

A Systematic Review of Using Internet of Things Technology to Promote the Digitization of Asset Inventory

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Abstract: In the modern society that comprehensively promotes digital transformation, the Internet of Things technology, as an emerging technology, plays an important role due to its unique advantages, especially in the field of asset inventory. In September 2021, eight departments including the Ministry of Industry and Information Technology issued the "Three Year Action Plan for the Construction of New Infrastructure of the Internet of Things (2021-2023)", which specifies that by the end of 2023, new infrastructure of the Internet of Things will be preliminarily built in major cities in China, and the foundation for social modernization governance, industrial digital transformation, and upgrading of people's consumption will be more stable. However, not only does the Internet of Things have its unique drawbacks, but the combination of the two also presents some new problems that require us to analyze and propose solutions. This article will first analyze the current situation of the Internet of Things and asset inventory, and then combine the advantages and disadvantages of the two to complement each other. It will point out the current problems and propose some possible solutions, and analyze a local case to provide some help for subsequent research in this direction.

Keywords: Asset inventory, Internet of Things, FRID, agriculture

1. Introduction

In the contemporary context of rapid technological development and collaborative coexistence of digital empowerment, many significant changes are quietly occurring. As a specific digital manifestation of enterprise industrial value, the financial field is inevitably undergoing comprehensive digital and intelligent development. Asset inventory, as an important part of corporate finance, maintains internal and external connections within the enterprise. In the emerging digital technology, the Internet of Things technology happens to have a high degree of compatibility with asset inventory. Due to the wide variety and distribution of assets, a large amount of manpower is required for asset inventory, and once problems arise, more time is needed for inventory. In this context, combining IoT technology with asset inventory for joint research is a feasible and promising direction.

Entering the 21st century, with the achievements of China's internet construction, China has already had the world's largest internet community. This not only accelerates economic

development, but also brings challenges to the next stage of digitization. Simply put, the Internet of Things (IoT) is a technology that uses sensors and other technologies to link a large number of objects and enable them to communicate. The data source for communication is the collection of various feature data information, and through various network connections, it achieves intelligent perception, recognition, and management of a certain item or process [1]. In recent years, with the gradual advancement of digital technology in China, the Internet of Things technology has become a hot topic of research. As early as 2015, the State Grid of China released the Action Plan for Promoting Smart Grid and "One Strong, Three Excellent" innovative development through new information and communication technologies, promoting big data, cloud computing Innovative applications of new technologies such as the Internet of Things and mobile connectivity in the construction of smart grids and modern companies with "one strong, three excellent" capabilities [2]. However, there are still many gaps in the practical application of the Internet of Things.

Physical assets are an important force supporting national economic development, but there have been various problems in the inventory of physical assets. As enterprises are an indispensable part of the national economy, they will inevitably undergo digital transformation in the future. This article will analyze examples of the application of the Internet of Things in physical asset inventory, and provide a foundation for enterprises to carry out digital transformation through separate and combined analysis.

2. Introduction to IoT Technology and Its Application in Asset Inventory

2.1. Asset Inventory Using the Internet of Things

The Internet of Things technology is mainly a new application technology developed based on the Internet, which can achieve the interconnection of things. At the same time, it can also use professional equipment and systems to control the interconnection of things and intelligently recognize object information [3]. In the new era, the following requirements are mainly proposed for enterprise accounting and supervision: intelligent information acquisition, intelligent information import, intelligent accounting reporting, reducing financial reporting costs and improving their timeliness, assisting owners in real-time control of asset information and monitoring assets, strengthening internal and external coordination, integrating internal information, connecting with external upstream and downstream industries, and comprehensively understanding external risks in enterprise operation, Enhance the risk resistance capability of the industrial chain [4].

In practical applications, many problems related to asset inventory have been solved. For example, after using Internet of Things technology for asset inventory, the inventory results can be automatically uploaded to the system and an inventory report can be generated, which facilitates timely verification by inventory personnel and improves work efficiency; Reduced management costs, such as having over 4500 items with assets of 100000 yuan. To ensure accurate real-time monitoring, the use of new IoT technology only requires a one-time cost of 4 million yuan, while the use of labor requires an annual expenditure of 1.5 million yuan, and labor costs continue to increase [5].

In addition, it can accurately confirm asset information and source and destination, and clarify accounting subjects. A few sensors can save a lot of paper work and handover work. For example, simply scanning the code can help you understand the source of assets and accounting subjects. During sales or liquidation, fill in information through sensors to ensure successful scrapping and handover. In the backend of the system, corresponding trajectory logs will be generated to view the asset status at any time, achieving dynamic supervision.

When conducting a large inventory of valuable assets that are difficult to count, it is possible to sign a LAN IoT communication protocol and use RFID technology. Electronic tags (RFID) are more accurate in identification compared to other Internet of Things technologies, and can be made into various shapes to match different environments. Relevant statistical personnel only need to hold RFID reading and writing handheld devices to remotely read electronic tags on assets over a large range [6]. The initial inventory method of PetroChina Yantai Company is to conduct inventory through mobile phones, which takes nearly three hours to complete all asset inventory. After using RFID, all asset statuses can be automatically read at the gas station now, improving the efficiency of asset inventory [7].

The Internet of Things can also bring many advantages at the company management level. For example, the production, sales, and service processes can be smoothly linked, reducing personnel handover work and reducing the presence of intermediate levels, better serving consumers, and creating more profits.

2.2. Application Status of Internet of Things Technology

Since the emergence of Internet of Things technology in China, the number of Internet of Things connections has exceeded 1.7 billion so far, and it is expected that the number of connections will exceed 9 billion in 2050, and the market scale will reach 4 trillion yuan. This is the window period for the development of Internet of Things technology [8]. At present, the Internet of Things is widely used in education, medical treatment, security, logistics, electrical, petrochemical and other industries, and gradually forms an ecological system centered on colleges and universities, forming a relatively complete industrial chain of the Internet of Things.

However, there are still some deficiencies in the application and development of IoT technology at present. The penetration rate of this technology is still low. Many small enterprises are difficult to support such technology and it is difficult to implement it. There are also hidden dangers in network and information security. According to its characteristics, we infer that in the application of promoting the digital transformation of enterprises, the Internet of Things technology is not convenient to be used as a financial digital technology in the agricultural industry, so we focus on one example.

2.3. Relevant Application Examples

Chun'an County, located in the west of Zhejiang Province, China, is the largest county in Zhejiang Province. The GDP of the county is 24.32 billion yuan, and the added value of the primary, secondary and tertiary industries are 3.6 billion yuan, 6.78 billion yuan and 13.94 billion yuan respectively, with growth rates of 3.4%, 2.2% and 8.8%, respectively, of which the growth rate of the smart economy is 1.46 billion yuan [9]. In the past three years, there have been more than 130 Internet of Things projects supported by the fund, with a total amount of about 5.3 million yuan. According to incomplete statistics, in the four years from 2015 to 2018, the county declared and implemented more than 200 Internet of Things projects (see Table 1 and Table 2).

Table 1: Incomplete statistics of Internet of Things projects in Chun'an County

Name	Industry	Address	Content
Hangzhou Qiandao Lake yingsang mushroom professional cooperative	Edible fungi	Xiawu village, Jiangjia Town, Chun'an County	480 square meters of production workshop was upgraded. Add aseptic operation table for bacteria experiment purification; Artificial climate box for strain cultivation, constant temperature refrigerator and other equipment; Complete the production and installation of the signboard of "provincial modern agricultural IoT technology demonstration base".
Chun'an Nongyou tea and fruit professional cooperative	Tea and fruit	Tashan village, Lishang Township	Build an expert room and a testing room of 15 square meters each, build a marble testing station, and purchase multiple sets of technical equipment. Complete the production and installation of the signboard of "provincial modern agricultural IoT technology demonstration base".
Mingcai family farm, fenkou Town, Chun'an County	Grain and oil	Zhengjia village, fenkou town	Complete the expert room and testing room, and complete the production and installation of the signboard of "provincial modern agricultural IOT technology demonstration base".
Qiandao Lake Deyao fruit and vegetable professional cooperative	Fruit tree	Cunli village, Hecun village, Weiping Town, Chun'an County	Build a fruit cold storage with a total area of 316 square meters. Complete the production and installation of the signboard of "provincial modern agricultural IoT technology demonstration base".

Table 2: Construction standards of IoT demonstration base in Chun'an County

Industry	Standard	Scale
Edible fungi	The comprehensive mechanization rate of farming and harvesting, the mechanization rate of efficient plant protection, the mechanization rate of drying and the mechanization rate of straw treatment reached 100%.	The area is more than 500 mu, and the mountainous area is more than 300 mu.
Tea	The mechanization rate of cultivation and land preparation in tea garden, the application of water-saving irrigation technology, bulk tea pruning and picking, and the mechanization rate of famous and high-quality tea processing reached 100%; It is equipped with continuous tea processing production line, and the hillside tea garden is equipped with rail conveyor, with a transportation volume of more than 80%. The tea garden in the severe frost area is equipped with frost prevention machinery.	Over 150 mu
Fruit and vegetable	Mechanization rate of tillage and land preparation, high efficiency mechanization rate of plant protection and water saving The irrigation rate reached 100%, and more than three kinds of machinery were equipped, including direct seeding, seedling raising, transplanting, harvesting and cold storage and fresh-keeping.	Over 150 mu

Table 2: (continued).

Rape	The planting mechanization rate, efficient plant protection mechanization rate and water-saving irrigation mechanization rate reached 100%.	Over 100 mu
Timber trees and fruit trees	Application of orchard water saving irrigation technology and mechanization rate of orchard farming The mechanization rate of efficient plant protection in orchard reached 100%; The vineyard is 100% protected from rain (including more than 30% of the standard greenhouse); The classification mechanization rate of citrus, pear and other fruits was 100%; Hillside orchards are equipped with rail transporters (or crawler transporters), with a transportation volume of more than 80%.	Over 100 mu

After the initial establishment of the Internet of Things service system, the agriculture in Chun'an County has been significantly developed. For example, the intensive production mode and demonstration and promotion project in the mulberry twig edible fungus park were popularized and applied through autumn cultivation of mulberry twig black fungus, industrialization of mulberry twig *Pleurotus geesteranus*, comprehensive utilization of waste and other technologies. In 2013, 22.4889 million bags of mulberry twig edible fungus were cultivated in the county, with a total output value of about 114million yuan. The UAV pollination technology supported by the Internet of Things technology has also significantly improved the yield of agricultural products. It took only 1.5 hours to complete the pollination of 200 mu of hickory, reducing the manpower loss and operation hazards, and saving a lot of manpower and material resources compared with traditional manual pollination.

With the support of the Internet of Things and other technologies, the leading enterprises of the Internet of Things in Chun'an County have won awards frequently, and the "Thousand Island Lake brand agricultural products Museum" has been built and opened. Qiandao Lake agricultural products won 3 gold awards and 3 high-quality awards at the 2018 Zhejiang Agricultural Expo, 5 gold awards and 4 high-quality awards at the Yiwu International Forest Expo, and 3 gold and 4 silver in the "Zhonglu Cup" Chinese famous green tea competition. The second Qiandao Lake Chinese herbal medicine Trade Expo and the fourth Qiandao Lake tea fight conference were successfully held. "Chun'an raspberry" successfully passed the registration and protection of agricultural products with geographical indications by the Ministry of agriculture. Qiandao Lake Anshang Fenpi won the "2018 top ten farm specialty snacks in Zhejiang", Qiandao Lake honey peach was selected as the "2018 top ten peaches in Zhejiang Province", and Qingye Qiandao Lake indica Japonica Rice won the top ten gold products of "2018 Zhejiang good rice" [9].

However, the Internet of Things technology in Chun'an county is still insufficient. The development of Internet of Things is still in the primary stage of simple application, and there are also limitations for the promotion of agricultural production. It has been about 13 years since 2011. The investment return cycle of IoT technology is long and the amount of investment is large. It is difficult for small agricultural enterprises to develop IoT technology without fund support. Secondly, the Internet of Things technology is still mainly based on sensors, which is difficult to separate from sensors. The application in agriculture also relies on the improvement of production management of UAV and unmanned system. However, there is a large gap in the statistics of agricultural products, which is difficult to start.

In addition, Chun'an County has fully used the Internet of Things technology for agricultural development, effectively promoting the digitization of asset inventory. However, the Internet of Things technology is not completely used in the field of finance, but in the field of production management to achieve the same goal. In the end, we will analyze the difference of the Internet of Things promoting the digitization of asset inventory in agriculture.

3. Problems of Internet of Things in Asset Inventory

At present, although the Internet of Things is widely used in asset inventory, there are still some shortcomings. First of all, in terms of application scenarios, the current use of Internet of Things technology is mostly limited to the secondary industry, and other primary and tertiary industries and other public institutions are less used or have not been introduced.

Secondly, compared with the current emerging artificial intelligence technology, it has the characteristics of insufficient intelligence. In the future, it is necessary to strengthen its combination with AI technology, design reasonable software and hardware and constantly update them, and use the most advanced technology in combination with them to keep pace with the times [10].

In addition, one of the technical features of the Internet of Things is the ability to unify standards, so the formulation of standards is very important. This requires strong supervision and operation of IOT technology and error proofing measures [10]. For example, the information carried in the sensor of a product must be accurate, otherwise it may lead to subsequent continuous errors. Various platforms, upstream and downstream industries and even different industries should be able to mutually authenticate the information carried in the sensors, which requires signing many agreements, with the government or industry leaders taking the lead in negotiation. If the negotiation and communication are not in place, it may even be counterproductive, resulting in more management costs. Due to the large amount of information contained in the sensors of the Internet of Things, if the information is sensitive, it is also necessary to take safety protection measures.

Finally, the Internet of Things technology must rely on entities. It must attach sensors to entities to transmit its information. This is its fundamental feature and a defect. This is bound to make it difficult to achieve outstanding performance in the primary and tertiary industries. The Internet of Things technology is mainly able to provide accurate information, but it can not help to analyze financial information, but can only achieve the transmission of financial information to a certain extent, and even can not be called sharing. So this technology is mostly used in the management field rather than the financial field. It helps management by passing financial information. At present, most of the application of Internet of Things technologies are concentrated here, and the potential application field of this technology is not as broad as other emerging technologies.

4. Relevant Solutions

4.1. Specification Adjustment to Achieve Unified Coding

After the assets enter the company, they will be pasted with a unified electronic label. Starting from the warehousing scanning, it will realize automatic collection and precise positioning, and standardize the asset inventory of the enterprise. The information collected after the inventory is shared by all departments. All kinds of problems caused by lack of information were avoided, and the construction of enterprise asset inventory system was strengthened.

4.2. Improve Network Information Protection Technology

Due to the large number of equipment, it is easy to cause interference in the transmission of network information, and the internal asset information of the enterprise is easy to be leaked or stolen, which is unfavorable to the development of the enterprise. Improve the protection technology of the Internet of Things to ensure the information security of enterprise assets. The background system data is stored encrypted. Ensure the integrity and security of background data, set up identity authentication, and defend the system from attacks by outsiders.

4.3. Reduce the Application Cost of Internet of Things Technology

Due to the low penetration rate of the application and development of Internet of Things technology, many enterprises have not yet developed the technology, and the economic factor is indispensable. If the cost is reduced, the enterprise will compare with the manual inventory of assets. If the cost of this technology is lower, more enterprises will choose this technology.

4.4. Improve the Popularity of Internet of Things Technology

As the traditional asset inventory has been used for a long time, the mechanism is relatively mature. Many enterprises do not know the existence of this technology and pay more attention to the traditional manual inventory. The popularization rate can be improved through trial and publicity. If the internal technology of the enterprise cannot support the technology, technical support can be provided to promote long-term development.

4.5. Set Unified Standards and Improve Intelligence

Since industry standards and national standards must be strict and scientific, it is necessary to set unified standards in the field. Internet of Things asset inventory is an emerging technology. Compared with other technologies, it may need more intelligent development, such as analyzing financial information after inventory.

5. Conclusion

With the progress of science and technology, the development of Internet of Things technology is also more and more rapid, especially in the field of asset inventory, to improve the current shortcomings, and realize the intelligent and informatization of asset management. Reduce the inventory cost of enterprises, improve work efficiency, realize financial sharing, and managers can master the status of assets at any time, so that managers can make decisions in time and provide accurate data support for managers' decisions.

In the agricultural industry, we found that the digitization of asset inventory can not only rely on financial digital technology, but also rely more on the combination of advanced production management technology and financial digital technology. Based on this, we conclude that IOT technology is not convenient to count low value consumables, small objects and intangible assets. Moreover, the Internet of Things technology has the problem of insufficient intelligence. However, the lack of intelligence is not entirely a disadvantage. In other words, because of its lack of intelligence, it can be smoothly combined with any artificial intelligence model. We can vividly compare the Internet of Things technology to a pair of hands. If we can combine the Internet of Things technology with artificial intelligence and install an intelligent brain on these hands, we can solve the problems of intelligence and inconvenient statistics at the same time.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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