Abstract

In the era of the Fourth Industrial Revolution, where Aegis destroyers, stealth fighters, robot fighters and smart cities are located, smart operating systems are being built by smart weapons systems. In addition, the aspect of future wars is expected to become unclear on military non-military boundaries, and so on, so-called hybrid warfare, which is a mixture of non-regular, asymmetric, cyber warfare and electronic warfare, and so on. With the advent of a new aspect of war, we want to diagnose the problems of mobilization supplies, equipment management and the current situation to prepare for future war. Next, we are going to propose an alternative to smart resource management, which is the basis for smart military operations by utilizing the Internet of Things (Internet of Things) and applying it to the era of the fourth industrial revolution based on connectivity and convergence.

To establish a smart operational system for future warfare, two major alternatives are to improve the production, management, and transport of mobilization materials, equipment and resources management. One is to utilize technologies that are discussed as a category of the fourth industrial revolution based on the ongoing IOT, and the second is to utilize and connect excellence in logistics, which is the resource management of private companies. Such smarting could enhance the co-operation between ground, air and sea operations and streamline joint operations with allies, thus enhancing the efficiency of the smart operational system against future warfare. As a comprehensive system of the above-mentioned alternative proposals, the system should enhance the systematic link between the laws applied during the war and the ordinarily written ones.

[Keywords] Future War, Hybrid War, Fourth Industrial Revolution, IoT, Smart Military Operations

1. Introduction

In the era of the Fourth Industrial Revolution, where Aegis destroyers, stealth fighters, robot fighters and smart cities are located, smart operating systems are being built by smart weapons systems. In addition, the aspect of future wars is expected to become unclear on military non-military boundaries, and so on, so-called hybrid warfare, which is a mixture of non-regular, asymmetric, cyber warfare and electronic warfare, and so on[1].

In the event of a state of emergency, such as a real war, terrorism, or a massive disaster, extreme social confusion and fear appear[2]. In this case, in order to achieve the purpose of military operations and protect the lives and property of the people, a well-prepared national crisis management system should be activated quickly in peacetime[3]. The national crisis management system should prepare human and material resources well on a normal basis. It is thought that its operability is guaranteed if that is the premise[4]. After all, how do we build resources on a normal basis? And how to provide the correct...
amount at the right time in line with the military-led operation system is very important[5]. These are the most important capabilities of a national leader to protect the lives and properties of the nation, as well as the lives and properties of the people, and the lessons of war history[6].

With the advent of a new aspect of war, we want to diagnose the problems of mobilization supplies, equipment management and the current situation to prepare for future war. Next, we are going to propose an alternative to smart resource management, which is the basis for smart military operations by utilizing the IoT(Internet of Things) and applying it to the era of the fourth industrial revolution based on connectivity and convergence.

2. A Study on the Environmental Change of War and the Resource Management in Preparation for War

As a result of the change in the war environment, the ground forces will become part of the joint forces, and in future wars such as the fourth generation war and the hybrid war, the ground forces will play the role of the omnipotent combined ground forces and the overall solver in preparation for the future merger crisis[7]. Therefore, the future war is expected to be a united war and a national total war. In this period of change in the environment of the battlefield, we will diagnose the current state of and problems in resource management compared to wartime.

2.1. A review of the environmental change of war and the resource management system

As mentioned earlier, the environment of war is showing a different phenomenon from that of the past. The reason is that there is rapid development and change in technology that forms the basis of various weapons systems[7]. Of course, science and technology are actively used in places where war is prepared and executed, such as arms development and war supplies management[1]. It is thought that the United States' dropping of a successful atomic bomb on Japan during World War II disproves this.

In modern and future wars, where advanced technology is used, military and non-military distinctions become difficult[7]. In the field of management of mobilized goods and equipment, which guarantees the success of military operations and the performance of military operations, a different system was required. Operations that require human and physical resources have been advanced, and if resources management that provide the purpose of the need are operated in an analog way, military operations will be less efficient. This will make it virtually impossible to protect national security and national interests through smart operations against future wars and protect the lives and property of the people.

2.2. A study on the status and prospect of war response resource management

In analysing the determinants of war victory and defeat, pre-World War I wars were determined primarily by their victory and defeat in the stage of the execution of war. However, after World War II, the research and preparation of the war determined the victory and defeat of the war. I think this emphasizes the importance of mobilization, which is the usual resource management[8].

If you look at the scope and purpose of the mobilized goods, the primary industry's products were mainly produced in the pre-modern war, including food such as munryangmi, and hay, which were food for horses and cattle. However, since World War II, the number of objects has increased dramatically, with various equipment, supplies, ammunition, and oil[8].
The need for resources during war is divided into peacetime assurance and wartime acquisition, and the scale and proportion of mobilization acquired in wartime are very high. In addition, it is analyzed that most transport and construction equipment are secured through mobilization, and 66% of the mobilization of the Korean Army in 2010 is analyzed. Among them, 95 percent of the resources required for industrial materials are based on mobilization, except for ammunition[8].

This analysis can be said to indicate how important the capacity of mobilization is in comparison to wartime, and in the end, if war breaks out, the operability of mobilization determines the outcome of the war.

The establishment of a perfect mobilization posture is necessary for the rapid transition to an emergency system in preparation for the National Total War and Short-Term Contingency War, which is characteristic of modern warfare. The perfect mobilization posture serves as an existing military force and a deterrent against war. It also contributes to the efficient utilization of national resources by maintaining the proper size of the required combat forces. Ultimately, a smart resource management mobilization system should be established so that it can respond quickly in the event of a national emergency.

It is expected that the supply and demand of troops will become more difficult in the future due to the current situation of reducing the service period and the decreasing birthrate. Based on the analysis of these realities, it is expected that the demand for high-tech equipment, such as robots, will surge as the number of soldiers who are lacking will be mobilized[9].

Next, analyzing the areas of securing supplies and equipment, there is instability in supply and demand due to the long-term need to secure raw materials for wartime. It is observed that wartime losses, the mobilization fulfillment rate is only 60 percent, and the lack of building production facilities to meet the demand needed in times of war.

Due to the lack of production capacity of the resource management company, the company lacks the capability to provide rapid operational support. In addition, production processes are long and often have only facility management and some raw materials.

There are also insufficient contingency plans to secure the swift execution of the war budget, and insufficient regulations regarding the preparation of the war budget. Therefore, innovative measures should be taken to secure a production system for industrial mobilization against war[8].

3. Resource Management for the Establishment of Smart Operating System

Changes in technology change the face of war. Because it brings about changes in the weapons system. Changes in the weapons system result in changes in the operational system. The smart weapons system, which reflects the technology of the fourth industrial revolution, will establish a smart operational system. Therefore, smart resource management systems will have to be involved. It is intended to present a plan for improving resource management to establish a smart operational system for future warfare.

3.1. Smart logistics industry for resource management of smart operations

The change in the world led by the fourth industrial revolution, an era of convergence and connectivity, such as Big Data, IoT, artificial intelligence and humanoid robots, is projecting a new future war[10]. As discussed earlier, the future of the logistics industry in the fourth indus-
trial revolution can be drastically improved in efficiency, including cost reduction and rapidity accuracy, by utilizing technologies that can be grouped into categories of the fourth industrial revolution centered on the Internet of Things.

Smart logistics can be described as a logistics system that seeks to improve its efficiency in all logistics areas, including storage, unloading, transportation, facilities, and distribution systems by utilizing symbolic technologies in the category of the fourth industrial revolution.

It aims to streamline logistics operations and reduce costs by applying sensors, information and communication, and control technologies[11].

We tried to apply the technology of the 4th Industrial Revolution to the field of war support resource management by summing up some changes in the logistics industry[12].

Countries around the world are actively pushing to establish infrastructure to introduce new technologies in order to strengthen national competitiveness. Germany is pushing for a smart port based on information and communications in Hamburg, and the EU has begun to make it mandatory for the U.S. to install inter-vehicle communication functions, which are the basis of autonomous vehicles[12]. These are considered examples of changes in ground, air, and sea operations.

The smart logistics system has greatly influenced the efficiency of the management, such as monitoring the current state of transportation, identifying the reduction of inventories, identifying the causes of soaring logistics costs, improving energy efficiency, eliminating logistics bottlenecks, and determining the proper amount of inventories[12].

It is assessed that these smart logistics systems provide an excellent model of smart resource management for smart operational systems.

3.2. A study on the smartening method of resource management for smart operations

The logistics industry is most relevant if companies seek resource management areas such as mobilization, supplies and equipment management for war. Analysts say that the logistics industry, which has accumulated big data and utilized the technologies of ICT, IOT, and fourth industrial revolution, is in practice under pressure from the market, which is bound to transform into a smart logistics industry.

In order to find efficiency in the field of mobilized goods and equipment management in the war preparation and resource management, we need to observe changes in logistics industry, a similar task. The aforementioned logistics industry should enhance its efficiency by applying the technologies within the category of the Fourth Industrial Revolution, focusing on the Internet of Things IOT, which is utilized for the transformation into smart logistics industry, to the field of resource management in preparation for war.

Smart logistics industry technologies are intended to present areas that can be utilized for smart resource management[12].

First, technical application of materials and equipment is possible in the field of information provision in the field of mobilized goods and equipment management. Information on transport costs is provided, information provided by different management entities, such as sea, air, rail, and land transport, is collected and used to identify information, such as tracking the location of goods and equipment, and comparing routes.
Second, information collection of real-time stockpiles and equipment will be possible. Information on the IoT-based smart scale system, which provides information such as management and disposal, and the forklift management system, which uses RFID and IoT to identify the location of forklifts, information and quantity of goods transported in real time, will be available.

Third, it is possible to analyze big data on equipment and materials loss, management cost reduction, and to identify information that reduces the period of use, transport, and management costs of goods and equipment. In addition, the management network of platform-based mobilization equipment will be possible.

Fourth, it can improve efficiency in managing supplies and equipment through AI (Artificial Intelligence), equipment management warehouse robots, self-driving trucks for transportation, self-driving ships and remote-controlled unmanned ships, and drones.

Fifth, it can be the wisdom of managing mobilized supplies and equipment to make good use of private military companies and private logistics companies that are well equipped with the technologies of the fourth industrial revolution centered on the Internet of things[9].

Sixth, crowd sourcing is required for light resources in the management of mobilized goods and equipment. In other words, we need wisdom to match mobilization needs with supply, such as transportation using ordinary people and public officials, and using state-owned land, buildings and private ownership spaces as warehouses.

Seventh, the number of items that can be intercompatible with military, administrative and private demand should be increased. Commercial vehicles should be used as military command vehicles and transport bus trucks. This can greatly improve the maintenance as well as the procurement of parts and utilize the infrastructure of private companies a lot.

Eighth, war emergency supplies and equipment with little actual situation should be used first every year for disaster management, and then interoperability should be improved between war contingency resources and disaster management resources that produce and return used materials.

4. Conclusions

In order to prepare for a future war of 5th generation using state-of-the-art science and technology equipment against all-out war as well as local warfare and terrorism[22], a support system for smart operation systems should be established. The conditions under which such smart operating systems will be operated can be said to be key to resource management that has been made smart in terms of stockpiling, mobilizing, producing and transporting resources in peacetime.

To establish a smart operational system for future warfare, two major alternatives are to improve the production, management, and transport of mobilization materials, equipment and resources management.

One is to utilize technologies that are discussed as a category of the fourth industrial revolution based on the ongoing IOT, and the second is to utilize and connect excellence in logistics[23], which is the resource management of private companies.

In the logistics sector of private companies, smart logistics systems using IOT and big data[24] are being introduced in earnest. This smart logistics system is a key supporting technology for smart operational systems against future war-
fare, and it is evaluated to present many implications and alternatives to smart resource management.

The above-mentioned smart logistics industry technologies will be summarized into a few benefits for smart resource management as a support system for smart operations against future warfare.

First, in the field of mobilized goods and equipment management, information identification, such as tracking the location of goods and equipment, and comparing paths, is used.

Second, in the field of management of goods and equipment, information collection of real-time stockpiles and equipment makes it possible to smarten up real-time identification of information and quantity of goods transported, including management and disposal causes.

Third, it is possible to smarten up the identification of information that reduces the total number of equipment and materials (the period of use) and transportation and management costs. It will also be possible to smarten up the management network of platform-based mobilization materials equipment.

Fourth, it will be possible to enhance transport efficiency of supplies and equipment through storage robots using artificial intelligence (AI), self-driving trucks for transportation, self-driving ships and remote-controlled unmanned ships, and autonomous flight drones [25].

Fifth, it will be possible to prepare private military companies and private logistics companies that are well equipped with the technologies of the fourth industrial revolution centered on IoT, enabling cooperative smartenning between private companies and military resource management [26].

Sixth, it is possible to establish smart application of production materials and equipment of private companies to enable production equipment of private companies and equipment held by government agencies to be utilized in future wars by ensuring that military and private enterprise demand and demand of government agencies are compatible.

Seventh, the future war is a smart operation that is inter-networking between ground, air and sea operations, so it can build smart management of supplies and equipment needed for the Army, Navy, Marine Corps and Air Force. Such smartenning could enhance the co-operation between ground, air and sea operations and streamline joint operations with allies, thus enhancing the efficiency of the smart operational system against future warfare.

As a comprehensive system of the above-mentioned alternative proposals, the system should enhance the systematic link between the laws applied during the war and the ordinarily written ones [27]. Legislative networking [28] should be established closely Law of forced use in war, the Emergency Resource Management Act, the Disaster and Safety Management Framework Act, the Civil Air Crisis Act, the Anti-terrorism Act, the Integrated Defense Act and the Framework Act on Science and Technology [26].

5. References

5.1. Journal articles


5.2. Books


5.3. Conference proceedings


5.4. Additional references


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