NIDS 防衛研究所
The National Institute for Defense Studies

Thinking about the Future of Military Logistics

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NIDSコメンタリー
No. 214, April 26, 2022

Introduction

Supplying War: Logistics from Wallenstein to Patton (Enlarged New Edition) written by Israeli historian Martin van Creveld is, as its title indicates, an analysis about "supplying war" and in the book logistics is discussed with a slightly narrower scope than the definition of logistics generally understood today.

In the introduction to this book, Creveld defines logistics as the practical art of moving armies and keeping them supplied. Put simply, the art of logistics is the problem of whether or not the soldiers under command can be supplied with the 3,000 kilocalories per day without which they will very soon cease to be of any use as soldiers. He additionally states that 90 percent of the problems surrounding war are related to logistics.

Logistics in the narrow sense is management of the "flow" of supplies as a system, and the origin of the term is a French word which means "lodge." However, subsequently, French strategic thinker Antoine-Henri Jomini, who established the modern concept of this word, mentioned the broad meaning of the term in his *Summary of the Art of War*, stating that logistics is nothing other than the science of applying all military knowledge possible.

The word "logistics" was normally translated as "*heitan hokyu* [army logistics supply]" in the Imperial Japanese Army. Furthermore, in today's Ministry of Defense and Japan Self-Defense Forces, it is expressed as "*koho* [rear support], *koho hokyu* [rear supply], *heitan* [army logistics]," etc. but military commentator Kensuke Ebata has accurately pointed out that logistics is not necessarily rear support; it is the backbone of fighting, and for that reason the expression "*koho*" is misleading.

In this paper, we think about the future of logistics while noting the point that a clear distinction is not made between the word "logistics" in the broad sense, the "supply" used by Creveld, and the definitions of the words "*heitan*" and "*koho*," and in conjunction with this noting the point that the main target of the discussion is the "flow" — distribution — of supplies.

Military professionals talk about logistics

There is a proverb that "military professionals talk about logistics and military amateurs talk about strategy."

That was true in the 1991 Gulf War and the 2003 Iraq War. In media such as television, etc. the only topic was the situation on the front line of the fighting, and the logistical aspects which were the foundation of the fighting, namely moving armies from the mainland United States and Europe, etc. to the Middle East region, providing food and water to the soldiers, and transporting the necessary weapons and ammunition, received almost no attention.

However, if the logistics were dysfunctional, even the US military, the strongest in the world, and the Multi-National Force (or the forces of the coalition of the willing) would hardly be able to fight at all.

Interestingly, the philosopher Socrates in ancient Greece stated that "tactics is only a small part of generalship. For a general must also be capable of furnishing military equipment and providing supplies for the men" (*Memorabilia*, Book III, Chapter 1), and it is reported that in 17th century France the Chief Minister of State Armand Jean du Plessis, Duke of Richelieu, said that history shows that there were more armies destroyed by a lack of supplies and a collapse of discipline than by the fighting of the enemy.

Furthermore, General Archibald Wavell of the United Kingdom, looking back on World War II, reflected that all of war was involved in administrative management and transportation and truly understanding the elements of supply and transportation was at the foundation of all plans of commanders. Without doubt this fact applies to warfare today as well.

The positioning of logistics

If we look back on the history of logistics, for example in warfare in medieval Europe, armies could basically be maintained only by plundering the invaded regions. "The armies of 17th century Europe resembled nothing so much as huge maggots gnawing their way across the face of the land, leaving a trail of famine and destruction behind them. (Keegan, Holmes, and Gau, *Soldiers: A History of Men in Battle*)

However, the form of medieval logistics based on plunder had too many problems to be adequate for the new warfare of the 19th century. As a result, at this time, changes in organizational management were seen, and the most important change was that operations called logistics were formally embedded in armies. Late British historian Michael Howard described these kinds of changes as a "management revolution" in *War in European History*. At this time, problems surrounding logistics prescribed the strategies even in the warfare of Napoleon Bonaparte, who dramatically changed the scale and scope of fighting through meticulous local procurement.

Of course at the same time, if we take a broad overview of the history of warfare then, as Creveld indicated, the fact is that the fighting in the period from mercenary leader Albrecht von Wallenstein in the 17th century to Chief of the Imperial German General Staff Alfred von Schlieffen at the beginning of the 20th century basically continued to be organized plunder. However, the fact that this history of plunder was extinguished on the occasion of World War I in 1914 was not because war suddenly changed to become humanitarian. It was because the amount of supplies consumed on battlefields became enormous and as a result it became impossible for armies to procure or requisition the required supplies locally any more.

Actually, Creveld states that the turning point that we should focus on the most when thinking about the history of logistics to the present day is 1914, not 1789 in relation to Napoleon, and not 1859 to 1871 as a consequence of the appearance of railroads and the success of Helmuth von Moltke (Moltke the Elder).

The limits of logistics

Expressing the importance of logistics in a single phrase taking into account the definition and history of logistics, the aspects of warfare from ancient times until today have been prescribed by the "limits of logistics" —the limits of army logistics support — rather than "strategy." In other words, logistics

themselves are a large and at times the largest factor prescribing the aspects of warfare and the strategies, etc. used in warfare.

If we think about it carefully, we can conclude that history testifies to the fact that it was impossible for the political and military leaders of all eras to conduct warfare using the quantities and types of supplies which were considered ideal under the political conditions and military constraints of their era, etc.

However, interestingly, there are many theorists who interpret the act of formulating a strategy as being like drawing a picture on a blank canvas.

In the world of business the idea is that the executive sets out the major goals, and then the strategies for moving toward the major goals are delegated to the lower-ranked departments using a top-down approach. Indeed, this is easy to understand and looks good seen from the outside. Nonetheless, no matter how much a strategist opens his/her map and works out a grand vision, if there is no foundation to support it — logistics — then it will be no more than a daydream in the end. In other words, it is logistics that prescribes the size of the canvas.

Actually, if we look back at history, we can understand that it was the limits or constraints of logistics which prescribed the place, time, and scale of the fighting to no small extent. In the Gulf War and the Iraq War, it appears that the US military in particular transported its soldiers and supplies to the front line all too easily, but that was possible because the US military had secured logistics lines to the Middle East region — for example, sea lanes — and was able to maintain them.

The interesting fact about the Gulf War is the point that the fighting on land was concluded in approximately 100 hours whereas the previous stage, the deployment of military power, took six months, and in addition the following stage of withdrawal — "Operation Desert Farewell" — used up ten months. Moreover, in this withdrawal operation, of course the soldiers withdrew, but in addition every kind of military equipment was transported from the desert regions which had been the battlefields to airfields and ports and then taken back from the Middle East region to its home country, the United States.

William G. Pagonis, who was, *de facto*, in overall control of the local logistics in this war, reflected on it as follows: "this war was fought in the support operations headquarters behind the lines rather than on the battlefields and on the major supply routes rather than in Washington and Riyadh. It was precisely because we carried out the preparations for the logistical support over many months that we were able to finish the combat in the air and on land in 1,012 hours. Moreover, we were preparing plans for many months from before the war and during the war period, so we were able to complete the withdrawal from the theater of operations successfully." (Pagonis, *Moving Mountains*)

Of course, the limits of logistics change with the era. For example, if we check the positions of famous historic battlefields on a map, we immediately realize the fact that most of them are near rivers and canals. This is because in the old days the only way to transport large numbers of soldiers and large amounts of supplies was to rely on rivers and canals. Logistics bases were established by rivers and the fighting took place within the range that action was possible from there.

Railroads and containers

The large turning point which changed the aspects of modern warfare from the perspective of logistics

was undoubtedly the appearance of the railroads. It became possible to send large numbers of soldiers and large amounts of supplies to inland regions without pause and also to rapidly send soldiers injured on the front line behind the lines for medical treatment. Naturally warfare changed due to the subsequent appearance of trucks — motorization — as well. Moreover, this kind of innovation of (military) technology is continuing today, and is greatly changing the aspects of war.

The typical example of this in the second half of the 20th century is containers. As a result of containerization and then palletization, rapid and high-volume transport of the necessary supplies became possible. This is the reason why this change has been evaluated to be one of the "revolutions in military logistics."

Containers — ISO containers — began to be widely used by the armies of each country, particularly the United States in the 1980s, and it is reported that as many as 40,000 containers were used in the aforementioned Gulf War. However, the items stored in half of the containers could not be ascertained so the work of unpacking them locally to confirm their contents was necessary. In the subsequent Iraq War, this problem was solved with the introduction of electronic tags called RFID.

In other words, today there are systems in place which make it possible to ascertain accurately and in real time the whereabouts of not only the containers themselves but also the individual supplies stored in them. This means the "visualization" of logistics has been realized. Note that when transporting supplies with irregular shapes, generally pallets are used rather than containers. This is the idea of transporting goods on "plates" rather than in "boxes."

Moreover, in recent years the shift to unmanned logistics and robotization in the world of business using AI (artificial intelligence), etc. has begun to be introduced into the domain of military logistics as well.

We will discuss the details later, but if we take an overview of the history of military logistics, we can conclude that it is like a loop, so to speak, resulting from changes in society: plunder (local procurement or requisitioning) — supply warehouses (prepositioning) — carrying the supplies oneself — mutual support (for example, ACSA).

Logistics 4.0

In the world of business there is the concept of "logistics 4.0." This suggests that the new technological innovations in recent years, AI, IoT, and robotics, and their applications are fundamentally changing the form of logistics.

Actually, as a result of the utilization of these kinds of technology, "labor-saving," "standardization" and "process industrialization" is occurring in logistics, but naturally the essence of these kinds of changes is to escape from labor-intensiveness, and to use a form of logistics which does not depend on human resources.

"Labor-saving" means greatly reducing the operations requiring the handling and judgments of people in the respective logistics departments. Due to the operation of robots and drones, etc., machines and systems are replacing people in running the operations. Furthermore, "standardization" combines the various functions and pieces of information related to logistics into one, making it possible to more flexibly rearrange means of transport and routes, etc.

Private companies use the term "MH." This is an abbreviation for "material handling" and its aims are to liberate people from the simplistic, harsh and repetitive work of carrying heavy cargo and to introduce mechanization as much as possible so that people can work on more creative operations. This also provides a major suggestion to today's armies (the Ministry of Defense and the Japan Self-Defense Forces) which are worried about a lack of human resources. This is because, for example, the lack of drivers at private logistics companies is not a transitory problem arising from the increase in transportation demand; it is a social and structural problem which will continue going forward, but armies also are facing similar problems.

The basic operations of logistics, namely transporting, loading and unloading, packing, and arranging, are changing into infrastructure functions which largely do not require intervention by people, but this kind of "process industrialization" of logistics means a switch from labor-intensive operations to capital-intensive operations. For that reason, going forward it will no doubt be necessary to actively work on the new possibilities of self-driving trucks, robots, and matching systems.

For example, at private logistics companies it has become possible to easily ascertain the quantities of supplies in warehouses due to the introduction of a warehouse management system called WMS. Inventory management ledgers, etc. are no longer necessary; moreover, management of the deployment status of the trucks became possible due to a transportation and delivery management system called PMS for which introduction started at about the same time as the WMS.

Operation of the WMS and PMS generally began from the 1980s, and due to use of these kinds of systems, in the case, for example, that it is judged — predicted by AI — that the usual transport routes cannot be used due to bad weather, a warning is displayed on the system's screen and adjustments are made rapidly, including changing of the transportation and delivery times, selection of alternative routes, selection of different means of transport, etc., thus increasing the "punctual arrival ability" of the supplies.

In addition, in Germany, etc. new initiatives called "supply chain 4.0" are being rolled out. These are attempts to introduce the latest technological innovations to ascertain the information and trends of the users in real time in order to optimize the supply chain overall. For example, leading online shopping site Amazon is conducting experiments aimed at the practical realization of a drone delivery system with the goal of delivering the products ordered by the users within 30 minutes, and the utilization of these kinds of drones also has great potential in the domain of military logistics.

The people who control logistics control business

If we simplify the logistics processes led by private companies, they can be classified into the "transportation process" and the "storage and transshipment processes." Alternatively, it is possible to use the classifications of "the operations from shipment at the bases used for delivery to users to the delivery to the user" and "inventory replenishment operations from the factory warehouses to the delivery bases."

In this context, due to the utilization of ICT (information and communication technology), etc., logistics generates the effect of broadly combining all of the functions and information. In addition, the functions and information possessed by the respective departments and individuals are "visualized," enabling shared use with other people. Naturally, due to this the optimal route and means of transport, etc. can be obtained,

making efficient logistics possible.

Furthermore, self-driving trucks and truck platooning are gaining momentum, and the latest automated warehouses have appeared in logistics bases. Robots which implement picking and loading and unloading and automated guided vehicles (AGVs) which travel autonomously are typical examples of this. Moreover, by replacing conventional conveyors with AGVs and self-propelled cranes with robots, the previous fixed and heavy equipment automation is changing to flexible and light equipment automation.

Logistics as a process

Whether the organization is an army or a private company, it is not permitted to delegate logistics to the logistics department of the organization only; it is a domain which must be handled by the organization overall.

This is because logistics in fact begins with the planning stage of military equipment or products, and involves nothing other than supporting the users through the entire life cycle until disposal. In other words, it is necessary to go beyond the transport of military equipment to guarantee continuous usability for users. The series of operations including the planning, design, services, and maintenance and repair components of military equipment are definitely not independent but rather are closely related to each other, so logistics is truly a process.

In this paper we will not delve into this deeply, but if we seek to truly understand logistics, we are required to keep in mind the entire process from the military equipment planning stage to the subsequent support (services) and maintenance and repair components. For example, in private companies, it is common practice to evaluate self-driving vehicles, typically trucks, using three indicators: working rate, ratio of loading trips to total trips, and loading ratio. Moreover, if we think about this from the perspective of maintenance and repair, the perspective of "turnaround" — "the ability to carry out another strike" in the military domain — is important. This is because reducing the "time when operation is not possible (downtime)" as much as possible is required.

Naturally, securing only the so-called "shooters" is insufficient for the execution of war; it is necessary to maintain the "flow" of soldiers and supplies, information, etc. Moreover, education and training is also essential to fully bring out the performance of military equipment or products, and if we look at it this way, we are required to interpret the meaning of logistics even more broadly.

The "last one mile"

Whether an organization is a private company or an army, traditionally one of the big issues pertaining to logistics was transport over the "last one mile." The fact of being forced to rely on trucks, horses or, in the worse-case scenario, people for the "last process" to the front line, whether using railroads or using aircraft, has worried people in charge of logistics through history.

However, going forward it may become possible to operate automated delivery robots and drones, etc. to make this "last one mile" unmanned. Putting this the other way around, no matter how much the automation of logistics bases progresses, if the streamlining of the "last one mile" cannot be achieved, the issues of logistics overall will continue to be there.

It is reported that private companies are today developing algorithms and systems which analyze and learn GPS data taking into consideration the unique constraints in transport over this "last one mile" and of course these attempts could be applied in the domain of military logistics as well.

The limits of AI and robots

Needless to say, the new technological innovations symbolized by AI and robots are not all-powerful.

In fact, AI responses to unforeseen situations can be suggested as a defect of AI. This is because natural disasters typified by earthquakes, infectious diseases, cyberattacks, and situations such as conflicts and wars do not necessary occur frequently, so judgments are required in a context in which the accumulated data is not sufficient. In addition, there is a possibility that the devices and systems themselves will stop working due to physical harm. For that reason, we are always forced to rely on people as the last resort, so it is also important to boldly retain conventional low-tech measures in part.

In the domain of military logistics as well, it is deemed to be important to delegate basic operations in peacetime to AI and robots, etc. as much as possible while communicating to the next generation the know-how which depends on individual skills in the field so that people can respond at times of war and times of emergency. Furthermore, maintaining systems which can be rapidly switched to operations led by people as necessary is required.

In the end, it is no doubt good if "collaboration" can be established under which people continue to implement the work in the domains where AI and robots, etc. do not perform well.

Outsourcing and the utilization of satellites, intelligence and the delegation of authority

It is reported that the outsourcing of military logistics made major progress in the Iraq War. One of the reasons for this is because private companies had superior know-how for transporting large volumes of supplies — in particular high-tech military equipment, etc. which cannot be procured locally — far overseas.

Of course, problems in the outsourcing of military logistics have also been indicated. For example, the reduction of costs is often suggested as an advantage of outsourcing, but careful analysis of whether this is true is necessary. In addition to that, the private companies to which operations are outsourced are basically outside the chain of command of the armies, and act in accordance with contracts rather than orders.

It is reported that in the Gulf War the US military prepared in advance enough supplies to be able to continuously fight for approximately two months but in the Iraq War it started its attack with enough supplies for approximately one week. Moreover, it was the development of communications networks using satellites or military satellites which made this kind of situation possible. This is because if the units on the front line and the units in charge of logistics are connected by satellites, it can be ascertained easily what units require which supplies.

In the world of business, it is often suggested that the three elements which control logistics are ascertaining the required information, procuring supplies, and transporting supplies, and in particular the importance of information (intelligence) is emphasized. This is the same in the domain of military logistics as well.

In fact, logistics and intelligence are in a mutually complementary relationship in warfare. Furthermore,

in the process of the general staff systems of the major countries being established, those logistics departments and intelligence departments are considered to be more important than the operations departments. Going into this more deeply, the general staff system was originally created for the purpose of strengthening functions related to logistics. This is because, naturally, the foundations which support the formulation and implementation of strategy, operations and tactics are logistics and intelligence.

Logistics in the world of business is considered to be an unmanageable domain. This is precisely why it is important to obtain the necessary information in advance and accurately in logistics. Management begins from the required assumptions, and the importance of intelligence can be inferred here, and this fact applies without modification to the military domain as well.

Furthermore, in recent years in the military domain the necessity of delegating authority to units in the field or on the front line so that they can respond rapidly to sudden terrorism and guerilla attacks, etc. has been recognized once again, and the domain of military logistics is no exception.

Indeed, today's armies are now able to ascertain the situation on the front line in real time even in the middle of their home country, mainly as result of the development of ICT. Despite that, the US military and others are employing the concept of "mission tactics" in some areas to advance the delegation of authority to the front line units, and one of the aims of that is of course to respond to terrorism and guerilla warfare. If instructions are sought from the center or headquarters every time the fighting starts, the response falls one step behind. In conjunction with this, we can conclude that as a result of the situation on the front line becoming visible in real time from the center, conversely the necessity of respecting judgments in the field was recognized once again.

From "just in case" to "just in time"

In the world of business the idea of "just in time" was adopted a long time ago and the core of the idea is "the necessary items at the necessary time, to the extent necessary" and this has been widely introduced into today's domain of military logistics.

According to Ebata's *The Military and Logistics*, in the time from the Cold War to the Gulf War logistics were operated using the idea of "just in case" and the result was that "iron mountains" accumulating large volumes of supplies were built everywhere as a byproduct.

Actually, in the Gulf War both the Multi-National Force and the Iraqi military basically used the conventional approach to logistics — "just in case" —, and deployed traditional fighting methods. That is, they accumulated vast amounts of supplies in the non-combat zones before the fighting (the Multi-National Force spent six months on this), so the offensive operations of the units were limited to the distance that the units in charge of logistics located behind the front line could keep up with, and when the units arrived there they stopped temporarily, advanced the base accumulating the supplies to the new non-combat zone near the front line, and only when that was completed could launch the next attack.

However, as mentioned above, it became possible to ascertain the flow of supplies in real time as a result of linking the front line and the units in charge of logistics through a communications network and the introduction of RFID tags.

Note that in the War in Afghanistan (2001 to 2021), which started before the Iraq War, 70 to 80 percent

of the supplies transported to the front line were fuel and water, and 75 percent of that water was for the soldiers' showers, but this is a "special privilege" only allowed for the US military. It is evidence of the outstanding logistics capacity of that country's military and is reminiscent of the Roman Empire (and its military) which "controlled the water."

Furthermore, although the idea of "just in time" is the same for both private companies and armies, supposing there is a difference, it is the point that a lack of supplies, etc. is absolutely unacceptable at a time of war or a time of emergency in armies, so a certain amount of stockpiling is deemed to be necessary, and acceptable. The symbolic case of this is the MPS typified by the so-called ro-ro ships.

Moreover in recent years, the idea of seabasing has gained attention as one of the possibilities for military logistics. Certainly, if logistics bases for fighting can be established at sea, unlike when building a base on land, the approval of a host country is unnecessary, and safety is also better. Furthermore, it is not necessary to bring all of the supplies onto land. This means this approach has a small "footprint."

The "Achilles' heel" of armies

Of course, these kinds of "revolutions in military logistics" which have occurred to date have solved big problems, while on the other hand many new issues have also arisen.

For example, in the Iraq War the offensive operations of the units were too fast, so even the shortcomings of "just in time," which provides the necessary supplies at the necessary time in only the necessary quantity, came to the surface. Furthermore, in this war more than two-thirds of the casualties of the US military were from the units in charge of logistics, and the fact that logistics is the "Achilles' heel" of armies has not changed even today when technology has developed greatly.

Moreover, after the end of the Cold War, warfare up until the present day has taken on aspects of the "war on terror" so conventional logistics systems built on the assumption of warfare between sovereign states are no longer as applicable.

In fact, this is one of the big issues faced by the armies of each country today. In conventional warfare between regular military forces — warfare between states — the position of the enemy was comparatively easy to identify, so it was possible to predict to some extent where the battlefields were and how logistics lines should be secured for them, etc. However, when fighting with terrorism and guerillas even the position of the battlefield is unclear. For that reason, it is thought that today the armies of each country are switching — regressing — to the approach of carrying the necessary supplies themselves as much as possible (or mutual support).

Logistics in the era of the "war on terror"

Theoretically, it is deemed that the forms of military logistics include the approach prescribed by the limits of army logistics support under which the fighting is conducted within the scope for which preparation is possible, and the operations-following approach which does everything possible to secure the logistics necessary for the fighting, but historically there are many more examples of the former (the Imperial Japanese Army and Navy is one of the few exceptions to this rule), and today's Ministry of Defense of Japan and Japan Self-Defense Forces are also basically the former. However, going forward the latter

approach is also strongly required.

Specifically, switching from the conventional approach of storing supplies in the warehouses of units and bases and transporting them to the front line as necessary, to the approach of transporting supplies to the front line directly from private companies in "non-combat zones" is conceivable. Moreover, the approach of instructions for transport to the optimal logistics bases being given automatically when the amount of food and ammunition, etc. held by units and individual soldiers declines below a certain level based on the management of supplies in accordance with the POS systems already introduced in convenience stores, etc. will probably be introduced. This applies the "order-less" idea in the world of business to military logistics.

In addition, although already often used in private aircraft (including some military aircraft), etc., the approach of promoting the building of systems which prevent in advance system failures caused by degradation over time by utilizing big data and IoT technology, etc. to ascertain in advance when maintenance and repair components should be replaced is also required.

As we touched on earlier, it seems that conventional forms of logistics assuming warfare between the regular military forces of states are gradually losing their usefulness today. In conjunction with this, conventional logistics systems which make being self-contained their core principle are also under pressure to make large revisions. New forms of logistics for meeting the demands of the era of "new warfare" symbolized by fighting with terrorism and guerillas are required but, as we thought, this will probably involve a regression to pre-modern forms in some areas.

Is there a loop in the form of logistics?

Furthermore, there is a possibility that "just in time" will be inadequate for responding to future warfare and conflict. For example, logistics with respect to units or bases surrounded by hostile forces — not necessarily the regular military forces of states, but including terrorists and guerilla units, etc. — no doubt differ greatly from the forms of logistics assuming fast and mobile fighting which have been built by today's armies. There is even the possibility there of regressing to "iron mountains."

Essentially, if there is a shortage of supplies at times of war or emergency this directly affects the survival chances of the soldiers (uniformed members of the self-defense forces), so the quantity of supplies which should be accumulated in advance always tends to become large. Furthermore, the preparation period necessary for that also become longer. In that context, it is important to anticipate diverse situations and stock up on the supplies in advance, but this cannot be handled with "just in time" alone.

Moreover, if this kind of situation is prolonged, the additional sending of supplies is required; furthermore, if the units on the front line — although this term is not appropriate anymore — are deployed to multiple fronts, a situation may occur in which accurate judgements cannot be made rapidly with respect to the issues of what supplies should be transported to what places. With respect to these kinds of concerns, a full range of scenario studies and repeated education and training based on the studies are the only solutions which can be found.

Summarizing the above content, the armies of sovereign states which traditionally make being self-contained their core principle are facing the problem of how to respond to conflicts and activities which

transcend the frameworks of today's states — for example, unconventional war (asymmetrical war) and United Nations peacekeeping operations (PKO) — and armies are facing the problem of how they can respond to today's social situation in which they are forced to consign many of their logistics operations to private companies. Moreover, a transition from traditional situation-response-type logistics systems to proactive-type logistics systems is no doubt required. Today when unconventional war as symbolized by terrorism and guerilla warfare frequently occurs, the borders (lines) between the front line and non-combat zones are becoming more and more ambiguous and sometimes this distinction is even meaningless.

Conclusion

Borrowing the words of a certain military person, logistics is definitely not a "glamorous" domain. Despite that, it is a necessary and essential domain for achieving victory in war. That is because "tactics, which are the art of winning fights, are actually an art which determines what is possible in terms of army logistics." (Keegan, Holmes, and Gau, *Soldiers: A History of Men in Battle*)

Quoting the words of Pagonis again as we conclude this paper, "the term "logistics" sounds scientific. It makes us think that we already know the answer and a methodology has been established. If anything it probably gives the impression that it is a field unrelated to the human element. However, even in this golden age of technology there are more people in this world and in this country lifting and carrying objects than there are people involved in other operational areas." (Pagonis, *Moving Mountains*) In the end, logistics is also a problem which preeminently involves people.

In recent years, vigorous discussions about food security, energy security, and economic security have been held. For example, the food self-sufficiency ratio of Japan is reported to be 37 percent on a calorie basis and the country's self-sufficiency ratio for energy overall is reported to be 12 percent. A shortage of semiconductors also became a large problem. However, for example, it is said that in the case that means of transport such as ships and aircraft, etc. cannot be used and transportation infrastructure typified by railroads and roads is interrupted, the food self-sufficiency ratio of Tokyo is no more than one percent.

Here, problems related to securing the supply chain in today's era of globalization arise. The flow of supplies is considered to be the "the lifeblood of the economy." That is precisely why seamlessly integrating the entire supply chain from production or procurement to retailing and consumption is important. Just for confirmation, logistics is the foundation and infrastructure for the lives of people. Military logistics is the foundation for fighting.

Going forward, how many people and resources can Japan allocate to the domain of military logistics, which was originally expressed as "*koho*" [rear support] and not given much attention?

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* National Institute for Defense Studies website:
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