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Research on Intelligent Storage Management of Tea Industry—Take Phoenix Dancong Tea as an Example

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Abstract: The tea industry, bearing a long history and cultural heritage, is facing the challenge of transformation in the era of intelligence. The application of traditional storage mode in the tea industry has increasingly shown its limitations. Taking Fenghuang Single cluster Tea as an example, its storage link has exposed problems such as low efficiency and extensive management. In order to comply with the development trend of The Times, the tea industry urgently needs to introduce cutting-edge technologies such as intelligent warehousing system, RFID technology and 5G communication to comprehensively optimize the warehousing process and improve management efficiency. These new technologies not only bring intelligent and information innovation to the storage of the tea industry, but also greatly promote the transformation and upgrading of the tea industry, revitalize the ancient industry, and realize efficient, accurate and sustainable development.

1. Introduction

Tea industry is an important part of China's outstanding traditional culture, and has become an important agricultural pillar industry in China after thousands of years of wind and rain. In recent years, faced with the challenges of intensified market competition and diversified consumer demand, problems have been exposed in tea production, sales and storage management, such as poor inventory management and product accumulation, which has adversely affected the quality and tea market competitiveness. Therefore, it has become an urgent need to improve the intelligent level of the tea industry and realize the fine and intelligent storage management. Through the integration of the Internet of Things, big data and other technologies, intelligent storage management can optimize the storage layout, improve the operation efficiency, reduce the inventory cost, solve the traditional storage management problems, and improve the quality and safety of tea. As a specialty of Chaozhou city, Guangdong province, Phoenix Chancong tea is famous for its unique flavor and charm, and its market position is constantly improving. However, its storage management also faces challenges, and the need to ensure the quality of tea storage. Therefore, taking Phoenix single cong tea as an example, this paper discusses the realization path and application effect of intelligent storage management in the tea industry, aiming to provide reference solutions for tea enterprises and promote the transformation and upgrading and sustainable development of the tea industry.

2. Overview of the intelligent storage theory and technology of the tea industry

2.1. The definition and characteristics of intelligent storage

Intelligent storage is a new storage mode that makes the use of advanced information technology, Internet of things technology, big data analysis and artificial intelligence to comprehensively optimize and upgrades the storage process, so as to realize the intelligent operation of storage facilities. This process not only improves the efficiency and accuracy of warehouse management, but also reduces the storage cost and improves the competitiveness of enterprises. Specifically, intelligent storage involves the integration of various intelligent equipment and systems, such as intelligent handling robots, intelligent shelves, RFID technology, sensors, and others. This integration enables the automation of storage, sorting, handling, and distribution of goods, as well as real-time monitoring and intelligent analysis of the warehouse environment. Intelligent storage has two remarkable characteristics: one is automation. Intelligent storage integrates advanced Internet of Things technology, relying on a large number of intelligent equipment for automatic operation, which can track the moving track and current location of goods in real time. When the goods appear abnormal situation, it can be warned in time for quick response. Second, intelligent. Intelligent storage can collect equipment information in real time, analyze and integrate data according to the predetermined logic, establish intelligent scheduling model and intelligent analysis model based on data, formulate intelligent algorithm strategy, and dynamically calculate the optimal solution. Through the intelligent scheduling model, the operation mode can be optimized to make the storage operation more efficient, and provide real-time and accurate inventory management ability, to provide effective reference for the production and operation decisions of enterprises.[1]

2.2. Intelligent warehouse management system and its technical support

Warehouse management system (WMS) is a real-time computer software system, through integrated and automatic management, the warehouse storage, picking, packaging, warehousing, warehousing and other processes of comprehensive control, to realize the efficient management of warehouse resources, inventory and operation process. It aims to help enterprises optimize the warehouse management process, manage and control the daily warehouse operations. WMS system integrates the operation and management of warehousing, warehousing, warehousing and inventory taking, and is an indispensable part of modern enterprise logistics management.

In intelligent storage, the Internet of Things is essential. The Internet of Things technology refers to the technology that real objects are connected through the network, so that they can exchange information. It is the advanced stage of the Internet, and its basic technical basis is computer technology and automatic control technology.[2]The Internet of Things technology also includes sensor technology, wireless communication technology, etc. Sensor technology can monitor the environmental parameters such as temperature, humidity and light in the warehouse in real time to ensure that the storage environment meets the storage requirements of goods. Therefore, the Internet of Things technology is widely used in the field of storage. In terms of inventory management and optimization, the Internet of Things technology enables the storage management system to realize intelligent inventory management, through real-time monitoring of the inventory situation, automatically generate replenishment suggestions, to avoid excess or shortage of inventory.

In terms of information perception technology, the most widely used is RFID technology, such as RF handheld terminal, RFID tag, etc., aiming to improve the sorting speed and transmission efficiency of warehousing and logistics center.[3]RFID technology recognizes target objects and obtains relevant data through wireless RF signal, which has the advantages of fast recognition speed, high accuracy and strong anti-interference ability. In the field of warehousing, RFID technology is

mainly used in the tracking, positioning and inventory of goods. By attaching RFID tags to each piece of goods, enterprises can know the location, quantity and status of the goods in real time, and improve the sorting speed and transmission efficiency of the warehousing and logistics center. At the same time, RFID technology can also be combined with WMS system to realize automatic collection and update of data, reduce manual input errors and repeated labor. For example, Alibaba Damo Institute introduces RFID and big data analysis to realize the real-time logistics information and the optimal warehousing scheme.

The operation of the intelligent storage management system can also not be separated from the support of 5G communication technology. The 5G network provides real-time data transmission capability for the Internet of Things. In the intelligent storage scenario, many intelligent devices and systems need to realize real-time data exchange and communication, which puts forward strict requirements for extremely low latency and high-speed data transmission of the network. The 5G network just meets this demand, enabling the intelligent storage management system to obtain and process all kinds of data in real time, and improving the efficiency and accuracy of storage operations.5G network slicing technology can cut the network into multiple virtual and independent networks according to different application scenarios and needs. This technology enables customized network services for different services, which greatly improves the flexibility and efficiency of the network. In intelligent storage, different equipment and systems may need different network services and quality assurance. Through network slicing technology, they can provide customized network services to ensure the smooth progress of warehousing operations.

5G technology also provides strong support for the application of unmanned forklifts and automatic guide vehicles (AGV) in the field of intelligent storage. With the help of 5G technology, the massive image data generated by unmanned forklifts can be efficiently processed to further promote the intelligent development of storage operations. In the traditional logistics and warehousing industry, the wireless communication protocols used by AGV and stacker are mainly Wi-Fi, which has problems such as low transmission efficiency, difficult to achieve equipment interconnection, and unsatisfactory security and stability of Wi-Fi connection. The application of 5G communication can greatly reduce the communication delay, improve the sensitivity of equipment, and achieve stable and rapid device interconnection. Through low delay communication, it can coordinate the cooperative work of various devices, improve the automation level of storage system, and improve the accuracy and efficiency of operation.[4]

3. Tea industry storage status quo analysis —Take phoenix single fir as an example

Phoenix dancong tea belongs to oolong tea, which is a type of semi-fermented tea. As the premier representative of Guangdong oolong tea, Phoenix Dancong tea is renowned for its unique floral fragrance, elegant and delicate taste, and its enduring characteristic of a sweet aftertaste. In recent years, with the popularization of tea culture and the improvement of consumers' health awareness, the market demand of Phoenix dancong tea continues to grow, and the industrial scale continues to expand. However, in the storage link, Phoenix dancong teaindustry is still facing many challenges [5].

3.1. Phoenix dancong tea storage conditions

As a special commodity, tea has the characteristics of easy to withstand moisture, easy oxidation, easy to absorb taste, so its storage conditions are relatively strict. First, the storage environment needs to be strictly controlled by the temperature and humidity. The refined water of phoenix single bush is 3.5%~4.5%, not more than 5%, so there is no need to refrigerate, and should be stored in the environment of 10-25 degrees Celsius to avoid accelerated oxidation of chemical components in tea

caused by high temperature environment. At the same time, the relative humidity should be controlled below 60% to further protect the quality of tea. Secondly, the tea leaves should be stored in a place to avoid the light, to avoid direct sunlight. For this reason, the container for storing tea should choose shading or opaque tea pot to effectively block the influence of light on tea. In terms of ventilation, tea storage needs proper ventilation, but not in places where the air flows violently. Because tea has a strong adsorption, so, ventilation is mainly to prevent odor intrusion while keeping the environment dry [6].

Finally, the packaging of tea is also an important link to protect its quality. The container for storing tea leaves must be well sealed to prevent contact with air, thus slowing the oxidation of tea leaves. At the same time, such packaging can also effectively prevent the tea from being damp and taste. When choosing container materials, avoid using plastic containers, because plastic may have a chemical reaction with tea and affect the quality of tea.(figure 1)

3.2. Phoenix dancong tea storage status quo

According to the above, Phoenix single fir requires harsh storage conditions, necessitating an appropriate temperature, accurate humidity control, avoiding direct light, and ensuring good ventilation. However, the current Phoenix dancong tea storage practices among most tea farmers and tea companies are more traditional, characterized by a lack of modern intelligent technology.

First of all, in terms of storage facilities, traditional tea farmers and tea companies mainly use brick or wooden structures, employing relatively simple temperature and humidity detection equipment. They lack a modern, intelligent temperature and humidity control system. In the face of bad weather or seasonal temperature changes, it is difficult to make accurate predictions and adjustments, easily leading to damage and reduction in tea quality. Secondly, in terms of tea storage management, the traditional storage management mode is mainly manual management [7]. In the process of storage management, manual inspection, recording and adjustment are still the mainstream methods. The manual management mode is not only inefficient, but also difficult to achieve the accurate control of the storage environment, the use of the storage space is not perfect, the vertical stacking height is limited, and the manual handling is repeated operations. At the same time, human factors also increase the uncertainty in the warehousing process. Finally, due to the lack of intelligent equipment support, it is difficult for tea farmers and tea companies to analyze the storage of Phoenix Dancong tea using a large amount of data and information. This leads to the tea storage temperature, humidity, light, and other key data often not being collected and analyzed in real-time. Consequently, the collection of tea storage data is not comprehensive, and the analysis is slow and lagging. Furthermore, there is often an error between the analysis results and the actual situation.(figure 1)

3.3. Phoenix dancong tea storage lack of intelligent impact

The traditional manual storage management method has significant inefficiency. It not only consumes a lot of time and manpower in the operation process, but also avoids the error rate due to the intervention of human factors, which is undoubtedly a major drawback for the modern tea industry that pursues high efficiency and precision. At the same time, the use of tea warehouse space is often not scientific enough, leading to the waste of space resources and reducing the overall efficiency of storage. Especially in the Phoenix Dancong tea storage process, due to the relatively outdated storage facilities and management methods, the tea is susceptible to the influence of adverse factors such as moisture and mildew, which cause great damage to the quality of the tea. Furthermore, Phoenix Dancong tea itself has the characteristic of flavor diversity, which undoubtedly increases the difficulty of warehouse management. Therefore, managers need to invest more energy and time to ensure the quality of tea storage. However, even so, due to the limitation of management means, it is still difficult

to completely avoid the loss of tea in the storage process, which not only affects the final quality of tea, but also brings additional storage costs to tea enterprises and increases the difficulty of cost control. With the increasingly fierce competition in the tea industry and the continuous emergence of new tea brands, intelligent storage has become one of the important means to enhance the competitiveness of tea enterprises [8].

By introducing advanced technical means, such as the Internet of Things, big data, artificial intelligence, etc., intelligent storage can realize the accurate monitoring of the storage environment, and the automatic management of the storage process, so as to greatly improve the storage efficiency, reduce the error rate, and reduce the loss of tea in the storage process. However, for the Phoenix dancong teaindustry, due to the lack of intelligence in the storage link, it is at a disadvantage in the market competition. This not only affects the quality and taste of tea, reduces the purchase intention of consumers, but also limits the brand building and market expansion ability of tea enterprises, making it difficult for tea enterprises to stand out in the fierce market competition. Therefore, for the Phoenix dancong teaindustry, strengthening the intelligent construction of the storage link, has become an urgent demand to enhance its market competitiveness.(see figure 1)

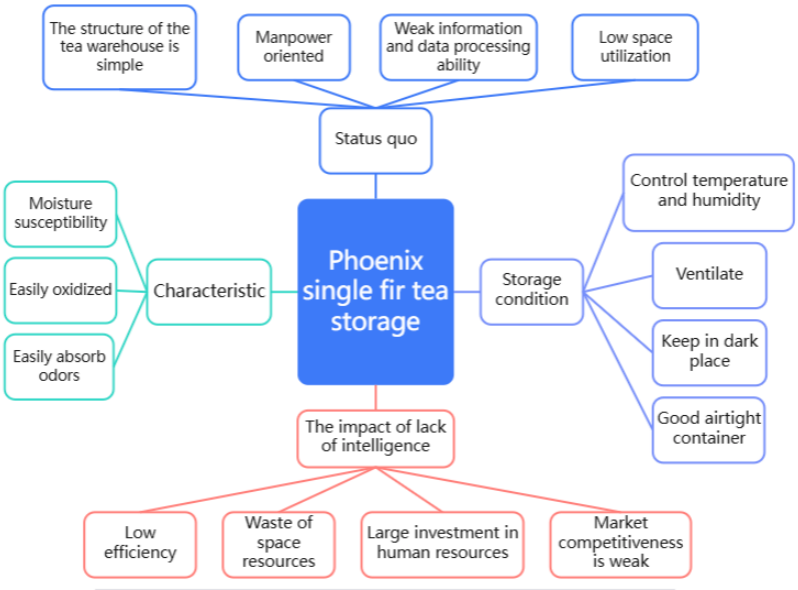

Figure 1: Phoenix dancong teastorage situation diagram

4. Main problems existing in the development of intelligent storage in the tea industry

Many problems are faced to upgrade the traditional storage mode of tea industry to intelligent storage. First of all, traditional tea companies and tea farmers, when faced with intelligent technologies such as the Internet of Things, WMS, and RFID technology, often encounter resistance due to their lack of understanding of the principles and operational mechanisms of these technologies. This resistance acts as an invisible barrier, seriously hindering the penetration, application, and deep integration of advanced intelligent equipment and efficient technologies in the long-standing and traditional field of tea storage. This not only limits the improvement of the efficiency and quality of tea storage management, but also delays the pace of the modernization process of the tea industry. Secondly, intelligent technology has technical bottlenecks and complexity, and intelligent storage needs to rely on advanced technical support, such as the Internet of Things, big data, artificial intelligence, etc. However, these technologies still face technical bottlenecks such as slow data transmission speed, insufficient data processing capacity and poor system stability. Intelligent storage system involves many fields of technology and equipment, high technical complexity, need

professional technical personnel for maintenance and management. Because of the technical bottleneck and complexity of intelligent technology, the construction of intelligent tea warehouse in the early stage. Intelligent storage system needs to be equipped with a large number of automation equipment and technical support, such as intelligent shelves, stacker, AGV cars, etc., to be purchased in large quantities, these intelligent equipment is expensive, difficult for tea enterprises to bear, intelligent equipment needs to be deployed, integrated, but also a large amount of capital. In addition, the operation and later maintenance of intelligent storage equipment also need to be invested. The hardware and software equipment of the system need to be constantly updated and upgraded, which increases the maintenance cost. The staff training cost is also high, because the operation of intelligent storage system requires professional skills and the training cycle is long [9].

In the process of tea enterprise management transformation, although the introduction of intelligent and automatic equipment can significantly improve the efficiency, but it is also accompanied by a series of challenges. The first priority is business process restructuring, which is a time-consuming and uncertain task, and requires tea companies to invest a lot of resources to adjust. Secondly, intelligent management puts forward a new height to the demand for human resources. High-level management personnel and technical personnel become the key to the successful transformation of tea enterprises. They need not only the deep expertise, but also the ability to think creatively and work across fields. However, such talents are often in short supply in the market, and it is difficult to meet the demand only by the internal training mechanism of tea enterprises. Therefore, tea companies have to face the external market and supplement and improve their own talent team through recruitment and introduction. This undoubtedly increases the complexity and difficulty of recruitment, training and management of tea companies. In addition, although the application of intelligent storage system is powerful, it also brings new challenges to information security. A large number of sensitive information and data are processed centrally, making tea enterprises become potential targets of network attacks, and the risk of data leakage and information loss is significantly increased. At the same time, the intelligent storage equipment itself also has hidden safety risks, and is prone to failure in long-term operation. Once not handled properly, the storage efficiency will be greatly reduced, but also may directly lead to production interruption, affecting the stable operation of the enterprise.

Finally, the intelligent storage equipment itself also has certain security risks. Long-term operation and high-intensity use are easy to lead to equipment failure or performance decline. Once the equipment fails, it will not only affect the storage efficiency, but also may lead to production interruption, bringing serious operational risks to the tea enterprises. Therefore, tea enterprises need to establish a perfect equipment maintenance and management mechanism, and regularly check and repair the equipment, to ensure that they are in a good running state.

Although the introduction of intelligent and automatic equipment in the process of introducing intelligent storage system can bring significant benefits, they also need to face a series of complex and multi-dimensional challenges. Tea companies need to be fully aware of these challenges and take corresponding measures to meet and overcome them to ensure the smooth and success of the transformation process.

5. Tea industry intelligent storage (scheme) planning and promotion suggestions

5.1. Intelligent storage (scheme) planning

5.1.1. Technical selection and architecture design

Technology selection and architecture design can build an intelligent storage management system based on advanced technologies such as the Internet of Things, RFID, QR code, big data, cloud

computing, artificial intelligence and so on. These technologies can realize the intelligent connection, information exchange, real-time monitoring and intelligent prediction of warehouse equipment. Reasonable system architecture is designed, including the front-end data acquisition layer, data processing and analysis layer, application service layer and user interaction layer, to ensure the efficient and stable operation of the system.

5.1.2. Hardware equipment configuration

The intelligent warehouse should be equipped with temperature sensors, humidity sensors, light sensors and other devices to monitor the warehouse environment in real time. At the same time, RFID tags and readers are installed to achieve real-time tracking and monitoring of tea. Tea companies have introduced automatic sorting systems, unmanned trucks, intelligent storage robots and other automation equipment to improve the efficiency and accuracy of warehouse operations. Install video surveillance, access control and other devices to ensure warehouse security.

In terms of AGV applications, 5G technology gives it stronger data processing and communication capabilities. With the help of 5G, AGV can collect and analyze environmental data in real time and dynamically plan the optimal path, thus greatly improving its flexibility and ability to cope with complex environments. Even in complex factory environments, the AGV can achieve accurate and efficient positioning, navigation and control with 5G networks, which not only significantly improves production efficiency, but also effectively reduces operational errors. At the same time, 5G's high-speed and low-latency communication features ensure the real-time monitoring and accurate control of the AGV, making its operation more autonomous and flexible. In addition, the low-latency feature of 5G also allows staff to supervise the operation of AGV cars through the cloud, and can easily dispatch multiple AGVs to conduct collaborative operations to jointly complete complex handling tasks and further improve the handling efficiency. Unmanned forklift truck and AGV can be integrated in a unified scheduling system, and directly and seamlessly connected with WMS, ERP and other systems. Through unified planning of the operation path, errors can be avoided and the overall operation efficiency can be improved. For example, when it is necessary to transport large, heavy tea goods, an unmanned forklift can be used. For fast, multiple batches, and small amounts of tea goods, an AGV (Automated Guided Vehicle) can be used to improve the storage and delivery efficiency of Phoenix dancong tea.

The integration of the Internet of Things and big data brings more accurate and comprehensive data support to enterprises, and greatly promotes the intelligent and efficient process of warehouse management. For tea enterprises, the primary task is to build the Internet of Things platform and connect various sensors and equipment in the tea warehouse, such as temperature and humidity sensors, smoke sensors, RFID tags, etc., so as to ensure the stability and reliability of data and information sources such as cargo positioning information. Subsequently, the warehouse environment, device status and other data are collected in real time, and the big data platform is used for efficient processing and analysis. In this process, 5G communication technology or wireless transmission technology are adopted to ensure the accuracy and timeliness of data exchange. In order to ensure information security, tea enterprises also need to establish data warehouse, computer rooms and other facilities, and build a firewall of the Internet of Things platform. At the same time, the information of goods and related tea supplier information is encrypted, the implementation of identity authentication and access control and other advanced technical means to ensure the security, stability and reliability of information. On this basis, big data analysis tools and algorithms are used to dig out the correlation rules in the data, and provide scientific decision-making basis for key business links such as inventory strategy formulation, path planning optimization and demand prediction. In this way, the problem of relying on manual recording, error-prone and inefficient cargo tracking can be solved with the help of the Internet of Things and big data. Through the application of advanced

technology such as RFID tags, the automatic identification and tracking of goods are realized, and the accuracy and efficiency of goods management are significantly improved, so that tea enterprises can grasp the key information such as the location and status of goods in real time, and provide strong support for inventory management and logistics scheduling.

5.1.3. Further optimize the configuration of intelligent equipment

Fenghuang single tea is produced in Fenghuang Town, Chaozhou City, Guangdong Province, where the subtropical monsoon climate, rainfall and high temperature appear at the same time, clouds and mist, lush vegetation. Such an environment is conducive to the growth of tea trees, forming a unique tea fragrance. But the steep mountain, few trees, more weeds, high fire risk, difficult to fight. In order to keep the facilities of the tea warehouse with The Times, we should regularly update the storage equipment to ensure the use of the most advanced intelligent technology. In order to realize the timely and convenient update of the equipment, enterprises can choose to use OTA (Over-The-Air) mode to upgrade. At the same time, it is equally important to conduct regular maintenance of the existing equipment to ensure that all the intelligent equipment is in the best working condition, so as to reduce the storage accidents caused by the equipment aging. In addition, enterprises can also consider upgrading to more advanced and safe intelligent fire-fighting equipment, such as wireless smoke detectors, smart fire extinguishers, thermal imagers, image fire detectors, etc. These intelligent fire protection systems can be connected to the Internet. Once any abnormality is found, they can immediately feedback the situation inside and outside the tea barn to the relevant responsible person, so as to realize instant alarm and significantly improve the security of the tea barn.

5.1.4. Strengthen the integration of information systems

Strengthening the integration of the information system can improve operational efficiency, facilitate the unified management of tea companies, enable real-time understanding of tea inventory information and logistics information, strengthen control over tea warehouses, enhance the cohesion and coherence of WMS, ERP, and AGV equipment, improve the overall system efficiency, ensure data unity and accuracy, reduce information discrepancies, and eliminate data silos. Information system integration provides a unified management platform, allowing tea companies to grasp business links in real time and enable cross-sectoral and cross-regional collaborative management. For example, tea companies can use the unified information platform to understand the inventory of their regional tea warehouses. When the inventory of one tea warehouse is insufficient, they can promptly supply from the nearest warehouse and timely replenish goods.

The information management system is the core of the intelligent storage operation. Through the integration of various advanced technologies, it realizes the comprehensive monitoring and optimization management of the storage operation. When deploying a storage management system (WMS), tea companies should first consider their actual storage requirements to determine the functional and technical requirements of the WMS system. Then, based on the tea companies' own economic situation, the types of tea products, and storage requirements, they should choose a WMS system that is cost-effective, has complete functions, is highly scalable, and is easy to use. Additionally, they should consider the supplier's credibility and the quality of after-sales service to ensure the long-term stable operation of the system. Again, in the system design and customization stage, the existing information systems of tea enterprises (such as ERP, MES, etc.) should be combined to realize data sharing and business collaboration. Then, in the deployment phase, the system should be installed and tested to ensure the stable operation of the system. Finally, it is necessary to train technical personnel to improve their cognition and use efficiency of the WMS system, to ensure the smooth operation of the system, and to upgrade and maintain the WMS system

regularly to ensure that it is in good operation condition. Through the integration of automation equipment and intelligent technology, the WMS system realizes the automation and intelligence of the operation in the warehouse, and thus improves the efficiency and accuracy of the operation. This solves the problem that the manual operation is easy to make mistakes and the operation process is difficult to standardize.

The management platform of information system should pursue diversified and multi-type development paths, which can be realized by building small programs, mobile APP, exclusive management web pages and other ways. Such a diversified platform strategy aims to enable managers, sales personnel and customers to view the relevant information of Phoenix single tea more conveniently and quickly, so as to greatly improve the transparency of information. At the same time, in the process of promoting the integration of information system, we must attach great importance to the infrastructure of network communication, ensure the smooth transmission of information and the stable operation of the system, ensure the unity and accuracy of data, provide a reliable analysis basis for tea enterprises, and support them to make more accurate business prediction and decision making. Real-time update of logistics information, timely and rapid feedback of the status of tea transportation, site location and arrival time, improve the transparency and response speed of logistics management.

5.2. Promotion advice

5.2.1. Solve the technical cognition and resistance

The government and related intelligent storage equipment enterprises popularize the advantages, principles and successful cases of intelligent storage to tea enterprises and tea farmers through holding seminars and training sessions, so as to enhance their cognition and acceptance of intelligent technology. Tea enterprises and tea farmers will be invited to visit and learn intelligent storage demonstration sites, such as China White Tea City Intelligent Storage Center and Small Can Tea Huangshan Intelligent Factory, to experience the efficiency improvement and management convenience brought by intelligent storage.

5.2.2. Solve the technical bottlenecks and complexity

Tea enterprises should strengthen the research and cooperation on technology. They should cooperate with universities, research institutions, and technology enterprises to jointly overcome technical bottlenecks such as data transmission, data processing, and system stability, and enhance the technical level of intelligent warehousing systems.

Tea enterprises should simplify the system operation and optimize the user interface and operation process of intelligent warehousing systems, making them more intuitive and easy to use, and lowering the technical threshold for operators. They should also provide professional training for operators to enhance their ability to use and maintain intelligent warehousing systems.

5.2.3. Integrate the intelligent storage construction scheme

In order to solve the problem of high cost, tea enterprises can make a phased implementation plan in the actual situation, start with a small-scale pilot project, gradually expand the application scope, and reduce the initial investment risk. Intelligent equipment suppliers can explore leasing and sharing modes for intelligent storage equipment, and they can propose modified package schemes for intelligent storage. These schemes can be combined with specific types of tea, such as Phoenix Dancong tea, and can cover multiple categories. Suppliers can put forward modification schemes to help tea companies with their tea warehouses. In the early stages, suppliers can send staff to conduct

field monitoring and research in the tea warehouses, provide feasibility reports, and, based on the storage demand for Phoenix Dancong tea and the actual situation of the tea enterprise, provide a reasonable modification scheme. They can also offer appropriate discounts to reduce the purchase cost for tea companies.

5.2.4. Strengthen information security and equipment maintenance

Intelligent equipment suppliers can negotiate with tea enterprises, establish a sound information security management system, adopt advanced encryption technology and firewall technology, to ensure the information security of the intelligent storage system. Enterprises should establish a regular maintenance mechanism for intelligent storage equipment to ensure that the equipment is in good running condition. At the same time, establish long-term cooperation with equipment suppliers, so that in the event of equipment failure, technical support can be obtained in time. For possible equipment failures and information security incidents, establish an emergency response mechanism to ensure rapid response and reduce losses in emergencies.

5.2.5. Expand the application scope of intelligent storage

Intelligent storage can not only be applied to the tea packaging and logistics link to improve transportation efficiency and reduce loss, but it can also, through access to big data analysis technology and data depth mining, predict future sales trends, helping tea companies adjust their tea inventory more scientifically and avoid inventory backlogs or shortages. In addition, with the construction of Fenghuangshan Tea Tourism Corridor, the integration of tea tourism has become a new development trend. Intelligent warehousing also plays an important role in this field. Through the intelligent storage system, tea enterprises can efficiently manage the material supply in the tea tourism integration project, such as tourist souvenirs, tea companion gifts, etc., to ensure sufficient and timely supply of materials, so as to improve the shopping experience of tourists and further promote the in-depth development of tea tourism integration.

6. Conclusions and outlook

Under the background of market competition and diversified consumer demand of the tea industry, intelligent storage management has become the key to the transformation and upgrading. This study takes phoenix single cong tea as an example, and discusses the application and effect of intelligent storage management, aiming to provide reference schemes. In the future, tea enterprises should continue to optimize the configuration of intelligent equipment, strengthen the integration of information systems, improve the skills of managers, and expand the application scope of intelligent storage. Intelligent storage management will become an important driving force for the transformation and upgrading of the tea industry, and promote the development of the tea industry to the direction of high quality and high efficiency.

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