

Research On Intelligent Engineering Management System Based on Rfid

Yi Sheng *, Jingtai Wang, Dexiang Zhang, Haotian Long

Qingdao University of Technology, ShanDong, China, 266520

* Corresponding Author Email: SY0212191116@163.com

Abstract. The radio frequency electron label technology is one kind of automatic diagnosis technology, its through the wireless radio frequency way carries on the non-contact two-way data communication, utilizes the wireless radio frequency way to the record media to carry on the renewal, thus achieves the recognition target and the exchange of the data purpose. The radio frequency electron label technology's appearance, causes the article to scan when may to the supply chain in the product logistics information to carry on the sharing and the real-time tracking, fully combines the modern information technology, establishes the supply chain and the seller between the information interaction, objectively improves the supply chain and the logistics management standardization. In addition, based on the radio frequency electron label technology and establishes the wisdom project management system through carries on the data interaction, realizes the long-distance range reads, the non-contact recognition, the rapid readout, the simultaneous processing many labels the data and so on the operation, may help the enterprise operator to do well the material recognition work, satisfies the enterprise practical demand practically.

Keywords: RFID, Engineering Management, Warehousing.

1. Introduction

Modern warehouse storage needs to record the type of warehouse goods, quantity, production attributes and other information, and will be recorded visually in the database, in order to obtain accurate information about the goods data at all stages of the logistics chain, rather than just completing the simple batch processing of goods in and out. In comparison, the traditional material warehousing has many problems. Warehouse materials of many varieties, inventory and low degree of information technology, it is difficult to do fine management; storage operations completed manually, low efficiency, goods cannot be quickly into the warehouse, and the workload of the workers, easy to make mistakes, the cost of making mistakes is high, which seriously hampered the efficiency of the materials into the warehouse, improve the cost of warehousing.

The radio frequency electron label technology (hereinafter referred to as "RFID") as the emerging warehousing technology, can the material warehousing each operation link data carries on the automated collection, the safeguard material warehousing each link carries on the fast, the accurate processing, grasps for the timely and accurately the warehousing management data provides the great safeguard, causes the warehousing to be more highly effective.[1]

Relative to the traditional material into the warehouse, RFID technology has non-contact, fast scanning, high recognition efficiency, not easy to damage, easy to operate, read and write fast, large information storage, good security encryption performance, reusability and so on. It can significantly improve the efficiency and accuracy of in and out of the warehouse, while substantially reducing the manual workload in traditional inventory management, to achieve security, efficiency and accuracy of storage management. Warehouse management is more intelligent and digitalized, reducing the work intensity of workers and the probability of error.[2]

2. Current status of RFID technology at home and abroad

2.1. The current status of domestic

With the rapid development of construction projects in China, more and more projects appear in various fields. However, the traditional project management method is difficult to meet the needs of modern project management. Therefore, the intelligent engineering management system based on RFID technology has a broad development prospect in the domestic market. From the competitive strategy, domestic competitors usually compete for market share through price wars, but some enterprises attract customers by providing higher quality products and services. From the perspective of market opportunities, the demand for intelligent engineering management system in the domestic market is increasing, and the demand of government and enterprises for improving engineering efficiency, reducing costs and improving engineering safety is also increasing, so the market prospect is broad.

At present, the domestic market has appeared a number of enterprises engaged in the application of RFID technology, these enterprises have rich technical experience and market resources. At the same time, the government in the construction of smart cities, digital economy and other aspects of the development of policy support, which also for the application of RFID technology in the field of engineering management provides a strong policy guarantee and market environment. The development of RFID industry in China is still relatively backward. From the perspective of industrial chain, the industrial chain of RFID is mainly composed of chip design, label packaging, design and manufacture of reading and writing equipment, system integration, middleware and application software. China has not yet formed a mature RFID industrial chain, and the core technologies of products are basically in the hands of foreign companies, especially chips and middleware. The packaging technology of low-frequency and high-frequency tags has been basically mature in China, but only a few enterprises have the ability to design and manufacture UHF readers. Domestic enterprises basically have the ability to design and develop RFID antennas. System integration is a relatively rapid development link, while middleware and background software are still weak.[3]

In recent years, domestic RFID technology has begun to be applied in many fields such as logistics, retailing, manufacturing, garment industry, medical care, identification, anti-counterfeiting, asset management, food, animal identification, libraries, automobiles, aviation, military, etc., which has had an important impact on improving people's quality of life, enhancing the economic benefits of enterprises, strengthening public security and improving the level of social informatization. China has applied RFID technology in many fields such as railroad number identification, ID card and ticket management, animal identification, special equipment and dangerous goods management, public transportation and production process management.

There are both advantages and disadvantages for enterprises to compete domestically. The advantages are: in the domestic market, there are more competitors, but it also means that the market demand is more extensive, enterprises have greater market opportunities; the culture and business habits of the domestic market and enterprises are more familiar with the better understanding of customer needs and market trends; the domestic market has a wealth of local resources, the enterprise can be more flexible in the use of resources, to provide products and services in line with the market demand. The disadvantages are competitors in the domestic market are more powerful, and enterprises need to be competitive enough to gain a foothold in the market; price wars among competitors in the domestic market are more common, which may lead to smaller profit margins for enterprises; shortcomings in technology and management in the domestic market may limit the development and innovation ability of enterprises.[4]

2.2. The current status of abroad

In foreign markets, intelligent engineering management systems based on RFID technology have been widely used. Especially in Europe, America, Japan and other developed countries, this kind of system has already achieved good application results in the field of project management, replacing

the traditional manual management method and realizing efficient and intelligent project management. At the same time, these countries are also very mature in the application and research and development of RFID technology, with strong technical and market competitiveness. From the perspective of competition strategy, international competitors usually attract customers by providing high-quality products and services and offering perfect after-sales service. In terms of market opportunities, the demand for intelligent project management systems in the international market is also growing, and with the development of the global economy and the continuous promotion of infrastructure construction, the market outlook is relatively broad. Therefore, in the international market, if you want to develop and promote the intelligent project management system based on RFID technology, you need to have enough strength and advantages in technology research and development, marketing and other aspects. In addition, in the international market also need to consider the impact of local policies and regulations, cultural differences and other factors.[5]

From a world perspective, the U.S. government is an active promoter of RFID applications, under its promotion of the U.S. in the establishment of RFID standards, the development of related hardware and software technology and application areas are at the forefront of the world. European RFID standards follow the U.S.-led EPCglobal standards. In terms of closed system applications, Europe and the United States are basically at the same stage. Although Japan has proposed UID standards, but mainly supported by domestic manufacturers, such as to become an international standard there is still a long way to go. At present, the United States, Britain, Germany, Sweden, Switzerland, Japan, South Africa and other countries have more mature and advanced RFID products.

From the global industry pattern, the current RFID industry is mainly concentrated in the more mature application of RFID technology in Europe and the United States market. Philips, Siemens, ST, TI and other semiconductor manufacturers basically monopolize the RFID chip market; IBM, HP, Microsoft, SAP, Sybase, Sun and other international giants have seized the RFID middleware, systems integration research vantage point; Alien, Intermec, Symbol, Transcore, Matrics, Impinj and other companies provide RFID tags, antennas, readers and other products and equipment.

Enterprises participating in foreign competition have both advantages and disadvantages. Advantages are the market opportunities in foreign markets are broader, which can help enterprises expand their business scope and reduce market risks. Advanced technology and experience in foreign markets can help enterprises improve their technology and management level and promote their development and innovation. There are more standardized and perfect market rules and laws and regulations in foreign markets, which can provide better market protection for enterprises. The disadvantage is that entering the international market requires full consideration of cultural and commercial differences, and it takes more cost and time to adapt and investigate. The market competitors in the international market are more powerful, and enterprises need to have sufficient technical and management strength to gain a foothold in the market. Entering the international market needs to face more market rules and legal requirements, and compliance evaluation and management are needed.[6]

3. Risks faced by RFID technology and the corresponding solution measures

3.1. Risks to RFID technology

External risks. First, commercial risk: insufficient market demand or competitors' monopoly may lead to commercial risk, which requires adequate research on market demand, formulation of differentiated marketing strategies, and establishment of cooperative relationships with other industry leaders. Second, economic risk: fluctuations and risks in the macroeconomic environment may affect the investment and return of the project, which requires adequate market research and risk assessment, and the development of a reasonable investment plan and budget control. Again, technology risk: the emergence of new technologies may affect the market competitiveness of RFID intelligent project management system, the need for technological research and development and innovation, and constantly optimize the performance and functionality of RFID intelligent project management

system to maintain market competitiveness. Finally, natural disaster risk: natural disasters such as earthquakes, floods, etc. may affect the construction and operation of the project, and risk assessment and contingency plan development are needed to mitigate the impact of natural disasters on the project.[7]

Internal risk. First, technology risk: RFID technology itself may have some technical problems, such as tag reading accuracy is not high, equipment failure, etc. We need to carry out sufficient technical research and experiments in the pre-project period, select stable and reliable RFID equipment, and carry out sufficient equipment testing and quality control. Secondly, system stability risk: RFID intelligent project management system is a large hardware and software system, there may be system stability problems, such as system crash, data loss, etc., so we need to carry out adequate system testing and quality control and set up a backup mechanism and data recovery mechanism. Again, data security risk: RFID intelligent project management system needs to deal with a large amount of engineering and construction data, there may be a risk of data leakage and tampering, we carry out adequate data security protection, such as encrypted storage, access control, firewall and other measures. Finally, personnel training risk: RFID intelligent project management system requires professional technicians to maintain and operate, if the personnel lack the appropriate training and skills, may affect the stability and performance of the system.[8]

3.2. The measures of risks solving

Technical risk solution measures. Conduct adequate technical research and experiments, select stable and reliable RFID equipment, and conduct adequate equipment testing and quality control. Establish a technical support team to ensure that technical problems can be responded to and solved in a timely manner. Regularly carry out technical updates and upgrades to keep the technology advanced and adaptable.

System stability risk resolution measures. Conduct adequate system testing and quality control, including performance testing and reliability testing. Set up a backup mechanism and data recovery mechanism to ensure timely data recovery in case of system failure or data loss. Establish system monitoring and early warning mechanisms to detect and deal with system problems in a timely manner.

Data security risk resolution measures. Adequate data security protection, including encrypted storage, access control, firewalls and other measures. Establish data backup and recovery mechanisms to ensure data security and integrity. Train employees to improve their attention to data security and security awareness.

Personnel training risk resolution measures. Conduct adequate personnel training and skill enhancement programs, including system operation training, technical training, etc. Establish a personnel appraisal mechanism to evaluate, reward and punish employees' skills and performance. Set up a professional technical support team to provide timely technical support and assistance.

Business risk resolution. Conduct adequate market research and competitive analysis to develop differentiated marketing strategies. Establish partnerships with other industry leaders to develop marketing and promotional activities. Stabilize the source of funds, make reasonable investment plan and budget control.[9]

Legal risk resolution measures. Establish a legal and compliance team to comply with relevant laws and regulations and accurately grasp intellectual property issues. Establish a legal risk assessment mechanism to evaluate and predict legal issues that may be involved. Engage professional legal consultants to provide timely legal advice and support.

Economic risk resolution measures. Conduct adequate market research and risk assessment, and formulate reasonable investment plans and budget control. Establish a fund management mechanism to ensure the rationality and transparency of fund utilization. Choose partners carefully, conduct adequate due diligence, and ensure the credibility and legitimacy of partners.

Natural disaster risk resolution measures. Risk assessments and emergency response plans are conducted to address the possible impacts of natural disasters. Establish an emergency response

mechanism to respond to emergencies caused by natural disasters in a timely manner. Adoption of advanced disaster prevention equipment and measures to minimize the damage caused by natural disasters.

4. Analysis of the tools used in RFID technology

4.1. The analysis of SWOT

Advantage analysis. RFID technology is efficient and accurate and can monitor and track items and equipment in real time. Intelligent engineering management system can improve work efficiency and productivity and reduce errors and waste. Intelligent engineering management system based on RFID can realize comprehensive equipment management and monitoring, improve equipment utilization and prolong equipment life. The system can provide data analysis and prediction functions to support management decisions. The application level of RFID tag is refined, which can be specific to each kind of single product, and the technical application is targeted. RFID is not interfered by external factors and has high security performance. Moreover, RFID tags can withstand high temperature environment, have long service life, are waterproof, anti-magnetic and wear-resistant, can adapt to the influence of various weather, and realize all-weather operation.[10]

Analysis of disadvantages. The system needs a certain investment in hardware and software, and the cost is high. Deploying and maintaining the system requires certain technical knowledge and experience. Depending on RFID technology, if the tag is lost or damaged, it may affect the accuracy and efficiency of the system. RFID electronic tag information is illegally read and maliciously tampered with, and the security is not high enough, so it is required to be used as far as possible without strong magnetic interference. The normal use technology of strong magnetic interference is not mature enough, and the RFID electronic tag has the characteristics of retroreflection, which makes it difficult to apply it to metals, liquids and other commodities.

Opportunity analysis. With the continuous development of the construction and engineering industries, the demand for intelligence and efficiency is also increasing. Technological innovation: The continuous development of RFID technology and data analysis technology provides opportunities for the upgrading and expansion of the system. In addition, we can also establish partnerships with equipment manufacturers and engineering companies to jointly develop and promote the system. Moreover, the relevant state departments have set up special funds to support the development of RFID industry, which has laid a good policy and economic environment for the development of RFID industry.[11]

Threat analysis. Similar intelligent engineering management systems already exist in the market, and the competition is fierce. In addition, the data contained in the system may be threatened by hacking or data leakage. The implementation of RFID system not only realizes automatic or semi-automatic processing to replace manual processing. Therefore, any improper RFID planning or system openness will lead to RFID security risks. Finally, in practice, there may be changes in regulations and standards, which put forward higher requirements for the compliance and security of the system.

4.2. The analysis of PEST

Analysis of political environment. (1) The RFID industry planning and related policies in line with the actual situation in China have been formulated, and the RFID industry has been brought into the national key development areas; Create a good technical and industrial development environment, encourage enterprises to invest and produce in the RFID field, promote the formation of RFID industrial bases, and support industries to use RFID technology. Through policies, regulations, economic, administrative and other means, support RFID manufacturing, base construction and use. The development strategy, standard system framework and key standards of RFID in China are studied. Encourage Chinese universities, research institutes and enterprises to develop technical products with independent intellectual property rights, participate in the formulation of domestic and

international RFID technical standards and industrial use standards, and form a standard system that can support industrial development and use as soon as possible. (2) Create a good investment environment for the RFID industry, encourage enterprises to invest and produce in the RFID field, promote the construction of RFID industrial bases, and support enterprises to adopt RFID technologies and products. Through policies, regulations, economic, administrative and other forms and means, we will give necessary support and preferential treatment to RFID manufacturing, base construction and use. Support the establishment of an open technology research and development platform, establish a public service platform to support the use of RFID technology, and establish an RFID technology testing environment, certification management mechanism and quality assurance system. Establish RFID technology training system, train all kinds of professionals through various educational modes, and form a perfect professional training mechanism. (3) Strengthen the publicity and public opinion guidance on the development of RFID technology and industry and create a good social atmosphere. Encourage RFID international technical exchange activities and strengthen cooperation with international enterprises.[12]

Economic environment analysis. (1) At present, the domestic economic growth rate is ahead of the world's major economies. The national living consumption level has improved. (2) The economic structure is gradually optimized and upgraded. From the perspective of factor structure, the economic growth driven mainly by the growth of labor force and capital stock is gradually changing to the economic growth driven mainly by the growth of science and technology and human capital. From the perspective of demand structure, it has gradually changed from relying mainly on investment demand to relying mainly on consumer demand to stimulate economic growth. 3. Comprehensive national strength ranks first in the world. In terms of economic strength, the total GDP of China in 2014 was US\$ 10.4 trillion, accounting for 13.4% of the global total, firmly occupying the second place in the world.[13]

Analysis of social environment. (1) In modern social life, the demand for information is increasing. For example, in freight transportation, the information about goods is inquired, and the information about using goods is inquired. (2) The domestic market is vast, and the application range is wide, and the mature RFID industry chain has not yet formed. Only a few enterprises have already possessed the design and manufacturing capability of UHF readers. Domestic enterprises basically have the ability to design and develop RFID antennas. System integration is a relatively rapid development link, while middleware and background software are still weak.

Technical environment analysis. (1) RFID makes the warehousing environment have no dead ends. For the warehousing closely related to manufacturing, retail and logistics, the application of RFID technology and products to the automation of inventory tracking, inventory checking, and asset management will revolutionize the industry, and then realize the digital management and intelligent upgrade of traditional factories and warehouses. (2) RFID makes traceability easier. The RFID traceability system is a set of system tools that use RFID identification to collect the target product, record the raw material information of the product, map RFID electronic tags on the packaging during the production process of the product, and then process the raw material, manufacturing and sales information of the product, load the electronic tags, and save the information data in the database, so as to realize the traceability of the whole product life cycle. (3) RFID radio frequency identification is a non-contact automatic identification technology, which can automatically identify the target object and obtain relevant data through radio frequency signals and can work in various harsh environments without manual intervention. RFID technology can identify high-speed moving objects and multiple tags at the same time, which is quick and convenient to operate.[14]

5. Conclusion

With the continuous development of manufacturing technology and transportation systems, the role of warehousing operations has been qualitative and quantitative changes. Modern warehousing should not only realize the storage of goods, but also the type of goods in the warehouse, the number

of owners and storage space and other attributes such as clear marking, storage of goods in the supply chain should have a clear upstream and downstream convergence data.

RFID technology is a wireless two-way communication automatic identification technology, can realize non-contact data reading, can also realize the target object batch reading, remote reading, even if the target object is covered also can realize the target object reliable reading and identification. RFID technology in addition to the traditional bar code technology has many advantages, but also has the advantages of bar code technology does not have, such as fast scanning, reading range, with penetration and barrier-free reading, data storage capacity, stain resistance, high security and can be reused and other characteristics.

RFID technology has been widely used in many industries, including engineering management. By attaching RFID tags to equipment, tools and materials, automatic identification and tracking can be realized to improve productivity and management efficiency. Therefore, RFID-based intelligent project management system has a broad application prospect in the future market.

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