information and visual image, to provide reference information for the first hand for collaborative logistics operation management. For example, in the logistics operation, using RFID technology, EDI code technology and infrared technology, can identify and trace the goods and physical goods, accurate classification, picking and statistics; using GPS and GIS positioning technology and a variety of video recognition technology, can accurately track and process monitoring of solid objects.

2) The application of communication and network technology in real-time transmission of information, to achieve the logistics operation of agility, integration. Internet of things network technology is the development and extension of the existing Internet and mobile communication network technology, it is integrated and innovative more types of ubiquitous network technology, convenient in different logistics operation environment selection application. For example, in the logistics enterprise, can choose the internal LAN connection of each subsystem, and a reserved interface connected with wide area network; geographic conditions do not allow the region can choose wireless gateway to connect distributed subsystem; logistics network system in wider areas, can use Internet technology and GPS, GIS positioning technology according to connect the various subsystems to build intelligent logistics information platform, the information transmission and interaction channels more smooth, more fast speed.

3) The application of intelligent computing technology to extract information, to realize the automation of logistics operation, intelligent. The application of networking technology has enormous potential application value in the logistics network of each distributed node collection and information sharing of massive logistics, whether the application value of these information fully, the key is whether they can be mining, processing and processing in a timely manner, it is arduous task of the existing small-scale processing equipment cannot be completed. In the era of things, logistics network nodes located in different areas the positions of the application of the Internet of things, cloud computing, mobile computing and expert system of intelligent information processing technology, the application of remote information processing services, rapid application to extract the most valuable reference strategy, and then set into the application of ERP technology, automatic control technology and intelligent robot *etc.* provide equipment, automation and intelligent logistics services for customers.

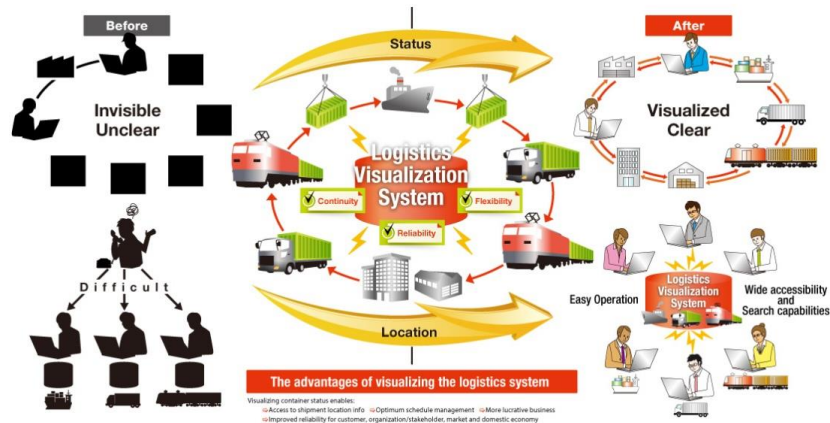


Figure 5. Logistics Visualization

3.2. The Influence of the Internet of Things Technology on the Whole Process of Logistics Operation

Internet of things technology in the logistics operation of the various aspects of the promotion and application, the traditional logistics operation process will be faced with a partial improvement or complete restructuring, the efficiency of the logistics operation will be greatly improved.

- 1) **Transport links:** Transport links, is a more important part of the logistics system, the factors involved are employees, goods, transport routes, loading and transportation tools, etc., at this stage, the lack of logistics industry to monitor these factors. Internet of things technology can be embedded in the operation of the vehicle RF tags, cameras and other means of scheduling the scheduling problem in the transport process. In transit, the goods can be delivered to the data center in real time. At the same time, the data center real-time analysis to obtain the relevant information, and according to the actual situation of the goods transport to the truck driver timely feedback of all kinds of information, so as to reduce unnecessary losses for enterprises.
- 2) **Storage link:** Each link storage link relates to the supply chain, because of the special goods, goods are not the same for storage and storage requirements, the use of networking technology, the data storage environment and induction identification system will be the quality of their goods information real-time transmission to the data center, the data center to make a comprehensive analysis and treatment of the feedback of information, and the suggestions for improving the storage and storage of the feedback to the warehouse. In the process of storage, this intelligent management can only be achieved through the Internet of things technology, but also to bring considerable economic benefits for the enterprise.
- 3) **Packaging and distribution processing:** In the packaging, circulation processing, commodity, packaging and processing requirements are also different, such as drugs have higher requirements on the environment, explosive and inflammable safety hazards caused by circulating in the processing and packaging process, in this part of the introduction of networking technology, can remind the packaging and processing requirements of goods to this is intelligent, time-saving and safe and reliable.
- 4) **Distribution link:** In distribution sectors, according to the first user delivery orders will be issued goods shelves, sorting and sorting. In the networking environment, waiting for the loading of cargo information input real-time logistics information platform, the background processing center for fast delivery planning after the instructions to the dispatcher, according to the instruction on the loading

distribution of goods, transport vehicles and complete distribution and loading scheduling tasks. Delivery of each vehicle according to the information platform issued by the distribution route map in the time required to deliver the goods to the user.

5) **Information service link:** The data center includes information storage, inventory information and sales information, after the comprehensive treatment of the data center of this information, manufacturers, retailers and consumers can log on the data center to query sales and store information, the manufacturer can take timely planning, production schedule, retailers can adjust the purchase plan, consumers can through the items on the label, login data center back production and logistics information.

3.3. Logistics Enterprise Development Strategy under the Internet of Things

Agile manufacturing, the refinement of the inventory control, the customer requirements of logistics enterprises to provide logistics services more timely and fast response; cost control pressure, open up new business, the customer requirements of logistics enterprise logistics services provided by more high quality and low price, the logistics system planning or solution and tailored for its proprietary; collaborative supply chain operations, transport distance extends to customer requirements of logistics enterprises provide services more cooperation and integration, the cooperation between enterprises of supply chain logistics can seamlessly switch between the various modes of transport more efficient. These new changes in the demand of modern logistics service force logistics enterprises to change the business philosophy, innovative management technology, and actively develop new logistics services to deal with the challenges from the market.

Logistics information value-added service means to inject the connotation of information in the traditional warehousing, transportation, distribution and other logistics services, after the upgrade is more consistent changes in market demand for logistics services. Logistics enterprises through the application of a variety of networking technology to reform the traditional logistics operation process, to meet the user's time, seamless logistics service demand, let the user in time based competition in the market occupy the initiative, and through intensive logistics operation as the user a section about logistics cost; or according to the needs of different users personalized logistics services the system planning scheme tailored and logistics network to match the existing logistics system operation efficiency improvement to provide management consulting decision-making, these new logistics service project is the high technology content, high added value is. The application of Internet of things technology can make more traditional logistics enterprises realize the extraordinary development of technology, to provide differentiated, personalized logistics information value-added services to the modern logistics service provider transformation and upgrading.

Modern market competition is between supply chain and supply chain competition based on supply chain efficiency and powerful combination of advantages can be fully revealed depends largely on each node of logistics operation on the whole supply chain. Therefore, more and more customers require logistics enterprises to provide integrated logistics services based on the whole supply chain, in order to achieve the supply chain logistics operation between the various nodes of the seamless, fine convergence. The perception technology of Internet of things and network technology can make the logistics enterprises break through the bottleneck of the supply chain management, and collect, process and transmit the logistics information of each enterprise in the supply chain. Such a powerful information advantage, will significantly contribute to improve the efficiency of the whole supply chain as the goal of the logistics service level, modern logistics solutions so

that these enterprises can rely on human resources and modern information technology of high quality and improve the network coverage, providing customized for the supply chain's cooperation and integration logistics service.

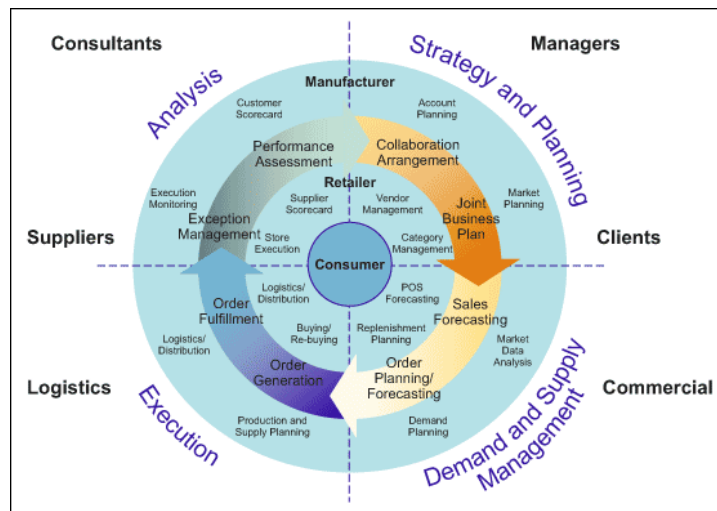


Figure 6. Supply Chain Strategy

4. The Influence of Internet of Things Technology on Logistics

Integrated logistics service innovation requires real-time acquisition, transmission and processing of vast amounts of information, which requires a convenient and unified information platform to complete this task. Therefore, building an efficient intelligent logistics information platform based on Internet of things has become the most critical part of logistics service innovation from local innovation and improvement to the integration of innovation. Intelligent logistics information platform proposed here, refers to a comprehensive logistics information exchange platform based on IOT application framework, it can collect the summary of each distributed node user "content" information, with convenient and efficient pan in the background USN component network rapid transmission to the platform, and then the background intelligent processing integration the information provided in a timely manner to the application of the level of service to users. Intelligent logistics information platform has many large groups of customers, and the information platform of the operator is responsible for the integration and optimization of all users of the "thing", realize the optimal allocation of logistics resources, information resources on the platform of user groups. The key technologies of the Internet of things in the logistics industry to gradually promote the application, first of all will lead to the gradual upgrading and transformation of traditional logistics services. When the innovation and improvement of local concentration to a certain extent, and the logistics information and intelligent level of development to a certain height, the functions of logistics services will accelerate the integration of innovation and integration will bring a comprehensive logistics service in the field.

1) Transport logistics service innovation

The goods and vehicles real-time query, transportation process visualization monitoring, intelligent transportation planning and scheduling to install the RFID label or other sensors in transport, containers and goods, in the transportation line after installation of important information reading and forwarding device, camera or other video equipment, so, in transit goods and transport information can be real-time transmission back to logistics enterprise data center, customers can log in interface information system of logistics enterprises, the state transport real-time

query their goods, arranged in advance preparations for receiving the. Logistics enterprise can also through the camera image information such as video transmission equipment, the whole process of visual supervision of goods transport, transport of goods, timely find routes and time in the process of potential problems, the investigation as soon as possible and can be solved, road conditions, traffic conditions and feedback time information to the driver through the information interaction device, is conducive to the safety of the driver and quickly complete the transportation task. The data center of logistics enterprises can be integrated to handle all transportation routes and means of transport and goods information, advance forecast and optimal arrangement of transportation loading route, and perform in the process of transportation planning according to the emergency technical adjustments to the original plan, seamless implementation of intelligent transportation scheduling and multimodal transport.

2) Warehousing logistics service innovation

Intelligent warehouse, remote monitoring management and fine inventory control installation information receiving and forwarding equipment in the warehouse entrance guard, when carrying the RFID tag information transmitting device of goods through access control, information will automatically read the label reader information goods loading, instantaneous automatic cargo information inventory, or delete entry. Update the warehouse management information system database to receive information, automatically give detailed instructions or operations of goods shelves, and arrange mechanical hand or automatic machine operation of roadway pile placing goods according to regulations, to achieve full automation and intelligent warehouse operation process. The installation of sensors and electronic tags in the warehouse shelf location, an important position in the warehouse the installation of cameras and other video equipment; can provide remote supervision and control of goods to customers' offsite storage or out of storage management. Intelligent and efficient completion of the daily operation of warehouse operations, can accelerate the turnover of goods, improve space utilization, accurate monitoring of inventory levels. If the warehouse management information system and the customer's information system is connected, but also can provide customers with remote sophisticated inventory control, to achieve a high level of supplier management inventory services.

3) Production logistics service innovation

JIT distribution and smooth convergence between consumer demand diversification and individuation trend makes manufacturing enterprises receive more multi variety and small batch orders, to complete the variety is fine but output batch orders, and obtain certain operating profits, manufacturing enterprises must implement JIT production and zero inventory. This new manufacturing mode will require logistics enterprises to provide more punctual peace hue logistics service. The Internet of things sensing technology can be real-time dynamic tracking processing and manufacturing of raw material procurement, production line and raw materials, WIP and finished goods inventory control, the perceptual information of real-time interactive in network information platform and cooperative enterprises, can quickly respond to changes in demand for new customers, to achieve smooth and balanced operation of production.

4) Sales logistics service innovation

In the retail store, when embedding the RFID label goods by customer extraction, sensor identification equipment where the goods will be equipped with the location in the transmission of information goods are extracted to sales management information system. Customers through the store checkout, the extraction of the goods will be instantaneous completion of the sale of information identification, automatic reporting of the purchase amount, to facilitate rapid customer checkout.

The sale of goods and customer information will give instantaneous transmission of sales management information system to connect the supplier management information system of warehouse management, supplier information system will be based on the order replenishment preset automatically start the replenishment process, fast supply of goods in place.

5. Conclusion

The Internet is emerging technologies with the interdisciplinary nature of the typical architecture of different levels and its application technology system has a profound impact on the full range of transformation of traditional logistics operation upgrade: sensing technology is used to the comprehensive collection of information, can realize logistics digitalization and visualization; application of communication and network technology of real-time transmission of information. Can realize the logistics operation, agile, integrated application of intelligent processing technology; integration of information, can realize the automatic and intelligent logistics operation. And separately from the transport links, storage and storage, distribution links and other logistics operation of the whole process of the logistics operation of the logistics operation of the whole process of the impact mechanism. On this basis, put forward in the IOT environment, logistics enterprises can choose the logistics information value-added service providers, integrated supply chain logistics providers, collaborative supply chain operations, leading the macro circulation order Association and development strategy, to achieve leapfrog development of their own.

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