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Research on Operation Solutions Based on Computer Technology - Taking the Fruit Industry Sales as an Example

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ABSTRACT

This paper applies computer technology to transform the fruit industry sales from traditional planting, processing, and sales models to intelligent, refined, and efficient operations through digital empowerment, refined management, and enhanced brand effect construction, thereby improving the operational efficiency and competitiveness of the entire industry chain. It is of profound and significant importance for promoting the transformation and upgrading of Shaanxi's fruit industry, significantly improving fruit industry management efficiency, enhancing market competitiveness, actively promoting farmers' income increase, and accelerating the sustainable development of the fruit industry.

KEYWORDS

Fruit Industry; Sales Industry; Digitalization

1. INTRODUCTION

Since the 18th National Congress of the Communist Party of China, China has been on a new journey of building a socialist modernized country, attaching increasing importance to digital agriculture and rural construction according to the national conditions and characteristics of the times. Shaanxi Province, as an important fruit-producing area in China, possesses rich fruit industry resources and a solid industrial foundation. However, traditional fruit industries face many challenges in market information acquisition, supply chain management, and brand building. With the rapid development of digital technology, digital transformation has become the key to solving these problems. Therefore, the fruit industry urgently needs a set of solutions based on computer technology to address the information silos and broken links in various links of the entire industry chain, providing a template for the informatization development of the fruit industry. This paper applies computer technology to study and realize the visual full-life cycle management from production bases to warehouses and then to sales in six aspects of customer management, sales management, online malls, traceability and supply chain systems, business middle office, and AI analysis. By building information systems, coordinating the regulation of important agricultural products, improving the monitoring and early warning system of the whole agricultural product industry chain, further strengthening the construction and application of enterprise informatization, integrating various data resources and application systems within the enterprise, promoting the construction of data standard systems, enhancing the ability of information interconnection and sharing, data-driven production, operation, and control level improvement, and changing the scattered situation of existing business systems, it supports the long-term development of enterprise informatization and digitalization.

Functional Design Research

To achieve visual full-life cycle management from production bases, warehouses, and sales, through investigation and study, the author believes that customer management, sales management, online malls, traceability and supply chain systems, business middle office, and AI analysis are the focuses of the fruit industry sales, and this paper studies and designs the above focuses one by one, aiming to lay the foundation for enterprise informatization and digitalization.

1.1. Customer Management

It includes:

(1) Customer Information Management: Collect, store, and update basic customer information, purchase history, preferences, etc., to build customer profiles;

(2) Customer Relationship Maintenance: Maintain communication with customers through various channels such as emails, SMS, and social media, provide personalized services, and enhance customer satisfaction and loyalty;

(3) Customer Feedback Handling: Timely collect and handle customer feedback for product improvement and service optimization.

1.2. Sales Management

It includes:

(1) Sales Order Management: Receive, process, track, and complete customer orders to ensure the accuracy and timeliness of order information;

(2) Sales Performance Analysis: Conduct statistical analysis on sales data, including sales revenue, volume, channels, etc., to assess sales performance and market performance;

(3) Sales Channel Expansion: Manage multiple online and offline sales channels, and expand new sales opportunities and partners.

1.3. Online Mall

It includes:

(1) Product Display and Search: Provide rich product display pages and convenient search functions for customers to browse and filter products;

(2) Shopping Cart and Checkout: Support users to add products to the shopping cart, make online payments and checkouts, and provide multiple payment methods and a secure payment environment;

(3) After-sales Service: Provide complete after-sales service functions such as online customer service, returns and exchanges, and complaint handling to protect customer rights.

1.4. Traceability and Supply Chain System

It includes:

(1) Inventory Management: Real-time master inventory situations, including inventory quantity, location, status, etc., to achieve accurate inventory management;

(2) Warehouse Operation Management: Manage the entire process of warehouse operations such as inbound, outbound, inventory, and transfer to improve warehouse operation efficiency;

(3) Logistics Distribution Management: Connect with logistics companies to achieve quick order distribution and logistics tracking, and provide logistics information query services.

1.5. Business Middle Office

It includes:

(1) Service Sharing: Provide unified service interfaces and shared resources for various business departments, such as user centers, order centers, payment centers, etc.;

(2) Process Management: Standardize and automate business processes to improve work efficiency and reduce human errors;

(3) Data Analysis: Collect and analyze data from various business departments to support decision-making.

1.6. AI Analysis

It includes:

(1) Data Collection and Integration: Collect data from various business departments and systems, clean, integrate, and store it to form a unified data warehouse or data lake;

(2) Data Analysis and Mining: Use AI tools and technologies to conduct in-depth data analysis and mining to discover the patterns and trends behind the data;

(3) Visualization Reports: Present the analysis results in the form of visualization reports to decision-makers and management to assist in making scientific decisions.

1.7. Innovative Technology Research

On the basis of meeting the above key functions, the author believes that it is necessary to conduct innovative technology research in three directions: “Traceability and Supply Chain Management System”, “Digital Classification of Fruit Warehouses”, and “AI Applications” to improve the applicability value of the solution and better empower enterprises and products.

1.8. Traceability and Supply Chain Management System

(1) Product Information Database, Product Traceability

Support the generation of QR codes, barcodes; support the tracking of full-life cycle information of items; support the entry and maintenance of item information; support the collection of platform sales data; support the collection and display of logistics tracking information, quality management. It includes data storage, traceable information identification, integration capabilities, and traceability query log management.

(2) Supplier Management

Conduct research and design in supplier information evaluation, supplier selection, performance management procurement management, etc., provide corresponding information query and filtering, specific data export and other functions, to support supplier performance analysis with real-time inbound and outbound management and analysis, storage and transportation environmental display and output and other functions, early warning and alarm information, the operation status of cold storage vehicles, to achieve centralized management of multiple regional cold storage and transportation. The main contents include supplier basic elements, supplier evaluation, and supplier performance management.

(3) Warehouse and Logistics Management

Warehouse and logistics management covers warehouse management and logistics management. Warehouse management includes warehouse layout design, operation management, equipment configuration, and inventory analysis, while logistics management involves vehicle management,

driver scheduling, transportation cost control, and logistics distribution and other links. The main contents include warehouse cold transportation monitoring, quality management, etc.

1.9. Digital Classification of Fruit Warehouses

The digital classification of fruit warehouses can be mainly divided into three categories: traditional warehouses, semi-digital warehouses, and full-digital warehouses.

(1) Traditional Fruit Warehouses: The management method mainly relies on manual and paper records, lacking the support of digital technology. In the inbound, classification, storage, and outbound of fruits, manual completion is required, and this management method is inefficient and prone to errors.

(2) Semi-Digital Fruit Warehouses: On the basis of traditional warehouses, some digital technologies are introduced to improve management efficiency. Its functional construction includes information management systems, such as WMS systems, for recording and managing fruit inbound, storage, outbound, and other information, reducing the use of paper documents, and improving data query and statistical efficiency. Compared with traditional warehouses, semi-digital warehouses have improved efficiency in fruit classification, inbound, and outbound links, but still require a lot of manual participation. However, despite collecting some data, semi-digital warehouses still have insufficient data integration and analysis capabilities, making it difficult to form effective decision support.

(3) Full-Digital Fruit Warehouses: A comprehensive application of digital and intelligent technology for fruit storage and management systems, whose core functions include intelligent information management systems, high-precision environmental control, intelligent sorting systems, blockchain traceability, and intelligent security monitoring. It uses big data, cloud services, AI vision recognition, the Internet of Things, and intelligent warehouse management and other advanced technologies to achieve full-digitization management of fruits from inbound to outbound, ensuring the best storage conditions for fruits. It not only reduces labor costs and error rates but also discovers and solves potential problems in a timely manner through real-time monitoring and data analysis, ensuring that fruits are stored and sold under the best conditions. In addition, full-digital fruit warehouses can also provide accurate decision support for managers, such as inventory alerts, sales forecasts, etc.

1.10. AI Applications

AI applications are mainly for the fruit AI vision recognition system. Fruit AI vision recognition technology is a comprehensive application of machine vision, deep learning, and image processing technology for efficient and accurate identification of fruits. Its technical implementation process includes data collection and annotation, model training and optimization, and real-time recognition and feedback.

(1) The system has real-time image acquisition and processing functions. Through built-in high-definition cameras or external image acquisition devices, it captures fruit images in real-time and preprocesses the images using image processing algorithms to improve the accuracy and efficiency of the recognition process. Secondly, the system realizes the recognition and classification function of fruits. Using a trained deep learning model (such as a Convolution

Neural Network CNN) to extract features and classify the preprocessed images. This model has been trained with a large number of annotated data to improve recognition accuracy and generalization ability.

(2) The system also has multi-species recognition and mixed recognition functions. In the model training stage, a dataset containing multiple species is used for training, so that the model can learn the characteristics of different species. At the same time, multi-classification strategies and feature fusion technology are used to improve mixed recognition ability. The system also evaluates the

maturity and quality of fruits. By training a specialized maturity and quality assessment model, using color, texture, and other characteristic information in the image, the maturity and quality of the fruits are quantitatively evaluated. The system has data recording and statistical analysis functions. By integrating a database or data storage module, it is used to store recognition results and related information, and provides data query, statistics, and analysis functions, generating visualized reports or charts. User interaction and feedback functions are also an important part of the system. The system should provide a friendly user interface, allow users to input query commands, view recognition results and statistical analysis reports, and provide a feedback mechanism for users to make improvement suggestions. According to different actual application scenarios, the fruit AI vision recognition system can also selectively add functions such as real-time price calculation, shelf life management, and inventory monitoring. The real-time price calculation function calculates the total price by combining the fruit price information with the recognition results and interfaces with the cash register system to achieve fast cash register. The shelf life management and inventory monitoring function monitors the inventory status and shelf life in real-time by recognizing the shelf life information of the fruits, reminding the merchants to sell or handle expired fruits in a timely manner.

2. CONCLUSION

This article has conducted an in-depth investigation of the current situation of the fruit industry, clarified the construction requirements and goals, and proposed six major system technical solutions and three major innovative system demonstration analyses. It lays a certain foundation for promoting the application of the platform in the entire industry chain and improving the quality and efficiency of the fruit sales industry.

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