Application and Development of Computer Technology in Modern Military Logistics Construction

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Abstract: *Military logistics is regarded as the "main artery" of modern warfare and is the foundation of combat command and logistics support. With the rapid development of computer technology, military logistics is gradually integrating computer technology to build modern informational military logistics. Based on the actual background of building modern informational military logistics, this paper points out the importance of computers in the construction of modern military logistics from three dimensions: a collection of cargo transportation and military logistics information transmission, information transmission and sharing, and intelligent dispatching of military logistics, and discusses the application of computer technology in the construction of military logistics from the level of procurement, transportation, storage, distribution and management.*

Keywords: *Logistics; Military; Computer technology; Cloud support*

1. Introduction

The level of military logistics is an important indicator to measure a country's military strength. With the rapid development of computer and network technology, global military logistics have also been upgraded iteratively. Military logistics informatization has become an inevitable trend. To win modern wars, it is urgent to build modern military logistics that match them. Computer technology has been continuously applied to the field of military logistics, enhancing the transmission, storage and interaction capabilities of logistics information, promoting the intelligent and information-based development of military logistics, and significantly improving the efficiency of military logistics [1]. The application of new science and technology in foreign military logistics has reached a high level. At present, a modern logistics technology pattern with system technology as the core and information and automation technology as the support has been formed. Therefore, China, as a military power and information technology power, is bound to fully integrate computer technology into military logistics, and transform to the construction of modern information-based military logistics, to further enhance military strength and combat collaboration [2-4].

2. Computer Technologie Application Framework

The application of computers in military logistics construction is mainly based on the data generated by the operation of various military actors, supported by the Internet of Things, blockchain, cloud computing, big data and other information technologies, and realized through intelligent operations and cloud platform construction. It plays a role in military logistics links such as storage, transportation and distribution [5]. Through automatic perception and identification of all links of military logistics and information integration of all support units, a new logistics support form with intelligent military logistics decision-making and real-time support is realized.

2.1. Material basis

The data information generated by the operation of military logistics is an important material basis for realizing the intelligence and informatization of military logistics. Data processing and application are the keys to the application of computer technology in military logistics [6]. Each military actor collects various structural, semi-structural, or non-structural information, such as inductive information,

attribute information, fault information, location information, etc., using communication technology according to its own needs; It is processed by data analysis technology and transferred in the informational military logistics system, to meet the specific needs of situation awareness, data interaction, demand feedback, etc.

2.2. Technical support

2.2.1. Internet of Things

The Internet of Things is a real-time acquisition technology, which provides the sensing capability for objects through various sensors, laser scanners, infrared sensors, radio frequency identification technology and other technical devices. In the application of military logistics, the Internet of Things can be seen as a nervous system, that connects and monitors various military actors [7].

2.2.2. Cloud Computing

The powerful computing power of cloud computing provides an important supporting condition for the development of military logistics informatization and intelligence. The distributed computing, processing, database and cloud storage functions can analyze the distributed architecture of big data, with low configuration cost and fast and flexible operation response. It provides flexible computing resources for the intelligent and information-based development of military logistics and is the heart of the intelligent and information-based system of military logistics [8].

2.2.3. Artificial Intelligence

During the development of military logistics intelligence and informatization, AI can be regarded as the brain of the military logistics system. According to the actual needs, it can screen the key information from the original information data to achieve the whole process of data collection, storage, calculation, transmission, utilization, etc. among various military actors. At the same time, artificial intelligence provides military logistics systems with strong self-learning, adaptive and self-updating capabilities, which is also the most significant feature of modern information-based military logistics different from traditional military logistics [9].

2.2.4. Grid technology

As the third generation Internet technology, grid technology can provide environmental support for the intelligence and information development of military logistics. Its core work is to build a cooperative work system among the military actors distributed in each node of the information network, to achieve real-time information sharing and transmission. Grid technology is an important prerequisite for building a "perception feedback" military logistics network [10].

2.2.5. Blockchain technology

Blockchain technology, as a subversive interconnection technology with universal significance for the future digital economy and social development, is increasingly accepted by the storage and logistics industry, and will also show great value in the field of military logistics. Blockchain is a new application mode of distributed data storage, point-to-point transmission, consensus mechanism, encryption algorithm and other computer technologies. It has the characteristics of decentralized, untrusted, collective maintenance and reliable database, realizing the organic combination of data distributed storage and asymmetric encryption [11].

2.3. Implementation mode

2.3.1. Intelligent operating system

An intelligent operation system is an important entity foundation for the development of military logistics intelligence and informatization. It can build an intelligent demand forecasting system, an intelligent military logistics unit and an intelligent blockchain chain for military logistics management. Realize the digitalization of logistics elements, geographic information and military user groups. Through RFID technology and sensors, we can effectively identify and multi-mode perceive the elements such as people, vehicles and objects in the military logistics system; Intelligent positioning of various elements in military logistics according to geographic information system, remote sensing system and BeiDou Navigation Satellite System; At the same time, every information dispatch, use and processing of each military actor is recorded in the background. In this way, the state information, geographic information and user information of each element in the intelligent operation system can be

obtained, and then the computer technology can be used to predict the state, improve the situation awareness, solve the communication problems of military logistics, and provide important support for the planning of military logistics support force.

2.3.2. Build cloud platform

The formation of military logistics big data is an inevitable result of digitalization. How to effectively use and efficiently process large amounts of data is an important way to the development of military logistics intelligence and informatization. Comprehensively use wired, wireless, short distance and long distance, heterogeneous and IP access networks to transmit data to the cloud, and then extract more data from the massive data through a large amount of data analysis, model and algorithm processing, which is the so-called "logistics cloud". Military logistics is a complex system, which covers many actors. Its efficient operation requires the joint efforts of government departments, the military, third-party logistics and other parties. The logistics cloud can connect stakeholders in all aspects, ensuring the confidentiality of military secrets as well as information. Compared with the traditional military logistics management mode, its information prediction and information matching will greatly improve the combat effectiveness and economic benefits of the military in the application of a cloud platform. The problems such as imperfect equipment, mismatched models of loaded materials, high no-load rate and low efficiency during transportation have been solved. In today's increasingly severe information security situation, the military logistics cloud platform is undoubtedly an important guarantee of security and confidentiality. When data is accessed, it must be authorized by the administrator, and access records cannot be changed, which greatly improves the standardization of management.

3. The Importance of Computer Technology in Military Logistics Construction

3.1. Collection of cargo transportation and military logistics information transmission

The greatest advantage of computer technology is mainly reflected in the automation of the operation process. Looking at the modern military system, the daily transportation volume of military supplies is amazing and can reach 100 million, which puts forward a very high requirement for the distribution capacity of the logistics system and the accuracy of computer technology. Information technologies are interconnected. Military materials and services have been able to integrate systems and information with and transportation centers during procurement and operation [12]. However, military logistics are not unchangeable. When temporary combat tasks are issued or emergency combat preparation is required, more complex situations will occur. It is unrealistic to rely only on manual operation and management. Therefore, it is of great significance to conduct military logistics information management with the help of computer technology and Internet technology, integrate multi-party logistics information, and realize the flexibility of logistics information management of normalized military, combat-ready military, and combat-oriented military.

3.2. Information transfer and sharing

The transmission and sharing of military logistics information can be realized by RF technology of computer technology and cloud platform.

The basic principle of RF (Radio Frequency) is electromagnetic theory. The advantage of the RF system is that it is not limited to the line of sight, and the recognition distance is farther than that of the optical system. The RFID card can read and write, carry a lot of data, be difficult to forge, and be intelligent. RF is suitable for non-contact data acquisition and exchange occasions such as material tracking, and vehicle and shelf identification. Because RF tags have the read-write ability, they are particularly suitable for occasions where data content needs to be changed frequently. No matter whether military materials are in any link of procurement, transportation, storage, use and maintenance, commanders at all levels can master their status and information in real-time. The specific application is realized by RFID tags attached to containers and equipment. RF receiving and forwarding devices are usually installed on some inspection points of the transportation line (such as gate posts, piers, etc.).

The military logistics cloud platform provides the military with a unified logistics service window and has interfaces with local logistics cloud platforms. On the premise of meeting the requirements of military security and confidentiality, data sharing can integrate structured and unstructured data, eliminate data islands, integrate internal and external data, eliminate data fragmentation, and ultimately

improve the visibility of the military logistics system. In addition, the cloud disaster tolerance feature of cloud computing ensures the invulnerability of cloud data.

3.3. Application of Computer Technology in Military Logistics Construction

The computer technology based on big data, according to real-time data statistics, calculates the logistics pressure of each region, each line, and each node, and displays it with the thermal energy curve (for example, the darker the red color is, the greater the material flow is, and the tighter the transportation capacity is). Taking time, cost, risk and other factors as objectives and constraints, a planning model for real-time optimization and intelligent scheduling of military storage resources and transportation resources is established. The dynamic, complex and dynamic military logistics support system often brings unpredictable risks. In order to better predict the danger, it is necessary to widely collect various forms of intelligence, and use special analytical means to judge whether there is abnormal data, so as to take early action to eliminate potential risks.

Cloud computing integrates, manages and dispatches all kinds of military and local logistics resources efficiently through the military logistics cloud platform. For example, the transport link may involve the joint participation of social transport capacity and military transport capacity, or it may involve multimodal transport issues, requiring the use of national basic transport resources at all levels and of all kinds. Even within the army, it is bound to involve the coordination of various storage and transportation elements. The logistics cloud's resource pooling and sharing, extensive network access, and fast elastic scalability can just meet this demand.

AI can also participate in the intelligent deployment of military logistics. AI can comprehensively consider the priority of material demand, quantity and volume of materials, cost and time and other constraints, and use an intelligent inventory model, intelligent path optimization, replenishment and allocation model, operation path guidance, operation balance algorithm, dynamic area balance and other methods to intelligently schedule packaging, material placement, vehicles, personnel, etc.

4. Application of Computer Technology in Military Logistics Construction

The application of computer technology in the construction of military logistics has successfully transformed the space concept of logistics into the time concept, which not only reduces the cost of hardware facilities but also improves the integration efficiency of existing resources [13]. In the modern military logistics information system based on computer technology, all data after input are permanently stored in the database platform for later data calls and military logistics management decisions. All users can operate interactively on this platform. Although our army has accelerated the pace of building military logistics network informatization in recent years, it is still far from the world's military logistics powers. Therefore, if we want to build a modern military logistics system based on computer technology, we must not only introduce foreign key technologies, but also adhere to independent development, and combine the two to quickly build information suitable for ourselves. The ultimate goal is to improve the efficiency of military logistics with advanced computer technology and management level and form a perfect military logistics service function and support capability. The application of computer technology in the construction of modern military logistics can be launched from the aspects of procurement, transportation, storage, distribution and management.

4.1. Procurement

At present, the cooperation between our military and material suppliers in the supply of military supplies is still at the level of resource sharing and division of labor and has not yet entered the stage of resource integration and coordination. The development trend of future procurement will be procurement technology networking, procurement strategy optimization and procurement relationship coordination. Taking the modern military logistics concept as the guiding ideology, the integration of computer technology will provide intelligent services for material procurement, which is mainly reflected in: the computer cloud platform can build a "three-in-one" network interaction system between army users, material suppliers and command and management departments through integration. In this system, the demand information of troop materials, the supply categories and prices of suppliers, and the production capacity of manufacturers can be fully reflected. At the same time, information will continue to provide service interfaces to military command and management departments during the integration process. For example, in wartime or other emergencies, the

command and management department is granted management authority, and according to the emergency demand order issued by the superior of the unit, the command and management department can quickly deploy the supply methods and channels of materials from the storage to the battlefield according to the order.

Compared to the past, this greatly reduces the supply cycle of logistics and guarantees the combat capability of the army. The procurement transaction system based on the computer cloud platform has rich expert database data and computing resources, so it can integrate the process of demand analysis, planning formulation, bidding and procurement, order payment and logistics receipt, so as to improve the professional level of procurement decision-making and procurement operations. At the same time, on the basis of strict confidentiality work, the procurement transaction system based on the computer cloud platform can also automatically release activity process information, thereby comprehensively improving the efficiency and transparency of military material procurement.

4.2. Transportation

The concept of transportation in military logistics can not only be understood as the process of delivering products to users (troops) in transit, but as a logistics cycle from the supply side to the end of the demand side, and the transfer of military materials and information from each link to the next link must have corresponding data records. The addition of computer technology can ensure that military logistics and information flow always flow consistently, and achieve the purpose of online intelligent control of resources. The main technology in transportation is driverless technology. In the past, the long-distance trunk transportation of materials was mainly achieved by people driving cars. The danger of long-distance transportation and the timeliness and accuracy of material supply is difficult to guarantee, while unmanned driving technology based on computer technology can accurately set the transportation route according to the departure time, arrival time, and trunk line, which effectively ensures the punctuality, safety and reliability of the arrival of materials.

4.3. Storage

In the modern military logistics storage system, the main computer technologies are platform application sensors, RFID, barcode, etc. These technologies can upload and connect military material information to the cloud platform, and then operate the storage, inventory and deployment of materials, so as to achieve the purpose of intelligent storage. Specifically, it includes: (1) The cloud platform can accurately formulate scientific material deployment plans according to the types, quantity, location and other data of military supplies, as well as the situation at both ends of supply and demand. (2) Under the technical support of cloud computing, the expert system can provide storage personnel with the implementation plan of material storage, such as optimizing the placement order of goods, so as to achieve the highest efficiency of the shortest path of storage and optimize the level of storage management.

4.4. Delivery

The Internet of Things technology can provide technical support for the distribution system of modern military logistics [14]. For example, Internet of Things technology makes distribution services intelligent. These distribution services can realize the communication and dialogue between people and traffic objects in the distribution process, thus ensuring that the completion of distribution services is intelligent. The implementation path includes the following two aspects:

(1) BeiDou II/GPS/DR/MM integrated positioning and navigation system can realize visualization and controllability of the distribution process. The cloud system built with the Internet of Things and cloud computing technology can include all traffic participants, track the whole distribution process, and feedback on the transportation status, road information and traffic information to the command and management department in real time.

(2) The cloud-based collaborative assistance system, which applies a geographic information system and navigation electronic map, vehicle positioning subsystem, map matching, wireless communication subsystem, path planning subsystem, path guidance subsystem and other technologies, can send real-time traffic information to the distribution personnel according to the actual requirements of the military transportation, avoid the risk of information leakage, and realize the active distribution service function..

4.5. Management

The role of computer technology in modern military logistics management is full chain, not limited to a certain logistics link. In general, the application of computer technology can make military logistics management have the characteristics of visible logistics resources, knowable support demand, and controllable full-dimensional links, so as to achieve the goal of building and optimizing modern military logistics.

4.5.1. Visibility of logistics resources

Logistics resource visualization is a form of refined logistics management, which refers to the process of using image curves, two-dimensional graphics, three-dimensional animation, and other data to accurately display logistics information. Common visualization technologies include network communication technology, automatic identification technology, satellite positioning technology, geographic information technology, etc. With the continuous application of these technologies in military logistics, the current logistics resources of our army in different regions can be integrated into a dynamic logistics visualization network. This is conducive to the coordinated management of logistics resources by all forces and the accurate allocation of materials in real-time according to the visual logistics system.

4.5.2. Knowable Support Demand

As the main component of logistics supports, military logistics is necessary to know the guaranteed demand of military materials according to the real-time situation of the battlefield and the real-time consumption of materials. This is related to the accuracy of the support of military supplies. The knowability of security requirements requires the participation of computer technology to predict requirements. For example, the storage management module of the global combat support system being used by the US military has the support resource demand planning function, which can carry out demand planning and forecasting, thus improving the accuracy of logistics distribution.

4.5.3. Controllable Full-Dimensional Links

Full-dimensional link controllability refers to the visual monitoring of the whole basin and the whole process of military logistics through the application and coordination of computer technology. The ultimate goal is to achieve accurate logistic support. The biggest difference between modern military logistics and traditional military logistics is the controllability of the whole process. All links from procurement, storage, and transportation to distribution may face huge losses of military materials. Through the application of computer technology, real-time monitoring and deployment of logistics in all aspects can be realized, thus narrowing the gap between support and demand. This enables the military supplies to be adjusted and controlled promptly following the battlefield situation and demand changes.

5. Conclusions

This paper describes the basic framework of the application of computer technology in the field of military logistics and then analyzes the importance of computer technology for the construction of military logistics from the three dimensions of cargo transportation and military logistics information transmission, information transmission and sharing, and military logistics intelligent scheduling, and discusses the application direction of computer technology in the construction of military logistics from the aspects of procurement, transportation, storage, distribution and management, It provides guidance for the application and development of computer technology in the field of military logistics.

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