Advances in Social Science, Education and Humanities Research, volume 610
Proceedings of the 7th Annual International Conference on Social Science and Contemporary Humanity Development (SSCHD 2021)

The Study of Just-in-time Inventory Management Based on the Perspective of the Internet of Things

Fengfu Xu *

School of Accounting, Shandong technology and Business University, China
**Corresponding author. Email:914946720@qq.com*

ABSTRACT
Inventory management is an important basis for production management and cost control in manufacturing enterprises. The timely management method of inventory timely system is the scientific and efficient inventory management mode with remarkable advantages in inventory management. How to use The Internet of Things technology to assist the effective implementation of inventory timely management is the main problem discussed in this paper. IOT technology can assist enterprises to collect, analyze and process real-time data, thus providing advanced technology support for enterprises to carry out scientific and efficient inventory management. This paper systematically expounds how to use The Internet of Things technology to monitor and control the process of delivering finished products to the buyer's location in real time, so as to better assist the smooth implementation of inventory timely management methods. From the perspective of product distribution, we summarize the feasibility and concrete implementation of the application of Internet of Things technology, so that enterprises to the product distribution process to accurately detect and control, effectively make up for the inventory timely management methods of defects, to avoid the occurrence of default liability.

Keywords: *JIT inventory management, net of things, Intelligent detection and distribution system.*

1. INTRODUCTION

The goal of inventory management for enterprises should not only meet the needs of specific customers and groups, but also minimize the total cost under established conditions. Therefore, enterprises should reasonably formulate various processes of inventory management, so as to ensure the safety and stability of enterprise assets. From the current enterprise development stage, the most efficient and ideal inventory management method is undoubtedly inventory timely management. At the same time, with the wide application of Internet of things technology in the field of enterprise inventory management, enterprise inventory management will be more scientific and efficient.

2. OVERVIEW OF INTERNET OF THINGS RELATED CONCEPTS

2.1. Concept of Internet of Things

The so-called Internet of things refers to the transmission and exchange between two or more objects or various information through the Internet. Including perception, recognition and other technologies. The Internet of things mainly relies on Internet technology to connect sensors, communicators and controllers in series to build the whole system of the Internet of things, so as to realize the integration of the whole network and the interaction of information. The Internet of things has a wide range of applications, good development prospects and outstanding characteristics, mainly in that it has the advantages of intelligent management, can carry out long-distance and all-round perception and detection, and can automatically identify some specific known and potential risks. At the same time, the Internet of things can send instructions to its end customers, So as to carry out a series of automatic operation procedures. The Internet of things also has the function of remote control, which can provide a lot of accurate information and data support for managers to change plans and decisions.

2.2. Development Status of Internet of Things Technology

The science and technology involved in network communication mainly includes signal transmission, signal exchange, networking and gateway. The most important technology of Internet of things is M2M technology, which can be effectively combined with GPRS, GSM and so on. The communication process of Internet of things mainly involves sensor network communication and telecommunication transmission network communication. Among them, sensor network communication technologies mainly include RFID, NFC, UWB, WiFi, etc. Telecommunication transmission network communication technology mainly includes DH, all-optical network and mobile communication network. This technology is mainly to realize signal transmission and communication between sensor network and transmission network. Among them, mobile communication network is now more mature 2G, 3G, 4G and 5g network which is developing at a high speed.

At present, the Internet of things technology is in the fast lane of rapid development, and the development of other science and technology also provides inspiration and technical support for reform and innovation. The Internet of things technology is absorbing the advantages of other science and technology to realize its continuous development and growth, and finally adapt to the actual needs of all walks of life in the new era, Continuously improve the frequency of information exchange and the ability to analyze and process data, and improve the level of intelligence, so as to better serve the society and enterprises.

2.3. Development Trend Analysis of Internet of Things Technology

In order to meet the needs and objectives of enterprises for the Internet of things, relevant scientific researchers need to keep up with the pace of the development of the times, position the development objectives of the Internet of things on the actual needs of different enterprises, and always adhere to independent innovation and technological reform. The needs of enterprises are the fundamental driving force for the development and reform of Internet of things technology. Nowadays, big data processing, cloud computing and sharing economy have become the trend of the times, and have profoundly changed people's way of life and work, making people's life and work more convenient and efficient. Science and technology always have something in common, which is based on the experience summarized from several years of scientific and technological development. Then we should make full use of the common points and similarities of these technologies, integrate them, and make them an organic whole to realize the flexibility and complementary between these technologies. Therefore, in order to meet the needs of modern enterprises for the functional advantages of the Internet of things, the communication technology of the Internet of things must pay attention to the development of big data processing and cloud computing technology.

3. DEFINITION OF TIMELY INVENTORY MANAGEMENT

3.1. Concept of Inventory Just in Time Management

Just in time (Jim) is a new method of inventory management. It mainly means that there is no need to prepare storage space for various states of goods (raw materials, semi-finished products and finished products), nor is there any intention to store them. Instead, all raw materials owned or purchased are invested in the production and operation process to ensure that the production process is continuous until the production is completed, Finally, the finished products are directly transported to the location of the customer who has signed the purchase contract with the enterprise. In short, it is to apply raw materials directly to the production process, so that there will be no "redundant" raw materials and finished products, make full use of the production plan, and there will be no shortage and surplus of raw materials and finished products, so that the production enterprise can formulate a reasonable production plan according to the product purchase and sales contract and ensure its accurate implementation. This is obviously different from the traditional concept of zero inventories. The core of just in time inventory management concept is to reduce the quantity of inventory as much as possible and improve the quality of inventory, so as to achieve zero inventory status, which will correspondingly reduce the supervision cost of inventory.

The difference from the traditional inventory management method is that the key goal of timely inventory management is to eliminate inventory to reduce the total cost, so that both raw materials and finished products can achieve the goal of "making the best use of everything", which is neither too much nor too little, reaching an equilibrium state, so as to avoid the problems of material shortage and overproduction. This method requires to comprehensively measure the requirements of purchase and sales contracts and formulate reasonable and standardized production plans when making plans. Therefore, enterprises should not only examine the ordering cost, purchase cost, holding cost and other indicators of inventory, but also consider factors such as storage cost and shortage cost. The timely inventory management method can effectively reduce the cost of inventory, simplify the product cost

accounting process and improve the performance evaluation indicators.

3.2. Premise of Realizing Timely Inventory Management

To successfully implement zero inventory management and achieve the expected effect of timely inventory management, two aspects must be fully considered and properly solved. First, how can we reduce the inventory quantity as much as possible and even reach the ideal state of zero inventory? If the enterprise cannot reasonably and effectively reduce the inventory level, the timely management cannot have the prerequisite and practical basis. Second, under the condition of low or even zero inventories, how can we ensure the continuity of enterprise production, so as to avoid unnecessary resource consumption and default cost? On the one hand, if the sufficient and uninterrupted supply of raw materials, work in progress and auxiliary materials cannot be guaranteed in the continuous production process of the enterprise, the production process of the enterprise will be forced to be interrupted due to insufficient materials, resulting in production shutdown, resulting in the idle of enterprise resources and many unnecessary expenses. On the other hand, if the qualified finished products cannot be delivered in time according to the time limit specified in the sales contract, the enterprise will face the risk of breach of contract and be in a disadvantageous position of violating the sales contract. Then it may face the legal consequences of compensating huge liquidated damages, and it will directly affect the reputation and credibility of the enterprise, so the benefits of implementing the timely system will outweigh the losses. Therefore, in order to solve the two premise problems of just in time management and ensure the reasonable and effective operation of just in time production system, we must establish a scientific and perfect just in time inventory management strategy considering risk control and other aspects.

4. DEFECTS AND COUNTERMEASURES OF ENTERPRISE INVENTORY TIMELY MANAGEMENT

On the one hand, the timely inventory management should make the production scale of the enterprise and the consumption level of customers reach a relatively balanced and stable state, and the supply and demand of products are basically consistent. Second, the actual production amount is small, resulting in a situation of supply exceeding demand, so as to reduce the inventory of the enterprise as much as possible, avoid the excess production of the enterprise's products, or retain part of the inventory for the possible price rise in the future. That is, through accurate research and analysis of the supply and demand of a product in the market, the market demand trend for the product and consumer preferences, the enterprise makes accurate predictions, so as to assist the enterprise to formulate a production plan consistent with the market demand from the macro level and the long-term production direction of the enterprise, The ultimate goal is to reasonably avoid unnecessary waste of resources or product backlog. In order to realize the flexible and efficient application of the concept of timely inventory management, the following three main problems must be solved.

4.1. How to Efficiently Meet Customer Needs

Under the timely inventory management mode, reducing inventory cannot fundamentally solve the problem. Meeting customer needs is nothing more than timely delivery with quality and quantity guaranteed. Only in this way can the whole contract be implemented smoothly and completely. However, during the period between signing the purchase and sales contract and product delivery, there are many problems that need to be prepared by the production enterprise, including the formulation of product production plan, the calculation of material quota and labor quota, the procurement of raw materials, when the raw materials will be delivered to the enterprise, when the product will be produced, and how to distribute after the production is completed. This requires enterprises to comprehensively and reasonably plan the production process while signing purchase and sales contracts with customers, strictly control each time point of product production, and do not allow any errors and faults. Of course, it can also be prevented and controlled through the enterprise's alternative production line and alternative products. In any case, it is necessary to ensure on-time delivery, neither too early nor too late. Early delivery will lose the significance of the timely system. When the buyer requires that it must be delivered on the same day as the date specified in the contract, early delivery will inevitably lead to product backlog and eventually form the inventory of the enterprise. Late delivery will bear the liability for breach of contract and estimated liabilities. Therefore, the implementation of timely management requires enterprise managers to maintain a high degree of concentration at all times and carry out accurate data calculation procedures at any time, so as to sensitively respond to the changes of production environment and realize the ideal state without any difference. In short, the only purpose is to ensure quality and quantity and deliver on time. The specific measures to solve this problem include expanding the scale of the production line, reducing the preparation time of raw materials and equipment in the early stage of production, ensuring the control ability of goods circulation procedures, etc.

4.2. How to Plan and Ensure the Continuity of Production

In case of production discontinuity, i.e. production shutdown, on the one hand, raw materials may not arrive at the enterprise in time before the start of production, on the other hand, there may be failure of the required number of machines for production, and there is no substitute machine for use. Machine failure may also lead to defective products. Once there are large-scale defective products, production should be stopped, because there is no point in continuing production. If the product quality is not up to the standard, continuing production will cause greater losses to the enterprise and even uncontrollable situation. After the machine failure and defective products, every product produced by the enterprise is equivalent to waste products. No buyer will choose products with unqualified quality, otherwise it will not only affect the reputation of the manufacturer, After the buyer sells the goods, it will also have an adverse or even negative impact on the buyer's credit. Therefore, the defective products can only be disposed of or destroyed. Even if these defective products can be treated at a low price or reprocessed, the losses to the enterprise are huge. To deal with this situation, measures can be taken to properly arrange and coordinate the delivery time of raw materials with the suppliers of production enterprises, increase the number of alternative production machines, ensure the number of necessary labor, and reasonably plan and control the production time.

4.3. How to Ensure That the Goods Are Delivered to the Buyer on Time

The key point of the timely inventory management method is that the products must be delivered to the buyer's location on the day agreed in the purchase and sales contract. The product production process mentioned above is only one link of the timely inventory management. Another link of the timely inventory management involves the product distribution process, that is, the inventory must be directly transported to the buyer's enterprise after the completion of the product. This cargo transportation process is not completely smooth, and unexpected situations may occur, such as deterioration and damage of goods during transportation, failure of transportation vehicles, sudden change of weather conditions, insufficient remaining gasoline of vehicles to reach the destination, changes of temperature and humidity in the compartment and many other complex factors. Moreover, these factors may change at any time. Therefore, it is particularly important to reasonably and effectively control these variable factors to make them at a relatively stable level.

On the whole, after comparing and weighing the three aspects affecting the smooth implementation of the enterprise inventory timely management method, it is concluded that the most difficult and urgent problem to be solved lies in the third aspect. The solutions to the first two defects are relatively easy to implement, as long as the product production process is completed regularly and quantitatively according to the plan, The third problem must use the Internet of things technology. By digitizing all these variable factors, we can solve the potential problems in the process of goods transportation, reasonably avoid various controllable risks, minimize the emergence of some uncontrollable factors, and finally ensure the smooth progress of goods circulation.

5. APPLICATION OF INTERNET OF THINGS TECHNOLOGY IN TIMELY INVENTORY MANAGEMENT

5.1. Optimized Treatment of Problems in Inventory Timely Management by Internet of Things Technology

It truly realizes the perfect connection between the market demand or customer demand and the production quantity of the enterprise's products, directly from raw materials to the enterprise's production workshop and directly from finished products to the customer's location. Therefore, Internet of things technology can run through the whole inventory management process. For manufacturing enterprises, Internet of things technology can be used for accurate analysis, control, planning and decision-making from the procurement of raw materials, the production of target products to the sales of final products.

Applying Internet of things technology to just in time inventory management is mainly to use the Internet of things to assist the smooth implementation of goods flow procedures. Because inventory just in time management is to eliminate the defects of enterprise inventory to achieve the ideal "zero inventory" state, while Internet of things technology provides more accurate algorithm support for the time control of goods arriving at the buyer, Internet of things technology must be equal to the difference between the start and end time interval of the order and the whole production time of the enterprise (in the case of delivery on the order date specified in the contract, it cannot be delivered in advance). Only in this way can the timely management procedure be finally realized. Using Internet of things technology to track and monitor products and goods in real time not only solves various problems that may exist in the timely inventory management mode, but also optimizes the ways and means to solve the problems. Using the auxiliary function of Internet of things technology for inventory, enterprises do not need to consider the storage of materials or products, so as to reduce the waste of enterprise resources caused by

traditional inventory management methods, avoid the expenditure of various unnecessary costs related to inventory storage, and provide a more scientific, efficient and advanced new concept of inventory management for modern enterprises.

5.2. Advantages of Internet of Things Technology Applied To Timely Inventory Management

5.2.1. With the Help of Dynamic Intelligent Detection Technology, Realize Real-time Monitoring and Control of Article Status and Position

In the process of goods circulation, on the one hand, it is necessary to detect the location information of goods in real time, which is a function that must be realized. Failure to accurately know the location of goods means that there is no technical breakthrough, including the completion of goods, because raw materials, work in progress and finished products may correspond to different locations. Accurately grasp the product production process information, including the different stages of product production, whether the product production process is standardized, whether the product quality meets the relevant industry standards, etc. On the other hand, it can intelligently detect whether there are accidental and non-human damages in the process of material or product circulation. These damages will cause customers' return behavior, which is undoubtedly a huge loss of property and human and material resources for enterprises. This deficiency can be reasonably solved by using the Internet of things technology with independent real-time dynamic detection in the goods circulation procedure. This intelligent technology can completely present the integrity and damage of all goods, send a prompt to the user for the damaged goods, and automatically send a prompt to the replaced goods, It can issue immediate instructions to enable replacement items at any time. On the one hand, this greatly reduces the possibility of return due to the damage of the goods themselves or the product quality does not meet the customer's standards, and also ensures that the defective products will not be transported to the customer's location, so as to bring customers a good purchase experience and improve customers' satisfaction with the quality of the products produced by the enterprise. On the other hand, it avoids the overlapping problem of the flow time of defective products and the items they replace. This overlapping time is a loss to both the seller and the buyer. This loss may directly lead to the return of customers or the increase of the estimated liabilities of the enterprise, which is well solved by the product detection function of the Internet of things. Therefore, the real-time tracking and detection of Internet of things technology not only improves the scientifically and accuracy of goods circulation, but also enhances the ability of enterprises to track and control goods in real time, so as to reasonably avoid the risks of various emergencies and liabilities for breach of contract. In this way, enterprises can also improve their ability to resist risks accordingly, further reduce the loss cost and increase the profit of the enterprise, which undoubtedly contributes to the rapid realization of the expected target profit of the enterprise. After all, the fundamental reason for the existence of the enterprise lies in increasing the value of the enterprise as much as possible and creating maximum wealth for shareholders.

5.2.2. Apply RFID Technology to Realize the Whole Process Traceability of Goods

The realization of purchase and sales contract mainly includes the production and distribution process of products. The defects existing in the production process can be easily solved. Some specific solutions have been mentioned above. Therefore, this paper focuses on the perception and detection of controllable factors in the distribution process, and take reasonable and effective control measures. Internet of things technology can monitor all goods in real time and record the whole process, which ensures the quality and integrity of goods, can also accurately trace fault liability, can effectively reduce the procedures for investigating the fault liability of relevant responsible persons, facilitate the rapid understanding and resolution of punishment problems, and timely make corresponding fault compensation. At present, RFID technology is the Internet of things technology, which is widely used in the process of goods transportation in modern enterprises. In modern logistics communication technology, the display of various addresses of goods, such as current location and destination location, is mostly 64 characters, and the matching format between goods is expressed in the form of RFID. This requires enterprises to scientifically and reasonably install electronic labels containing all information of each goods on all goods, and reasonably divide the classification number of each goods. The most important thing is to ensure the consistency of the information format of this classification number when dividing all goods, and the uniqueness between different individuals of similar goods, so as to facilitate accurate search and positioning. Only in this way can we be specific to each product and create a visual, controllable and preventable precondition for each individual goods at any time. At the same time, the storage form of various addresses of the Internet of things is also 64 bits, so the format of such addresses can also be set to RFID tag address form. In this way, the address and cargo address required by the Internet of things in format are unified. The two addresses are closely related. When one party changes, the other party must change

accordingly, which is conducive to accurately matching these two types of addresses and simplifying the workflow accordingly.

5.2.3. Build an Intelligent Product Distribution System by Using Intelligent Information Processing Technology

Through the comprehensive calculation and analysis of the changes of these indicators through the Internet of things, it provides technical support for transportation drivers to select the best driving route, including but not limited to the shortest route. In order to ensure the integrity of goods as much as possible, it is sometimes necessary to select the route with the flattest and fewer bends according to the nature and existing state of different goods, It is not necessary to choose the shortest route. Of course, these can be realized by using Internet of things technology. The analysis and calculation of big data are often more reliable because it stores all recorded information. There is no doubt that in terms of the current development and maturity of remote sensing technology and network technology, these technologies can fully realize intelligent selection. The technical advantage of this process is a great progress in the development process of the Internet of things. According to the problems and defects that could not be solved by Internet technology alone, researchers made corresponding adjustments, reforms and innovations, and comprehensively realized it through Internet of things technology. Using the goods circulation procedure of the Internet of things not only improves the efficiency of the transportation procedure, but also ensures the quality and integrity of goods, so as to improve the customer shopping experience and improve customer satisfaction, mainly because the Internet of things technology has formulated personalized distribution schemes for all customers, which is highly flexible and targeted, The goods of all customers will not be combined for distribution, so as to finally improve the enterprise's reputation and integrity, and greatly improve the recognition of the enterprise's goods quality and distribution service.

5. CONCLUSION

The wide application of Internet of things technology in modern financial field provides technical support and scientific guarantee for the concept of timely inventory management. The integration of modern scientific and advanced information technology and efficient and reasonable inventory management methods makes the advantages of enterprise inventory management compared with traditional inventory management methods increasingly prominent. The application of Internet of things technology to assist inventory management not only directly saves human, material and financial resources, but also achieves real-time monitoring and risk prevention for the circulation process of inventory. The wide application of Internet of things technology in the financial field has become an inevitable trend. Its scientific and efficient data processing mode has brought significant technical advantages to the enterprise inventory timely management mode. Whether the Internet of things technology can be reasonably and effectively applied to the timely inventory management mode is also the key factor to evaluate the comprehensive ability of enterprises. In terms of the current development of science and technology, mastering and using various technologies of the Internet of things to perfectly solve the time fit of inventory timely management can create more opportunities for enterprises, so as to take the business ability of enterprises to a new level. Therefore, the development of manufacturing enterprises should always keep up with the pace of the development of the Internet of things, and strive to find a breakthrough in the perfect integration of technology and management methods, so as to maximize the enterprise value.

REFERENCES

[1] Xie Dongwen. Research on the realization path of "zero inventory". Economic aspect, 2019 (17)pp. 186-187

[2] Li Mingxin. Problems and Countermeasures in enterprise inventory management [J]. Modern marketing (Information Edition), 2020 (01)pp. 135-137

[3] Chen Yongmei. Research on enterprise financial management innovation in the era of big data [J]. Enterprise reform and management, 2019 (09)pp. 176-177

[4] Anna V. Kitaeva & Natalia V. Stepanova & Alexandra O. Zhukovskaya. Zero Ending Inventory Dynamic Pricing Model under Stochastic Demand, Fixed Lifetime Product, and Fixed Order Quantity [J]. IFAC PapersOnLine, 2019(13).

[5] Bagyalakshmi K & M. Karpagam. Performance enhancement of efficient process based on Carry-Skip Adder for IoT applications [J]. Microprocessors and Microsystems, 2020(16) pp.41-42.