Data visualization project implementation workflow of smart cold chain system

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Abstract. Purpose: In response to the increasingly complex cold chain related work, the requirements for daily cold chain system data information collection, analysis and data information traceability continue to increase. This article starts from a design perspective, research how to improve the effectiveness and usefulness of data and information transmission in the cold chain system to build a smart cold chain system. Method: By mining the connection between smart cold chain and data visualization, analyze the goals and requirements of data information transmission and reception. The design uses a large data visualization screen as the carrier, mainly research the design process of data visualization large screen, it is used to construct the actual operation of the data visualization project of the smart cold chain system. Conclusion: Data visualization has great advantages in mining, disseminating and communicating data information. Combine the smart cold chain system with data visualization, provide effective data information for workers in the smart cold chain industry, highlight functions required to upgrade the smart cold chain system, consolidate the coordination between the various working links of the smart cold chain, strengthen the user experience of the staff related to the smart cold chain, improve the efficiency of smart cold chain work.

1. Introduction

Due to the rapid development of the cold chain industry, increasingly fierce business competition, and the imminent cold chain traceability in the post-epidemic era, traditional project production methods can no longer meet the needs of the cold chain market, but a comprehensive and efficient data visualization method is needed to carry out projects Manage, restrict work processes, formulate work standards, and improve industry quality. With the widespread application of information technologies such as the Internet of Things and big data, the traditional cold chain system should be transformed and upgraded to automation and intelligence. Building a smart cold chain system has become the development trend of the future cold chain industry. At present, the cold chain system is not perfect. Due to the nature of collaborative work in each link, and the information of the smart cold chain system comes from many different aspects, the users of the smart cold chain system also come from a variety of fields, therefore, the requirements for the acquisition and transmission of data and
information have also increased. How to use data visualization methods, it has become an important research topic to be able to transmit the effective information of the cold chain system more efficiently and usefully. This research will take the smart cold chain system as the design object and the data visualization design process as the main content of the research, focusing on how to use data visualization to accurately and efficiently communicate smart cold chain data to relevant cold chain workers.

2. Overview of data visualization of smart cold chain system

2.1. Research Background
From a national perspective, the national “new infrastructure” policy support accelerates the development of the times, and big data is the future of the smart cold chain. The epidemic is accelerating the practice of data visualization in the smart cold chain. Cold chain epidemic prevention has become a key entry point for foreign defense and needs to be included in normalized air defense. The state clearly requires that the entire process of closed-loop control of imported cold chain food be implemented. In view of the large amount of work and multiple links in cold chain food disinfection and inspection, it is necessary to use data visualization technology to improve the current inspection efficiency and prevention and control safety.

The main problem solved by data visualization is data perception. The massive information produced by the cold chain system can be quantified to obtain a valuable digital basis. The more important problem is to transform data perception into data perception. Human cognitive psychology is more complicated. This article will summarize the design model of data visualization design of smart cold chain system from the perspective of the development of smart cold chain system under the background of data visualization era, and study the data visualization of smart cold chain system. The designed process provides some reference ideas and methods for improving the information transmission rate of the smart cold chain system, and finally uses data visualization to meet the needs of cold chain system integrated operation and cold chain system big data real-time display applications.

2.2. Significance
In this article, through the production of actual projects, it is to mainly study the workflow of data visualization design of smart cold chain system, and study how to build a cold chain information collection model and build a cold chain information visualization platform, put forward the visualization and dataization of the whole process of the cold chain system. Combined with data visualization to highlight the important role of cold chain information. This research has important theoretical value and academic significance for the development and construction of my country's cold chain system. The construction of the cold chain system data visualization information platform is beneficial to related enterprises and the government. Enterprises can exchange information through the platform and strengthen their own competitiveness; the government can implement supervision and monitoring through the platform to avoid the appearance of vicious food Security Question. Considering comprehensively, the research on the collection and application of information of the smart cold chain system in this study has important practical significance for promoting the development of our cold chain level, improving the living standards of the people, and ensuring the safety of our citizens.

3. Data visualization design workflow of smart cold chain system

3.1. Business index combing and data collection
Clarify the problems to be solved in the visualization project, collect the data information that users want to view, in order to obtain the data content of the visualization large screen, and develop a large screen data visualization design after fully understanding the business needs. The effectiveness of
statistical data information is to classify whether the data is available in real time and which data is available in a specific time period, analyze customer needs, determine priority and classify requirements, and business personnel organize business scenarios according to customer needs and expected results. The business scenario extracts key indicators, divides the business indicators into primary and secondary, and splits the effective data into different dimensions.

3.2. Quantitative information processing and establishment of indicators
After determining the visualization goal and visualization form, establish the index that best provides the goal. The collected information is quantitatively processed to obtain a digital basis, and the key indicators are effectively divided and framed in the previous step to establish the indicator analysis dimension, so that users can easily measure the degree of business development. Indicators of different dimensions correspond to display modes from different perspectives. Therefore, the establishment of indicators after quantitative processing of information lays the foundation for subsequent sorting of information levels and selection of reasonable visualization charts.

3.3. Visual form model mapping and analysis display graphics can be achieved
After establishing the indicators, the data needs to be presented to the user in an intuitive, easy-to-understand and manipulate manner, that is, the data must be converted into a visual representation based on the visualization mode and presented to the user. Choosing the correct chart type helps users understand the information and laws contained in the data. The choice of chart type depends on the type of data being processed and displayed by the designer. The selected chart should follow the principles of easy understanding and achievable. In addition, designers can add innovative graphs and charts, and users can choose according to their needs. At the same time, designers need to clarify the data that can be processed efficiently and the form of charts that can be carefully processed to prevent developers from not achieving development work. Developers should work together to achieve the display effect.

3.4. The page layout is divided to form a prototype
Before entering the large-screen page design stage, the designer needs to understand the large screen, determine the size of the design draft, and then enter the page layout and division stage. Only by rationally using spatial relationships and paying attention to the integrity and continuity of the page can the page layout be completed effectively.

Layout and display charts according to the established business indicators to reflect the distinction between primary and secondary, related relationships, and improve delivery efficiency. Then conduct reports and exchanges. The report mainly confirms whether the data can be collected and used, whether the business indicators are correct, whether the graphic representation conforms to the business logic, record the customer's comments on the modification of the business indicators, and deeply understand the style and style that the customer wants, which is the next step Lay the foundation for the design work, as shown in Figure 1.
3.5. Large-screen visualization design and production

After the prototype and design style are determined, the designer will enter the visual design stage. The work content at this stage can be roughly divided into graphic design, modeling design and motion design. In graphic design work, all design activities are centered on displaying key information and indicator data. In the design process, it is necessary to grasp the uniformity and coordination of the visual element styles. Under the premise of keeping the design semantics consistent, in order to avoid a single form, some decorative elements can be added to the details. In terms of color use, colors with sharp contrast are selected, and the background is generally dark tones, so that the entire large screen is not easy to cause user visual fatigue, and at the same time, the large screen content is vivid and easy to distinguish and watch. Designers carry out reasonable visual design based on the defined design style, determined business indicators and chart types. At the same time, the design process is divided into several steps, and the customer continues to communicate and modify and improve, and gradually achieve perfection and refinement. There should be multiple iterations during the modification process, to avoid the situation of major repairs and major changes.

3.6. Design, development, configuration and testing

After all the large-screen design pages are finalized, enter the development process. The visual resources are organized and archived by the designer and sent to the developer. After the developers have completed the first development of all large-screen pages, they can get the feedback report of the design walkthrough and enter the second adjustment stage. After the adjustment work is over, the developer will output a final configuration file, which means that 90% of the design and development work of the large-screen project has been completed, and the remaining 10% is for on-site debugging.

On the one hand, developers will arrange configuration files on the on-site host device, and do a good job of local database backup, in case the on-site network environment becomes unstable and affects the reading of real-time data. On the other hand, the designer needs to check the readability of the data and text information on the spot, and the coordination of the proportion of the information form on the overall screen. If the designer has a problem, he should communicate with the developer to correct it in time. During the development and configuration process, the design personnel should cooperate to avoid inconsistency between the effect and the design draft.

3.7. On-screen demonstration and customer confirmation

Designers and technicians should demonstrate the prepared data visualization page on the large data visualization screen. And confirm with the customer the business and style of the visualized large-screen, at the same time record customer opinions, in order to carry out the final modification.
and daily operation and maintenance guarantee.

4. Data visualization design practice of smart cold chain system

Undertaking the above workflow analysis for data visualization design, the functional requirements of smart cold chain systems are roughly divided into three categories: enterprise data monitoring, public security traceability, and departmental supervision. The users targeted by this design practice are smart cold chain companies, staff member. In non-functional requirements, the use scene is a large data screen with a size of 1920px*1080px. The cold chain work has timeliness, the overall style should be rigorous, atmospheric, and full of sense of science and technology, and should be practical, scientific and convenient in use and operation.

First of all, in the smart cold chain large-screen data visualization design project, the key indicators that need to be extracted are: cold chain company name, date and temperature, market operation area, national agricultural batch market distribution, regional cold storage capacity, corporate strategic layout, national Data with core business value such as fruit transaction volume, national frozen product transaction volume, and national vegetable transaction volume.

The designer first quantifies the acquired information, then determine the indicators and analysis dimensions. The indicators of different dimensions correspond to the display modes from different perspectives. Determining the indicator analysis dimension lays the foundation for the subsequent combing of information levels, and selection of reasonable visualization charts. After finishing the above preparations, divide the page layout area for the data hierarchy (Figure 2).

Since the smart cold chain system involves a wide range of aspects, this research will take a picture of the smart cold chain as an example for design practice. Data visualization design practice for smart cold chain system (Figure 3), based on the confidentiality of the case, some information in the design has been modified.
5. Conclusion

Use the method of data visualization to realize the intelligent management, monitoring and analysis of the smart cold chain system, so that all links of the smart cold chain system are seamlessly connected. The essence of data visualization revolves around how to bring relatively complex and abstract data to users in a visual and easy-to-understand way to bring better experience, expression, and analysis and early warning. Through the establishment of a large data visualization screen for smart cold chain enterprises, an auxiliary decision-making hub between data and users is established to make users feel relaxed and happy; by continuously polishing the visible details of the data, the data concept is enriched and truthfully expressed, and precise positioning of problems and risks is achieved. Finally, the perfect combination between data and business is realized. Mastering the data visualization design workflow can accelerate the cold chain industry’s entry into smart management, solve the current cold chain system’s backward management mode and the reality of ultra-energy-consumption operation, make the cold chain system operate more reasonably and economically, save energy consumption, and ensure goods Quality, avoid cold waste, thus forming a smart cold chain system.

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