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Research on the Construction of Logistics Equipment Support System under the Background of the Internet

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Abstract

Based on the application of the Internet of Things and cloud computing technology to the construction of the logistics equipment support system, the paper puts forward the concept of "smart logistics equipment support system", and studies and explores its basic connotation, feasibility analysis and basic ideas for construction. In the future, the construction of the logistics equipment support system will take the road of "smart" development and effectively improve the overall effectiveness of logistics equipment support.

Keywords

Equipment system, maintenance support capability, parameter system, Internet, support system.

1. Introduction

Logistic equipment supports information system integration, that is, the heterogeneous database equipment supports information systems developed by various departments and supported by different databases are integrated into a new platform for unified management, resource sharing, and elimination of "information islands." The navigation equipment support information system has developed rapidly, and a large number of information systems have been developed to apply to the military's equipment support, but there are still shortcomings, mainly reflected in the lack of unified technical standards and planning guidance, the difficulty of compatibility between information systems, and the difficulty of integrating information sharing . The integration of equipment support information system mainly studies two aspects: integration model and integration technology. There are generally two methods for integration models: one is a unified architecture method based on top-level design, that is, the establishment of a unified logistics equipment information sharing center, and the establishment of a support subsystem that follows a unified standard, a unified network, and a unified technical system. The method does not conform to the status quo of the development of the maritime industry [1]. The other is the information integration method based on middleware, that is, through the establishment of "connections" between the existing guarantee information systems, the information flow of each link is integrated, and information is shared. In terms of information technology, XML can not only extract structured data, but also extract required information from semi-structured and unstructured data. Therefore, this article adopts the UML method to construct the equipment support information system integration model, and uses XML technology to realize the data sharing between information systems.

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2. Autonomous Support System for Marine Logistics Equipment

Autonomous support is derived from the autonomic nervous system, a knowledge-based logistics support system that guarantees and strengthens logistics equipment tasks based on the identification and comprehensive logistics support requirements, supply chain management, component reliability and safety, etc. carried out. The purpose of autonomous support is to design an active logistics equipment support system to identify problems to the greatest extent and initiate the correct response autonomously. Its contents include:

1) With the help of high and new technology such as information technology, the condition-based maintenance and the entire information chain system are combined to achieve the information integration of logistics equipment support. 2) Standardize and strengthen the self-diagnosis, prediction, and maintenance support capabilities of logistics equipment so that logistics equipment is not only the object of maintenance, but also an important part of the main body of maintenance support. 3) Reduce logistics equipment support links, optimize logistics equipment support systems and resources, and achieve the goals of accuracy, mobility, speed, and economic support. Autonomous support technology is being developed and applied simultaneously with the JSF project, and is beginning to be popularized and applied in the logistics equipment of other maritime industries [2].

3. Analysis of Influencing Factors of Equipment System Maintenance Support Capability

3.1. Analysis of the Implementation Process of Maintenance Support

Equipment support can be divided into two types: use support and maintenance support. The research object of this article is the marine equipment system, and only the maintenance support is considered. Through the study of the interaction between the navigation mission system, the support object system and the support system, the implementation process of maintenance support can be better described. The interaction between the support target system and the navigation mission system will enable the use of equipment, promote the construction of the support system, and drive the operation of the support system, and the operational effect of the support system will counteract the two, thus affecting the use of equipment and the success or failure of the mission. As shown in Figure 1.

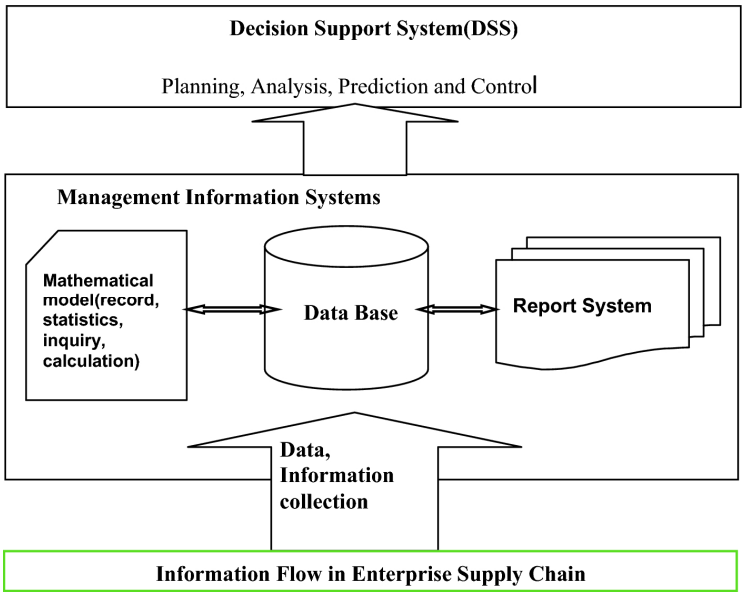

Figure 1. The relationship between the logistics support system and other systems

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3.2. Influencing Factors

The aforementioned support process involves the decision-making, supply, maintenance, and transportation aspects of the equipment support system. In the process of evaluating the completion quality of specific nautical tasks, the top-level parameters of logistical equipment integrity and mission continuity are often used as comprehensive indicators to measure. The logistical equipment integrity parameters include equipment integrity rate, availability, and mission continuity typical parameters are Navigation efficiency. This paper selects these three parameters as comprehensive parameters that affect the maintenance support capability.

Equipment quality performance is also an aspect that affects maintenance support capability. Here, equipment reliability and maintainability that are most closely related to equipment maintenance are selected as the research content. For a specific type of equipment, the higher the frequency of natural failures, the greater the pressure on the support system and the greater the difficulty of maintenance support, thereby reducing the possibility of completing maintenance support tasks within the specified time; , Whether the equipment is easy to maintain also affects the advancement of maintenance support tasks, which also belongs to the category of maintainability. Through the above analysis of the equipment system support process and the frequency of failures, maintenance support capabilities can be preliminarily divided into the following sub-capabilities: support resource allocation capabilities, inventory supply capabilities, transportation capabilities, support command capabilities, maintenance capabilities, and general quality characteristics of equipment. as shown in picture 2.

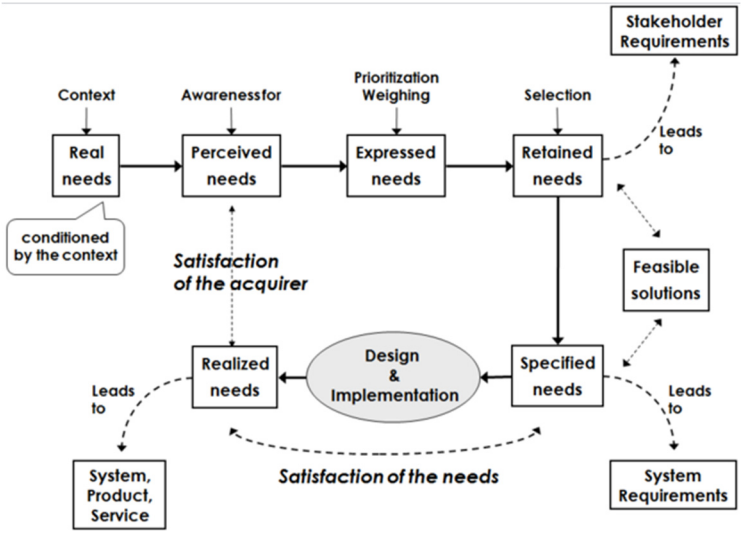

Figure 2. Logistic maintenance function analysis diagram

3.3. Raising Supply Capacity of Stock Spare Parts

The objects of spare parts financing and guarantee are equipment and spare parts, which mainly provide timely supplements for equipment and spare parts that are lacking under maintenance conditions, thereby improving the sustainability of maintenance. In the whole maintenance activities, the equipment supplies unit and the corresponding warehouse are related to the stock spare parts financing and supply. When resource allocation is fully prepared in advance, the impact of the financing and supply of spare parts on the entire maintenance support activities is concentrated in the supply efficiency of the actual support process. Therefore, the number of supply units, the distribution capacity of the supply units, the average loading and unloading capacity, and the average preparation time required for the task are selected as relevant parameters [3].

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4. Logistics Equipment Integrated Management System under the Background of the Internet

4.1. Integration Elements of Equipment Support Information System

The integration of equipment support information system faces many users, and the handling of affairs is complicated. The core part of the equipment support information integration system is the development of a data integration environment. Data is the basis of the integration platform and the basic condition of integrated applications. The key technology of the data integration environment is heterogeneous data integration. Heterogeneous data integration is the process of binding the concepts and knowledge of individual data sources with a global unified data view. The global view isolates users from specific data sources, and users do not need to consider where the data comes from when accessing data. Considering how the data is transformed into a unified global view, the main elements included in the integration of equipment support information systems are shown in Figure 3.

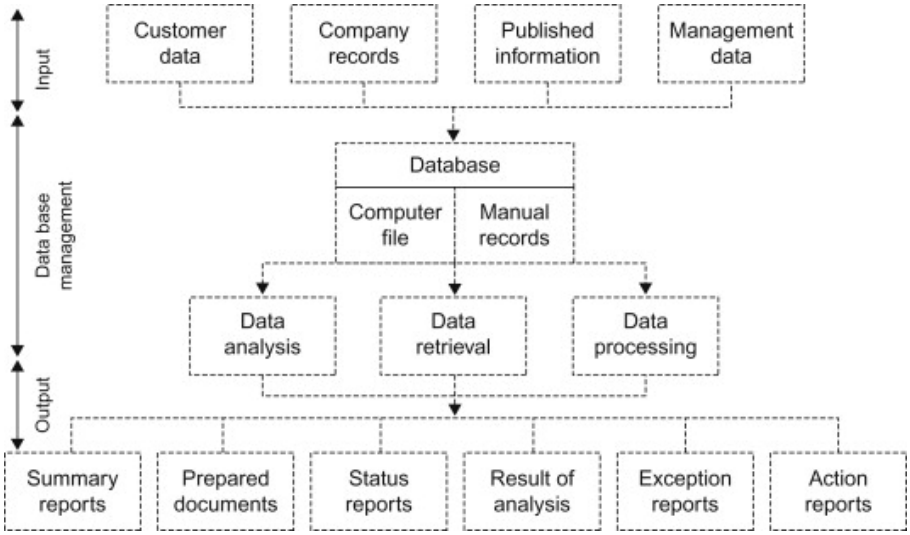

Figure 3. Integration elements of logistics equipment support information system

According to the current status and development trend of the existing equipment support information system and the information integration method of the said middleware, we adopt the "bridging" method, that is, a considerable number of local autonomous support information systems are coupled to realize material flow and information flow. It is used as an entity for the user and material information interaction of other guarantee information systems. At the same time, it is equipped with an information exchange system based on XML technology to realize data exchange with other information systems through an intermediate file format. Electronic label information is exchanged by information System write or read.

4.2. Overall Model of Equipment Supports Information System Integration

The design of the intermediate file format is mainly due to the fact that multiple equipment support information systems are required to perform information conversion for each information system. The workload is too large and it is difficult to meet the ever-changing management needs of the warehouse. Therefore, an information exchange system based on XML intermediate format is developed to shield the differences between systems. However, due to the different functions of the current equipment support information system platform, and there is no unified standard for database design, the information conversion system can be used as an embedded module of the equipment support information system. The overall model of equipment support information system integration is shown in Figure 4. The information

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exchange system exchanges data with the equipment support information system through an intermediate file format [4].

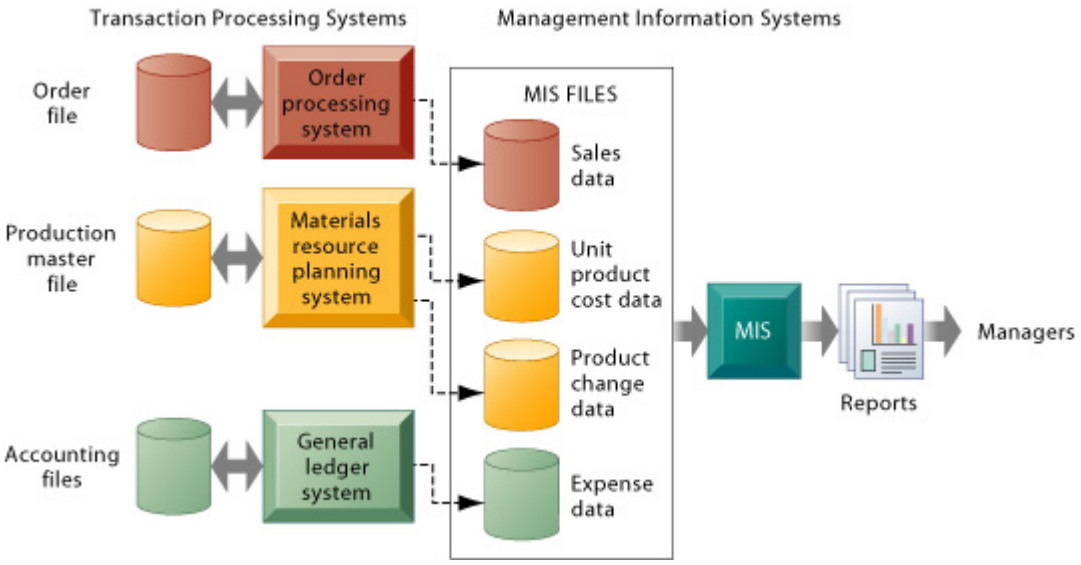

Figure 4. Overall model of equipment supports information system integration

In order to perform unified processing, the system must use a common model to represent various data from different information sources. The equipment support information system is the data provider of the system and contains heterogeneous information of different systems. Each data source can be located at a different service site, and the data is managed in a local way. To achieve information exchange for each information system, a unified public dictionary and model are used to establish an XML-based intermediate file format. The heterogeneous data integration middleware shields the distribution and heterogeneity of data sources. From the user's point of view, all data They are all local and in the same service domain. The middleware is responsible for the processing of specific query requests and the return of results. The middleware mainly realizes the unified query and access to the heterogeneous data sources of the data layer, and provides the required basic data service interface for the upper-layer business.

5. Logistics Equipment Support System Simulation

This paper studies the five types of agents used in the logistics support simulation system and the coordination relationship between them for the behaviour of the support layer, that is, the logistics support department (branch).

5.1. Interface Agent

The interface agent is the master control agent in the system. It is mainly used to complete the data interaction tasks between the logistics support simulation system and other sailing members. On the one hand, it receives command and control, maritime situation, entity interaction and other information from other members through RTI. And by coordinating with each entity agent in the system, the task is decomposed and assigned to the appropriate entity agent for processing. On the other hand, the simulation data is provided to the outside according to the results of the coordination and execution of each entity agent in the system [5].

5.2. Material Warehouse Agent

The warehouse agent is mainly used to simulate the business behaviour of the warehouse director in the navigation, mainly including: according to the plan and instructions of the

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superior, organize the completion of the delivery and storage of ammunition and equipment; calculate and apply for the transportation capacity, according to the existing staff and material status, timely dispatch The transportation team guarantees the navigation unit; it commands the dispatched transportation team, summarizes the situation that occurs during the transportation, and reports to the logistics support agency in a timely manner.

5.3. Health Unit Agent

The health team Agent is mainly used to simulate and organize the supply of medicines and equipment on ships and professional health training, guide and assist ships in health protection and epidemic prevention, provide ambulance, medical treatment and evacuation of the wounded and sick on ships, and summarize the implementation of guarantees , Report to the superior unit in due course.

5.4. Agent

Maintenance Agent is mainly used to simulate and implement the maintenance of facilities such as docks, ship caves, warehouses, barracks and special roads, including the berthing, supply, repair and shore training of the ship, as well as the fresh water, soft water, and shore power required by the ship. As well as heating and high-pressure air supply activities, and summarize the implementation of the guarantee, and report to the superior unit in a timely manner. For the coordination relationship between the agents in the logistics support simulation system, this paper mainly studies the following aspects: the hierarchical relationship between the interface agent, the material warehouse agent, and the terminal maintenance agent, as shown in Figure 5.

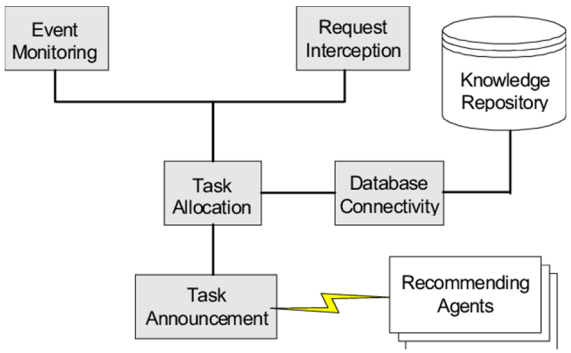

Figure 5. Coordination diagram between Agents

6. Conclusion

The establishment of a parameter system for the maintenance and support capability of the equipment system is the basis for the research on the navigation support of the equipment system. This article first clarifies the research object, and secondly, on the premise of determining the comprehensive parameters of the maintenance support capability of the equipment system, the sub-capabilities are divided, and the basic parameters for evaluating each sub-capability are explored from the influencing factors of each sub-capability, thereby establishing The three-level parameter system facilitates the modelling and simulation of maintenance support capability.

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