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Improving way of Logistics Management in Korean Army

Sungtae Jung

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The Improving Way of Logistics Management in the Korea Army

THESIS

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AFIT/LSCM/ENS/11-06

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The Improving Way of Logistics Management in the Korea Army

THESIS

Presented to the Faculty

Department of Operational Science

Graduate School of Engineering and Management

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Air Education and Training Command

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Logistics and Supply Chain Management

Sungtae Jung

Captain, R.O.K Army

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APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

Abstract

The objective of this research is to find a way to improve Korean Army Logistics. This is accomplished through interviewing field experts and adopting their ideas to improve it. An interview with the manager of a successful civilian company and relevant literature also gave ideas in improvement.

This research is written based on interviews with the logistic officers on different branches and different units in the Korean Army. Through interview with them, this research identified 4 main problems in the current logistics system: 1) multilevel supply support system, 2) inaccurate demand management system, 3) inefficiency of procurement and transportation management, 4) the short of professionalism of logistics officers. The solutions about the identified problems are acquired by an investigation of the relevant literature, telephone interviews with Army logistics personnel and an interview with a leading private enterprise manager.

Four applicable improvements ways are presented: 1) construction of central inventory management system for shortening the customer wait time, 2) simplifying the supply chain by direct purchase by users and units, 3) reducing inventory cost and increase supply rate through applying the Prime Vendor system, 4) establishing an education system and ensuring an education environment.

In addition to the above identified problems and solutions, Korea Army Logistic still has other unidentified problems. These things can be identified and improvements of those can be found in different kinds of units through analyzing their situations.

Dedication

My Country, Republic of Korea, the Korean Army and my family

Acknowledgments

I sincerely appreciate to my faculty advisor, Dr. William A. Cunningham, for continued support, guidance and encouragement throughout this thesis effort. Due to his insight and experience, I could finish this thesis. Sincerely, thank him again. I am also grateful to my reader, Dr, Jeffery Ogden for reviewing my work and for his valuable comments. His knowledge and support provide enhancing the quality of this thesis. I specially thank him about his effort.

Sungtae Jung

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The Improving Way of Logistics Management in the Korea Army

I. Introduction

1 Background

Civilian companies process customer orders in real time as soon as they receive orders. Usually it takes only 1 or 2 days until shipping. Compared to civilian companies' quick process system, the Korean Army has problems supplying material immediately when requested by users (combat unit or personnel). Even though the Korean Army invested huge amount of money to construct the Logistics Information System, it is still hard to improve logistics support system and material management efficiently. In the ultimate object level of support, it does not satisfy the customers (combat units).

These kinds of problems in the current Army Logistics System can be examined through analyzing the Army Logistics Support structures and the experience of supply officers' experience.

a) Vertical and many step structures in supply support

The Korean Army has many steps structured from the user to the Logistics Supply Support Organization Unit. Because of many layers of supply units and processes, it takes at least 8 days to get the requested material. In some cases, it takes 3 months, and the worst case, it takes more than 6 months.

To be more concrete in this situation, unit requisition documents are aggregated by organizational supply officer, after daily inspection of supply is executed by each unit. Then, the requisition documents are sent to the DSSU (Division Supply Support Unit) by the organizational supply officer. In the Korean Army, it is common not to have inventory except BL (basic load) at the organizational level, so there is no case to supply directly from

organization to unit. Therefore, organization aggregates all requisitions from units on a daily basis and requests to Division on the next day. When DSSU has in stock and supplies to the organization directly, the shortest time to supply material to the unit is 3 days (Unit: 1 day, Organization: 1 day, Division: 1 day). If supply reaction is taken the next day, the organizational supply officer has to request vehicles for supply on the next day. At the next day, the organization receives material and supply to the unit right after reception, so, it takes 2 more days. In this case, from unit request to material reception to combat personnel, it takes at least 5 days.

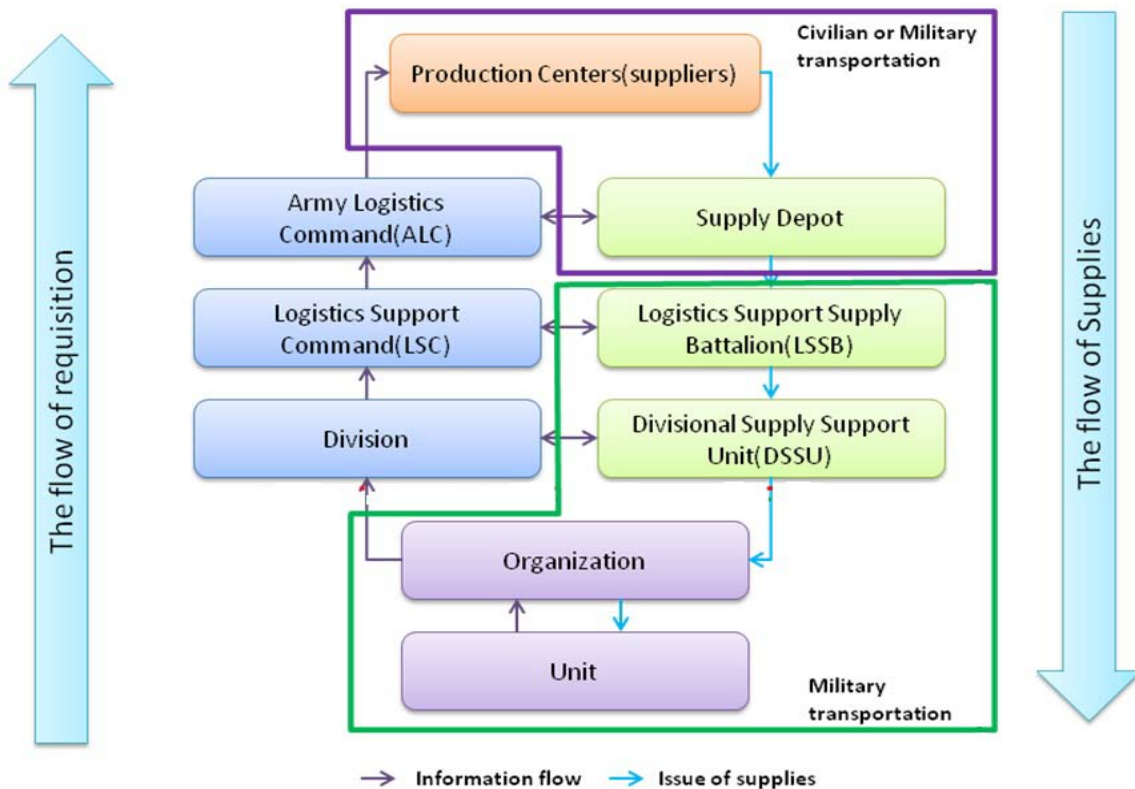
According to the Korean Field Training Manual, Wednesday, Saturday and Sunday are not available because the Korean Army Field Manual prescribes not to do routine works but to do moral education and physical training on those days. So, considering the current situation, the minimum days to supply material are 8.

The above is the best case scenario. If we consider the longest supply chain of the Korea Army, it is as followings. Unit reports the Supply Daily Inspection (SDI) and report to the organization on a weekly basis. The organization puts all the reports together from each unit and requests to the DSSU. When the requested item is available in the inventory of DSSU, it supplies to the organization. Otherwise, DSSU sends a request to the LSC (Logistics Support Command). When the item is available in the LSC, it supplies to the DSSU. In case of absence of requested material in the LSC, the LSC also requests to the ALC (Army Logistics Command).

When the DSSU has no stock of the requested item in its inventory, it sets up as 'supplied from LSC' and it does not take any further action. So there is no way to know when the item shall be supplied at the user level. And more, when the LSC has no stock either, the LSC also requests to the ALC. In that case, if we assume there is no difference among requisition processing between layers, the requisition time might become a total of 52 days to get the

supply support (Unit level: 7 days, from DSSU to LSC: 15 days, from LSC to ALC: 30 days). This is just a estimate when there is no other interruption. So in the real situation, it sometimes takes more than 3 months.

Figure 1 General Korea Army Supply Chain Structure



As you can see in the above figure, the Korea Army Supply System has a multiple step structure, and it generates inefficiency on distribution and inventory management on each layer. Due to this inefficiency, it lowers combat readiness and combat power of the Korea Army.

b) Trend to management based on Information Technology

In the 21st century, our society transforms, through the so called “Digital Revolution”, to an information managed society due to rapid development of information technology. High amounts of information can be processed due to the development of computer, semiconductor, and communication networks. This kind of technology improvement enables society to

implement the new web based virtual reality, which can communicate and share information over time and space. And now it is transforming to Digital Economic Era such as e-commerce.

Furthermore, this Digital Economic Era accelerates competition. The nations and companies introduce the new management method and pursue information management renovation to fit with Digitalization and Information Age.

The logistics administration of civilian companies are automating processes based on information technology, and are developing new logistics management system to serve customers with the minimum logistics cost and time. To achieve this, they expand e-commerce and internet service structures, construct automated transportation system, and place whole logistics system on-line from order to delivery.

The US Army also constructed 'sole logistics support system' for deployed units all over the world. Through that, they are using automated and information-oriented logistics management systems, to share the information about operating, deployed, and transporting assets all over the world. Material Command manages and controls stockpiles through visualizing all military assets. Moreover, through introducing Prime Vendor program and executing e-commerce, they are building a logistics management system to maximize the efficiency for guaranteeing combat unit's mission.

In the Korean Army, they planned 'Vision 2020' which was designed for a future operation concept known as "Multi-dimension simultaneous integrating combat", which strives to improve information-oriented, mobile technology-intensive units. To follow this, in the logistics management aspect, they strive to set up new system to meet future combat environment.

However, the current logistics support circumstance of the Korea Army is well behind civilian companies and advanced-military. There are lots of required work to become advanced-Army. For example, minimizing the supply time from requisition of combat unit to

supply, reducing management expenses to secure supply level for each supply echelon, relieving management burden of most supply material by Army itself, and increasing the speed of transportation even though depending on vehicles.

Therefore, the Korea Army has to control all units' asset on real-time and forecast the requisition precisely to supply right amount, time, and space to combat units by utilizing civilian assets with the maximum amount. For that, the Korea Army should develop the low expense-high efficiency logistics system through building information-oriented, mobilized prompt logistics system.

2 Research Objective

The objective of this research is finding the current logistics management problem of the Korea Army and through that, providing the building and improving of the Army Logistics System.

3 Research methodology and composition

This study looks over the changes of logistics management in the information age, analyzing the situation and problem of the Korea Army, and also analyzing the successful case of a civilian company. Through this analysis, this research will provide information on improving Army Logistics Management and suggest the construction of a Logistics Management System which can be applied in the Korea Army.

The analyzing method will be performed through theoretical consideration about logistics and case studies. Data will be gathered through interviews with the field experts, Korean MND (Ministry of National Defense) regulations, Korean Army regulations, Korean Army Field Manuals (KA-FMs), Korean Army journals, Korean Combat Development journals, Korean National Congress e-library, current economic journals and other Internet sources.

In the case studies, the focus is currently on-going projects in Korea Army. In analyzing civilian industry's successful cases, this research will investigate the case of Samsung Electronics innovative supply network. To gather the data on Samsung electronics, interviews and documentation will be used. In analyzing the military case, case studies will also be used. Through the interview with the field experts on the military logistics, the study will investigate what are the most important problems that are confronted in real life and how those problems can be overcome. Finally, by adopting successful civilian factors in Army logistics, this research will provide suggestion for future improvements of Korean Army Logistics.

This research consists of 5 chapters. The first chapter is the background, objective, and methodology, the second chapter is the literature review about Army Logistics Management. The third chapter provides the methodology, the fourth chapter analyzes the data about problems and improvements. The fifth chapter is the conclusion and future research problems.

II. Literature Review

1 The area of Logistics Management

Logistics is defined as follows: Logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective orders. So, logistics involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, and security. Logistics is a channel of the supply chain which adds time and place utility. Today the complexity of production logistics can be modeled, analyzed, visualized and optimized by simulation software.

Logistics management is that part of the supply chain which plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer and legal requirements. A professional working in the field of logistics management is called a logistician.

The functional areas of logistics activities have five main areas. Those are transportation, warehousing, loading and unloading, packaging, and information. When research data is gathered, these five parts will be analyzed.

(1) Logistics Information system

Logistics information is an essential element for harmonization of comprehensive logistics activities. Logistics information system deals with whole logistics management with organized combination of transportation, warehousing, loading/unloading and packaging for performing efficiently. Therefore, logistics is not simple flow of goods but flow of information. So, comprehensive systemization of logistics information is important issue to operate information flow efficiently.

And also, for rational logistics management, it is essential to build a communication network and to process information by computer. Due to rapid development of computer industry, computerization of logistics management becomes a basic requirement. To meet various customer demands, it is necessary to establish comprehensive logistics information to connect each logistics function systematically and efficiently. Hence, the function of logistics information system pursues efficiency for expense reduction and competitive edge of businesses.

For building a logistics information system, the basic composition of the system and the relation between sub-systems should be clearly defined and then it should be performed by

stages from high priority sub-system (Korea Chamber of Commerce and Industry). Main contents of logistics information system consist of 5 systems; order process system, inventory management system, warehousing management system, transportation/shipping management system, and logistics management system.

2 The technologies of logistics management system

Today, civilian and US military logistics systems are developing to overcome the time and space limits through using advanced information technology, and business logistics settles e-commerce through internet service and applies automated shipping system with artificial intelligence traffic control and tracking technology. So the trend is changing to online and automating on logistics system.

a) Booming e-commerce by Internet

(1) E-commerce structure

The definition of e-commerce is short form of electronic commerce, and it consists of the buying and selling of products or services over electronic systems such as the Internet and other computer networks. Modern electronic commerce typically uses the World Wide Web at least at some point in the transaction's lifecycle, although it can encompass a wider range of technologies such as e-mail as well. E-commerce using Internet has many differences to traditional commerce and it overcomes the time and space limits. It can response immediately in real-time worldwide 24 hours to meet customer demand. The greatest advantage is that there is no time and space limit in buying goods at the buyer's end. Also, it is easy to get information about purchasing goods, which enables efficient decisions. At the seller's end, it can overcome the space limit. The difference between e-commerce and traditional commerce is shown in the following table.

Table 1 the difference between e-commerce and traditional commerce

Section	E-commerce	Traditional commerce
Distribution	Businesses ↔ Consumer (whole world)	Businesses ↔ Wholesale ↔ Retail ↔ Consumer(restricted area)
Space	No limit	Limited to consumer
Time	24 hours (Real Time)	Limited Business hour
Demand acquisition	On-line acquisition	Sale person (information re-input)
Marketing	Both direction, one by one marketing	One way marketing
Customer response	Immediately response	Delayed response
Selling point	Virtual space	Physical selling space

Source: Susung Kim, 'study of development of Army logistics system', Hannam Univ, 2002

E-commerce does not require physical selling space, so it can save distribution and advertisement expense comparing to traditional commerce. It is also possible to set up effective marketing strategy due to automatic analyzing of customer demand. Moreover, it enables an international sales strategy rather than just domestics. In case of major businesses, they can get a synergy effect through utilizing subsidiary companies' separate specialty. In the case of small- and mid-sized companies, they can increase the competitive power with joint-ventures. So, each company is concentrating B2B. B2B is e-commerce that is conducted between businesses.

(2) E-commerce growth and future changing aspect of logistics

E-commerce has changed traditional commerce dramatically. It affected not only distribution business structure but also logistics parts. Especially, logistics between retail stores and consumers which was processed by consumer is moved to the supplier's part. So, saving time and effort for purchasing goods is considered a core growth factor in e-commerce. Therefore, logistics related to the e-commerce will grow up with fairly different direction to traditional commerce.

Though there are little changes from factory to retail store in a traditional commerce logistics network, an e-commerce logistics network is complex due to having unspecified number of consumers (the last stage of logistics network).

Considering the characteristics of e-commerce, logistics related to e-commerce shall be developed as followings.

First, low expense structure in logistics will be required to secure the price competitiveness comparing to traditional distribution channels. Second, rapid and reliable shipping service is required due to the customer characteristics of using e-commerce. Third, we need to take proper means to provide efficient logistics service because the last point of distribution (consumers) is not fixed like the traditional commerce and has small amount of goods. In traditional commerce, regardless of final consumers, logistics is executed within the businesses such as between manufacturer and distribution enterprise or between wholesale and retail distribution enterprises. So it is possible to set a logistics system up that is comparatively stable. However, e-commerce logistics is hard to set up due to uncertainty of end user, dispersion and wide area, various and small amount shipping commodities, etc.

Even though logistics with E-commerce requires some future improvements currently, it is definitely right to apply it because it has lots of advantages and it inspires to improve the current military problems: eliminating middle layer, cost reduction of transportation, saving administrative jobs, increasing the customer satisfactions, etc.

b) Automatic identification technique and warehouse automation

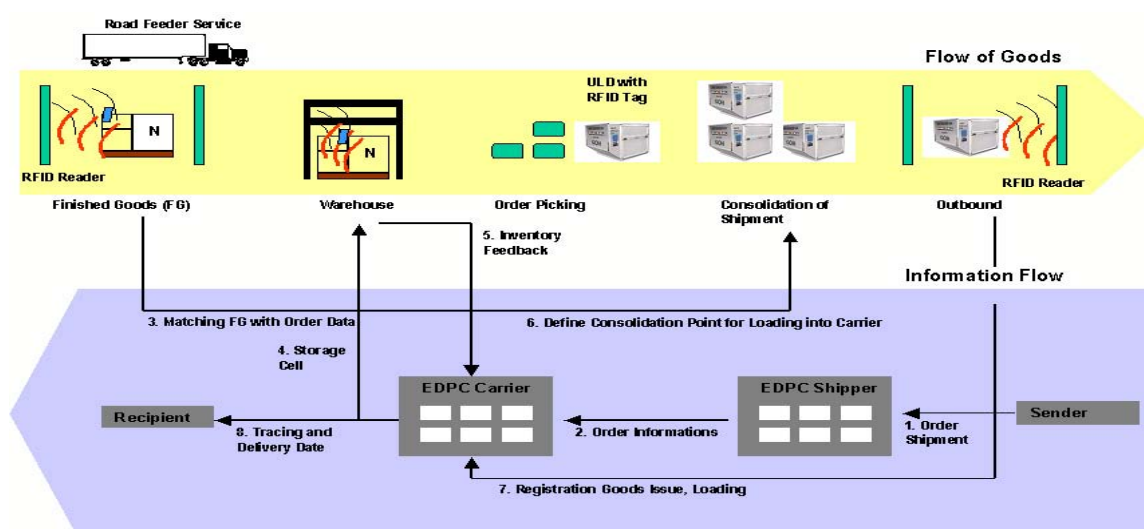
Automatic Identification and Data Capture (AIDC) refers to the methods of automatically identifying objects, collecting data about them, and entering that data directly into computer systems (i.e. without human involvement). Technologies typically considered as part of AIDC include bar codes, Radio Frequency Identification (RFID), biometrics, magnetic stripes,

Optical Character Recognition (OCR), smart cards, and voice recognition. Now, multiple AIDC technique with warehouse automation increases the efficiency of logistics and related works.

With automatic tags, like barcodes which already contains commodity information, it is possible to add records such as movement route, commodity name, quantity, sender, receiver, due date, etc. When a decoder is attached in vehicle, it enables to check instantly what the load is. In case of interlocking GPS, it is possible to check where truck is located in real-time.

Due to this, assortment error and difference between invoice and contents are dramatically decreasing, and it is possible to manage by products. Furthermore, in case of interlocking with POS (point of sales) system, it is easy to manage the store precisely. Automatic tags can be identified without decode, it is almost the same as opening the box. The related techniques are growing so fast, and the representative techniques are 2nd generation barcode (quick response code), memory card, optical character recognition technique, RFID, etc.

Figure 2 radio frequency identification and warehouse automation system



Source: RFID journal, <http://www.rfidjournal.net/images/Figure1.jpg>

Nowadays, applying automated warehousing is increasing in the civilian sector. Through that, they can save not only manpower and expense but also increase speed and accuracy of

in-and-out procedures of warehousing. So, it is possible to scan and check out products with minimum handling. Especially, in the civilian sector, advanced warehousing management system such as DPS (Digital Picking System) and WMS (Warehouse Management System) enables minimum handling between man and product boxes. It also shortens scanning time by checking the product location by computer. Similarly, this system also increases efficiency in packaging, sorting, finding, storing, issuing, etc.

3 The Prime Vendor system

The US military has outsourced lots of parts because of not only concentrating its core competence but also reducing the cost. Among the various kinds of outsourcing, the major outsourcing part in the United States Military is performed in the logistics area, such as distribution and supply. One of the outsourcing forms is the prime vendor system. Around 1997/98, the US Defense Logistics Agency changed their business practices, and entered into the Prime Vendor long term sustainment contracts with various suppliers to provide materials needed to support the maintenance, repair, and operation (MRO) of its facilities.¹ Items such as plumbing, electrical components, heating/ventilation/air conditioning (HVAC), lumber, fixtures, other hardware supplies, etc. would be included. The Prime Vendors need not make these items; the idea is to use purchasing power and commercial purchasing practices to consistently get the US Department of Defense the best prices on these civilian items, delivering them quickly and with little overhead. And more, this also increased the product quality and enabled the reduction of facilities or organizations for supply support.

The reasons why the prime vendor system brought about these effects are as follows. In the past, after the production of military materials is made, the military completely had managed inventory for continuous supply support. As a result, the military had been holding a

¹ Defense Industry Daily: US military, The DLA's Prime Vendor MRO Contract (16-sep-2010)

large amount of stocks. When military applies the prime vendor system, specialized producing or distributing companies are maintaining or managing a certain level of inventories. When military needs supply supports, the required items are procured or purchased through the prime vendors. This enables them to minimize the number of kind and the amount of items that are managed by military. As a result, several effects are gained; the reduction of procurement and supply works by own military personnel, increasing customer satisfaction with lead time reduction, and cost reduction through efficient inventory management.

The developing phases of the prime vendor system in the US military are as follows. Initially, US military was dedicated completely on procurement and supply processes. So, the whole processes such as request, procurement, transportation, and distribution were dedicated by the US military. Therefore in the past system, when field units request the supply, the US Army Quartermasters made contracts about the unit procurement items and the Procurement Agency made contracts with the suppliers about the central procurement items. Although direct supply items were delivered to the request units, most of the items were stored at the Supply Depot and then were supplied to the request units.

The advanced concept of above distribution system is the vendor direct system. Under this system, the US military made a long-term contract with suppliers, and the vendor often delivers the items to the request unit directly whenever unit needs. After that, unless violating certain regulation or stock control function of Army Quartermasters, it was developed as a prime vendor system which is the vendor supplies materials to the units when they request.

The concept of the prime vendor system was continuously expanded. The concept was applied to not only simply supplying repair parts but also maintenance part which was called the prime vendor support. Boeing and Lockheed Martin, which produced the Army's Apache helicopter, delegated all maintenance responsibilities above the intermediate level to the

Team Apache System (the maintenance company). Through this company charges intermediate and depot level maintenance, US Army could save the facility and personnel in the depot maintenance, cost and personnel reduction on procurement, distribution, and inventory management about repair parts.

And more with the prime vendor system, the Defense Logistics Agency (DLA) could support the combat material faster and swifter through concentrating supply and transportation functions to supporting combat materials which were allocated in the non-combat material previously. In investigating US military cases, the prime vendor system not only saves resources but also contributes to enforce the combat abilities which are the original military mission. However to operate the prime vendor system smoothly, long-term contract with suppliers is required. And more, it can be applied on only those items with recurring annual demand.

4 The Characteristics of the Korean Army Logistics

a) The concept of the Korean Army logistics management

The definition of military logistics is the discipline of planning and carrying out the movement and maintenance of military forces. The meaning of logistics in the Army is activities needed to maintain military forces (weapons, equipments, materials) to be ready through resource management of logistics functions.

In the Army, logistics management is the flow of supplies from the producer to combat personnel via supply support procedures. This means material supplies and progress procedures for distribution to the users through a supply request. To wit, materials should be identified, assorted, documented, received and shipped in the right time and place with the right amount. Moreover, unlike businesses, the military has differences in the meaning of objectives and existing values. Therefore, military logistics has difference characteristics than

business logistics regardless whether the item is a physical object or intangible.

b) The different characteristics between military and business logistics

First, supply distribution requires needs and demands. To wit, the proper supply level is preparing for future needs and demands. And this kind of flow starts from the occurrence of demand.

Second, supply distribution is one way presentation and it does not have counter presentation. In principle, either forward or backward (request, distribution) direction is identical. This cannot be considered as exchanges (the profits to sales in general businesses). So, if there is a counter presentation in military logistics, we can say it is different to measure the value, such as the completion of combat readiness for the victory of national defense.

Third, because there is no exchange in military logistics, there is no organization such as market or pricing mechanism which enables to exchanges. And also, there is no competition. Therefore, under the current situation 'demand > available resource', for realization of the balanced supply condition to replace the pricing mechanism or competition principle, the only way to control is the one-way control.

Fourth, the objective of business logistics management is maximization of profit and customer satisfaction through cost reduction. In some cases, however, economical efficiency of military logistics can be ignored. Eventually, when effectiveness and efficiency are stood in opposition in military logistics, effectiveness is generally considered first. Therefore, we cannot consider only in business perspective. We should develop efficiently and effectively while maximizing military objectives.

The goal of military logistics should be to enhance the effective and efficient measures for distribution of operational required materials. And also, the ultimate goal of military supply is maximizing military forces while minimizing resource required. Therefore, supply

support is providing required resources rapidly in the right time and place. So, the principle of supply support can be considered as that of military logistics management.

III. Methodology

This chapter will describe the methodology used in this research. First, This research will explain which research methods is chosen between qualitative and quantitative. Second, various qualitative methodologies are provided and a case study methodology is selected to achieve the purpose of this research. Last, this research will describe the data collection method and data analysis procedure.

1 Quantitative vs. Qualitative approaches

In general, quantitative research is used to answer questions about relationships among measured variables with purpose of explaining, predicting, and controlling phenomena. This approach is sometimes called the traditional, experimental, or positivist approach.

In contrast, qualitative research is typically used to answer questions about the complex nature of phenomena, often with the purpose of describing and understanding the phenomena from the participants' point of view. The qualitative approach is also referred to as the interpretative, constructivist, or postpositivist approach.

According to the 'practical research', the characteristics between qualitative and quantitative research can be distinguished as a following table.

Table 2 the distinguishing characteristics of quantitative and qualitative approach

Question	Quantitative	Qualitative
What is the purpose of the research?	To explain and predict To confirm and validate To test theory	To describe and explain To explore and interpret To build theory
What is the nature of the research process?	Focused Known variables Established guidelines Predetermined methods Somewhat context-free Detached view	Holistic Unknown variables Flexible guidelines Emergent methods Context-bound Personal view
What are the data like, and how are they collected?	Numeric data Representative, large sample Standardized instruments	Textual and/or image-based data Informative, small sample Loosely structured or non-standardized observations and interviews
How are data analyzed to determine their meaning?	Statistical analysis Stress on objectivity Deductive reasoning	Search for themes and categories Acknowledgement that analysis is subjective and potentially biased Inductive reasoning
How are the findings communicated?	Numbers Statistics, aggregated data Formal voice, scientific style	Words Narratives, individual quotes Personal voice, literary style

Source: Leedy and Ormrod, 'Practical research', p.96

To complete the objectives of this research, a qualitative approach is more appropriate than a quantitative approach. Because this research will be first identifying the current problem of Korean Army logistics system, and then investigating solutions and suggesting how to improve the identified problems. Also, in the aspect of characteristics of data and the nature of research process, this research deals with textual and non-standardized data and it might have somewhat subjective aspect. So, this research methodology shall be qualitative rather than quantitative.

2 Which method can be chosen among 5 type of qualitative methodology?

According to the Leedy and Ormrod, the qualitative research has 5 types of designs.

Those are case study, ethnography, phenomenological study, ground theory study and content

analysis. The case study deals with a particular individual, program or event in depth. Therefore, sometimes, findings may not be generalized. The method of case study is that the researcher collects extensive data on the individuals, programs, or events on which the investigation is focused. In the ethnography, the researcher looks in depth at an entire group that shares a common culture; it is especially useful for understanding complexities of a particular, intact socio-cultural group. When adapting ethnography, it is essential to mingle with the group together. The researcher depends on the people in the group and he is also an observer. A phenomenological study attempts to understand people's perceptions, perspectives, and understandings of a particular situation. Phenomenological researchers depend almost exclusively on lengthy interviews with a carefully selected sample of participants. The content analysis is a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes, or biases. The content analysis is systematic and includes (1) identification of the material to be studied, (2) definition of the characteristics to be studied, (3) a breakdown of complex items into smaller segments, and (4) scrutiny of material for identified characteristics under study.

As showed above, there are five kinds of qualitative research approaches. To decide which method to be chosen, one should consider the purpose, focus, method of data collection and method of data analysis.

The research objective is to find a development way in Korean Army logistics. Among these five types of qualitative research, case study is good to find the answer when the researcher has no influence or no control on the event and when qualitative research method examines contemporary real-life situations and provides the basis for the application of ideas and extension of method. Because the research question deals with the problem of Korean Army logistics management and how can improvements in the current situation in real-life context be implemented. Hence, the case study is the best way to research this topic due to

the nature of this problem.

3 The six steps in case study

According to case study researcher Robert K. Yin, there are six steps to conduct the research successfully.² The six steps are followings.

a) Step 1. Determine and define the research questions

The first step in case study research is to establish a research focus to which the researcher can refer over the course of study of a complex phenomenon or object. The researcher establishes the focus of the study by forming questions about the situation or problem to be studied and determining a purpose for the study. The researcher investigates the object of the case study in depth using a variety of data gathering methods to produce evidence that leads to understanding of the case and answers the research questions. In this research, there are 2 main questions.

- What are the causes which lead to problems in Logistics Management problem in Korean Army?
- How can solutions to these identified problems be effectively implemented in the Korean Army?

Case study research generally answers one or more questions which begin with "how" or "why." So, this question is appropriate to conduct the case study method. After determine the research questions, the next step is select the proper cases for analyzing and determine data gathering and analysis techniques.

b) Select the cases and determine data gathering and analysis techniques

² The Case Study as a Research Method: Soy, Susan K. (1997) University of Texas at Austin

During the design phase of case study research, the researcher determines what approaches to use in selecting single or multiple real-life cases to examine in depth and which instruments and data gathering approaches to use. (Susan K. Soy, 2006)

Due to closed the characteristics of the Korean Army environment, Army becomes outdated compared to civilian companies. One of the reasons can be security problems and a more critical reason is lack of economic mind of Army personnel. However, civilian businesses work for profits. So, to be more economical and to increase combat readiness level at the same time, it is essential to adapt the successful factors of civilian businesses. Moreover, due to the vertical structure of Army Supply Chain, the issues are different depending on each layer. To identify the detailed problems and to solve the problem, it is necessary to interview each layer expert. And also, because of military regulation and specialized information about Army Supply Structure, documentation is required to gather the necessary data. The next phase explains how to gather the data.

c) Prepare to collect the data

According to the Martin E. Modell(2007), the interview is the primary technique for information gathering during the systems analysis phases of a development project.

Through the interview, we can obtain in-depth information about the participant's experience. According to the way of performing interviews, the interview can be categorized into four types. Patton's types of interview category are followings.³

1. Informal, conversational interview: no predetermined questions are asked, in order to remain as open and adaptable as possible to the interviewee's nature and priorities; during the interview, the interviewer "goes with the flow".

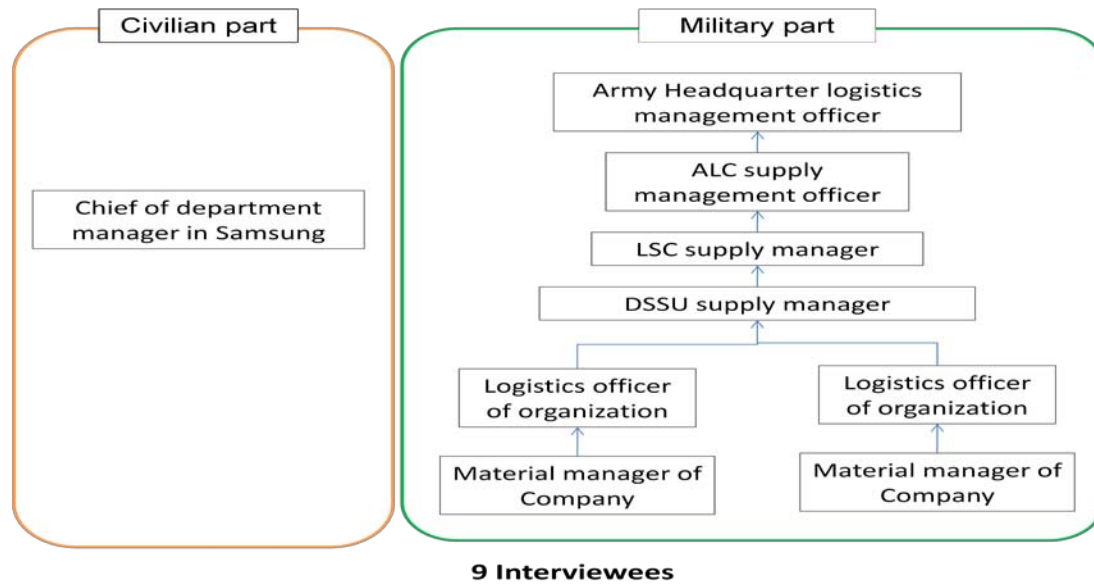
³ M. Q. Patton: How to Use Qualitative Methods in Evaluation, pp. 116–117, 1987

2. General interview guide approach: the guide approach is intended to ensure that the same general areas of information are collected from each interviewee; this provides more focus than the conversational approach, but still allows a degree of freedom and adaptability in getting information from the interviewee.
3. Standardized, open-ended interview: here, the same open-ended questions are asked to all interviewees (an open-ended question is where respondents are free to choose how to answer the question, i.e., they don't select "yes" or "no" or provide a numeric rating, etc.); this approach facilitates faster interviews that can be more easily analyzed and compared.
4. Closed, fixed-response interview: where all interviewees are asked the same questions and asked to choose answers from among the same set of alternatives. This format is useful for those not practiced in interviewing.

Due to data characteristics from the interviewee, standardized open-ended interview is chosen for data gathering method. The selection of interviewees can be divided into two main parts, the civilian part and the military part. To learn the successful factor in civilian logistics management part, one chief of department manager is chosen to collect data. In the military part, the problems are different depending on the each layer, 2 participants are chosen on each layer of Korean Army Supply Chain. As you go down the supply chain, there are lots of branches. So it is impossible to investigate all supply chain procedures depending on branches. Therefore the most basic unit in Korean Army, the Infantry Division, was selected

Following figure shows the interviewee chosen way.

Figure 3 the interviewees' selection for data gathering



Another method for data collection, relevant documentation, will be used. Through collecting documentation, one can get the background knowledge about specific logistics and can provide analyzed factors about successful cases. Due to the security problem, almost all documentation can be collectable from the internet materials. Some comes from Korean MND regulations, Korea Army regulations, Korean Army Field Manuals, Military publications, the Internet National Assembly Library, and other internet sources.

d) Collect Data in the Field

In this step, this research can collect lots of data from various sources of documentation and personal interviews. Due to collecting data from interview, it is easy to distract from the issues. Therefore, to get proper data from the interviewee, it is necessary to organize and set up the interview questions logically and systematically before conducting the interview.

When interviewing the civilian chief of department manager, main question is “What is the competitive edge of your company?” With this main question, relevant sub-questions are formulated on the basis of the logistics functions. When interviewing the military logistics managers in each layer, two main questions become the basis of the whole interview question,

“What is causing the problem in Korean Army logistics?” and “What changes can improve it efficiently and effectively?” This part also has relevant sub-questions with respect to logistics functions. All of the questions are listed in the Appendix A.

e) Evaluate and analyze the data

Data analyzing procedure consists of 3 steps. First, identify the problems in the current Korean Army Supply Chain. Second, propose the successful practices of civilian companies. Last, suggest the solution about the identified problems in Korean Army Logistics Management. In this step, it is important to arrange and categorize the data so as not to lose the research direction.

f) Prepare the report

The goal of this research is suggestions for improving Korean Army Logistics management. So, this report should represent the situation of each Army Logistics layer. Therefore, this research can convey the indirect experience to the reader. In this step, the report should have the validity and reliability with the logic.

IV. Analysis

1 Overview

This chapter will analyze data which was gathered by interviews and relevant documentations. This chapter will mainly consist of 4 parts. First, the data analyzing procedures will be described. Second, through the interviews with current Army logistics officers in charge, what the problems in the current system are and why these things occur will be described. Third, through the interview with the director of civilian company, this research will investigate how their logistics management strategy is planned and executed,

and then identify what is the advantage and what is the future improvement. Finally, based on the suggestion of field logistics officers and civilian company's successful factors, this research will suggest the improvements in current and future Army logistics system.

2 Data analyzing procedure

The objective of this research is finding relevant improvements in Korean Army logistics management. To achieve this objective, there are two main questions. One is what is causing the current problem in Army logistics and the other is how this problem can be improved. This research gathered data from the field logistics officers with different branches; quartermasters, maintenance, and infantry with logistics specialty. In order to answer the research questions, questions in six areas are addressed as follows.

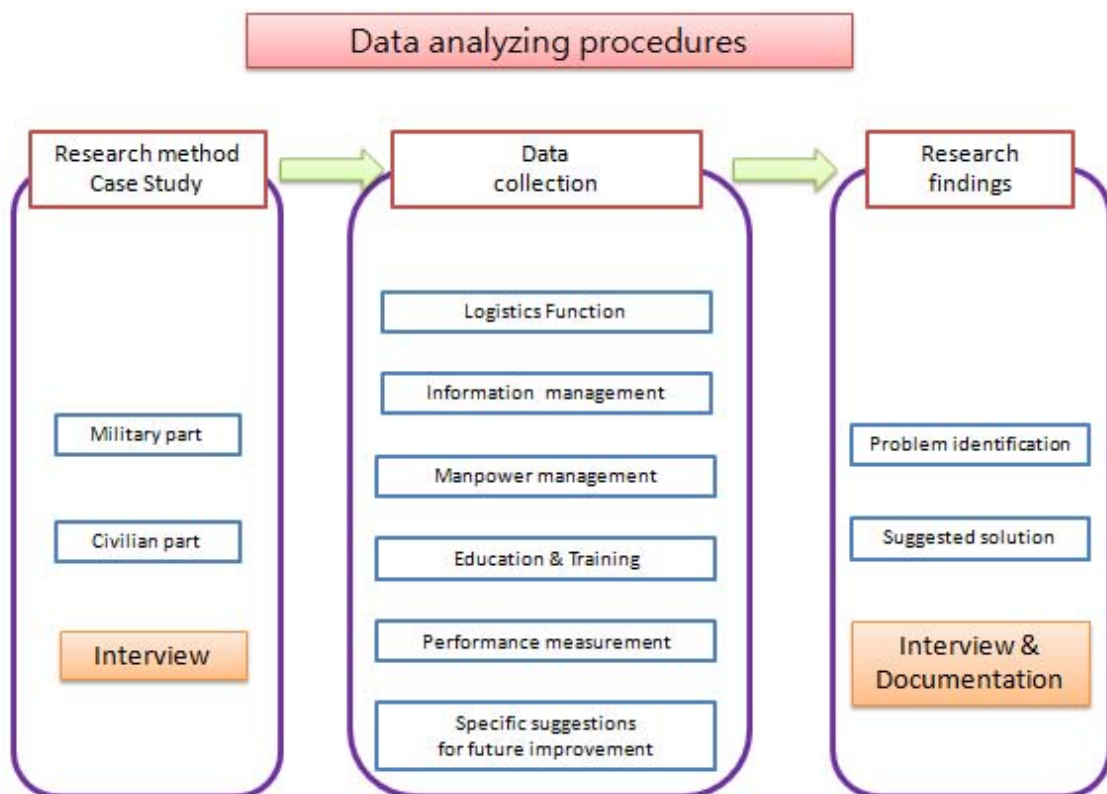
1. Logistics functions: transportation (logistics process time), warehousing, loading/unloading, and packaging
2. Information management: information sharing
3. Manpower management: amount of workload, familiarity of computer system
4. Education and training: OJT frequency and knowledge check
5. Performance measurement: combat readiness, operating efficiency, administrative jobs
6. Specific suggestions for future improvement in the Korea Army logistics

These six areas are questioned in both the military part and civilian part. From the military part, current problems can be identified and suggestions for future improvement are gathered. From the civilian part, this research can investigate effective and efficient way to manage logistics. However, it is hard to get all required data from the interviewees, so data

can be collected from the relevant resources: the Korean Army regulation, previous logistics researches, the Korean Army journals, the Korean Army Logistics Command conference data, the National Assembly Library, and other internet sources.

This research will focus on the current problems and suggestions. The whole procedure of this research will be summarized as shown in the following figures.

Figure 4 data analyzing procedures



3 Overall data results

To identify the current problem, three different branches of officers are interviewed. Three people are quartermasters, and another three are maintenance and the last 2 are infantry with logistics specialty. The summarized data result is shown following figure.

Table 3 overall interview results

Section			Response	Percent	Remarks	Problem
Logistics Functional Area	Transportation	Supply process time	1~2 weeks	75%	Logistics branch officers	
			2~3 weeks	25%	Infantry logistics officers	
		The reason of Problems	Multi-level supply system	87.5%	Include chain of command gap	★
		Warehousing	Procurement inaccuracy	37.5%		★
		Loading/unloading	No	100%	Manpower	
		Packaging	No	100%	Box packed / carton(class 1)	
Information system		NDMMP	No	100%		
		Gap ledger & real	Less than 10%	100%	Some exception (CS units)	
Manpower Mgmt.		Average number of items dealt with	100~150	62.5%	No problem	
	Problems		Additional activities	75%	PT, moral edu, military training	★
			Additional tasks	25%	Facility mgmt, disaster mgmt	★
		Familiarity to computer system	Easy to use	100%		
Education & training	Job education & training experience		3 month OBC, 6 month OAC	75%	Logistics branch officers	
			None	25%	Infantry logistics officers	★
Performance measurement	Performance metric		Good	75%	Combat unit's metric	
			Same	25%		

The detailed explanation of these results will be followed in sub-sections.

a) Logistics functional area

In the logistics functions, three major parts are considered; the supply process time, warehousing, and loading/unloading/packaging.

(1) Supply process time (include transportation)

The total supply time for requested items was varied depending on the interviewees' branches. It takes 2~3 weeks for infantry logistics officers, but it only takes 1 week to the logistics branch officers. However, the real transportation time in the supply process is less than 1 day. The reason why it takes too much time is due to the multi-level supply process. The administrative processing time of each layer, such as vehicle allocation and documentation processing, takes too much time in the supply process. All the supply support units have 2 main sections. One is supply part and the other is transportation part. Because supply support is divided into two parts, it is required to allocate the vehicle even though requisition is processed in the upper unit. Because of that, additional administrative jobs are required and finally supply process time is delayed.

The goods flow through the logistics units and then are distributed to the combat units. This causes the supply time difference between infantry and logistics branches. However, all the supply officers are satisfied with the current supply time because the current supply process is for general items not urgent items. In case of urgent items, the suppliers ship directly to the request units if there is no security problem. However, almost every interviewee (7 among 8) replies that the major problem in the current supply process is the multi-level structure.

(2) Warehousing

In warehousing, inventory policy is different depending on the items. In case of Authorized Stockage List⁴ (ASL) items, the s-S policy is used for maintaining supply level (three quartermasters and two maintenance officers replied). The general items are managed through the s-Q system and the order amount Q is decided based on the logistics officers'

⁴ Stored and maintained items at all times for continuing the current supply operation and for future demand

experience. This inventory policy also has a problem due to the multi-level supply process. Three interviewees (2 quartermasters and 1 maintenance officers) replied that this problem causes the procurement problem. Because supply processes are delayed due to many administrative works in each level, supply officers requests more than actually they need to secure the supply. This action distorts the actual demand of units and the amount of total procurement has a gap with actual requirement because the Procurement Headquarters forecasts the next year supply level based on the previous year requests. However when the item is essential to units, it is delivered directly to the request units through a parcel service. In this case, the customer wait time is dramatically decreased by eliminating intermediate stages (one maintenance and 2 quartermasters replied).

(3) Loading/unloading/packaging

The current loading/unloading procedures totally depend on human powers except the big depot level supply units (all interviewees answered unanimously). In most cases, they can handle the loading/unloading works (6 interviewees answer). However, one interviewee (quartermaster) answers that sometimes it takes so long because the organization of supply support unit has less manpower than combat units. To overcome this, he suggested the conveyer belt in the loading/unloading procedures.

In the packaging, all interviewees are satisfied with the current packaging method. Every class of materials except class 1 is box packed with a cushion, so there is no damage to the material. One quartermaster replied that the class 1 contract supplier delivers items with cartons, and occasionally some damaged items are delivered. However, the supplier delivers more than required amount to consider the damage during transportation. It does not matter to the units.

b) Information system

Every interviewee (8 of 8) is satisfied with the National Defense Material Management Program (NDMMP). This system is developed for visualizing the amount of inventory assets of all the Korea Army units and for integrating the previous various systems depending on item classes into whole one. By adapting this system, the NDMMP allows for logistics officers not only to check their own inventory but also to check the upper units' inventories. And also, all interviewees replied that this system is easy to use so there is no problem to know how to use it.

The gap between the ledger and the real amount of inventory is not bad. Every interviewee replied that the gap is less than 10% because there has been continuous effort to match the ledger with the real inventory since the NDMMP was developed. However, one quartermaster said that the gap in the combat support units such as chemical support or medical support units was not good. The combat units and combat service support units have continuously been checked to match the inventory. However, combat support units are out of the focus on these effort and the commandants of those units are not concerned. So, he replied that the worst case of the gap was up to 50%.

The reason why this gap is happened is the Supply Daily Inspection is not performed well (5 interviewees answered). The two answered the laziness of logistics staffs and one answered the shortage of the commandant's concern.

c) Manpower management

To check the workload of the logistics personnel, how many items they are in charge of is investigated. All interviewees do not know the exact number of items. The average number of items they actually deal with is between 100 and 150. To process supply of these items is not big problem to them. However, sometimes over-workload occurred. All logistics branch officers replied that there are lots of additional activities to do, such as logistics support;

moral education, basic military field training, physical training, etc. Due to this, there is short of logistics personnel to perform the basic military activities. The 2 infantry logistics officers also answered sometimes it is hard to meet the work performance. They are in charge of not only logistics affairs but also facility management, disaster management, etc. So it is hard to do all these work since they do not take systematic logistics support education.

d) Education and training

All interviewees' experience are varied. The shortest is 3 months and the longest is one year and 2 months. The six logistics branch officers (maintenance and quartermasters) answer that they took the Officers Basic Course (OBC) and the Officers Advanced Course (OAC). They said those course training gave the big picture of logistics and detailed knowledge through introducing real field cases. And 5 of logistics branch officers replied that they took 3 months to work fluently in their positions and one said he only took 1 month. However, the 2 infantry logistics officers replied that they took about 3 months to understand the general work procedures and it will take 1 year to get enough knowledge on their positions. And more, they never took the logistics education or training. They also took the OBC and the OAC in the Army Infantry School, but it was only focused on the infantry operations. Because of this, they are short of professional knowledge on logistics functions. Actually they know that there is the FLOCE (Field Logistics Officer Call Education) in the Army Logistics School. In reality, it is hard to take that course due to job vacancy. Due to this, most of their logistics knowledge is acquired from predecessor's takeover document or their experiences.

e) Performance measurement

In the performance measurement, even though 2 people said it is the same as before, 6 interviewees replied that the current system is well reflecting on measuring the combat support system. In the past, the performance of logistics support was measured at the logistics

unit. So the good logistics support means how many times they support the combat unit successfully. Due to that, logistics units split the supply material into small amount to increase the successful supply rate. However, the current system measures the performance in the side of combat units. Now the performance is measured based on how much percentage of request material is supplied to the combat units. This removed inefficient processes at the logistics support units.

The 6 interviewees answered certain conditions are required to increase the operating efficiency. They thought the reason for their being is to give logistics support the combat unit. However, there are lots of things to do except the logistics support; moral education, guard duty, physical training, basic military training, and etc. These things impede the smooth logistics support.

f) Summary of findings

To analyze the data, this research identified 5 problems that the Korea Army logistics is faced. The major problems are followings

1. Multi-level supply support system
2. Inaccurate demand management system due to distorted demand
3. Inefficiency of procurement and transportation management
4. The short of professionalism of logistics officers
5. The additional assignment to the logistics officers

The first to third problems are related to the logistics part. The fourth problem is related to the education and training. However, the fifth problem is related to the Army Regulation, human resource department, field established rule, and etc. To solve the fifth problem, all of the things are considered comprehensively. Therefore this research investigates the first four problems and finds the improvement. The next section will investigate the identified four

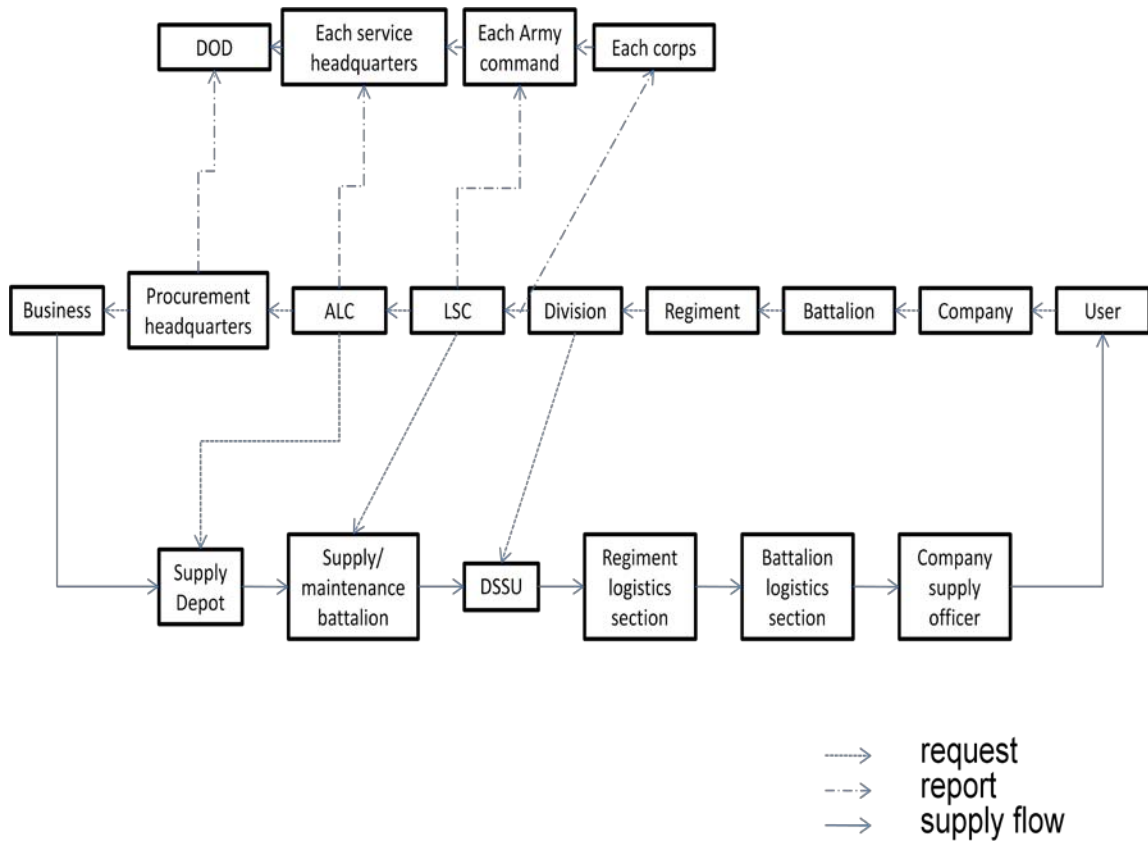
problems more specifically.

4 The problems of Korean Army logistics

a) Multi-level Supply support structure

As this research dealt with in Chapter 1, multi-level supply support structure is causing the biggest problem of inefficiency in Korean Army. It is not an exaggeration that all the problems happened due to this. Commonly, civilian businesses process customer orders in real-time and ship within 1 or 2 days. However, in Army, when equipment user or unit request to supply, shown as following figure, it is requested to Division following 4 steps. If there is stock in the DSSU, supply procedure takes 4 stage processes to get the material to combat personnel. In the whole Army supply chain from user to procurement head office, supply procedures go through total 71-72 processes. And more, when there is no stock in DSSU among requested items from the organization, organization unit takes it as 'scheduled supply'. However, actually, there is no automatic request to the higher echelon, DSSU still depleted stock until the Division supply officer takes action to request the item to the LSC. And worse, there is no way to know when requested item shall be distributed due to no reply from higher logistics department. Because the system is not automatically connected among Division-LSC-ALC, it is hard to get right supply support when the unit is not laid in the supply support channel, even though Korean Army holds the stocks in all supply support units. (In case of some stocks, implementing horizontal transition via open inventory management)

Figure 5 multilevel supply support structure of Korean Army



Source: Susung Kim, 'study of development of Army logistics system', Hannam Univ, 2002

b) Inaccurate demand management system

Inaccurate demand forecast incurs increasing inventory and wastes resources. So, it is very important to estimate demand precisely. In case of Korean Army, they forecasted yearly demand based on the data during past 5 years of supply and total consumption. However, the precision rate is quite low as shown in the following table. In the following table, procurement occurrence is the number of items that the Procurement Headquarters sets to supply, and demand occurrence is the number of items that field units request for supply. According to the previous result, only 66% of procurement items are requested to supply, the 34% is not requested from the field units. This means lots of redundant items are procured this generates operating inefficiency and wastes of money. Even though the forecasting accuracy of items showed at the table is 66%, however when we forecast demands of each

item, the forecasting accuracy will drop more.

Table 4 demand vs. accuracy state in 2002

Section	Sum	No demand occurrence		Demand occurrence	
Sum	53,039	25,375	48%	27,664	52%
No Procurement occurrence	13,121	11,808	90%	1,313	10%
Procurement occurrence	39,918	13,567	34%	26,353	66%
<ul style="list-style-type: none"> ♦ Excessive no demand items among procurement occurrence items(34%): Increasing inventory of logistics support units ♦ The less item demands, the harder forecast: 80% of no procurement occurrence items has less than 10. 					

Source: Korean Army Logistics Command, “2003 analyzing procurement forecast result”

There might be various reasons for inaccurate forecasts. One of the main reasons is uncertainty about the supply. So each unit requests more than they need or they duplicate requests for securing supply. Due to un-synchronization among logistics support units or between logistics support unit and combat unit, it becomes fake demand even though it was a real demand at the time of request. However, processing request and supply take too much time by going through multiple layers, so combat units take their own way to get requested material. Therefore, actual demand becomes virtual demand and demand is distorted.

The Korea Army maintains a total of 175 day supply level on the ASL (Authorized Stockage List) items. This is 3 to 10 times more than civilian businesses. However, supply support takes 9 to 18 days on stock items, and 197 to 362 days on backorder items by going through ALC request procedure. This is fairly inefficient and it takes more than 10 times civilian businesses. Of course, it is natural to secure high level of stock on the strategic munitions, however, now the whole ASL items have too high stock level.

Table 5 supply level of Korea Army

(unit: day)

Section	Operating Stock	Intermediate site Stock	Safety Stock	Sum
ALC	.	60	30	90
LSC	25	25	15	65
DSSU	10	10	.	20

Source: Samsuk Jung, the study of improving Army logistics system, Hannam Univ, 2000, p52

Table 6 supply support time

(unit: day)

Section	Combatant - DSSU	DSSU - LSC	LSC - ALC	ALC - Procurement HQ
Goods	11 – 12	10 – 49	20 – 34	141 – 173
Repair part	9 – 18	11 – 38	21 – 48	156 – 258

Source: the result of 25 items which had stocks in common on field division, LSC, ALC, and Procurement HQ

c) Inefficiency of procurement and transportation management

In addition to inaccurate amount of procurement, there is another problem in the procurement. The military procurement is executed as following ways. First, each service supply command requests supply to the Procurement Headquarters (PH) with designated delivery date. Next, the PH sets up monthly procurement plan based on the amount of yearly procurement. And then, they make a contract with production enterprises according to quarterly needs. However, because of discordance between budget allocation time and the time of procurement contract at the PH, about half of contracts were not made until 30 June 2001. And more, because the PH draws out a procurement plan only once per year, it is hard to meet the actively changing demand of combat units, and it is also hard to procure flexibly because changing procurement plan creates excessive administrative jobs.

In transportation part, the National Military Transportation Command (NMTC) was established in 1999 to plan and control all the external and internal military transportation.

However, most of transportation services of the NMTC are either operational function or mass material transportation. Due to this, most of logistics supports affairs are conducted by own fleet of supported units. Transportation time takes so long and it makes much delay to receive material.

And the NMTC is under the control of Ministry of National Defense. However, the Supply Depots are under the control of ALC. So when Supply Depots need to operate a vehicle from the NMTC, it takes more than 3 days to process administrative jobs at the higher echelon than Army Transportation Command (the Army Unit which was charging transportation before establishing integrated service transportation command). So someone said at the part of Supply depots, they lost flexibility in transportation. The vertical organization decreases horizontal efficiency.

And more, because the procurement and actual demand have a gap, so reverse transportation⁵ is happened. As showed in the following table, total reverse transportation happened almost 19.3% and it causes budget wasting. Due to this, Army should have inventory which is up to \$1.3 billion and also needs much of human/material resources to manage and maintain the inventory.

Table 7 the amount of reverse transportation

Section	Sum	1st Supply Depot	2nd Supply Depot	3rd Supply Depot	5th Supply Depot	6th Supply Depot	5th Maintenance Depot
Supply material (ton)	84,529	8,288	29,136	3,076	8,354	35,228	417
Reverse transportation material (ton)	16,350	4,786	3,275	1,375	4,049	2,813	53
Percent (%)	19.3	57.7	11.2	44.7	48.3	8.0	12.5

⁵ Reverse transportation: transportation which sends back to origin due to wrong delivery,

d) The short of professionalism of logistics officers

According to the Korean Army personnel management policy, infantry officers choose their specialty after they are promoted as majors. Before that, they had no chance to experience the logistics jobs because the policy of managing infantry officers is focused on only doing well on operations. However, other combat service support branch personnel work as logistics officers as soon as they are commissioned. So, there is big difference on working professionalism between infantry logistics officers and other combat service support officers. The thing that makes it worse is there is little training or education about logistics affairs after infantry officers choose logistics specialty. Generally, training or education can make up for a shortage of experience. However, due to lack of education or training, the gap between infantry officers and other logistics branch officers becomes bigger.

In reality, there are two education programs from the ALS (Army Logistics School). One is training how to use the NDMMP (National Defense Material Management Program) online. The other is the FLOCE (Field Logistics Officer Call Education) at the ALS. However, the former is only focusing how to record well to match between a ledger and an inventory, and the skill to request supply support to upper layer. The latter is teaching general logistics flows and it consists of 2 weeks. Two weeks are too short for infantry officers to understand enough about whole logistics function. As everybody knows, logistics have various parts. Because of that, branches are divided specifically. All the other logistics support branches such as maintenance and quartermasters take enough specialized education at the ALS. They learn specialized information and technique to perform enough well on their positions. The OBC (officer basic course) consists of 3 months and the OAC (officer advanced course) consists of 6 months. During those education periods, they can learn detailed information and technique to become field experts. However, even though infantry logistics officers control all other

specific logistics branches, they have the lack of opportunity to get the right amount of education. Besides, field units are commonly short of officers, they do not have enough time on job transition. Because of that, infantry officers lack professionalism on their jobs. And that becomes the reason for delaying and missing supply support on combat units.

Usually, most businesses offer education or training to their new and existing employees to enhance productivity and job efficiency. However, the Korean Army overlooks the importance of education and training. To prepare the right level of combat readiness and to increase the job efficiency, the Korea Army should solve logistics manpower management problem.

5 The successful factors of civilian business

As this research dealt with at the section 3, even though a lot of things has improved, the Korean Army still has some problems on logistics management. Because of closed environment of military due to security problem, lots of fields in Korean Army are well behind than civilian businesses. This research investigates the ‘Samsung Electronics case’ through interview and internet materials. Through investigating Samsung’s strategy, Korea Army may adopt the competitive edge of the civilian business and make up for the weak points in the current situation.

a) Construction of integrated logistics information system

In the transportation area, the interviewee said their success of logistics comes from the construction of integrated logistics information system. He said all kinds of modes are used to transport material in and out to the central distribution center. However trucks are the account for major transportation mode. Most of transportation cost comes from the truck operations. To operate truck more economically, Samsung invented the fully automated transportation planning system first in Korea. Before that, material allocation and transportation scheduling

were performed manually. The automated transportation scheduling system enables them to optimize transportation route and vehicle loading rate. And this system also enables them to replenish the inventory automatically through checking inventory level by online real time system from order to shipping. And more, the national road network model data base was constructed. This data base divides the whole country into 309 major sections and 1632 minor sections. And then, each section is connected through the road data. This data gives the basic information about the transportation plan algorithm and the calculation of transportation cost.

Through constructing the integrated logistics information system, the Samsung electronics gains several benefits. The first benefit is 1.3 million dollars of annual transportation cost reduction (Due to transportation route optimization).⁶ The second benefit is that it enables them to shorten the lead time to less than 12 hours from order to shipping. And the last is overcoming the limitation of manual work. Fully automated material allocation and transportation scheduling make it possible to process a greater workload when it was impossible to be done manually.

b) Improving inventory management system

When managing the inventory, the interviewee answered that the goal of inventory management is 'making the inventory to zero'. So, the required amount of items is planned and that is ordered to the production department. And then items are produces and delivered. This system is similar to JIT concept. They constructed the inventory level operation system by applying the current level into daily sales plan. Through that, they could unify the production and sales in the inventory management. This system enabled them to visualize the inventory management. Additionally to increase the work efficiency, they attached the

⁶ Source: Moonkyu Yoon, the successful logistics case of the South Korea's business, 2000.

intelligent sensor on the goods. With this, the goods are assorted automatically according to their delivery destination during moving on the conveyor belt.

And more the Samsung electronics sets up different amount of inventories depending on logistics distribution points. To do this, they applied ABC analysis depending on the frequency and volume of order.

With this improvement of inventory management, the Samsung electronics can save \$2.6 million on inventory holding cost.⁷ And it is possible to identify the problem and to solve it on each section (sales, production, and materials). And it enables to set up the management system and clear the responsibility of each section.

c) Making integrated logistics center

The 20 scattered storages in the Suwon complex were combined into one integrated depot. During that procedure, they also constructed the automated inventories for small- and mid-size products. Those are operated in remote automated control by the computer. And, the integrated logistics center also improved logistics flows within the business. For that, they made the one way in vehicle line of flow during in and out. They also made new a exit exclusively for product shipping.

This integrated logistics center increased 30 % of work efficiency by the transferring from separate management system to integrated management system. And automated inventory enables to increase storage efficiency and work efficiency about 50%. The improved logistics flow increases the vehicle circulation rate and decreases the traffic jam time inside the Suwon complex. So, making the integrated logistics center saves the total logistics cost about \$1

⁷ Source: Moonkyu Yoon, the successful logistics case of the South Korea's business, 2000.

million annually.⁸

d) Introducing unit load system

The Samsung electronics adopted the tractor and trailer method rather previously used trucking method. They also applied palletizing on product boxes and it turned work methods into mechanization and unitization.

Several advantages can be gained by the applying Unit Load System (ULS). First, it can save labor cost. Palletizing makes loading and unloading works able to be done by machine. Therefore, it can save human labor, so this way can save labor cost than conventional method. Second, ULS can take full utilizing of limited space on warehouse, container, and vessels. Third, various kinds of cost can be saved through reducing the lag time on freight cars, ships, and transport equipment. Fourth, it is easy to check the inventory, due to the simplified inventory by lots. Fifth, because ULS simplifies a warehouse work, the ventilation inside the warehouse becomes better. Sixth, due to large unit lots and moving by equipment, ULS can prevent theft and damage. In addition, ULS has more advantages such as labor reduction on packaging, simplification of documents, prevention of moisture on the product, etc.

e) Investment on employee training

The motto of Samsung is ‘the best is the talented people’. It was considered as the most important thing from the foundation of their enterprise. The Samsung electronics spends more than \$170 million annually on employee education and training.⁹

New employee training consists of 4 weeks. During this course, they teach not only job trainings but also courtesy, creative thinking, theme activity, etc. It is very strict course and it takes from 5: 50 AM to 9:00 PM. However, after that, they cannot go to bed until midnight

⁸ Source: Moonkyu Yoon, the successful logistics case of the South Korea's business, 2000

⁹ Source: Seungjun Ahn, Human resource development in the Samsung Electronics

due to team meeting. At the end of course, the new employees have to suggest new products or innovative ways. This is called 'Crepid (Creative + Olympiad)'. Through that, they learned the basic knowledge about their jobs and also learned to think about which part can be improved.

For the existing employee training, various kinds of educations are provided according to the employees' position. This education consists of 2 weeks. During this course, employees are provided intensive job training and given time for job research. To know better about their position, senior guidance is matched to each employee on a man to man way. At end of this course, the trainee should propose the business improvement report manual.

Both new and existing employees training require finding the way how the current system can be improved. The interviewee on this research said that the most successful factor of Samsung electronics is continuously deriving improvement on current situation and not to be satisfied with the status quo.

Another factor that makes these systems work effectively is that Samsung provides adequate compensation to their employees. Previously, Samsung gave the salary based on work career year in their business not based on their performance. However, after the IMF economic crisis in 1998, Samsung stressed the performance of personal and organization to survive in the uncertain economic environment. So, they changed the salary structures. Now, the employees' salaries are decided based on their performance. Samsung decreased the portion of fixed basic salary and increased the portion of PI (Productivity Incentive) and PS (Profit Sharing). So, employees are trying hard for their education because expertise in their position is closely related to their salary.

f) Summary

Through analyzing the Samsung Electronics case, this research identified its competitive

edges for surviving in the intense competitive environment. They introduced as followings: construction of integrated logistics information system, improving inventory management system, establishment of integrated logistics center, introduction unit load system, and investment on employee training. As everybody knows, the goal of businesses is maximizing profit. The Samsung Electronics goal is the same so all of these improvements are for efficient operating. However, the effectiveness overwhelms the efficiency in the military due to war preparation. So, all identified competitive edges cannot be applied in the Korea Army logistics. As this study identified at the section 4, the main problems in the Korea Army logistics comes from administrative jobs due to multi-level supply structure and short of professionalism of logistics officers. So, the future improving should focus to solve these problems. In the next section, improving ways are suggested based on adaptation of civilian case and field officers' suggestions.

6 Improving ways of Korean Army logistics

At the section 3, we identified what are causing problems in the current Army logistics system. Those can be summarized into main four problems. The first are multi-level supply support system, the second is inaccurate demand management system, the third is inefficient procurement, and the last is lack of professionalism of logistics officers. Possible suggestions are provided from the interviews and possible solutions are gathered from the documentation.

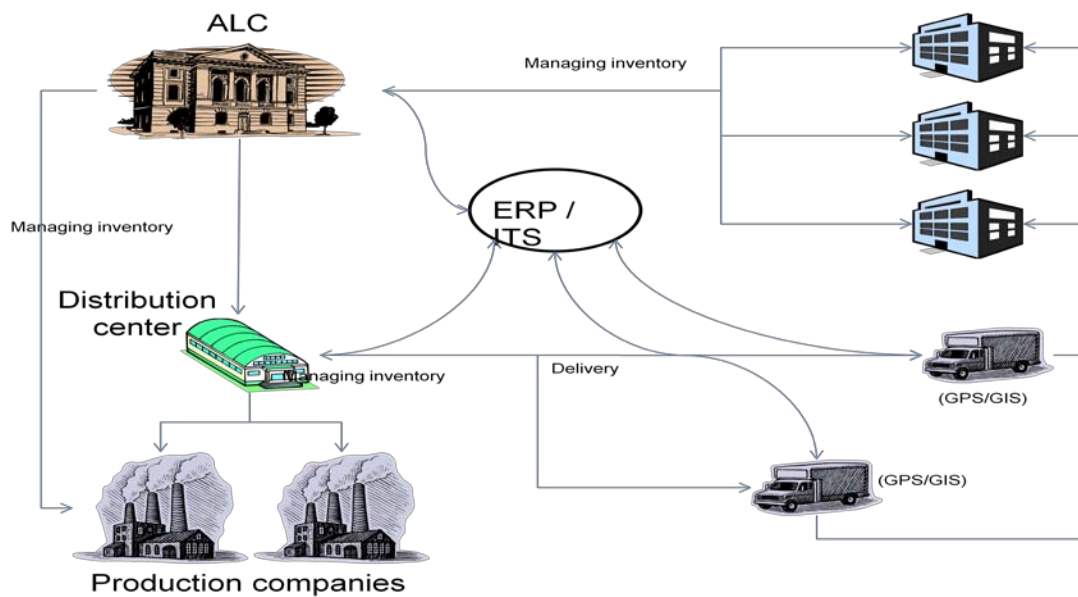
a) Construction of central inventory management system for shortening CWT

To solve the problem about the multi-level structure and inaccurate demand, it is necessary to introduce a central inventory management system such as the integrated logistics information system of Samsung Electronics. To check, adjust, and control all Army assets through visualizing those, it is important to construct central inventory management system

for managing information comprehensively at the ALC. Through the constructing this system, it is possible to simplify the complex logistics chain from the ALC to organization. And because this system also makes it possible to check the inventory level of Army, distributing company, and producing company in real time, so transportation and OST can be reduced.

As seen in the following figure, it is possible to check not only Army inventory assets and distributing company's inventory assets but also the location and quantity of current moving or shipping goods through GPS (Global Positioning System) or GIS (Geographic Information System). This system also can check and manage the inventory level of production companies. From the point of supply units, this enables to check the exact arrival time and quantity. They can increase the reliability from the field units.

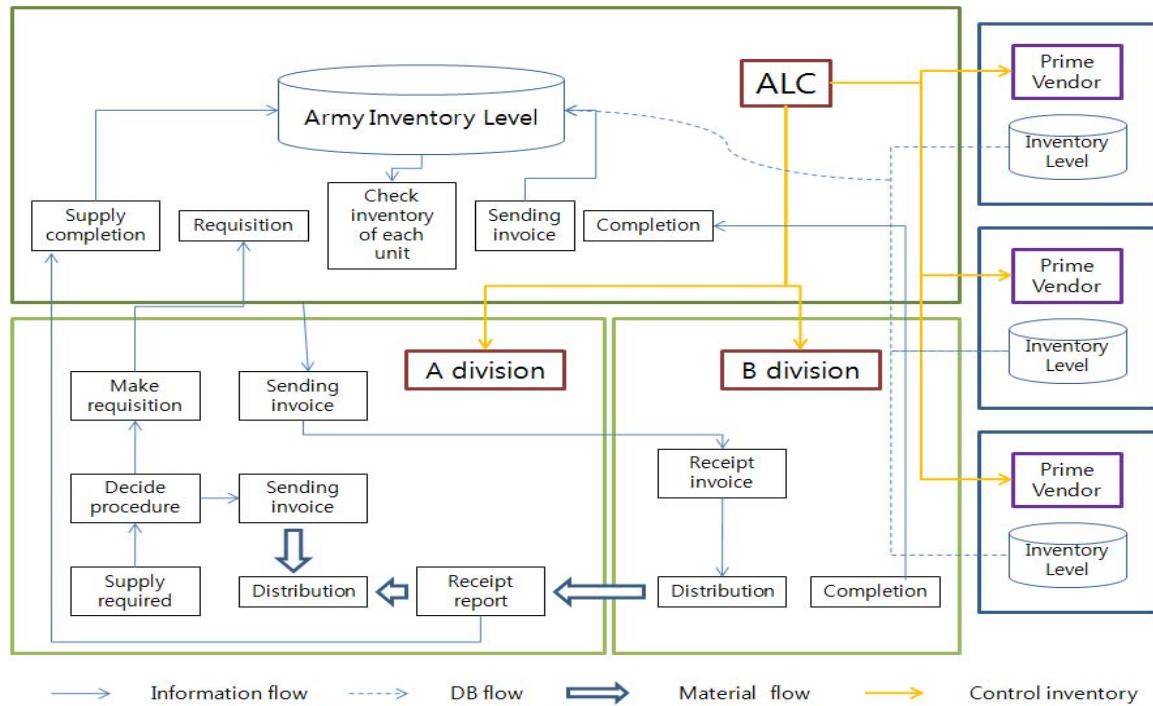
Figure 6 the central inventory management system



Source: Jonghyuk Kim, 'study of military logistics', Hannam Unive, 2008

The central inventory control system works as following figure 10.

Figure 7 the central inventory control procedure



Source: Susung Kim, 'study of development of Army logistics system', Hannam Univ, 2002

When supply is requested from units, the division processes the requisition immediately if division has stock in DSSU. When it is impossible to process within the division, the division request to the ALC. After requisitions from the divisions are gathered at the ALC, those are distributed to the each class officers. The officers decide the supply procedure (checking the amount of inventory of each unit) based on Army management system. When adjacent division has surplus stocks in its inventory, they send the requisition to the adjacent division. The adjacent division distributes the requested items to the needed division, and then the adjacent unit reports to the ALC about the result. The needed division also reports to the ALC about the completion of supply. After all these procedures go through, the requisition / supply procedures are completed by the central inventory management system.

b) Simplifying supply chain by direct purchase

To solve problem about the multi-layer supply procedure, inefficient procurement and

transport management, simplifying the supply chain is one of the ways which is suggested by field experts. This research presents direct purchase between user and seller (producer) and then checks which items are possible to apply this method and provides the work procedures.

User direct purchase form can be considered into two ways. One is purchasing by individually and the other is purchasing by unit.

(1) User direct procurement method

The user direct purchase items can be applied periodically to supplied materials, officers' clothing, and etc. The unit direct purchase items can be applied to currently unit purchasing items with budget allocation by unit such as expendable supplies which do not require operational criteria.

Applying the criteria above, items which can be applied direct purchase method are the following table.

Table 8 applicable items which are purchased directly from user

Class	Individual buyable items	Unit buyable items	Remarks
1	♦ Subsidiary food: cup noodle, rice noodle, bread	-	
2	♦ Personal cleansing: soap, toothpaste, toothbrush, razor, toilet paper, etc ♦ Periodic clothing: innerwear, socks, towel, shoe polish, etc ♦ Officers' clothing: every item	♦ Office equipment: desk, chair, file cabinet, etc ♦ Kitchenware: knife, chopping board, scrubber, pot, thermos bottle, catering hat etc ♦ Maintenance material: barber machinery, etc ♦ Others: administration supplies, shoe closet, water cooler and heater, etc	Except first supplies when people get enlisted
3	-	♦ Disease preventions: mosquito repellent (liquid, incense, electric fume), pesticide, etc ♦ Chemicals: nitrogen, argon, hydrogen, oxygen, acetylene, boiler-cleaning component, etc ♦ Others: waste water purification chemicals, antifreeze, etc	
4	-	♦ General materials: timber, paint, vinyl floor, cement, etc	
7	-	♦ Commercial telephone, etc (small appliances)	

Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

To facilitate individual or unit purchase, it is necessary to introduce the e-commerce like civilian businesses. To do this in the military, E-mall should be operated to provide the information about commodity standard, cost and delivery of each producer for purchasing standard munitions.

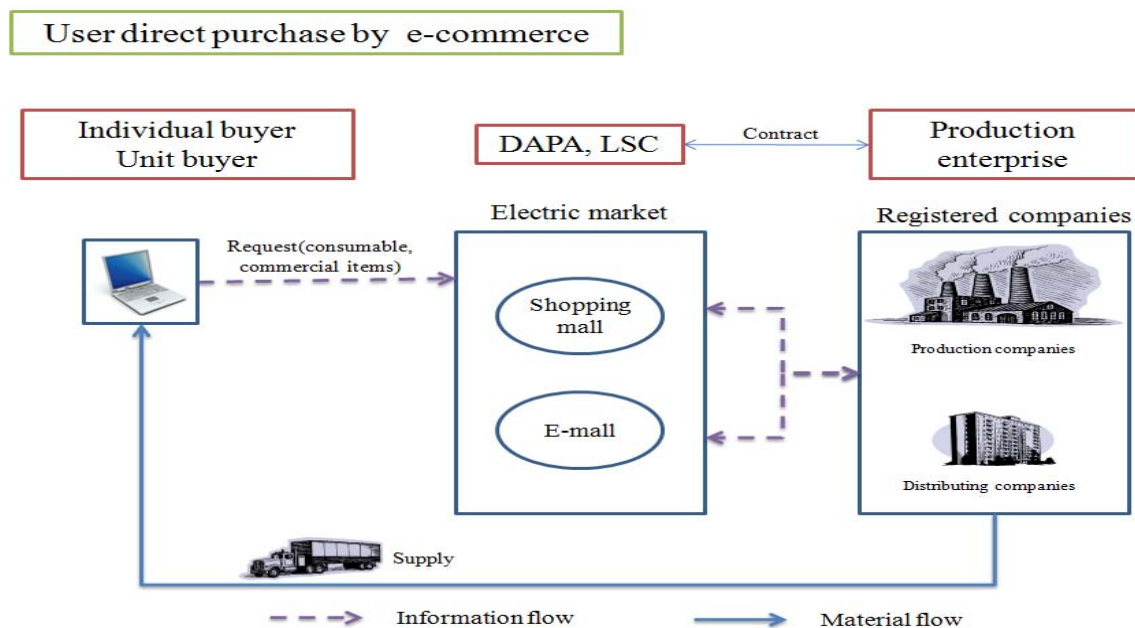
It seems to be adequate for LSC or Divisions to operate the E-mall. The vendors which

can sell the items should be selected through the qualification at the DAPA (Defense Acquisition Program Administration). However, in order to promote the competition of item quality, it is desirable to select multiple companies.

(2) Direct purchase approach by units

Direct bought items by units are not applied to the current method (cash is deposited to unit's bank account through the field distribution system). However, it is applied to buy unit's required product through the government purchase card. To implement this way, MND and Army Headquarters should provide cash allocation criteria based on unit type and budget project. Operating concept and procedure of user direct purchase method are following figure and table.

Figure 8 user direct purchase concept through e-commerce



Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

Table 9 operating concept of user direct purchase

Section		Operating method	Remarks
Applying plan		<ul style="list-style-type: none"> ♦ The registered companies which are qualified by DAPA provide the items to the required time and space by user 	
Contract type		<ul style="list-style-type: none"> ♦ Unit price contract by items ♦ Required quantity supply contract by regions 	
Operating concept	Individual purchase	<ul style="list-style-type: none"> ♦ Individual user or unit purchase required items through PX within allocated budget ♦ When items are ordered with e-card through the E-mall, the registered companies ship the item to the buyer within the contract period 	
	Unit purchase	<ul style="list-style-type: none"> ♦ Unit places the order to the supply contract registered companies within the allocated budget (Select items and vendors at the E-mall) ♦ Supply contractors ship ordered amount within the contract period 	
Role by layer		<ul style="list-style-type: none"> ♦ MND, AH: set budget allocating criteria by items and units ♦ DAPA: selecting supply companies and making contract ♦ ALC: set budget by items, decide procurement need and request procurement ♦ LSC and divisions: operate E-mall ♦ User unit: raise annual requirement by items 	

Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

When Korean Army applies user direct purchase method, several good effects are expected. Firstly, it is possible to buy standard items easily which can meet the individual need and taste. Secondly, logistics budget can be executed efficiently through buying selected items which are actually required at that unit. Lastly, combat readiness level can be increased by reducing administrative jobs and supply time due to removing complex procurement

contract procedure.

c) Reducing inventory cost and increasing supply rate through applying the Prime Vendor

(1) Korean Army case of introducing the Prime Vendor system

If the Prime Vendor system is introduced the Korean Army, military inventory can be shrunk dramatically and also the customer satisfaction can be increased through rapid supply. The Prime Vendor manages munitions inventory and delivers required amount of munitions when and where Army requests it. Actually, US military reduced inventory cost and increased the customer satisfaction through introducing the Prime Vendor system in 1993. The effects are shown following table.

Table 10 the applied items and the effects of Prime Vendor in US military

Introduced organization	Applied items	Effects
US DLA	Medicine and medical supplies	<ul style="list-style-type: none"> ◆ More than 85% reduction in stock ◆ Lead time reduction ◆ 95% of supply level, improve user satisfaction
	Clothing and general merchandise	<ul style="list-style-type: none"> ◆ Inventory decreased by units from \$ 6 to \$10 millions ◆ Lead time reduction, improve user satisfaction
	Food and cooking utensils	<ul style="list-style-type: none"> ◆ More than 50% reduction in stock ◆ Lead time reduction ◆ Improve user satisfaction
	Repair parts	<ul style="list-style-type: none"> ◆ Lead time reduction ◆ Improve user satisfaction
US Army	M109 Self-propelled artillery, Apache chopper	<ul style="list-style-type: none"> ◆ Integrated logistics support operations undertaken by companies
US Air Force	Non-standard items	<ul style="list-style-type: none"> ◆ Missions operated by companies ◆ Reduction of military affairs ◆ Improve user satisfaction

Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

The applicable items for introducing the Prime Vendor system are considered the

commercial products which can be mass-produced and distributed regardless of peacetime or wartime. When Prime Vendor system is applied to the Army, supplies taken over place shall be designated as user unit or storage facility unit on the logistics distribution system with the consideration of purpose, user units, and the amount. The following table shows applicable items and receiving units when the Prime Vendor system is introduced.

Table 11 the Prime Vendor system applicable items and receiving units

Class	PV system applicable items	Supplies receiving units
1	♦ Agricultural and marine product: meat, vegetable, fish, shell	Cooking units
3	♦ Oil: gasoline, diesel, kerosene	User units bigger than battalions
4	♦ Hand tools: construction material, commercial OVM-OEM tools	User units
7	♦ Commercial device	User units
8	♦ Medicines	Medical center, user unit bigger than divisions
9	♦ Repair parts of commercial device	Division, LSC, maintenance unit in ALC

Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

The next is successful outsourcing case of using civilian business at the OO division. That division improved military feed system dramatically through introducing civilian business, so this case was published 'the excellent case of innovation in Korea Army' on June 20th, 2007.

The food service system in the past experienced some problems. First, it was hard to ensure the working condition of logistics staffs due to receiving and transporting foodstuffs. Because of receiving foodstuffs 3 times per week, this disturbs the original work of logistics staffs. And more, it takes average 780 hours (98 days) annually to receive foodstuffs. Due to these problems, there exists vehicle safety problem because of long vehicle operating hours. And it increased the burden to the commander about the accident. Second, due to aging of food supply vehicles, the freshness of food becomes poor. So, the problem about food

poisoning has occurred. Also, it was hard to distribute precise amount to the distant units from the battalion. Because foodstuffs were delivered to the battalion and then they were distributed to the distant units.

Because of above presented problems, the OO division provided the new food service system model for solving existing problems. First, they established 'Food distribution center' which is the core infrastructure of new food service system. They changed the existing warehouse into the inspection / packaging workshop. And more, through internal work performed by the company, refrigerated equipment and packaging equipment were established.

The next, 'packaging / shipping processes' which were the driving force in the system innovation were developed. This process was applied to the food packaging which is essential during supplies from battalion to distant units. It also applied to plan the optimized direct shipping course, so shipping time was decreased average 3~4 hours than previous system.¹⁰

As a result of these improving efforts, remarkable achievements were obtained. The next table shows comparison between existing system and new system with food distribution center.

¹⁰ Source: Bongeun Kim, "military food service improvement through outsourcing", the OO division, 2007

Table 12 comparison food service between existing and new system

Section		Existing food service	Food service with distribution center
Distribution place per 1 vehicle		1 ~ 2 places	5 ~ 6 places
Delivery	How to	<ul style="list-style-type: none"> ♦ All items are loaded on the vehicle ♦ Distributed at the vehicle upon arrival by each unit 	<ul style="list-style-type: none"> ♦ Set packaging by items and units before delivery day ♦ Distributed after sorting and loading by each unit to the vehicle
	Pros / Cons	<ul style="list-style-type: none"> ♦ Require too much time, vulnerable to food poisoning, hard to distribute precisely 	<ul style="list-style-type: none"> ♦ Shorten the time, prevent food poisoning, distribute precisely ♦ Additional cost to the companies (labor: 6 people)
Inspection		<ul style="list-style-type: none"> ♦ Once per day - Simple inspection on delivery day 	<ul style="list-style-type: none"> ♦ Twice - Previous day: supervise packaging - Delivery day: inspection by 2~3 units
Average vehicle operating time		7 hours	4 hours
Pros / Cons		<ul style="list-style-type: none"> ♦ Different food receiving time by units, difficulties preparing dinner - The first: 10:00 - The last: 16:00 	<ul style="list-style-type: none"> ♦ Food receiving time is almost the same regardless of unit locations

Source: Bongeun Kim, "military food service improvement through outsourcing", the OO division, 2007

As seen on the above table, through food distribution center outsourcing to the civilian business, it is possible to inspect the food condition and the packaging procedure at any time. Also, this system decreased the receiving time of foodstuffs averagely more than 3 hours.¹¹ As a result of that, the risk of traffic accidents decreased and working conditions of logistics staffs are guaranteed.

Next, it enables to manage personnel and defense budget efficiently. Through transporting

¹¹ Source: Bongeun Kim, "military food service improvement through outsourcing", the OO division, 2007

to the each military unit by companies, labor and vehicle maintenance cost are decreased. So it saved up to \$170,000 of labor costs, and \$62,000 of vehicle maintaining and operating costs. And more, through transporting general items using the food service vehicle, it decreased vehicle operations. Finally, defense budget was saved total \$231,000 annually.¹²

In terms of maintaining food freshness, the risk of food poisoning was zeroing by realization of hygienic distribution through vacuum packaging and refrigerated keeping throughout the whole distribution process.

Through the excellent innovation case of Army Headquarters, outsourcing to the civilian business can be realized successfully, which was considered having limitation before the case.

When the Prime Vendor system is applied, the subject of contract in the military side will be as following. When the items support all military, the subject should be the DAPA. When items are procured by units, the subject of contract shall be the LSC. The subject of supplier in civilian companies can be classified into two groups. One is the companies which are capable to produce and to ship the product to the military. The other is the companies which only take care of distribution between producer and military. These two parties can be participated in the contract.

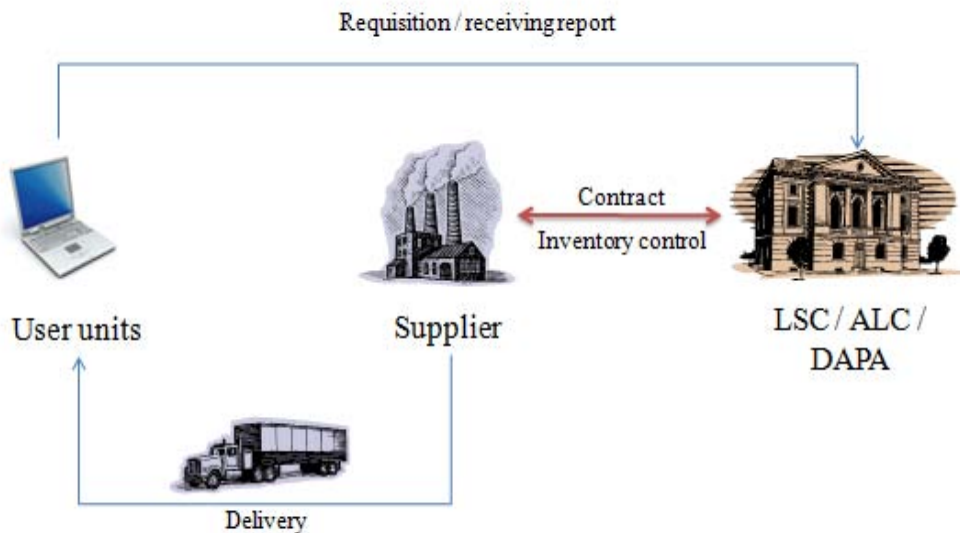
(2) The application process of the Prime Vendor system

To apply the Prime Vendor system, the logistics information system should be connected between suppliers and military units. Therefore, it should be stepwise method for Army to introduce this system. The first step is executing with current logistic information system which is not connected between supplier and Army. The second step is settling this system when logistics information systems are connected with each other.

¹² Source: Bongeun Kim, "military food service improvement through outsourcing", the OO division, 2007

At the first step, the supply chain is operated the same way as the current supply method. However, the time of delivery is applied when user units request the supply. During the first step, the executing procedures are as following. First, supply contract is made between contract subjects. And then, user unit requests supply to the LSC or the ALC within allocated budget. The LSC or the ALC process the requisitions per daily basis and direct the delivery to the supplier. And then the supplier delivers products to the user units. The first step approach is done through explained procedure.

Figure 9 the applying procedure of the Prime Vendor system at first step



Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

When the second step is applied, user units receive items through requesting directly to the supplier within allocated budget. And they report the request and receiving list to the contract subject monthly and settle by monthly basis. Compared with the first step, the administrative time can be reduced significantly because inventory control procedure at the LSC or ALC is omitted. Described so far, the operating concept and procedure of the Prime Vendor system are as follows.

Table 13 the operating concept of the Prime Vendor system

Section		Operating concept	Remark
Applying plan		<ul style="list-style-type: none"> ♦ Supplier, the PV, provides the required items with the time and place which military requires, while maintaining the appropriate level of inventory 	
Contract type		<ul style="list-style-type: none"> ♦ Unit price contract by items ♦ Contract to supply the actual demand items within total allocated budget 	Applies the international contract law
Operating concept	The 1 st step	<ul style="list-style-type: none"> ♦ User units request to the ALC or the LSC within allocated budget ♦ The ALC or LSC direct the supply to the PV daily ♦ The PV ships within 1~2 days after receiving order ♦ The contract subject (the LSC or the DAPA) pays after monthly settlement 	Reflect the operating system when logistics information system is developed
	The 2 nd step	<ul style="list-style-type: none"> ♦ User units request to the PV within allocated budget ♦ Other procedures are the same as the 1st step 	
Responsibility by echelon		<ul style="list-style-type: none"> ♦ MND, AH: set budget by unit type and by items ♦ ALC: set budget by items, estimate procurement requirement and request procurement ♦ DAPA: the PV selection and making contract ♦ User unit and LSC: raising annual requirement by items 	

Source: Kyungeun Jung, "Logistics support improving plan", Army Headquarter, 2007

When the PV system is applied to the Korea Army, the expected effects will be as followings. It enables a reduction in the amount of inventory, so inventory holding cost and labor can be saved. Also, it is possible to increase supply rate and to decrease procurement lead time. So finally, it is expected to increase the customer satisfaction greatly.

d) Establishing education systems and ensuring education conditions

As Samsung electronics does, the most important thing in the logistics is managing

manpower. As identified through the interview, the biggest problem of managing manpower in Korea Army is the lack of professionalism. To achieve this goal, the education to the infantry logistics officers should be organized well and also a sufficient time for job transition must be guaranteed.

First, the current FLOCE should be subdivided into 2 groups (the basic course and the advanced course) depending on logistics officers' work career. The basic course is for the new infantry logistics officers and the advanced course is for the existing all logistics officers. The reason why the basic course is only for infantry officers is all the other specialty logistics branch officers get knowledge of their specialty from the OBC and the OAC.

The detail implementation plans are following. All the basic and advanced courses should be planned and performed at the ALS. The basic course education should be scheduled 12 times per a year, and the education period should consist of 2 weeks to gain a general idea of logistics. The entrance time for the basic course should be before starting logistics affairs. And the course should provide the general understanding about military logistics and how it works.

The advanced course education should be scheduled 4 times per a year, and the education period should be 1~2 weeks depending on the amount of curriculum. The purpose of the advanced course is to know the new logistics policy and technology and to get the answer about problems when they work on their fields.

To get the successful result for implementing this plan, two conditions are required. First, the commanders should ensure the conditions for logistics officers to take the education. In the field units, some commanders do not allow for logistics officers to take education away from their unit, due to job vacancy during the education. However, by taking the education, they can increase the job efficiency and unit's combat readiness level. Second, performance based incentives should be given to the logistics officers. Some officers do not concern about

their performance because it is not related to their interest. So, in this case, taking education is waste of money and time. To maximize education effect, proper incentives should be given to the logistics officers such as the PI (Product Incentives) of the Samsung Electronics. Therefore, performance based bonuses or leaves should be awarded to the logistics officers to enhance the work efficiency.

V. Conclusion

1 The summary and research findings

The purpose of this research is to find the improving way of Korea Army logistics. To achieve this goal, this research checked the theoretical consideration about the military logistics and then identified the current problems through interviewing with the field experts.

The current problems in the Korean Army logistics are divided into 4 kinds. The first is the multi-level supply structure. Because each layer holds different kinds of inventory, this system generates unnecessary administrative jobs. As a result, supply procedures are delayed and the CWT is increased. The second is inaccurate demand management. Due uncertainty of supply, combat units take their own method by themselves. So, the real demand becomes virtual demand, and when supplied items are received at the combat units, those become redundant. However the DAPA forecasts demand based on yearly requested amount of each items. So demand forecast is distorted and finally inefficient use of logistics budget occurs in the Korean Army. The third is inefficiency of procurement and transportation management. The DAPA makes a contract certain amount of items with vendor per yearly basis. However, when demand is changed, it is hard to response to meet the demand due to complex procedures. Also, due to the chain of command, inefficiency of operating transportation asset is created. The last is lack of professionalism of logistics specialty officers. Because of

insufficient opportunities to get education and training on their jobs, job inefficiency is generated.

To improve these identified problems, various sources are adapted: getting the suggestion through interviewing with field experts, applying successful civilian business case through interviewing with a manager, and using relevant literature and research materials.

With those sources, this research proposed 4 kinds of concrete implementing ways to improve identified problems. For shortening the CWT and improving transportation management, constructing central inventory management system is presented. To improve the multi-level supply system, user or unit direct purchase method is presented. For implementing this method actively, e-commerce is suggested. And when the Prime Vendor system is applied to the military, this research discussed how to apply logistics support network between user unit and the Prime Vendor in stepwise way. The last, training and education plan for field logistics officers to increase their job efficiency is presented.

2 The limitation of research and the way of future research

This research is developed based on the relevant literatures, research materials, Internet sources and interview with field experts. However, 8 field experts' opinions cannot represent all the idea of logistics personnel in the Korean Army. The ideas came from the interviewee's personal experience so it might have the biases. And more, the selected interviewee's idea is related to the supply chain of infantry division. There are many kinds of divisions and organizations depending on the branches. Even though infantry division is the basic unit in Korea Army, it is hard to apply these ideas to all throughout the Korean Army units. And last, this research is short of analyzing the actual conditions in the field. Because of distant geographical restrictions, the validity of this research through on-site analysis is not acquired.

As this research is completed, some further research questions are arisen related to this

research.

First, establishing relationship between online and offline in the military logistics is required. Now, the current flow of time is moving depending on the Internet technology development. So, there are lots of potentials in the military logistics using Internet. Therefore, online and offline research is required.

Second, for constructing central inventory management system about all Army assets, it is required to study about real-time interlocking system which has the compatibility between Korea Defense Information System and existing unit-developed system

Third, it is necessary to find the concrete way for applying civilian businesses' outsourcing system such as state-of-art logistics management system and 3PLs, to the Korean Army.

This research provided the four improving ways by analyzing current logistics management problems in Korean Army. However, to construct the advanced Army, it is required continuous improvements and efforts. If further research is done for future improvements, more advanced Korean Army can be built.

Appendix A

Interview Questions (Samsung chief of department manager)

Purpose of interview

This interview will provide valuable information for developing Korean Army logistics management. I think Korean military should learn the lesson from successful civilian cases. Due to closed environment and security problem, Korean Army logistics still needs improvement in many areas. As everybody knows, your company has succeeded in developing SCM. Today, the interview with you will give us the key how Korean Army develop the supply chain. All your sincere responses will be used as valuable research data. Thank you very much for your time.

- General information
 - ◆ Name
 - ◆ Position:
 - ◆ Address:
 - ◆ Phone number:
 - ◆ Work career(How long did you work in your company)

1. Logistics function

A. Transportation

- i. Which of following mode does your company use for supply material?
Ex. Truck, railroad, water, air, bike or car (quick delivery), and etc
- ii. Does your company have own fleet or have contract with other companies or mixed?
 1. What percentage of own fleet? And what percentage of contract?
Ex. Own fleet: 40%, Contract: 60%
- iii. Do you think your current transportation system is most efficient?
 1. If yes, why do you think it is?
- iv. Does your transportation system differ from other areas in your industry?
 1. If yes, how? Please explain briefly.

B. Warehousing

- i. In supplying material, do you use push system? Or pull system?
 1. Push system: supply material based on supplier's master plan
 2. Pull system: supply material based on customer's demand
- ii. In managing inventory, which way does your company use as an inventory control system?
 1. s,Q system: fixed order point, fixed order quantity system
 2. s, S system: fixed order point, order-up-to-level system
 3. R,S system: periodic review, order-up-to-level system
 4. R,s,S system: periodic review, fixed order point, order-up-to level system

- iii. Do you think your current inventory system is the most efficient for your company?
 - 1. If yes, why? If no, why? Please explain briefly.

- iv. What kinds of problems does your company have in the current inventory system?

C. Loading/unloading

- i. I heard your company chose the ULS (Unit Load System) from the internet sources. What is the advantage of adopting ULS?

D. Packaging

- i. What kinds of packaging policies does your company use now?
- ii. Do you have recently or are you contemplating in the near future any specific changes in your packaging policy?

2. Information management

- A. Do you think information sharing within your company is working well?

- i. If yes, what are the things that make this works well?
Ex. Barcode, RFID, Network system, and etc
- ii. What areas do you see for future improvement? And what kinds of improvement?

- B. Do you think information sharing between your company and vendors is working well?

- i. If yes, what are the things that make this works well?
Ex. Computer networking, telephone, fax, and etc
- ii. What areas do you see for future improvement? And what kinds of improvement?

- C. Do you think information sharing between your company and customers is working well?

- i. If yes, what are the key factors to be successful with customers?
- ii. What areas do you see for future improvement? And what kinds of improvement?

3. Man power management

- A. Do you think current amount of logistics manpower in your company is the correct level or too high or too low?

- B. Do you think the workload of the logistics employees about right, too high, or too low?

- i. If you choose too high or too low, why do you think that?

- C. What does your company do to facilitate employees being able to perform their workload?

Choose below followings

- i. Incentives: additional pay of overtime, compensatory time, increasing salary level, opportunities for promotion, and etc
- ii. Controlling break time
- iii. Machine automation
- iv. Information technology: software program, scanner, RFID, and etc.
- v. Other things

D. What changes does your company consider about making for future manpower efficiency improvement?

4. Education and training

A. Does your company have specific plan of continuous training or education for employees?

- i. How much training or education time per year does your company provide for your new employees?
- ii. How much training or education time per year does your company provide for your sustaining employees?
- iii. Does this program increase the productivity?
- iv. How about the amount of current training or education time? Are you contemplating increasing or decreasing this in near future?

B. Does your company have a problem with acquiring (hiring or transferring) trained personnel?

- i. Where do you get those personnel from? Ex. transferred or new hired
- ii. What kinds of policies or methods does your company use to retain qualified employees? Ex. Bonuses, salary level increasing, opportunities for promotion, leave, welfare for families and etc.

5. Performance measurement

A. Which of following areas have you seen improvement?

- i. Customer service
- ii. Operating efficiency
- iii. Administrative jobs

B. What improvement have you seen on those areas? Please explain briefly

6. Comments (not on the above question)

A. Do you have anything we have talked about that you think improvement is important for logistics improvement?

B. In the future, which factors will be important to maintain the competitive edge?

Thank you for your sincere response about many questions. These answers only will be used for academic purpose.

- Captain Sungtae Jung -

Interview Questions (logistics managers on each layer in Korean Army Supply Chain)

Purpose of interview

This interview question will provide valuable information for developing Korean Army logistic management. I know you are working so hard, due to your specialty, Army can sustain combat powers. However, as you know, there are lots of things to be improved in Army Logistics Management. I think no one can know better than you about the real problems. Please answer these questions based on your experience and your personal opinion. I appreciate to your time to collect data.

- Interviewee information
 - ◆ Name:
 - ◆ Unit / title:
 - ◆ Contact number:
 - ◆ Work career(How long have you worked in this position):

1. Logistics function

A. Transportation

- i. Do you think current transportation time for supplying material is sufficient to sustain right level of combat power?
 1. How long does it usually take to get material? (simply average)
 2. How many days do you consider to be adequate as a transportation time?
- ii. Do you think current vehicle allocating system is sufficient to meet the supply requirement?
- iii. When we compare to civilian delivery system, what should we do for increasing the vehicle utilization and reducing CWT?
- iv. Do you have any specific suggestion for improving transportation part in Korean Army Supply Chain? If yes, please explain it.

B. Warehousing

- i. What kinds of inventory are you managing?

Ex. Ammo, food, war preparation material, gas, etc
- ii. What kinds of inventory policy do you using on managing inventory?
 1. s,Q system: fixed order point, fixed order quantity system
 2. s, S system: fixed order point, order-up-to-level system
 3. R,S system: periodic review, order-up-to-level system

4. R,s,S system: periodic review, fixed order point, order-up-to level system
- iii. Do you think the current inventory policy work well?
 1. If yes, go to the next question, or please explain why do you think it is not?
- iv. What do you think the advantage of your current policy?
- v. What kinds of problems are arising in current inventory policy?
- vi. Do you have any suggestion for improving current inventory management?

C. Loading/unloading and packaging

- i. Do you think current loading/unloading system work well?

(If yes, skip the sub 1 question)

 1. What is the problem in your current loading/unloading system?
 2. Do you have any applicable solution for increasing the efficiency?
- ii. The current packaging unit is box packed. Almost all kinds of materials are supplied with box packaging.
 1. Do you have any suggestions in packaging for increasing handling efficiency?
 2. Do you have any suggestions for improving securing the material about the packaging?

2. Information management

- A. Do you think the information sharing along supply chain is working enough well?
 - i. If not, what or where is the problem?

Ex. Ordering, transportation, warehousing holding, administrative jobs, and etc
 - ii. Do you have any suggestion which can be applicable for increasing information sharing?
- B. As you know better than me, there is some difference between ledger and real amount of inventory. What do you think why this gap is happened?
 - i. And also, there is also gap between ledgers of each layer. Why these things happen?
 - ii. Do you have any idea for solving these kinds of problems such as real-time recording? If have, please explain.
- C. If you have any idea about improving current information sharing system in Korean Army logistics management, please explain.

3. Man power management

- A. Do you think your workload is right level to your ability?

- i. How many items are you responsible for management?
 - ii. Do you see any areas that could be improvement for increasing efficiency such as administration, transportation, loading/unloading, packaging, computer systems and etc.?
- B. Are you familiar with the computer system and technology in current situation?
- i. Do you see any problems in current computer system and technology? If so what are they?
 - ii. What solution would you offer to solve each problem?

4. Education and training

- A. How long have you been working in your position?
- B. Did you get the education or training about your position (on the job training)?
- i. If yes, is it sufficient for conducting your work?
 - ii. If not, how much time did it take for you to acquire enough knowledge about your position?
- C. Do you see any problems in the current education and training system?
- D. Do you have any suggestion for improvement in education and training system?

5. Performance measurement

- A. What improvement should Korean Army Logistics have in following areas? Or where and how should be improved?
- i. Increasing combat readiness (customer service)
 - ii. Operating efficiency
 - iii. Administrative jobs

6. Comments (not on the above question)

- A. Do you have any other problem which was not dealt with above, please describe it on the basis of you experience.
- B. If you have any idea for improving Army Logistics, please feel free to explain it.

Thank you for your sincere response about many questions. These answers only will be used for academic purpose.

- Captain Sungtae Jung -

Appendix B. Blue Dart

First Name: Sungtae Last Name: Jung
Rank (Military, AD, etc.): Captain. Designator # AFIT/LSCM/ENS/11-06
Student Involved in Research for Blue Dart: Captain Sungtae Jung
Position/Title: Student
Phone Number: 937-613-9434 E-mail: stjung79@gmail.com
School/Organization: Air Force Institute of Technology / ENS
Status: Student Faculty Staff Other
Optimal Media Outlet (optional): _____
Optimal Time of Publication (optional): _____
General Category / Classification: core values command strategy
 war on terror culture & language leadership & ethics
 warfighting international security doctrine
 other (specify): The improving way of Logistics Management in the Korean Army
Suggested Headline: Finding the current logistics management problem in the Korea Army
and providing the improvements of Korean Army logistics system
Keywords: multi-level supply structure, e-commerce, prime vendor system, education & training

The objective of this research is to find a way to improve the Korean Army Logistics. Until now, Korean Army has improved in many fields. However, it still needs more improvement to become an advanced military. In logistics field, it is far behind than civilian businesses. As most of the Korean military personnel recognizes, its supply procedures take more time than civilian companies do even though it has more on-hand stocks. This research investigates the reasons and future improvements by interviewing with field experts and


benchmarking a successful civilian business case.

This research is written based on the interview with the logistic officers on different branches and different units. By analyzing the interview data with field experts, this research identified 4 main problems in the current logistics system: 1) multilevel supply support system, 2) inaccurate demand management system, 3) inefficiency of procurement and transportation management, 4) the short of professionalism of logistics officers. The solutions about the identified problems are acquired by investigation about relevant literature review, telephone interview with Army logistics personnel and interview with a leading private enterprise manager.


Four applicable improvement ways are presented: 1) construction of central inventory management system for shortening the customer wait time, 2) simplifying the supply chain by direct purchase by users and units, 3) reducing inventory cost and increase supply rate through applying the Prime Vendor system, 4) establishing education system and ensuring education environment.

The main contribution of this research is to increase the combat readiness level of combat units. The reason for being of the Korea Military is preparing for wartime. As most Korean people know, the Korean War in 1950 was broken because we did not prepare the war. This research identifies the current problems and suggests the solutions. With these actions, the Korea Army can approach an advanced military and improve the combat readiness level.

Appendix C. Quad Chart



Improving ways of Logistics Management In Korean Army



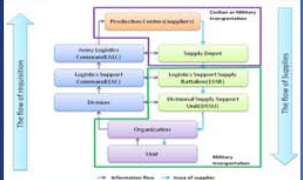
Captain Sungtae Jung (Korean Army)
Dr. William A. Cunningham (Advisor), Dr. Jeffery A. Ogden (Reader)

Department of Operational Sciences
Air Force Institute of Technology

Objective:

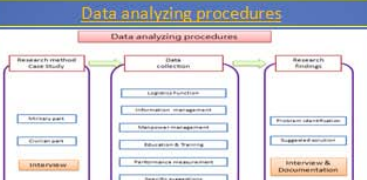
1. Find current logistics problem in the Korean Army
2. Provide the improving ways in Korean Army logistics system

Supply process delay: Vertical and many step structures in supply support



Data analyzing procedures

Data analyzing procedures



Improving ways of Korean Army logistics

1. Introducing central inventory control system
2. Simplifying supply chain by direct purchase
3. Introducing prime vendor system
4. Establishing education condition & ensuring education conditions

Vision 2020: building information oriented & mobile technology intensive unit

Difference between military and business logistics

1. Supply distribution requires needs and demands
2. Supply distribution is one way presentation
3. No organization exists such as market or pricing mechanism which enable to exchange
4. Effectiveness is considered first than efficiency

Successful factors of Samsung Electronics

1. Construction of integrated logistics info system
2. Improving Inventory management system
3. Making integrated logistics center
4. Unit Load System (ULS)
5. Invest on employee training

Problems of Korean Army Logistics

1. Multi-level supply support structure
2. Inaccurate demand management system
3. Inefficiency of procurement & transportation Mgmt
4. Short of professional knowledge of infantry logistics officers

Section	Sum	No demand occurrence	Demand occurrence
Sum	22,030	22,275	27,664
No Procurement occurrence	12,121	11,808	1,313
Procurement occurrence	29,818	13,567	26,351

• Increase in demand remaining procurement occurrence rate (24%) increasing inventory of logistics support units
 • The reaction speed, the faster the increase of procurement occurrence rate has less than 10

Stepwise method (2 steps)

1st step: implement prime vendor system (logistics info system not connected)


2nd step: connect logistics information system each other (bet Army & suppliers)
 User unit requests directly to the supplier
 Administrative time can be reduced significantly (Inv. Control is eliminated)

FLOCE (Field Logistics Officer Call Education) should be divided into 2 groups

Division	Rate	Standard
Signal	10 days per year	20 days per year
Headquarters	10 days per year	20 days (10 days per year)
Division	5 days	15 days (depending on location)
Base	10 days (depending on location of logistic)	15 days (depending on location)

Required condition
 Guarantee opportunities to take the education, Performance base incentives given

Sponsor:
Korean Army HQs,
Korean Army HRC



Appendix D. Abbreviation & Acronyms

ABC	Activity Based Cost
AIDC	Automatic Identification and Data Capture
AH	Army Headquarter
ALC	Army Logistics Command
ALS	Army Logistics School
ASL	Authorized Stock Level
B2B	Business to Business
BL	Basic Load
CWT	Customer Wait Time
DAPA	Defense Acquisition Program Administration
DOD	Department of Defense
DPS	Digital Picking System
DSSU	Division Supply Support Unit
FLOCE	Field Logistics Officer Call Education
GIS	Geographic Information System
KA-FMs	Korean Army Field Manuals
LSC	Logistics Support Command
NDMMP	National Defense Material Management Program
NMTC	National Military Transportation Command
MND	Ministry of National Defense
OAC	Officer Advanced Course
OBC	Officer Basic Course
OCR	Optical Character Recognition

PH	Procurement Headquarters
PI	Productivity Incentive
POS	Point of Sales
PS	Profit Sharing
PV	Prime Vendor
RFID	Radio Frequency Identification
SCM	Supply Chain Management
SDI	Supply Daily Inspection
ULS	Unit Load System
WMS	Warehouse Management System

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