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Comment: Humanitarian Relief Logistics: Pre-positioning Warehouse Strategy

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ABSTRACT

The importance of preparedness is emphasised in humanitarian relief logistics as it gets even more sophisticated. Pre-purchased relief items are stocked in pre-positioned warehouses around the world by various relief organisations which is commonly taken to improve their capacities to deliver sufficient relief aid within a relatively short time frame. This comment paper provides a better understanding about the humanitarian disaster management with the comparison between the commercial logistics. Furthermore, pre-positioned warehousing strategy is overviewed along with the global warehouse locations operated by international relief organisations.

Keywords: Logistics, humanitarian relief logistics, pre-positioned warehouse strategy

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1. Introduction

It is clear from recent studies statistics that natural and man-made disasters are occurring more frequently. It has been shown that natural disasters around the world have increased up to nine fold in the last thirty years (Fritz Institute, 2005; EM-DAT, 2008). An increase in disasters are estimated to strike our planet, killing around 75,000 people and impacting more than 200 million others (Van Wassenhove, 2006). The importance of an emergency relief response operation increases as the numbers of disasters rise. The large number of disasters around the world has illustrated the importance of emergency relief response logistics. One of the most serious problems affecting the modern world is the vulnerability of nations or regions to natural disasters (e.g. earthquakes, floods, droughts) or man-made crises (e.g. civil unrest, war, and political or tribal disturbance) (Pettit and Beresford, 2006). Even though advanced technology is working hard to predict natural disasters, most disasters remain unpredictable.

Disaster relief logistics management is categorised into three phases, which are: preparation, immediate response, and reconstruction (Kovacs and Spens, 2006). The three key phases which cannot be designated to specific time periods are consistently part of the preparation reaction process and logistics serves as a bridge between disaster preparedness and immediate response (Thomas, 2003). The overall goal for preparedness is to improve rapid response facilities so as to allow the timely delivery of food aid in emergency situations (Scott-Bowden, 2003). Speed of delivery is considered one of the important factors in the relief chain where the pressure of time in the relief chain is often not a question of money but the difference between life and death (Van Wassenhove, 2006).

A number of decision support systems and technologies have been developed for the preparation phase. One of the decision support systems is facility location, while stock pre-positioning decisions in the relief chain are critical components of disaster preparedness and, hence, require long-term planning to achieve a high-performance disaster response (Balcik and Beamon, 2008). Pre-positioning in strategic locations around the world is a strategy that has recently been implemented by some humanitarian relief organisations to improve their capacities in delivering sufficient relief aid within a relatively short timeframe and with improved mobilisation (Balcik and Beamon, 2008). The basic purpose for establishing an emergency stockpile is to support life-saving operations during the first few days after a sudden-onset disaster through an immediate delivery of required relief items (UNDHA, 1994). Many relief organisations have recently established a pre-positioned strategic model to carry out extensive work to strengthen their logistical preparedness and capacity (Scott-Bowden, 2003).

In these circumstances, it is imperative to understand the differences of humanitarian relief logistics from commercial logistics, including the characteristics of humanitarian relief logistics. The logistics structure and the process of humanitarian relief, including the different stages of operation phase dealing with disaster occurrence. The importance of the preparedness of the operation phase is covered. Lastly, the structure and the location of pre-positioned warehouses will be analysed in the last section.

2. Humanitarian Relief Logistics

Humanitarian relief logistics is defined as: the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people. (Thomas and Kopczak, 2005). Long and Wood (1995) defined relief itself as a 'foreign intervention into a society with the intention of helping local citizens'. The objective of the relief chain is to provide humanitarian assistance in the forms of food, water, medicine, shelter, and supplies to areas affected by large-scale emergencies (Beamon and Balcik, 2008). Several reports have emphasised that it is crucial that humanitarian logistics should be located in the centre of the disaster relief operation. Chaikin (2003) reported that humanitarian aid logistics require logisticians with professional management experience. Logistics actually serves as a bridge between disaster preparedness and response (Thomas, 2003); therefore, humanitarian logistics is crucial to the effectiveness and speed of response for major humanitarian programs. Procurement and transportation in the logistics function are often one of the most expensive parts of the relief operation. (Thomas and Kopczak, 2005).

2.1. Characteristics of Humanitarian Logistics

Since most natural disasters are unpredictable, the demand for goods in these disasters is also unpredictable. Consequently, it is difficult to rely on demand information for quick-onset disasters for humanitarian relief supply chains (Balcik and Beamon, 2008). Gustavsson (2003) reported the hindering factors that a relief organisation could learn from the commercial supply chain, which are: lack of depth in knowledge, funding that is biased towards short-term responses, and lack of investment in technology and communication. The characteristics of humanitarian logistics are summarised in Table 1.

Table 1. Characteristics of humanitarian logistics

The main aim	Alleviating the suffering of vulnerable people.
Actor structure	Stakeholder focus with no clear links to each other, dominance of NGOs and governmental sector. Existence of vertical coordination and horizontal coordination.
3-phase setup	Preparation, immediate response, reconstruction.
Basic features	Variability in supplies and suppliers, large-scale activities, irregular demand, and unusual constraints in large-scale.
Supply chain philosophy	Supplies are 'pushed' to the disaster location in the immediate response phase. Pull philosophy added in reconstruction phase. Short lead times for a wide variety of suppliers. Unpredictability of demand, in terms of timing, location, type, and size. Lack of resources.
Transportation and infrastructure	Infrastructure destabilised and lack of possibilities to assure quality of food and medical supplies.
Time effects	Time delays may result in loss of lives. Speed of delivery affects people's lives. High stakes associated with adequate and timely delivery.
Bounded knowledge actions	The nature of most disasters demands and an immediate response: hence, supply chains need to be designed and deployed at once even though the knowledge of the situation is very limited. Dynamic and chaotic environments.
Supplier structure	Choice limited, there are even sometimes unwanted suppliers.
Control aspects	Lack of control over operations due to emergency situations.

Source: Balcik et al. (2010), Blacik and Beamon (2008), Cassidy (2003), Kovacs and Spens (2007), Long and Wood (1995)

2.2. The Comparison of Humanitarian Relief and Commercial Logistics

There are clear parallels between business logistics and relief logistics; however, to date the transfer of knowledge between the two has been limited and the latter remains relatively unsophisticated, although more recently greater effort has been put into understanding and developing system which can improve the relief supply chain (Fritz Institute, 2005). Table 2 shows the comparison and contrast between commercial logistics and humanitarian logistics.

Table 2. A comparison of commercial and humanitarian logistics

Criteria	Commercial	Humanitarian
Revenue Sources	Earned from sale of products and services to customers	Government funding, charitable donations, and in-kind donation
Goals	Make profits and provide satisfactory financial returns to shareholder interests	Achieve its social purpose and mission Financial stability is crucial to mission and survival Constraints rather than
Motivation	Profit	Beyond profitability to alleviating the suffering of vulnerable people
Coordination	Well-coordinated	Lacks coordination

Criteria	Commercial	Humanitarian
Strategic Goals	Cost reduction Capital reduction Service improvement	Mission effectiveness Financial sustainability
Stakeholders	Homogenous interests of the owners of a firm guide the firm's policy	Multitude of constituencies whose goals and needs may be heterogeneous
Demand	Products and service Individuals or organisations receiving the products Stable, predictable external demand patterns, often from fixed locations in set quantities, and regular intervals	Supplies and people (aid recipients) Generated from random events that are unpredictable in terms of timing, locations, type, and size No 'true demand' Demand is accessed through aid agencies Lack of customer pressure
Lead Times	Customers accept a lead time of several days to one week between the time they place an order and their shipment arrives	Zero lead time
Performance Measurement	Profits are measured easily and they are a good test of market-need satisfaction and an organisation's ability to operate efficiently	Intangibility of the services offered, immeasurability of the missions, unknowable outcomes, variety of interests and standards of stakeholders

Source: Adapted from (2004), Beamon and Balcik (2008), Beamon and Kotleba (2006), Cassidy (2003), Ernst (2003), Kovacs and Spens (2009), Thomas and Kopczak (2005), Tomasini and Van Wassenhove (2009), Tzeng et al. (2007), Van Wassenhove (2006) arranged by author

The fundamental differences between humanitarian and commercial logistics were found to be in terms of strategic goals, the customer and demand characteristics, environmental factors, and in the motivation for improving the logistics process. The ultimate goal of humanitarian relief logistics is to deliver the right supplies in the right quantities to the right locations at the right time to save lives and reduce human suffering within given financial constraints (Beamon and Balcik, 2008). Although cost reduction and service improvement are common considerations for both logistics and the relief logistics, the differences between the two sectors bring different dimensions to these common objectives. Humanitarian logistics characterised by large-scale activities, irregular demand and unusual constraints (Beamon and Kotleba, 2006). For example, the humanitarian sector often has difficulty establishing reliable transportation routes and it is affected by political instability, in-country infrastructure, and topography. Most of the operations are carried out in an environment with destabilised infrastructures or weather delays of air or sea links (Cassidy, 2003; Long and Wood, 1995). The problems can range from a lack of electricity supplies to limited transport infrastructure and include 'controlled' environments with some minor variability (Kovacs and Spens, 2009).

Commercial logistics are normally planned in advance of demand while most commercial logistics operations are relatively well established while relief logistics decisions are made within shorter time frames. In addition, commercial logistics usually deal with a predetermined set of suppliers, manufacturing sites, and a stable or at least predictable demand, which are all unknown in humanitarian logistics (Cassidy, 2003). The major factors concerning humanitarian relief logistics in decision making after disasters occur are the uncertainties and variability (Balcik and Beamon, 2008). In the commercial sector, many businesses are driven by customers while

humanitarian organisations are mostly driven by donors (Tomasini and Van Wassenhove, 2009). In humanitarian relief operations, the customer, who are aid recipients, actually have no choice and, therefore 'true demand' is not created in humanitarian logistics (Kovacs and Spens, 2009).

3. Humanitarian Relief Logistics Management

A number of models have been identified which incorporate many of the key stages of the emergency relief cycle: however, there is no single model that can accommodate all of the variables in the supply of emergency relief materials (Pettit and Beresford, 2006). Humanitarian logistics literature distinguishes between different phases of disaster relief. Most relief organisations engage in two broad types of activities: relief and development (Byman et al. 2000). Firstly, relief activities provide relief for victims of large-scale emergencies, these tend to be short-term activities that focus on providing goods and services to minimise immediate risks to human health and survival. Secondly, development activities provide long-term aid, focusing on community self-sufficiency and sustainability, these activities include establishing permanent and reliable transportation, healthcare, housing, and food.

Disaster management helps regional actors in the phase of operating for disasters, while extra-regional actors can turn to strategic planning during the disaster relief operation (Lee and Zbinden, 2003). In the immediate response phase, regional actors learn from crisis management, or even from the response to disruptions in material flows in business logistics (Kovacs and Spens, 2007). The reconstruction phase is in fact similar to a business environment, although it does not aim to generate a profit. Their three-phased model included 1) prepare an immediate response and reconstruction; 2) preparedness during the operation; and 3) post-operations. The phases of disasters can be distinguished as: before the disaster strikes, instantly after a disaster strikes, and the aftermath of a natural disaster.

3.1. Preparation Phase

The preparation phase is the time in which aid agencies can develop collaborative platforms. Coordination in the preparation phase is an important challenge for many different aid agencies because suppliers and local and regional actors all have their own ways and structures of operating. Unfortunately, many emergency preparedness plans lack any insight into disaster relief logistics (Chaikin, 2003). In addition, since donors insist that their money goes directly to help victims and not to finance back-office operations, preparation and training are often neglected. Meanwhile, the donors place importance on the donated money or goods being used for another emergency or in another place. The failure of early warning system could lead to a major catastrophic disaster and the improvements that are learnt from the past experience often lead to a successful responding to the future disasters (Hale and Moberg, 2005).

3.2 Immediate Response Phase

The main problem in the immediate response phase lies in coordinating supply, the unpredictability of demand, and the last mile problem of transporting necessary items to disaster victims (Tomasini and van Wassenhove, 2004). It is found in various studies that less developed regions are also more prone to a larger scale destruction of their infrastructure once a disaster strikes. In addition, there exist different difficulties such as demand assessment, language barriers, demand forecasting and so on. The speed of relief operations during the first days of the disaster significantly affects the lives of many people threatened by the disaster (Balcik and Beamon, 2008). Aid agencies receive many unsolicited and unwanted donations which could clog airports and warehouses.

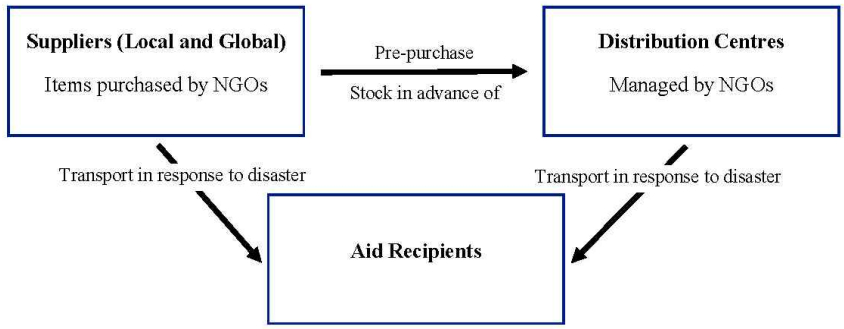
3.3 Reconstruction Phase

The reconstruction phase is important since disaster can have long-term effects on a region where most cases international aid agencies provide technical and financial assistance for the disaster affected population (Chang et al. 2011). It is also argued that humanitarian relief should focus on the reconstruction phase for continuous planning should be successfully in place (Kovacs and Spens, 2007). Categorising disaster management into the phases may be too rigid, allowing insufficient flexibility for external influences and unforeseen problems in the crisis management plan (Pettit and Beresford, 2006). The three elements cannot be designated to specific time periods but they are all consistently part of preparation-reaction process (Brown, 1979).

4. Humanitarian Relief Logistics Network

Once a disaster occurs, humanitarian organisations can acquire relief supplies from three main sources: local suppliers, global suppliers, and distribution centres (pre-positioned warehouse) (Balcik and Beamon, 2008). Figure 1 illustrates the simplified overview structure of humanitarian relief chain to show how relief goods are distributed.

Figure 1. Simplified relief chain overview



Source: Balcik and Beamon (2008)

Acquiring the necessary supplies for disaster relief chain can be done both locally and globally depending on the various situation and circumstances. The advantages and disadvantages of the integrated procurement process are shown in Table 3.

Table 3. Advantages and disadvantages in relief logistics procurement

Procurement type	Advantages	Disadvantages
Local procurement	Low transport cost Prompt deliveries Local economy support	Risk strategy to operate solely Unavailability of enough quantity and quality needed Create shortage in the local market
Global procurement	Increase the availability of large quantities of high-quality supplies	Longer deliver times Higher transportation cost Supplies not delivered to affected area during the initial critical days due to bidding process
Pre-positioned stocks	Deliver sufficient relief aid within a relatively short timeframe Less expensive than post-disaster supply procurement Increase the ability of mobilisation Efficient (low cost less duplication of efforts, less waste of resource) Effective (quick response, satisfied demand)	Financially prohibitive Complex Too many uncertainties Only few can operate Impossible to depend solely in case of large scale disasters Capacity limitations

Source: Adinolfi et al. (2005), Beamon and Balcik (2008), Balcik and Beamon (2008), Strash (2004), PAHO (2001), Salisbury (2007)

4.1 Local Procurement

Acquiring supplies locally may be advantageous due to low transportation costs and prompt deliveries. Local procurement provides support to the local economy. Although meeting a country's emergency needs from local resources could be considered as the best procurement scenario, it may be risky to develop a response strategy that depends solely on local sources. Local procurement can also create local competition among relief organisations trying to purchase the same types of supply and may,

therefore, create shortages in the local market (PAHO, 2001). Relief agencies procuring locally must develop contingencies for acquiring supplies from other sources (Balcik and Beamon, 2008).

4.2 Global Procurement

Using global supplies in disaster relief procurement increases the availability of large quantities of high-quality supplies (Balcik and Bemaon, 2008). Meanwhile, the potential disadvantages lie in the longer delivery times and higher transportation costs (PAHO, 2001). The time-consuming bidding process during the initial critical days following disaster led some humanitarian organisations to begin to establish pre-purchasing agreement with suppliers, specifying the quality and delivery requirements for certain critical emergency items (Balcik and Beamon, 2008). The problems of the disaster relief logistics procurement process unable to obtain and deliver emergency supplies to affected area within a critical response time period. This emphasises the necessity of the preparedness logistics activities of pre-disaster response.

4.3 Pre-positioned Stocks

In the initial days of the deployment phase, most of the critical supplies arriving to the disaster areas are sourced from a relief organisation's global pre-positioned stocks. Cost is one of the reasons for pre-purchasing the supplies because it means that they are able to purchase them at a reasonable price (Salisbury, 2007). Once a disaster occurs, demand for supplies increases dramatically and suppliers will often raise their prices in response (Beamon and Balcik, 2008). Meanwhile, the distribution centres are located as close as possible to the emergency area, depending on their strategic operations. Furthermore, the pre-disaster activities mean that the relied organisation is able to react quickly to a disaster.

The inefficiency of ad-hoc methods brings attention to the need for pre-positioning facility location and stocking decisions (Adinofli et al. 2005). As the number, scale and complexity of emergencies have risen, the relief providers have found themselves unable to response any longer to a sudden-onset disaster in a timely and appropriate manner using the traditional relief methods. (UNDHA) (1994). Emergency preparedness requirements for large-scale emergency in the pre-positioned or staging areas are critical because they enable a rapid disbursement of supplies from the stockpiles (Rawls and Turnquist, 2010).

5. Pre-positioned Strategy in Humanitarian Relief Logistics

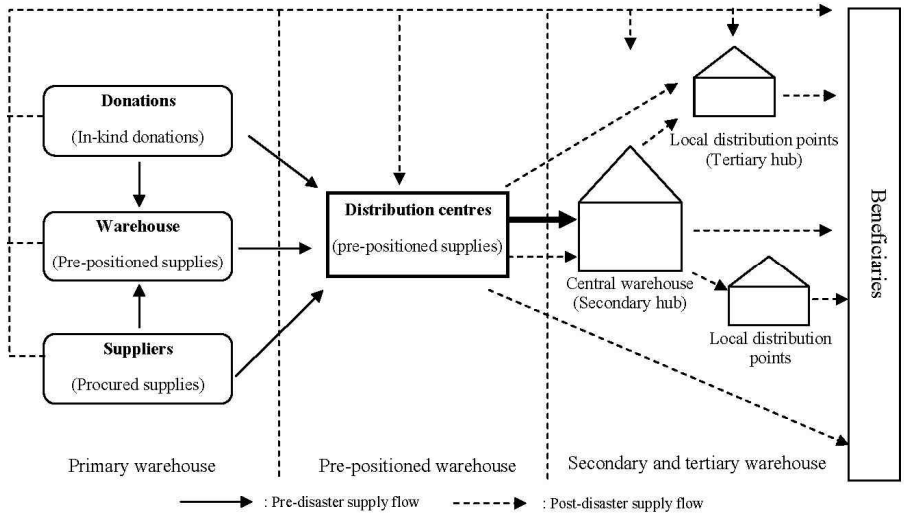
Pre-positioning in strategic locations around the world is a strategy that has recently been implemented by some humanitarian relief organisations to improve their capacities in delivering sufficient relief aid within a relatively short timeframe

with improved mobilisation (Balcik and Beamon, 2008). The main goal of emergency response efforts is to provide shelter and assistance to disaster victims as soon as possible. To achieve this goal, supplies can be pre-positioned at a strategic location so that they are readily available when needed (Rawls and Turnquist, 2010). The basic purpose for establishing an emergency stockpile is to support life-saving operations during the first few days after a sudden-onset disaster through an immediate delivery of required relief items (UNDHA, 1994). The challenge of logisticians consists of prepositioning items out of the reach of the potential demolishing impact of a disaster while at the same time ensuring that they are close enough to the disaster to deliver aid quickly and effectively (Balcik and Beamon, 2008). Agencies have established, or are establishing, global and/or regional prepositioning units that are capable of delivering critical emergency supplies, materials, vehicles and technical assistance to any place in the world within a short timeframe (Gustavsson, 2003). The emergency pre-positioned stockpile is not an end itself but is instead a specific tool to support the basic activities of the stockpile holder. Although it is a costly operation, it can be consideration as a viable solution only if the activities it supports are sufficiently long-term (UNDHA, 1994).

The structure flow of supplies in relief chain is illustrated in Figure 2. Supplies flowing through the relief chain primarily consist of pre-positioned stocks in warehouses, supplies procured from the suppliers, and in-kind donations. Individuals, governments, and private sectors contribute in in-kind donations (Holguin-Veras et al. 2007). Supplies are shipped from various worldwide locations to a primary warehouse, which is usually located near a sea or airport, it is then moved to a secondary hub to be sorted. From the secondary hub, supplies are transferred to tertiary hubs, from where it is moved to the beneficiaries. The strategic pre-positioned warehouse will provide storage capacity and act as staging areas for response, which does not necessarily involve large stockpiles, with a focus on rapid local procurement capability (Scott-Bowden, 2003).

After a disaster occurs, the demand for aid supplies is likely to change over time. Items that are needed immediately at the earliest stage of relief operations tend to be stocked in the pre-positioned facility locations, while other items are safely supplied during the later stages of the relief effort. The pre-positioned stocks vary and choose to meet the immediate needs of those affected; they included food items, non-food items, medical supplies and equipment. Pre-disaster facilities are used for pre-positioning relief items, whereas post-disaster facilities are regional and local rescue centres (Doyen et al. 2012).

Figure 2. Example structure of pre-positioned relief chain



Source: Modified from Beamon and Balcik (2008), Balcik et al. (2010)

Relief organisations have established the pre-positioned strategic model in recent years, after carrying out extensive work to strengthen its logistical preparedness and capacity (Scott-Bowden, 2003). Many stockpiles of disaster relief times have been established and are being operated by a variety of organisations around the world. The locations of some of the pre-positioned warehouses that are operated by some of the humanitarian relief organisations are presented in Appendix 1. It is interesting to note that there are more than fifty stockpiles of disaster relief items, located in similar countries. Also the organisations implementing pre-positioned warehouse strategy are increasing in similar locations. All emergency stockpile holders stressed the promptness of the response is crucial in emergency situations and that the cost of delivery is of secondary importance. UNHRD developed the 'four corner' concept establishing strategic response depots to cover the four quarters of the world. It has been studied that pre-positioning of relief supplies near the affected area has proven to be an effective strategy for responding to emergencies (Beamon and Kotleba, 2014). Korea International Cooperation Agency (KOICA) also operates global warehouse in Dubai and Panama to reach the people in need to reduce time and save cost. Cost saving can be met due to the availability of storage space of free of charge by using the facility of UNHRD.

6. Concluding Remarks

Pre-positioning of build, maintain, stock and staff enable rapid response immediately following a disaster. The facilities can be stocked with equipment and non-perish-

able relief items which are built in-country or at regional location. The pre-positioning of stock closely relates to the preparation phase of a disaster and means that the organisation can ensure a rapid response when a disaster occurs. The two frequently mentioned advantages of operating the pre-positioned warehouses are that they are cost effective and reliable sources. As pre-positioning is undertaken in response to a risk profile, the possibility remains that the risk will not eventuate, and the pre-positioning site and equipment will not be used in an emergency response. For these reasons, it is important to consider ways to make a pre-positioning worthwhile, even in the event that no disaster is ever declared.

There are several challenges that need to overcome in order to ensure the smooth flow of the relief logistics. Difficulty in creating an effective pre-positioning plan includes uncertainty about whether or not natural disaster will occur and, if they do, where and with what magnitude. Consequently, operating a pre-positioning policy can be financially prohibitive and there are only a handful of relief organisations who can support the expense of operating international distribution centres to store and distribute relief supplies. Financial limitations and other resource restrictions limit the amount of relief supplies that can be stocked and shipped to disaster areas. Meanwhile, NGOs are encouraged to focus on operational disaster relief activities rather than disaster preparedness because this enables them to reduce expenses or make their relief operation more effective over the long-term. It has also been found that internal transport capacity is one of the most limited resources in determining the capacity where third-party logistics contractors need to be involved. Even though international humanitarian organisations provide warehouse space free of charge, relief organisations consider logistics as their own core competency and prefer to retain their own logistics infrastructure.

Despite of the limitations, it is shown that the need of implementing of the pre-positioned warehouse strategy is increasing in the humanitarian relief logistics. This could not only reduce the time during emergency occurrences when delivering relief items but also cost. Moreover, critical relief items could be standardised in advance before the disaster strikes and would able to avoid the uncertainty of distribution. The combination of the financial and resource limitations usually inherent in disaster relief activities led international relief organisations to establish their own emergency stockpiles. From this aspects, humanitarian relief organisations should also consider implementing pre-positioned warehouse strategy align with their emergency disaster relief to improve their efficient and effective logistics operations.

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Appendix 1. Example of humanitarian global warehouse locations

UN Agencies	Asia	Europe	Americas	Africa
UNDP	Dubai, UAE Kuala Lumpur, Malaysia			
UNFPA	Dubai, UAE			
UNHCR	Dubai, UAE Amman, Jordan	Copenhagen, Denmark		Accra, Ghana Douala, Cameroon Nairobi, Kenya Isaka, Tanzania
UNHRD (WFP)	Duabi, UAE Kuala Lumpur, Malaysia	Brindisi, Italy Las Palmas, Spain	Panama, Panama	Accra, Ghana
UNICEF	Dubai, UAE Shanghai, China	Copenhagen, Denmark	Panama, Panama	Accra, Ghana
UNOCHA	Dubai, UAE	Brindisi, Italy		
UNAMA	Dubai, UAE			
WHO	Dubai, UAE Kuala Lumpur, Malaysia		Panama, Panama	Accra, Ghana
NGOs				
AAR Japan	Dubai, UAE			
ACF	Dubai, UAE			Accra, Ghana
Care Int'l	Dubai, UAE			
CRS	Dubai, UAE			
CESVI	Dubai, UAE			
Concern Worldwide	Dubai, UAE			
Finn Church Aid	Dubai, UAE			
Mujeres por Africa	Dubai, UAE			
Global Soap Project	Dubai, UAE			
GMMP	Dubai, UAE			
Goal Ireland	Dubai, UAE			
Good Neighbors	Dubai, UAE			
Handicap Int'l	Dubai, UAE			
Humanity First	Dubai, UAE			
Oxfam	Dubai, UAE	Bicester, UK		
IDLO	Dubai, UAE			
IFRC	Dubai, UAE Kuala Lumpur, Malaysia	Las Palmas, Spain	Panama, Panama	Nairobi, Kenya
Int'l Medical Corps	Dubai, UAE Jakarta, Indonesia		Panama, Panama	Accra, Ghana
IOM	Dubai, UAE	Brindisi, Italy		
Int'l Rescue Committee	Dubai, UAE			

InterSOS	Dubai, UAE			
Islamic Relief	Dubai, UAE			
Japan Platform	Dubai, UAE			
Johanniter Int'l	Dubai, UAE			
Linking the World	Dubai, UAE			
Lion Clubs	Dubai, UAE			
Lutheran World Relief	Dubai, UAE			
MEDAIR	Dubai, UAE			
Mercy Corps	Dubai, UAE Bangkok, Thailand			
Mercy Malaysia	Dubai, UAE Kuala Lumpur, Malaysia			
Norwegian Church Aid	Dubai, UAE	Oslo, Norway		
NRC	Dubai, UAE			
Plan	Dubai, UAE			
Permiere Urgence Int'l	Dubai, UAE			
Qatar Charity	Dubai, UAE			
Save the Children	Dubai, UAE			
Shelter Box	Dubai, UAE Kuala Lumpur, Malaysia	Brindisi, Italy	Panama, Panama	Accra, Ghana
Solidarities Int'l	Dubai, UAE			
Swiss Red Cross	Dubai, UAE		Panama, Panama	
ADRA	Dubai, UAE			
Triangle G H	Dubai, UAE			
Welthungerhilfe	Dubai, UAE			
World Animal Protection	Dubai, UAE			
WVI	Dubai, UAE Subang, Malaysia Brisbane, Australia Kuala Lumpur, Malaysia	Brindisi, Italy Frankfurt, Germany	Pacific Northwest, USA Denver, USA North Texas, USA Chicago, USA Appalachia, USA Pittsburgh, USA Greater New York, USA Panama, Panama	Accra, Ghana
Governmental Organisations				
AECID	Dubai, UAE		Panama, Panama	
AHA ASEAN	Dubai, UAE Kuala Lumpur, Malaysia			
Australian AID	Kuala Lumpur, Malaysia			

BM.I	Dubai, UAE			
Cascos Blancos	Dubai, UAE		Panama, Panama	
Cooperazione Italiana	Dubai, UAE	Brindisi, Italy		Accra, Ghana
EU Humanitarian Aid	Dubai, UAE			
ECOWAS	Dubai, UAE			
Government of the French Republic	Dubai, UAE	Brindisi, Italy		
Irish Aid	Dubai, UAE Kuala Lumpur, Malaysia	Brindisi, Italy		Accra, Ghana
Italian Civil Protection	Dubai, UAE			
JICA	Dubai, UAE Kuala Lumpur, Malaysia Singapore, Singapore		Miami, USA	Accra, Ghana
KOICA	Dubai, UAE		Panama, Panama	
MSB	Dubai, UAE			
SDC/HA	Dubai, UAE	Switzerland		
USAID	Dubai, UAE Subang, Malaysia	Pisa, Italy	Miami, USA	

Source: UNHRD (2016), UNICEF (2016), UNOCHA (2016), WHO (2016)

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Post-Panamax-effects on Major U.S. Ports

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ABSTRACT

The role of large U.S. port cities has been affected by mega transportation infrastructure, such as seaports or navigable ports through rivers or lakes. Adapting to the globalization process, which has brought speeder changes, requires developing strategic operation in order for port management to survive in the internationally competitive urban systems. The port-dependent urban areas need to integrate their economic activities into the scope and complexity of city services and commodity activities in order to convey international trade more efficiently. This paper delivers what components need to be considered to understand the maritime shipping route changes and what types of methods have been applied to measure the changes from the Panama Canal expansion. While it is still important to build a sophisticated state-of-the-art model to conduct empirical analysis, this paper only discusses what the expected changes would occur on both the West Coast and South East Coast ports, specifically the Port of New York and New Jersey (PNYNJ) with various limitations. Simultaneous responses to the economic impacts on the other states of the U.S. made it difficult to forecast the economic effects on PNYNJ of the Panama Canal expansion. While the West Coast ports or major ports in Southeast Asia may experience a potential reduction in trade volume, they may inversely improve the utility of these ports; still, it is not easy to predict the change quantifiably. The international port authorities and policy makers, at national and local levels, who are responsible for developing seaport plans on the new realities of the Canal expansion and in the context of global maritime shipping, also need to understand changes in various inter-connected behaviors related to shipping, trucking and rail-related companies. This is because these behaviors may affect the choice of logistics, labor costs, and the status of economic and transport hubs. Finally, this study demonstrates the necessity of developing plausible scenarios that account for the investment strategy of the PNYNJ.

Keyword: Post-Panamax-effects, Panama Canal expansion, maritime shipping, economic impact, Port of New York and New Jersey

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1. INTRODUCTION

The role of many U.S. cities has been critically affected by large transportation infrastructure, such as seaports or navigable ports through rivers or lakes (Park and Park, 2016). To improve or maintain the economic positions of port cities, various labor-oriented facilities are important because they generate domestic- and foreign-jobs and participate in the international marketplace successfully (Rondinelli et al., 1998). Indeed, adapting to the speedy changes of the globalization process requires developing strategic operation in order for port management to survive in the internationally competitive urban systems. Port-dependent urban areas need to integrate economic activities into the scope and complexity of city services and commodity activities, so that port cities can engage in international trade efficiently. By doing so, strong urban agglomeration would appear, and hence, would lead to technological innovation to grow the city.

Understanding the expansion of the Panama Canal can provide how a global trade facility could affect various countries and U.S. states. Since the Panama Canal Authority decided to invest the Canal expansion in 2006 in order to increase container shipment capacity, the newly expanded canal is now accommodating larger post-Panamax vessels of 13,000 TEUs that could not traverse the facility earlier. Along with the capacity expansion, the Panama Canal expansion project is expected to impact U.S. water and ground carriers significantly, including transportation networks and systems relating to cargo distribution, port development, supply chains, and logistics especially for the North American East Coast ports (Park and Park, 2016). It is highly expected to induce a larger flow of container trade between Northeast Asian countries and the U.S., and shift the congestion experienced in the West Coast ports (WCPs) to the East or Gulf of Mexico ports.

Many trade flows in cross-continental trucking and railway networks are expected to change as a result of the Canal expansion. At the same time, it is important to consider how much the traffic and congestion in the ports prior to the expansion could be reduced. For example, WCPs of the U.S. will become less busy due to the increased freight shares of the East Coast and Gulf ports of the U.S., resulting in the better operability among WCPs. Another point worth considering is the global port locations and the use of the expanded Panama Canal. Still, several major Southeast Asian container ports, including the Port of Singapore, may sail via the Suez Canal because the sailing routes are closer to the northeastern American ports. For example, considering the Port of Singapore is the busiest transshipping port as well as the second largest tonnage port, it is also necessary to investigate if the enlarged canal may threaten the current sailing route choices of transshipping and/or the shipping volume via the Port of Singapore or other Southeast Asian ports. This is because many competitive contexts are involved in forecasting the future of ports in the Southeast Asian region.

The reduced volume of trade to use the WCPs or Southeast Asian ports will greatly improve the utility to use these ports, although it is not easy to predict the change quantifiably. This paper introduces which components need to be considered

to understand the maritime shipping route changes and what type of methods have been applied to measure the post-Panamax-effects. The international port authorities and policy makers, at national and local levels, who are responsible for developing seaport plans for the new realities of the Canal expansion and the global maritime shipping context, also need to understand changes in various inter-connected behaviors related to shipping, trucking and rail-related companies. This is because these behaviors may eventually affect the choice of logistics and their labor costs, and the transport and economic hub status that was maintained via traditional port development strategies. Along with studies that analyzed various port impacts (Park et al., 2014; Park and Park, 2016; Richardson et al., 2017), this study focuses on plausible impacts on the Port of New York and New Jersey (PNYNJ).

2. BACKGROUND

2.1 The Panama Canal and the Recent Trade History of U.S. Ports

Before introducing various economic impacts of the widening of the Panama Canal on the ports of the U.S., it first needs to overview the history of the Panama Canal and the Canal's development. The Panama Canal was built in 1914 and originally planned to re-open in 2006 to celebrate its 100th anniversary in 2014.The Canal was supported by the rationale that the only 48-mile waterway connecting the Pacific and the Atlantic Ocean could avoid the 8,000-mile waterway sometimes resulting in hazardous travel around South America.

Although the construction period had experienced several physical and financial impediments, the Canal construction remains one of the largest projects in the world history. The excavation of the Canal that started in the early 1880s by a French company could be begun constructing in 1904 by American ownership. In the early years of construction, fatal infectious diseases were the potential risk. Another risk was to dig a ditch through desert sand, causing huge costs for canal locks to accommodate height differences. Based on the rapid improvement in engineering and medical components, both risks have been resolved. A reason supporting to construct the Canal was its influence on the city economies trading via WCPs. After some political conflicts between Panama and the U.S. in 1999, Panama and Panama Canal Authority could completely manage the Canal. In 2007, the project plan to widen and deepen the Panama Canal started. The estimated cost was about $5.2 billion. The post-Panamax size was to double the potential size of the Pana-Max tankers at least (Richardson et al., 2017).

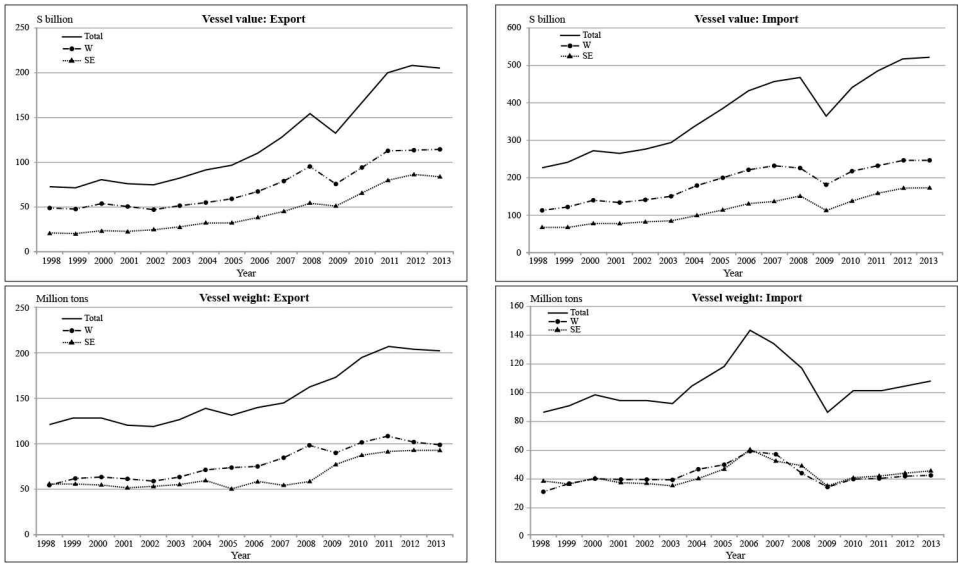
Because most U.S. ports will be affected by the Canal expansion, it would be important to overview the history of major U.S. WCPs, focusing on the changes in recent trade of U.S. ports and some statistics that help forecast the future trade of the ports. Figure 1 depicts the general trade history of U.S. ports. Based on dollar and tonnage values of exports and imports for U.S. ports, the entire U.S. export patterns have increased consistently except in 2009 when dollar values dropped down

due to the economic recession, but rebounded instantly in 2010 to the level greater than 2008 (Richardson et al., 2017). Because WCPs and South and East Coast ports (SECPs) are expected to be differently affected, additional detailed trade patterns were suggested.

The trade value pattern of WCPs in the graph is similar to the pattern of total trade value of both foreign exports and imports. SECPs increase consistently in exports while they still experience a similar drop in imports in 2009. Consistently, dollar values of the WCPs are greater than those of the SECPs. Based on the weight patterns that are somewhat different from the value patterns, the total weight pattern in foreign exports has constantly increased since 2005. However, the weight of foreign imports curved down from 2006 and could not recover to the 2006 level. Interestingly, there have been consistent gaps between the WCPs and the SECPs in dollar values for both imports and exports; however, the weight pattern of foreign imports between the WCPs and the SECPs is close for the given years while the export weight pattern of the WCPs is still greater than that of the SECPs.

According to the American Association of Port Authorities (AAPA) which is the primary data source of port statistics (www.aapa-ports.org), rankings of top ten ports varied by types of cargo. In this study, only top three leaders were suggested in three main categories for the year of 2011; tankers, containers, and dry bulk. For vessel calls by tankers, Houston, New York-New Jersey, and Los Angeles were the top three. For container ships, the three leading ports were Los Angeles-Long Beach, New York-New Jersey, and San Francisco. However, the dry bulk carrier leaders were very different and New York-New Jersey was not included even in the top seven ports. Considering all trade, the three leading ports were Houston, Los Angeles-Long Beach, New York-New Jersey. In terms of trade dollar ranking, Los Angeles-Long Beach, Houston, and New York-New Jersey were the top three leaders, respectively recording $382 billion, $243 billion, and $208 billion out of $1,729 billion for the total U.S. value of foreign trade.

Figure 1. The Change of trade value and weight patterns of West Coast ports and Southeast Coast ports in the U.S.



Notes: 1. Total = All U.S. ports
2. W = Customs Districts of Columbia-Snake, Los Angeles, San Francisco, and Seattle
3. SE = Customs Districts of Baltimore, Charleston, Houston/Galveston, Miami, Mobile, New Orleans, New York City, Norfolk, Philadelphia, Savannah, and Tampa

Source: Richardson et al. (2017)

Furthermore, port calls by post-Panamax vessels increased by 78% between 2006 and 2011, generating the increased share of larger than 5,000 TEUs by 10% from 17% for the same period. In addition, ships' age was becoming younger on average; from 11.2 years in 2006 to 9.7 years in 2011. Finally, the ranking of U.S. share of global vessel calls was second, accounting for 7.3% in 2011 behind China; Japan, Singapore, South Korea, and Brazil followed in the global share of vessel calls. From these facts, it would be important to understand global port strategies including New York-New Jersey ports in liaison with the Panama Canal expansion. Various discussions on the impacts affecting Los Angeles-Long Beach can refer to Richardson et al. (2017). They well explain the history of the twin ports of Los Angeles-Long Beach, which are separately managed but the largest seaport complex in the U.S.

2.2 The New York and New Jersey Seaport

New York City (NYC) is located on the East Coast of the U.S, and connected to the river of which condition is easy to collect and distribute trade goods and cargo for a long distance. The NYC's geographical advantage has contributed to generating the economic gain of the city and growing as a trading city. Historically, New York State benefited from the Hudson River and the Atlantic Ocean. The Erie Canal construction was finalized in 1825, which linked directly NYC with the Great Lakes.

This Canal allowed inland ports and producers to load and carry goods far distant more quickly and cheaply, reducing freight costs from 20 to 1.5 cents per ton mile (O'Sullivan, 2009).

NYC could be considerably advantageous in trading by being placed as an ocean-going port accessible via water from various ports located in the Great Lakes. NYC could be greatly thrived due to the port capacity supplying the city and the neighboring regions of the U.S. with goods produced across the country. Both the transportation advantages and technological innovations in production process had made NYC become the first coastal city to establish trading routes with the interior of the U.S. before the highway 90 route was constructed. Currently, the New York and New Jersey port is the third busiest port in the U.S. Considering the historical experience of transportation improvement, the geographical location of NYC as a gated city of the East Coast States, the Panama Canal expansion can lead to prospering PNYNJ. Considering the changes in the port's status in line with the Panama Canal expansion, the PNYNJ is ready to accommodate larger freight volume from the post-Panamax vessels. The PNYPJ has built multimodal networks, specifically including rail and airport, that contributes to moving the freight more efficiently (Wang and Pagano, 2015). Also, the PNYNJ has planned to raise the Bayonne Bridge which restricted the access of large vessels to pass due to the low level of height (Snyder et al., 2013; Wang and Pagano. 2015).

Figure 2. Port locations on New York and New Jersey

Note: Blue marks indicate the Port of New York and New Jersey
Source: http://www.zdnet.com/article/new-jersey-port-to-be-powered-entirely-by-five-wind-turbines/

Some recent research reports and articles have discussed plausible implications on economies and environments stemming from the Panama Canal expansion while many uncertainties still need to be resolved (Park et al., 2014; Park and Park, 2016; Richardson et al., 2017). This study only analyzes the economic impact on the PNYNJ, utilizing the study conducted by Park and Park (2016) to find a meaningful strategy for the port and develop appropriate strategies of the PNYNJ needed to prepare the global route changes.

3. Economic Impacts of the Panama Canal expansion on U.S. ports

Measuring the economic impacts of the Panama Canal expansion on PNYNJ is complicated. Without a proper quantitative approach, it is not easy to capture the change of trade structure and its economic impacts. In terms of economic impact analysis, one of the most widely applied methods is to use a spatially disaggregate Input-Output (IO) model. For the U.S. case, the National Interstate Economic Model (NIEMO) which is a U.S. version of spatially disaggregate IO model has been applied for the economic impact analysis on the Panama Canal expansion. Since 2003, NIEMO has been applied in many case studies of economic impact analysis (Richardson et al., 2014; 2015). Especially, because the NIEMO includes all interstate trade relations among the U.S. states, estimating the economic impacts resulting from reduced costs associated with redirecting larger ships that now pass through the Canal requires a supply-side IO model (Park, 2008)[1].

The change of maritime shipping route will lead to the changes of multimodal transportation costs, the price of goods delivered via the vessels passing through the expanded canal, etc. Because residents would keep the spending pattern similar to the prior, the cost and price changes would ultimately affect the structure of trading in the region unless consumers could change the budget at the same rate as the change in the costs and prices. Also, port capacity and port congestions should be considered because the currently busy ports such as the WCPs that may improve the quality of port operation would experience an increased level of port utility stemming from the redirection of shipping routes. Considering that all conditions require very complicated economic modeling and scenario development process, it is more reasonable accounts only for transportation and warehousing activities reduced in the WCPs and increased in the SECPs. Therefore, many of the post-Panamax vessels which could not use the canal beforehand can now pass through the Panama Canal instead of being sent the freight from WCPs via inland transportation to the South and East region.

According to Park and Park (2016), California (CA) would experience the largest reduced impacts resulting from the negative impacts on transportation and warehousing

1) Because Previous articles that applied NIEMO have been widely cited in delivering the mythological approach to measuring economic impacts it is highly recommend to read various books and articles for the methods including Park(2008) and Park and Park (2016).

values. As suggested in Table 1, approximately $4.9 billion and $1.2 billion would be the negative economic impacts, respectively for imports and exports of CA. Comparatively significant economic impacts on CA are explained by the twin ports that play a hub function in the WCPs. Table 2 provides another piece of information on economic impact by industrial sector. For imports, Transportation and Postal and Warehousing sectors are reduced significantly by $3.1 billion and $0.8 billion, respectively. For exports, while the same sectors as in the imports case are impacted, the impacts are slightly smaller than that of imports, showing less than $1 billion for both sectors.

Table 1. Economic impacts of reduced transportation and warehousing activities in the West Coast side for the most impacted three states in the U.S.

(Unit: Million dollars)

State	Imports	Exports
California(CA)	-4925.82	-1189.68
Washington(WA)	-295.96	-347.53
Oregon(OR)	-211.96	-133.31
Others	-360.97	-185.45

Note: Top three states are only shown.
Source: Park and Park (2016)

Table 2. Economic impacts of reduced transportation and warehousing activities in the West Coast side by industrial sectors

(Unit: Million dollars)

Industry	Imports	Exports
Transportation	-3109.08	-915.83
Postal and Warehousing	-817.89	-234.45
Utility	-144.05	–
Coal and Petroleum products	–	-111.24

Note: The most negative impacted three industries are only shown per imports and exports.
Source: Park and Park (2016)

The economic losses of WCPs would generate economic gains of the SECPs side when the Panama Canal expands. Shifting transportation modes and new warehousing activities for trade are the main cause. Individual state of economic benefits from the shift of imports ranks Texas ($1.7 billion), New York ($1.4 billion) and New Jersey ($1.1billion) in order. If combining the economic impacts of New York and New Jersey, the total impacts are much higher than that of Texas. If focusing on exports, the economic gains were substantial in New York ($4.9 billion), accounting for 42% of total U.S. gains. Indeed, the Panama Canal expansion can significantly induce sizable positive impacts on New York and New Jersey states. The economic benefits for both states are greater than 40% of the entire economic benefits of the U.S. Therefore, it would be important that New York and New Jersey should prepare appropriate strategies to handle the increased port activities.

Table 3. Positive impacts of transportation and warehousing activities on the East Coast side for the most impacted states in the U.S.

(Unit: Million dollars)

State	Imports	Exports
Texas(TX)	1716.79(27.2%)	1908.53(16.5%)
New York(NY)	1412.83(22.4%)	4902.23(42.3%)
New Jersey(NJ)	1140.19(18.1%)	504.07(4.4%)
Pennsylvania(PA)	383.70(6.1%)	1386.89(12.0%)

Note: The four states are only selected by authors.
Source: Park and Park (2016)

Table 4 provides the economic benefits by top industry sectors, where transportation is the most highly impacted from the Panama Canal expansion, increasing $3.5 billion and $6.6 billion, respectively for imports and exports. This is due to the fact that the transportation industry is highly connected with trade activities.

Table 4. Positive impacts of transportation and warehousing activities on the East Coast side by industrial sectors

(Unit: Million dollars)

Industry	Imports	Exports
Transportation	3466.58(55.0%)	6667.80(57.6%)
Postal and warehousing	820.72(13.0%)	318.72(2.8%)
Coal and petroleum products	88.67(1.4%)	663.81(5.7%)

Note: The most positive impacted three industries are only shown per imports and exports.
Source: Park and Park (2016)

Therefore, the port development strategy can be further discussed. The increase in the freight volume of the PNYNJ is related to container port capacity. The container port capacity is affected by several factors including container yard storage density, operating hours, and the use of vessels and cranes. Utilization of the container yard storage at the PNYNJ reaches to 78% (Tioga Group Inc., 2010). Using this information, various scenarios on container port capacity can be developed in order to account for the accommodation rate of trade diversion. A further study needs to combine with the impact study which has not been conducted so far.

4. Conclusions and Discussion

The Panama Canal expansion may change not only maritime shipping structure, but also port development and port-related industries. The most expected change is maritime shipping routes between Southeast-Northeast Asia and the U.S. The WCPs have had an advantage over the SECPs due to the trade specifically with Northeast Asian countries such as China, Hong Kong, Japan, South Korea, etc. Expecting the

volume of freight would shift from the WCPs to the SECPs after the expansion, much complicated impacts may follow (Jaffee, 2010; Rodrigue, 2010). On the other hand, Southeast Asian ports will be minimally affected from the Panama Canal expansion because maritime shipping route may not change seriously (Snyder et al., 2013). It also relates to the Panama Canal capacity. The Panama Canal can accommodate only post-Panamax, not super post-Panamax. Northeast Asian countries have various multirmodal network options including waterway of post-Panamax to convey the freight from West to East. Unfortunately, many Southeast Asian countries are likely to choose the maritime shipping routes to pass through the Suez Canal for super post-Panamax (Rodrigue, 2010; Synder et al., 2013).

Even though the expanded Panama Canal has limitation on vessel capacity, both the WCPs and SECPs may be affected from significant changes in various factors such as cost, time, industry sector, etc. explicitly and implicitly. Also, it may occur ripple effects on both regions in the U.S. This is because the cross-continental transportation network is densely connected in the regions. As a result, various economic effects on the states involved in these regions can be generated.

It should be noted that simultaneous responses to the economic impacts on the other states of the U.S. from the Panama Canal expansion are difficult to be forecast as conducted for the economic effects on the PNYNJ. While it is still important to build a sophisticated model to conduct an empirical analysis, this study only discusses what the expected changes on both the WCPs and SECPs, specifically New York and New Jersey despite various limitations. Also, this study provides the necessity of developing plausible scenarios that account for the investment strategy of the PNYNJ.

This study discusses the economic impacts based on the result of previous studies. The Panama Canal expansion can affect both the West Coast and South and East Coast regions. The West Coast region is expected to suffer negative economic impacts while the South and East Coast region positive impacts. Many of freight vessels may choose the shipping route to pass through the expanded Panama Canal, reducing the freight volume of the WCPs. Consequently, the distribution system of inland transportation for the WCPs is expected to shrink. Among the ports, California may experience the highest economic losses, while congestion in these ports may improve the port operation and generate somewhat positive gains. On the other hand, the SECPs may gain economically. Among them, the PNYNJ may thrive more than the present, expecting more than $8 billion. It is highly recommended that the PNYNJ needs to prepare a strategy on the anticipated increase in the port demand. As more comprehensive models need to be built to address the complicated operational issues associated with the Panama Canal expansion, plausible strategies on the PNYNJ still need to be prepared. Richardson et al. (2017) partly addressed economic impacts of the Panama Canal expansion, but various plausible scenarios and simulations need to measure the impacts on the PNYNJ. Advanced scenarios and simulations can suggest rational investment strategy for the port. Numerous NIEMO applications can be referred to measure the advanced scenarios and simulations (Gordon et al., 2009; Park, 2008; Park et al., 2007; 2008; 2011; 2014).

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An Analysis on the Problems and Improvement of using ECS for Coastal Ships

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ABSTRACT

The electronic chart system(ECS) is a navigational equipment with a simple electronic chart and is used in small and medium sized vessels such as coastal cargo ships, fishing boats. For the purpose of preventing marine accidents of oil tanker ships in the 1990s, the prohibition of passage of oil tankers was set up, and also forced to install the ECS to record and save the track of the ship at the same time. However, regulations for the installation of AIS (Automatic Identification System) for ships corresponding to the Ship Safety Act were newly introduced, and the enforcement regulations for the installation of ECS were deleted in 2009. However, the operators of small vessels such as barges in which there is no chart and operated without electric and navigational system, and fishing boats of less than G/T 50 tons, which are not the vessels to be installed AIS, are using the ECS as navigational equipment due to the convenience of operation. However, marine accidents such as collision, aground are occurring due to the lack of follow-up service for the customers of ECS and safety awareness of the ship operators. In this paper, we analyzed the case of marine accidents such as aground and collision caused by the misuse of ECS in the small and medium sized ships with the coastal area of the Republic of Korea. In addition, as an improvement measure to prevent marine accidents, we suggested some ways that construct a simple electronic chart updating system of the ECS, strengthening infrastructure, upgrading simplified electronic charts, and establishing management plans.

Keywords: electronic chart system, marine accidents, navigation equipment, maritime safety

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1. Introduction

The ECS is equipped with a simple electronic chart and receives orbit information transmitted from 24 satellites (GPS, Global Positioning System) to display a ship's position, bearing, time and speed. It's a kind of navigational reference equipment that provides the necessary information for safety navigation (National Oceanographic Research Institute, 2009). In order to prevent marine accidents of dangerous cargo ships in Korean coastal areas in the 1990s, an oil tanker passage prohibition zone was set up (Jeong, 2013). To record the ship's track ECS, as a recording device, was forced to install by the enforcement of the Maritime Traffic Safety Act.

Due to this background, most of the vessels were loaded on small ships of less than 30 tons or more than 5 tons which sailed the domestic coast as well as oil tankers. However, in accordance with Article 30 of the "Ship Safety Act" in 2008, the provisions for the installation of AIS(Automatic Identification System) were newly introduced, and it was applied to oil tanker ships, towing vessels with a gross tonnage of 50 tons or more, and the ECS enforcement regulations were deleted in May 2009.

However, operators such as small vessels and fishing boats less than 50 tons, which are not ships to which the ship position transmitter is installed, still use the ECS as navigational equipment due to their ease of use. The problem is that an ECS does not regularly update the simplified electronic chart due to the lack of follow-up management after the manufacturer's product sale and the lack of safety consciousness of ship's officer. Also the ECS with simple electronic chart installed at the time of purchase is used for many years.

In a previous study on the ECS, Kim(2004) studied the "Development of a small ship operator support system using fuzzy language representation" to provide a safe and optimal route to small-sized ships. Jeong(2013) suggests the case of marine accidents caused by careless use of the ECS in the "Measures to prevent marine accidents by GPS Plotter", and the necessity of legalization of the ECS and exemption of paper chart onboard. But this research has limitation for implementation.

Therefore, in this study, we review recent trends, advantages and disadvantages of the ECS, and examples of accidents caused by ECS, and suggest ways to improve the use of ECS for small ship operators including fishing boats.

2. Outline of ECS

An electronic chart system is navigational equipment for display of chart data. It does not generally meet the performance standards of Electronic Chart Display and Information System (ECDIS) by IMO regulation. But ECS is simple and convenient for using because the chart database installed in the display system can be showed to ship's operators. 30,000 small vessels registered in the Republic of Korea are using the ECS. In the Republic of Korea, 85% of the registered vessels are less than G/T 500 tons. Around 30% among the fishing vessels registered to the Korean govern-

ment are more than G/T 30 tons.

The general configuration of ECS shows in Figure 1. ECS consists of display, GPS antenna, and DGPS antenna, which can be connected to a user memory card, a water temperature meter, an external monitor and a transceiver, etc.

Figure 1. Configuration of ECS

The international regulations for electronic navigational chart(ENC) to be installed in the ECDIS are established by the International Standard Organization (ISO), the International Maritime Organization (IMO) and International Association of Marine Aids to Navigation and Lighthouse Authorities(IALA). But there are no regulations and rules for simplified electronic charts for ECS. So, the Radio Technical Commission for Maritime Services (RTCM) is working to make the standards for performance, guidelines of simplified electronic charts used in ECS. At present, the ECS is regulated separately by each country without standard.

3. Status of development of simplified electronic charts

3.1 Foreign case analysis

3.1.1 Jeppensen Marine (C-MAP)

The C-MAP company in Norway was absorbed by Jeppesen, and the existing C-MAP products are sold as Jeppensen marine. Jeppensen marine is a global provider of simplified electronic chart services tailored to the needs of merchant vessels, accounting for 95% of the market share of vector-based simplified electronic charts around the world. The charts produced by this company are stored in the C-Card according to the region, and the manufacturer of the ECS such as GPS plotter can use the C-MAP without any burden of making and upgrading.

3.1.2 ERC(Electronic Reference Chart)

The ERC is published by the Japan Waterway Association, licensed by the Japan Maritime Security Agency, and is currently being supplied to small ships throughout

Japan. The ERC data is stored in the IC memory card recognized by a certain protocol. The data storage format is a binary file created by the Japan Waterway Association. It is stipulated that the ERC should be used for Japanese ships in the coastal area of Japan.

3.1.3 PEC(Personal Electronic Reference Chart)

PEC is designed to be able to view the same file format and the same information as ERC on a PC. It is provided as CD-ROM by digitizing information as same as ERC.

3.1.4 Blue Chart

It is a portable electronic chart made by TRANSAS, a manufacturer of electronic chart, of Russia. It is built together with global positioning system(GPS) and supplied globally by GARMIN, a global GPS company. Blue Chart data is provided as a programmed Data Card or Map Source CD.

3.2 Domestic case analysis

Domestic ECS have mainly built-in electronic charts for equipment manufactured by each company. The electronic charts for ECS were digitized from paper charts or process electronic charts and numerical charts produced by the National Oceanographic Research Institute as needed. In the Republic of Korea, there are some companies for manufacturing of ECS. In case of company A, this company is a manufacturer of marine navigational equipment. They manufacture their own simplified electronic charts for using in their ECS, and account for 70~80% in the domestic market for ECS. In case of company B, they also manufacture navigational equipment which ECS with a function of fish finder. And they are developing a simplified electronic chart for installation on ECS such as GPS plotter.

When the navigational chart is newly issued or revised by the National Oceanographic Research Institute (KOSEF), the checking point to make a simplified electronic chart are as follows: coastal line, dangerous rock, depth contour, dangerous materials and so on. In addition, ECS is providing the location of ship as well as various information and function such as shoal of fish, image of engine room by CCTC and external speaker and alarm. Also, in order to update the existing products, the equipment had to be removed from the ship and updated on the land. But, recently, it is possible to update easily with SD card (Secure Digital Card) without the support of landside. In addition, some of the ECS manufacturers are updating free of charge for products purchased within 5 years.

4. Analysis of merits and demerits for ECS

4.1 Merits of ECS

Most small ships' wheelhouse is very narrow and has not separate to chartroom and do not have updated charts. Also, since the captain is not only engaged in sailing but also engaged in fishing, and is the only person on duty alone while on the ship, it is very difficult to confirm the establishment of the navigation plan and the compliance with the route.

In terms of navigation of these small vessels and the environmental aspects of the vessel operator, the advantages of using the ECS are as follows.

① Simplified electronic chart appears on the screen, so ship's operator can easily check information such as position, obstacles without using a paper chart.

② Ship's officer can create voyage plan by inputting the start position and the destination by using the menu button. And also it can save the route and use it again if necessary.

③ It's possible to store the ship's track, which can be used to identify the cause of the accident when a marine accident occurs.

④ In addition, ECS is providing navigation information as well as possible to add functions such as traffic function and engine room monitoring, thus enhancing the convenience of the operator.

⑤ ECS with various functions is cheaper than other navigation equipment such as radar, AIS, autopilot and so on.

Because of these advantages, despite having legal force, most small vessels which navigate coastal area of the Republic of Korea installed ECS such as GPS plotter.

4.2 Demerits of ECS

The disadvantages of using the ECS are follows due to problems in the usage environment rather than the technical shortcomings of the equipment itself.

① If not take an active interest in ECS by ship's operator, it's difficult to update the latest simplified electronic chart because of time and cost.

② Because ECS is not mandatory navigational equipment, the manufacturers of ECS, the Ministry of Oceans and Fisheries and the Korea Water Works Association have not prepared up-to-date rules for simplified electronic charts.

③ ECS manufacturers have the technology and interest for making simplified electronic charts. But the navigational charts of coastal area for small ships by survey are not enough to develop simplified electronic charts.

The merits and demerits are summarized in Table 1. In case of merits for ECS, firstly, ECS have simple operation and understanding to collect or set the information by ship's operator. Secondly, it's suitable equipment to narrow wheelhouse environment. Lastly, In spite of similar functions, ECS is cheaper than ECDIS which using normally on merchant ships. On the other hand, in case of demerits of ECS, firstly, it's incon-

venience to update of simplified electronic chart because of not providing of materials. Secondly, there is a lack of infrastructure for large-scale navigational chart and fishery chart. Lastly, operators have blind faith about ECS due to the shortage of related knowledge and education.

Table 1. Comparison with between merits and demerits of ECS

Merits	Demerits
Information collection and route setting by simple operation with keyboard Easy to understanding information for ship's operator with graphic mode Suitable for narrow wheelhouse of small-sized vessel (display size is around 10 inch) Low price with various function (normally 3,000,000~5,000,000 Korean won)	Inconvenience for updating of simplified electronic chart In operation, high possibility of blind faith in ECS and can cause accident A lack of infrastructure for large-scale chart and fishery chart

4.3 Status of marine accident by improper use of ECS

As shown in Table 2, there are 19 accidents such as aground, collision related to using of ECS directly and indirectly through the analysis of 557 judgment cases by the Korea Maritime Safety Tribunal from 2011 to 2014. The number of aground was the highest at 13 cases, followed by collision (3 cases), contact (2 cases), and other accidents such as breakwater contact (1 case).

Table 2. Marine accidents due to usage error of ECS

Classification		2011	2012	2013	Total
Number of judgment		203	159	195	557
Type of marine accidents	Aground	2	6	5	13
	Collision	1	2	-	3
	Minor collision	-	-	2	2
	Others	1	-	-	1
	Sub-total	4	8	7	19

Source: Korea Maritime Safety Tribunal

With the development of the technology of making a simplified electronic charts, the errors, which mean the gap between simplified chart and electronic navigational chart(ENC) have been reduced compared to the past. However, there is still a possibility of error due to accumulation of charts such as large-scale chart 5000:1. In addition, although the accuracy of the simplified electronic charts has been higher than that in the past, there are still distance errors compared to ENC in the specific area such as narrow channel. So, these errors became the cause of marine accidents.

The cause of marine accidents by ECS can be divided into aground and collision. Aground accidents often involve fishing boats and small ships sailing in coastal water

area rather than general cargo ships. Most of them are aground on reefs due to the lack of modernization and use of not updated simplified electronic charts installed on the ECS such as GPS plotters. Ship's operators have to pass the obstacle with sufficient distance when sailing because there are potential errors due to the digitalization of large-scale chart. But ship's operators have blind faith about ECS without related knowledge or information.

In case of main reason of collision accident, a ships' operator sets a start point and a destination point using an ECS, and an accident occurs that collides with another ship due to negligence of look-out, drowsiness driving with alarm turned off or blind faith.

In this paper, to prevent the accident related use of ECS, I suggested usage improvement of ECS as follows.

5. Usage improvement of ECS and Conclusion

Although the ECS is widely used as navigation equipment in small ships or fishing boats due to its relatively low price and convenient use, it has been confirmed that marine accidents are continuously occurring because the latest introduction problems are not solved.

Therefore, in this study, I suggests realistic and practical short-term and mid to long-term improvement plan for the enhancement of reliability and prevention of marine accidents in the use of ECS.

5.1 Short-term proposal

5.1.1 Manufacturer part: establishment of update system of simplified electronic chart for ECS

In order to present the latest electronic charts installed on the ECS at present time, the active interest and consciousness of the fishing vessels and the small vessel operators are important. Since there are no compulsory regulations for the latest introduction, there are many ships that use simplified electronic charts that are not updated. Therefore, before the laws and regulations governing the management of the ECS are made, it is necessary to make the ship operators aware of the importance of the latest update of ECS. In addition, it's required to actively cooperate with the manufacturer of ECS, the National Federation of Fisheries Cooperative and the regional office of Oceans and Fisheries to make the latest introduction work.

5.1.2 Public administration part: designated "update-month" by local office of Oceans and Fisheries or the National Federation Fisheries Cooperatives

The Korea Coast Guard, the Regional office of Oceans and Fisheries and the National Federation Fisheries Cooperatives, which manage and supervise the safe

operation of the fishing vessels jointly, have designated the "Important Update Month of the ECS" to alleviate the burden on the ship owners and operators. It is necessary to induce the company to improve the credible image and publicity effect of the manufacturer by providing A/S.

5.2 Long-term proposal

5.2.1 Public administration part: strengthen infrastructure for large-scale chart for small to medium-sized vessel

The National Oceanographic Research Institute had completed the development of electronic charts in the coastal areas of Korea until 1999 and has been supplying it since July 2007. The manufacturer of the ECS is developing simplified electronic charts based on the electronic navigational charts. However, it can be said that electronic charts, which were made by the Korean government are focused on cargo ships. Small vessels including fishing vessels mainly navigate in coastal water where there are many obstacles on the route rather than general cargo ships. Therefore, even if the technology for the production of simplified electronic charts is developed, there is still a possibility that an error may occur. Therefore, the National Oceanographic Research Institute needs to make large-scale chart larger than 5000 : 1 for improving the navigation safety of small ships by carrying out surveying on the coastal sea area where small and medium sized vessels are sailing.

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A Study on Maritime Cooperation between Korea and Georgia

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ABSTRACT

Georgia is located at the crossroads of the East-West and North-South transport corridors. Providing intermodal transport routes between the Caspian Sea and the Black Sea, the country is a critical part of the Euro-Asian Transport Linkage that joins Central Asia and the Caucasus. As the trade between Asia and Europe grows, there is a great opportunity for countries in Central Asia and the Caucasus, including Georgia and Azerbaijan, to transit some of this trade and to develop themselves as regional trade and logistics hubs. The Governments of Korea and Georgia concluded a bilateral maritime agreement in 2014 and an agreement on reciprocal recognition of certificates of seafarers in 2015. The present paper attempts to identify areas and projects for enhanced cooperation under the framework of the agreements. Through a series of interviews and an Analytic Hierarchy Process (AHP) questionnaire, the paper finds that Korean shipping and logistics service providers suggest 'customs clearance and freight forwarding' as the most preferred area for cooperation and investment, whereas the Georgian maritime agencies wish to induce investment in 'construction and operation of port terminals'. The paper concludes that this preference gap can be narrowed through deeper common understanding on the issues, particularly from the long-term perspective and proposes such areas as 'seafarers' and 'knowledge sharing' for initial cooperation projects.

Keywords: Georgia, Black Sea, Maritime, Cooperation, Korea, AHP

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1. Introduction

With globalization of the world economy, international intermodal transport to support international trade becomes increasingly important for enhancing a country's competitiveness. Georgia and Azerbaijan that are located between the Black Sea and the Caspian Sea have attracted increased attention of logistics companies and global investors, as they connect Europe, Africa, the Middle East, and Central Asia. Furthermore, energy pipelines through the Black Sea and the Caspian Sea heighten the geopolitical potential of Georgia and Azerbaijan.

There are many sub-regional, regional and international organizations, and bi-lateral donors that are working on various technical cooperation and infrastructure development projects in Georgia and Azerbaijan, including EU, USAIDS, TRACECA, BSEC, ADB, World Bank, ESCAP, ECE, etc. (Ministry of Oceans and Fisheries of Korea, 2015). The Chinese government included transport networks of Georgia and Azerbaijan as a link in its strategy of One Belt One Road (OBOR). As part of their efforts to improve the efficiency of international intermodal transport, China and Georgia together with other related countries implemented a demonstration project of intermodal transport from Shihezi in China's Xingang Uygur Autonomous Region to Georgia through Aktau port in Kazakhstan and Alyat new port in Azerbaijan in 2015 (Global Trade, 2015).

Georgia is located at the east side of the Black Sea and plays a role of a gateway to Central Asia through the Caspian Sea. Though it is a small country with a population of 4.6 million in an area of 69 thousand ㎢ and poor in mineral resources, Georgia has strength as a convenient junction in international transport and energy pipelines.

Korea and Georgia concluded diplomatic ties in 1992, however the two countries could not diversify the areas of economic cooperation until 2012. At a summit meeting in 2012, two countries agreed to enhance economic cooperation by sharing knowledge on development planning in Korea, including Korea's participation in Georgia's infra-structure development projects. Following the summit, Georgia was selected as a beneficiary of the Economic Development Cooperation Fund (EDCF) of Korea in 2012. The bilateral shipping agreement between Korea and Georgia was concluded in 2014 and an agreement on reciprocal recognition of certificates of seafarers in 2015 (Ministry of Oceans and Fisheries of Korea, 2015).

Figure 1. Map of Georgia

Source: UNESCAP, Trans Asian Railway Network, 2009.

Maritime cooperation between Korea and Georgia will enlarge geographical coverage of the Korean maritime sector and improve service quality of Korean shipping companies and logistics service providers. The present paper aims at reviewing the environment of maritime cooperation between the two countries, and suggesting priority areas for cooperation.

The paper is constructed as follows. Section 2 describes literature review and methodology. The paper adopts interviews with maritime transport experts and Analytic Hierarchy Process (AHP) questionnaire in Korea and Georgia in order to suggest cooperation areas. Section 3 compares the maritime power of the two countries and analyzes investment environment in Georgia. Section 4 explains the main results of interview and AHP questionnaire responses. Section 4 delves into the analysis on gap of opinions of experts in Korea and Georgia. Section 5 proposes areas and projects for initial cooperation. Section 6 concludes the paper.

2. Literature review and methodology

2.1 Literature review

The geopolitical importance of the region around the Caspian Sea has been reviewed by various studies and reports mainly on energy (Ziyadov, 2011; Jo et al., 2012; USAID, 2012a). Georgia among the regional countries provides an ideal location for trades and transits for different countries in other continents (USAID, 2012b).

Georgian Black Sea ports are connected through road, rail and rail-ferry networks with the logistics nodes in the Caspian Sea, such as Baku port and Alyat new port in Azerbaijan, and further connected by shipping networks to Turkmenbashi port of Turkmenistan, Aktau port of Kazakhstan, Russian ports, and Iranian ports in the other side of the Caspian Sea. As a part of its endeavours, the Georgian government is planning to build a deep sea port at Anaklia, to enhance the potential of its maritime industry in the regional multimodal transport connection.

In 2011 the Georgian government adopted the 'Strategic 10-point Plan for Modernization and Employment 2011-2015', which included three points related to transport: (i) make Georgia a regional logistics hub and business platform; (ii) upgrade multimodal infrastructure; and (iii) develop professional and higher education centers (Georgian government, 2011; Ministry of Oceans and Fisheries of Korea, 2015).

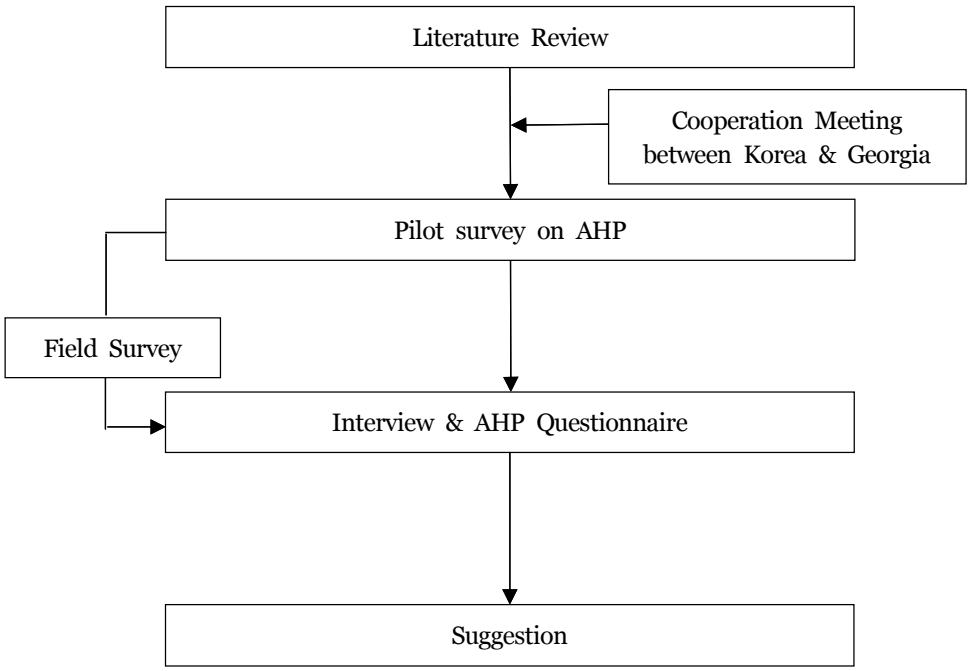
For Korea, Georgia's strategic location creates opportunity to enlarge the trade with the countries in Central Asia and to diversify the investment in transport and energy infrastructure, and facilitate trade (Jo et al., 2012, 14-17; 63; Ministry of Oceans and Fisheries of Korea, 2015).

The present paper has the following contributions to the literature. First, the paper focuses on maritime cooperation between Korea and Georgia. Second, the paper attempts to use AHP questionnaire to identify areas for bilateral cooperation in maritime sectors between Korea and other countries. AHP questionnaire can clarify the difference in evaluation criteria and cooperation areas.

2.2 Methodology

In order to identify cooperation areas and business projects between Korea and Georgia, the present paper adopts the following process as in the Figure 2. First, the paper reviews overall environment for maritime cooperation between Korea and Georgia. Second, a series of interviews with maritime transport experts and questionnaire of the Analytic Hierarchy Process (AHP) were conducted to identify maritime cooperation projects between Korea and Georgia. The contents of the AHP questionnaire were prepared through a pilot AHP questionnaire with the aim of testing the responses and deciding business areas and evaluation criteria. AHP analysis was undertaken according to the normal process suggested by Korea Development Institute (KDI) in 2000. In addition, the analysis partially adopted the evaluation criteria of Public-Private Partnership projects in the reports of KDI. The normal process is composed of brainstorming, structuring, weighting, consistency test, and prioritization, except feedback. Third, the paper arranges the cooperation areas and projects in the order of priority, taking account of common interests of the two countries, and proposes the two cooperation areas: cooperation on seafarer and knowledge sharing.

Figure 2. Flow of the present study



3. Environment of Maritime Cooperation

3.1 Comparison of maritime power

While understanding a blurred boundary between two concepts of maritime power and sea power (Mahan, 1987; Ju, 2015), the present paper narrows the concept of maritime power to the commercial maritime power. The present paper focuses mainly on the capacity of commercial fleets and container port of Korea and Georgia.

3.1.1 Korea

Korea has successfully completed many infrastructure projects as part of its efforts towards the vision of a transport and logistics hub for North-East Asia. These projects include the development and operation of new deep sea ports, logistics centers, Inland Container Depots (ICDs) and the establishment of extensive maritime and inland transport infrastructure and service networks. During the course, Korea has gone through extensive reform processes to improve regulations and laws and other institutional bottlenecks that jeopardized the efficiency of transport infrastructure and logistics performance. Sharing such experience and knowledge as well as good practices of transport policy planning will help Georgia plan its transport and logistics development in a comprehensive and integrated manner.

Table 1. World Ranks of Merchant Fleets (2015)

Country(ranking)	No.	1000GT
Greece (1)	3,677	164,131
Japan (2)	4,069	157,356
China (3)	3,791	105,726
Germany (4)	3,128	82,153
US (5)	2,468	65,521
UK (6)	1,455	55,144
Korea (7)	1,409	46,522
Singapore (8)	1474	36,592
Norway (9)	2,110	36,496
Hong Kong (10)	1,004	33,706
Azerbaijan	151	633
Georgia	1	1
World Total	50,500	1,191,003

Source: IHS Fairplay, World Fleet Statistics 2015, 2016.

In the shipping sector, Korea's merchant fleet records fifth largest in the world, following Greece, Japan, China and Germany. In 2015, Korea controlled 1,409 ships of 46.5 million gross tonnage with its share of 3.9% of the world tonnage (Table 1). Korean fleets are mainly composed of dry bulk ships, tanker and container ships.

Main container ports in Korea include Busan, Gwangyang, and Incheon. The three major ports have totally 20 container terminals in length of 20.1 km as shown in Table 2. Busan port with 10 container terminals in length of 12.5 km as shown in Table 2 handles containers of about 19.4 million twenty-foot equivalent unit (TEU) in 2016: 9.6 million TEU of export and import, 9.8 million TEU of transhipment containers mainly from China and Japan and a few containers of domestic coastal trade (SPIDC, 2017).

Table 2. Container terminals and port facilities of major Korean ports

Item/Port	Busan	Gwangyang	Incheon	Total
No. of terminals	10	4	6	20
Length(m)	12,523	4,400	3,088.5	20,111.5
Depth(m)	-11 ~ -17	-15 ~ -17	-7.5 ~ -16	
No of Q/C	120	27	27	174

Source: Yeosu Gwangyang Port Authority, Cargo Distribution Trend and Analysis of Yeosu port and Gwangyang port, 2016. pp. 61-62.

3.1.2 Georgia

Georgia ranked 94th in the world shipping with 1 ship of 1 thousand gross tonnage in 2015, compared with Azerbaijan, its neighbouring country, which controlled 151 ships of 633 thousand gross tonnage. The main Georgian ports include Poti (with cargo throughput of 5.8 million tonnes), Batumi (5.1 million tonnes), Kulevi

(1.5 million tonnes), Supsa (3.8 million tonnes) in 2016 and Sukhumi (Maritime Transport Agency of Georgia, 2016). Container movement in Georgia ports grew from 330 thousand twenty-foot equivalent unit (TEU) in 2012 to 410 thousand TEU in 2014 and fell to 303 thousand TEU in 2016, as shown in Table 3. Poti port handled about 256 thousand TEU in 2016 and Batumi 47 thousand TEU in 2016.

Table 3. Container movement in Georgian ports

(TEU)

	2012	2013	2014	2015	2016
Poti	261,211	303,438	353,283	293,315	256,475
Batumi	68,373	68,660	57,011	49,615	46,728
Total	329,584	372,098	410,294	342,930	303,203

Source: Ministry of Economy and Sustainable Development of Georgia (2017).

Table 4. Container port facilities of Georgian ports

Item/Port	Poti	Batumi	Total
Berth	2	1	3
Length(m)	211, 253	280, including Rail ferry berth	-
Depth(m)	-8.2, -8.4	-11.7	-
No of Q/C	3	2	5

Source: Maritime Transport Agency of Georgia (2017).

Due to lower growth in container movement in Georgia, Georgia handles containers only in the two ports as shown in Table 4. Poti port uses two berths with three quay cranes for containers. Batumi port handles containers with 1 berth of 280m and 2 quay cranes. Compared to the container handling facilities of Korean ports as shown in Table 1, the size of container port facilities in Georgia is too small for Korean terminal operators to consider foreign investment.

Georgia is implementing an ambitious plan to develop a new deep sea port in Anaklia. When the first 3 phases are completed in 12 years, it will be capable of handling 40 million tons and accommodating large vessels, including container vessel of 6,500 TEUs (Ministry of Economy and Sustainable Development of Georgia, 2015a). The plan also includes the establishment of a free industrial zone.

Once developed, this new sea port is expected to be central part of TRACECA routes and contributes towards the realization of Georgia's vision of Euro-Asian transit transport and logistics hub. However, the operational capacity of the new sea port will be maximized when extensive maritime transport networks in the Caspian Sea and the Black Sea are also developed. It is also required to increase the capacity of inland transport along the east-west corridor, in particular the capacity of railway for transit transport.

3.2. Institutions of Maritime and Seafarers

Korea and Georgia have a common interest in seafarer education and training: Korea as an employer and Georgia as a supplier. Korea has advanced academic education and professional training institutions on shipping, port and logistics development and operations. The main educational and training institutions include the Korea Maritime and Ocean University (KMOU), the Mokpo National Maritime University (MMU), the Korea Institute of Maritime and Fisheries Technology (KIMFT) and the Pukyong National University. In addition, Korea Maritime Institute is a representative Korean think-tank on maritime issues.

Nevertheless, Korea has experienced a shortage of supply of seafarers since the 1990s. The number of Korea's seafarers decreased from 106,000 in 1990 and 50,000 in 2000 to 37,000 in 2014 (Korean Seafarers Welfare and Employment Center, 2015; Park, 2016). According to the forecast of demand and supply of seafarer by Ministry of Oceans and Fisheries (MOF) of Korea, the shortage of seafarers will amount to 26,763 in 2020 and 34,860 in 2030 (Ministry of Oceans and Fisheries of Korea, 2013). This forecast includes seafarers of merchant marine in overseas and coastal transportation services, fishing, and foreign flag vessels (Park, 2016). In contrast, the number of foreign seafarers on board Korean-flag vessels increased remarkably from 2,653 in 1995 to 24,624 in 2015 (Korean Seafarers Welfare and Employment Center, 2016). The main supplier of foreign seafarers on Korean-flags was China in the 1990s, but now more seafarers are from Indonesia, Vietnam, Myanmar, and the Philippines (Korean Seafarers Welfare and Employment Center, 2016). Since China is changing its role from a main supplier of seafarers in the world shipping to a customer, the Korean shipping industry is increasingly relying on other countries and needs to find a new source of seafarer supply.

Georgia and Azerbaijan are well known for established maritime education and training systems that supply skilled and English-fluent seafarers and crew in the Black Sea and the Caspian Sea. Georgia has a long history of maritime education from early 1900s with the Maritime Industrial Technical Secondary School in Batumi, which has now been reorganized as a state-owned university, Batumi State Maritime Academy (BSMA). Currently BSMA offers bachelor and master programmes in maritime navigation and engineering as well as in shipping and port management and logistics. For students seeking a seaman's career, it also provides special on-board training on ocean-going merchant ships. Nevertheless, BSMA does not own and operate a training ship.

The Seafarers Training and Certification Centre at BSMA is equipped with modern simulators, machines and installations in accordance with IMO requirements and provides seafarer training and retraining programmes in accordance with STCW requirements. Currently a total of 1,480 students are enrolled in the various programmes of BSMA, and the student enrolment is expected to increase to 4,000, attracting 500 foreign students. Georgia faced challenges in the implementation and enforcement of the STCW Convention in the training and certification system after the European Maritime Safety Agency (EMSA) withdrew the recognition of Georgian Seafarers Certificate of Competency (COC) in 2010. Maritime Transport Agency was established

under the Ministry of Economy and Sustainable Development in April 2011 with a mandate to create a sustainable maritime system in Georgia, and from 2013, MTA started to issue a new Seafarers Certificate of Competency.

In 2015, the Ministry of Oceans and Fisheries of Korea and the Maritime Transport Agency signed an agreement on reciprocal recognition of certificates of seafarers pursuant to regulation of STCW.

3.3. Investment Environment of the Maritime Sector in Georgia

In recent years the government of Georgia undertook a number of projects for modernization and expansion of transport infrastructure including railways, roads, seaports and airports. Total investment of Georgia in transport infrastructure increased from 76.7 million Euros to 479.2 million Euros in 2011(see Table 5).

The investment was mostly spent in the inland transport infrastructure development, particularly in the road sector, which accounted for 59% (791.2 million Euros) of total investment in transport infrastructure made during the period from 2008 to 2011 as shown in Table 5. Upgrading international roads was on a high priority in line with the attempts of the government of Georgia to make their transport system an integral part of the TRACECA routes and a regional logistics hub. However, the port sector accounts only for a minor share of investment, decreasing from 29.7 million Euros in 2008 to 13.4 million Euros in 2011.

Table 5. Investment in transport infrastructure in Georgia

(Million Euros)

	2004	2005	2006	2007	2008	2009	2010	2011
Rail	11.1	14.2	61.9	212.0	48.2	80.3	77.5	249.2
Road	40.0	62.5	90.9	122.2	124.3	218.8	232.4	215.7
Sea Port	-	-	-	-	29.7	23.6	24.0	13.4
Airport	-	-	-	27.4	0.1	0.1	0.2	0.9
Total	51.1	76.7	152.8	361.6	202.3	322.8	334.1	479.2

Source: OECD and ITF (2013)

Being benefitted from the improved road infrastructure, a majority of the growth of the inland freight transport in Georgia occurred in the road sector while railway traffic showed an overall decreasing trend (Table 6).

Table 6. Inland Freight transport in Georgia

(Million ton)

Mode/Year	2012	2013	2014	2015	2016
Road	26.2	26.5	26.8	27.1	27.4
Rail	18.5	16.7	15.1	13.0	10.9
Total	0.02	0.02	0.02	0.01	0.03

Source: Ministry of Economy and Sustainable Development of Georgia (2017).

Container trade between Korea and Georgia jumped from 3,126 TEU in 2010 to 9,473 TEU in 2015 as shown in Table 7, but it is still not enough for Korean shipping companies to consider their participation in the shipping market in the Black Sea. Furthermore, severe competition is expected from Bandar Abbas port of Iran, a hub in the Middle East, which is eager to catch transhipment cargo from Central Asia.

Table 7. Container movements between Korea and Countries in the Black Sea and the Caspian Sea

(Unit: TEU)

Country/Year		2010	2013	2014	2015
Georgia	export	2,591	9,417	14,471	9,094
	import	535	922	593	379
	total	3,126	10,339	15,064	9,473
Azerbaijani	export	2	-		
	import	-	-		
	total	2	-		
Kazakhstan	export	-	-		
	import	2	-		
	total	2			
Iran	export	160,116	49,601	7,879	38,879
	import	92,112	34,788	6,035	13,163
	total	252,228	84,389	13,914	52,042
Turkey	export	62,122	80,266	103,391	128,711
	import	19,949	30,574	39,719	40,945
	total	82,071	111,02	143,110	169,656
Total		337,429	205,748	172,088	231,171

Source: Korea Customs Service, Export and Import Distribution Yearbook, each year.

The Georgian government emphasizes its potential role as a regional logistics hub. Realizing that the development and promotion of investment in transport infrastructure is critical to facilitating the roles, the Georgian government has adopted various investment laws: Law on the Investment Activity Promotion and Guarantee (1996), Law on the Georgian National Investment Agency (2002), Law on State Promotion of Investment (2006) and Law on State Support for Investment (2006).

4. Main Results of Interviews and AHP Questionnaire

4.1. Interviews

During the field visit to Georgian ports in June 2015, Poti port and Batumi port, interviews with maritime and intermodal transport experts in Georgia were conducted (Appendix 1). In October 2015 at a consultation meeting between Korea

and Georgia in Tbilisi, Georgian experts in Batumi State Maritime Academy (BSMA) and Maritime Transport Agency (MTA) of Georgia were interviewed. The interviews with Korean experts in Korea and Georgia were done earlier in March, May and June 2014. The interviews aimed at obtaining expert opinions on interested areas and proposals for maritime cooperation between Korea and Georgia.

The Korean experts have the opinion that the level of cargo throughput at Georgian ports is not high enough for Korean service providers to consider entering into the maritime industries in Georgia. However, the experts pointed out the necessity of expansion of service network by Korean service providers. A few experts suggested a possibility of cooperation for employment of Georgian seafarers on Korean-flagged ships.

The BSMA and MTA expressed their interests in developing cooperation projects to increase the employment of Georgian seafarers by Korean shipping companies. Particularly, BSMA hopes its students may have a chance of on-board training for the student's in Korean-flagged ships. Georgian seafarers are composed of 3,730 officers with the capacity of STCW and 5,201 ratings, lower level seafarers, as numbered in Table 8. 3,730 officers include 1,942 officers in management level and 1,788 officers of operational level.

Table 8. Georgian seafarers (2015)

(TEU)

management level	operational level	support level	Total
1,942	1,788	5,201	8,931

Source: Maritime Transport Agency of Georgia (2015).

Officials in MTA and Ministry of Economy and Sustainable Development of Georgia hope to induce foreign direct investment (FDI) by Korean maritime and logistics providers in the construction and operation of container terminals and logistics facilities such as container yards. Georgian government promotes foreign investors to invest in logistics and port facilities in Georgia (Ministry of Economy and Sustainable Development of Georgia, 2015b).

4.2. AHP Questionnaire

4.2.1 General description

The AHP questionnaire covered two parts as shown in Appendix 2: (1) a selection criteria which includes profitability, cost, entry easiness, urgency, future prospect and demand, and (2) business entry and cooperation areas including construction/operation of port terminal, operation of on-port/inland logistics warehousing, customs clearance agency, international logistics service, freight forwarder, trucking business, logistics service of crude oil and natural resources, and education and training of professional manpower. Business entry and business areas of the AHP questionnaire were formulated based on the provisions of bilateral agreements in the maritime

sector through which the governments of Korea and Georgia agreed to cooperate on shipping, port services, seafarer, and other maritime related areas.

The AHP questionnaire was distributed to both Korean and Georgian experts, and responses were collected from April to June in 2015. Recognizing the recommendation on participant number of AHP questionnaire by the Korea Development Institute (2013): usually 8 persons, the present paper collects totally 11 respondents; four from Georgia and seven from Korea as shown in Appendix 1. The responses were divided into 4 groups of experts, including Korean logistics service providers, Korea Shipowners' Association (KSA), Korea International Freight Forwarders Association (KIFFA), MTA and BSMA. Since Georgia locates at remote area and the container volume between Korea and Georgia is about 10 thousand TEU in 2015, a few Korean logistics service providers handle the cargoes to/from Georgia. We narrowed interviewees and respondents of Korean logistics service providers to the staffs of the providers, which had offices or branches in the Black Sea and the Caspian Sea in 2015. The three respondents of KSA and KIFFA were selected. They were executive directors in charge of international cooperation.

The respondents revealed a common opinion on selection criteria for cooperation areas; all groups put 'profitability' as the first priority in selecting business entry areas and cooperation agenda as shown in the Table 9. The second priority is 'entry easiness'. The inconsistency ratio of responses is 0.06 compared with the critical value of 0.2 (KDI, 2000, 51)

The responses on cooperation areas show differences between Korean and Georgian sides as shown in Table 10. The most preferred area by Korean experts is 'customs clearance and freight forwarding', followed by 'operation of warehousing'. Korean experts seem to consider Georgia as a country of transit to the Central Asia and therefore, choose the areas with low risk in profitability. On the other hand, Georgian respondents tend to emphasize on 'operation of port terminal', 'trucking business', 'education and training of professional manpower'. The inconsistency ratio of responses is 0.06.

Table 9. Responses on selection criteria of cooperation areas

Item	Total	Korean Logistics Service Providers	KSA	MTA of Georgia	BSMA
Profitability	0.41	0.40	0.28	0.36	0.56
Cost	0.13	0.18	0.17	0.05	0.09
Entry easiness	0.16	0.12	0.24	0.21	0.10
Urgency or Necessity	0.08	0.16	0.12	0.06	0.03
Future prospect	0.14	0.07	0.14	0.21	0.14
Demand situation	0.07	0.07	0.05	0.11	0.08
Inconsistency Ratio	0.06	0.23	0.25	0.06	0.11

Overall, the respondents put 'customs clearance and freight forwarding' as the priority area for cooperation, as listed in Table 11. The business of customs clearance and freight forwarding gets the highest scores in 'profitability', 'cost and entry easiness' and the second highest scores in 'necessity', 'future prospect', and 'demand situation

of the partner country'. The next priority areas as a whole include in the order of priority, 'operation of on-port terminal,' 'inland logistics warehousing', and 'education and training of professional manpower'.

Table 10. Responses on cooperation areas

Item	Total	Korean Logistics Service Providers	KSA	MTA of Georgia	BSMA
Operation of port terminal	0.21	0.16	0.12	0.24	0.35
Operation of logistics warehousing	0.18	0.22	0.18	0.1	0.125
Customs clearance and freight forwarder	0.30	0.33	0.46	0.12	0.11
Trucking business	0.13	0.15	0.12	0.23	0.06
Logistics service of crude oil and natural resources	0.08	0.09	0.08	0.07	0.10
Education and training of professional manpower	0.10	0.06	0.04	0.22	0.26
Inconsistency Ratio	0.06	0.23	0.25	0.06	0.11

Table 11. Responses on cooperation areas by selection criteria

Item	Profit-ability	Cost	Entry easiness	Urgency or Necessity	Future prospect	Demand situation of the partner country	Total
Operation of port terminal	0.15	0.22	0.21	0.15	0.40	0.35	0.21
Operation of logistics warehousing	0.19	0.19	0.14	0.19	0.16	0.16	0.18
Customs clearance and freight forwarder	0.31	0.33	0.36	0.16	0.17	0.20	0.30
Trucking business	0.13	0.14	0.11	0.12	0.12	0.14	0.13
Logistics service of crude oil	0.08	0.07	0.11	0.05	0.06	0.08	0.08
Education and training	0.15	0.05	0.07	0.06	0.09	0.06	0.10
Inconsistency Ratio	0.08	0.08	0.07	0.03	0.05	0.08	0.06

4.2.2 Different opinions between Korea and Georgia

Figure 3, 4, 5 and 6 illustrate, for each of 4 respondent groups, the scores of selection criteria, based on which the areas for cooperation were evaluated. The area of ' customs clearance and freight forwarding' that Korea logistics service providers and KSA indicated as a top priority, received second highest scores from the viewpoint of 'urgency or necessity' by MTA and from the viewpoint of 'cost' by BSMA respectively. For the area of 'construction/operation of port terminals' that is most preferred by the Georgian experts, the Korean logistics service providers gave the highest score

from the viewpoint of 'future prospects' and 'demand situation of the partner country'. This implies that while the AHP questionnaire responses from Korean and Georgian experts revealed some differences in preferred areas for cooperation, such gaps can be closed if the two countries have deeper common understanding on the issues, particularly from the long-term perspective.

Figure 3. Responses of Korea Logistics Service Providers on cooperation areas

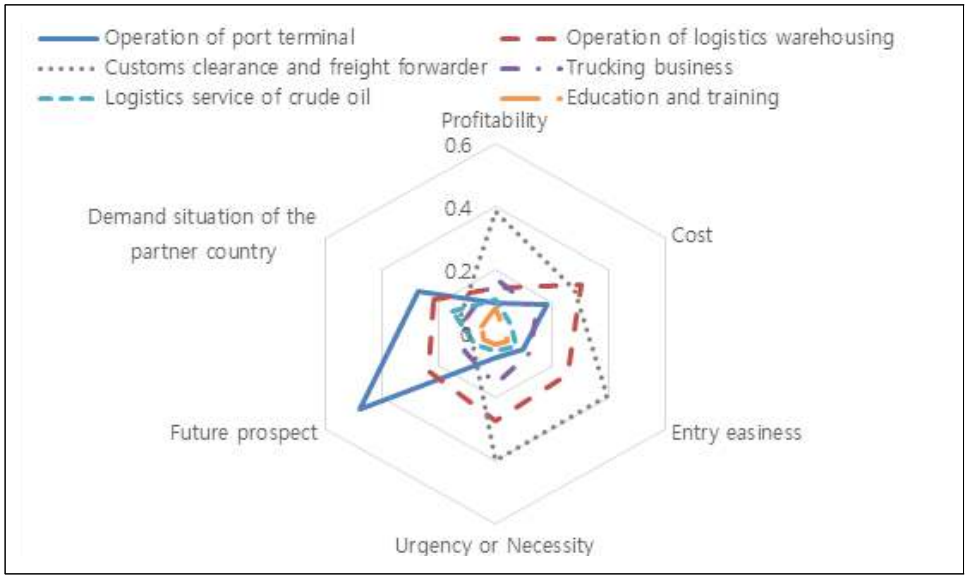


Figure 4. Responses of Shipowners' Association on cooperation areas

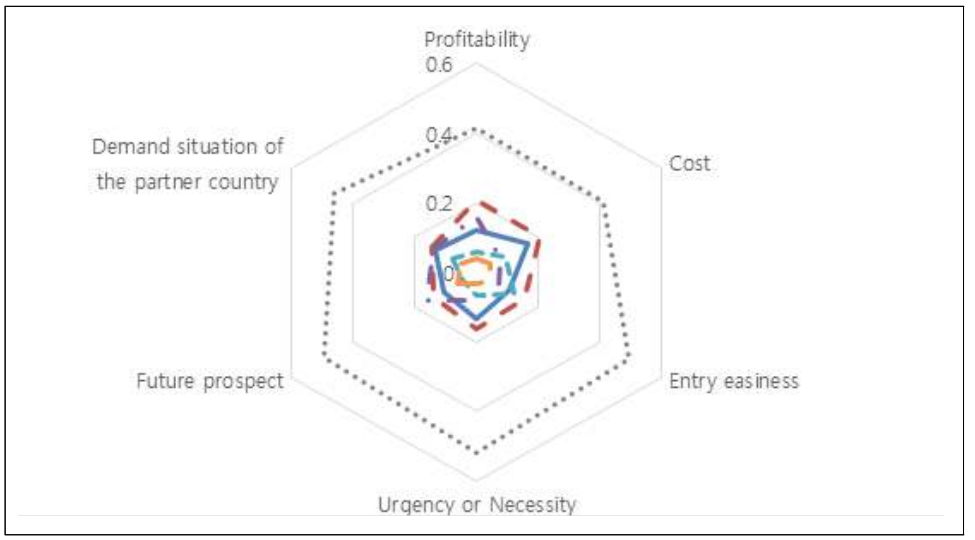


Figure 5. Responses of Georgia Ministry on cooperation areas

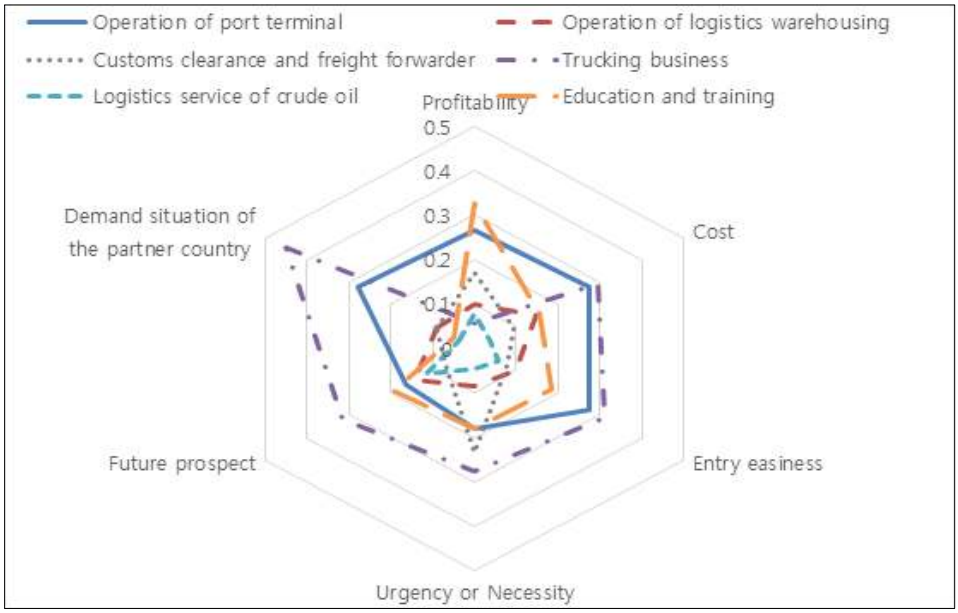
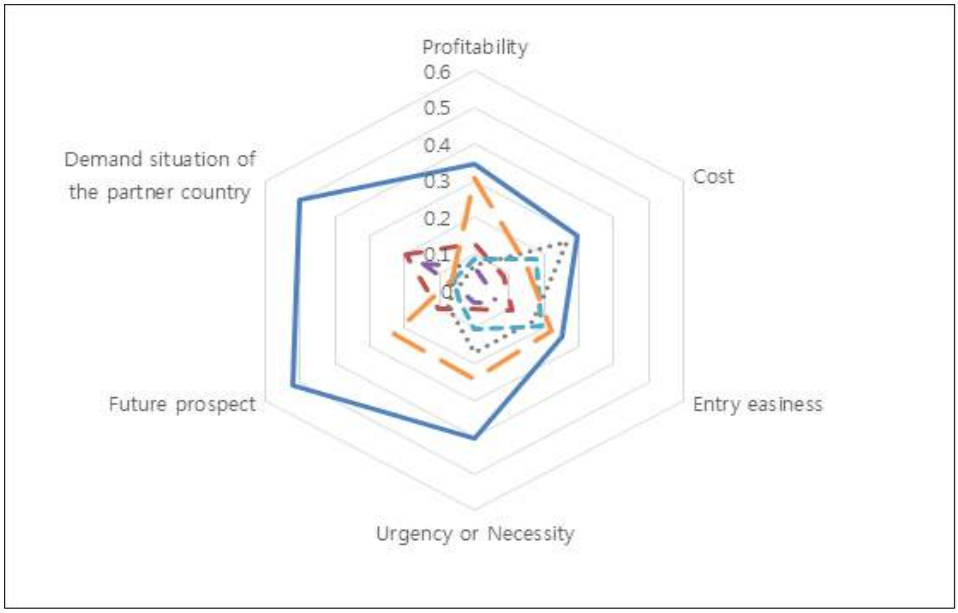


Figure 6. Responses of BSMA on cooperation areas



5. Proposed Areas for Maritime Cooperation

AHP questionnaire responses show that Korea and Georgia have different preference with regard to the area for cooperation. The Korean side considers 'freight forwarding and customs clearance agency' as the top priority area for cooperation, and 'operation of logistics warehousing' as the second priority. The Korean side seems to have selected these areas because these businesses may involve low financial risks. The Georgian side put its top priority on 'operation of port terminal' and second priority on 'education and training of professional manpower'. Korean shipping companies and logistics providers indicate that the current level of container and cargo throughputs in the Georgian ports is not enough for them to consider the investment in port construction and terminal operation.

The present paper also found that different preferences of Korea and Georgia on the cooperation areas can be narrowed by deeper and common understanding of the two countries on the issues, particularly from the long-term perspective. In order to follow up the bilateral maritime agreements and to bridge the gap of preferred cooperation areas between Korea and Georgia, the present paper proposes the following two areas for initial maritime cooperation projects between Korea and Georgia.

5.1. Cooperation on seafarers

The first demonstrative cooperation may focus mainly on on-board training of Georgian students of BSMA on training ships of Korea Maritime and Ocean University (KMOU) and Korea Institute of Maritime and Fishery Technology (KIMFT). In October 2015 in Tbilisi Georgia, BSMA and KIMFT already started to discuss the cooperation programme on training of Georgian students on Korean training ships. Furthermore, Korea and Georgia concluded an agreement on reciprocal recognition of certificates of seafarers in 2015

BSMA can be a stable source of seafarers for the Korean shipping industry that has been experiencing a shortage of seafarer supply. To achieve this end, it is necessary to develop jointly special seafarer education and training programmes customized to meet the specific requirements of the Korean shipping industry. Student and faculty exchange programmes can also be offered on the subjects of shipping, port and logistics management as well as off-shore structure operation and dynamic positioning.

5.2. Knowledge sharing

The transport and logistics system in Korea is well developed. The government has long pushed forwards the country's vision of a transport and logistics hub for North-East Asia, and made a significant achievement particularly in the area of maritime shipping and ports as well as international logistics. Furthermore, under the recent Eurasia Initiative, the geographical coverage of the vision is now extended to cover

the whole Asia and Europe and in this regard Azerbaijan and Georgia may offer a great opportunity for Korea in realizing the vision. Korea has a lot of expertise and knowledge accumulated during the past decades in developing transport infrastructure and services.

A good approach to bilateral cooperation is sharing of knowledge and expertise. Korea has become a leading maritime country, being ranked high in terms of the provision of maritime shipping and port services and international logistics. Since 1990s, Korea has successfully implemented many projects of transport infrastructures as part of its efforts towards the vision of a transport and logistics hub for North-East Asia. The includes the development and operation of new deep sea ports, logistics centers, ICDs and the establishment of extensive maritime and inland transport infrastructure and service networks. The Korean government has led in building new deep sea ports in Busan and Incheon, logistics centers near Busan port, Gwangyang port, Incheon ports and other ports. Nevertheless, a long-term depression of world maritime industry and Hanjin Shipping bankrupt reduced the spatial coverage of shipping service networks of Korean liners.

During this course, Korea experienced extensive reform processes to improve regulations and laws and other institutional bottlenecks that jeopardized the efficiency of transport infrastructure and logistics performance. Sharing such experience and knowledge as well as good practices of transport policy planning will help Korea and Georgia have common understanding on the transport and logistics development issues and thereby lead to enhanced maritime cooperation between the two countries.

6. Conclusions

The region around the Black Sea and the Caspian Sea has attracted attention of logistics companies and global investors. Georgia is located at the east side of the Black Sea and serves as a gateway for European countries to Central Asia through the Caspian Sea. The bilateral shipping agreement between Korea and Georgia in 2014 propelled the discussion on cooperation in shipping, port service sectors, seafarers, and other related areas.

Although maritime cooperation between Korea and Georgia will enlarge geographical coverage of the Korean maritime sector, the present paper finds different opinions on the areas for cooperation between Korean and Georgian experts from both interviews and AHP questionnaire. While Korean experts indicate their preference on ‘freight forwarding and customs clearance agency’, and ‘operation of logistics warehousing’, Georgian experts put their highest priority on ‘operation of port terminal’. Furthermore, Korean shipping companies consider the current level of container and cargo throughputs in Georgian ports is not high enough for them to invest in port and logistics facilities in Georgia.

The present paper proposes that maritime education and training is an area for initial cooperation, and that such cooperation projects include employment of Georgian seafarers by Korean shipping companies, on-board training of Georgian

students on Korean training ships, and the development of visiting and exchange programmes for maritime students and cadets. The paper also proposes as another area for cooperation the sharing of experience and knowledge as well as good practices of transport infrastructure planning, which will help expand the coverage of maritime cooperation between the two countries.

The policy implications of the present paper have a few aspects. First, maritime cooperation efforts of Korea may face different opinions of partner countries. Countries may have different importance on selection criteria such as profitability, necessity, and entry easiness. Second, bilateral maritime agreements may indicate major cooperation areas, however countries may have different priorities that need to be narrowed to enhance maritime cooperation. Third, knowledge and experience sharing with partner countries may increase common understanding on the cooperation issues and lead to expanded areas for cooperation in the long term.

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APPENDIX 1. Interviewees and Respondents of AHP Questionnaire

Item	No. of interviewees	Major interviewee	No. of AHP response
BSMA	5	President, Mr Irakli Sharabidze Head of Legal Dept. Mrs. Rusudan Kipani	2
MTA of Georgia	4	Deputy Director Mr. Vakhtang Mikelaishivili	1
Ministry of Economy and Sustainable Development of Georgia	2	Deputy Head of the Transport Policy Mr. Davis Javakhadze	1
Logistics service providers of Korea	10	Unicologx, President Park	4
Related Association of Korea	5	KSA, Executive Director Hwang	3
Total	26		11

APPENDIX 2. Questionnaire on Shipping and Logistics Cooperation with Georgia and Azerbaijan, Business Entry and Policy Findings

◆*Purpose of Survey*◆

Korean government is preparing policy directions in a way to support Korean companies to do business with partners in shipping and logistics market of Georgia, Azerbaijan and other central Asian Countries. This survey is focused on business entry and international cooperation with your countries.

KMI (Korea Maritime Institute) is a government funded research institute, specialized in comprehensive ocean policy development including shipping, port and logistics industries and conducts this questionnaire survey to help the Korean government shape policy development.

We want to receive your highly esteemed opinion. -May 2015

Yong An PARK, Ph.D. Research Fellow, KMI
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□ General Introduction of Georgia and Azerbaijan(2013)

	Population (000)	GDP (US$ billion)	Per capita GDP (US$)	Int'n trade (US$ billion)	Major trading countries	Main Items
Georgia	4,580	27.3	6,100	Export: 2.6 Import: 7.1	Export: Azerbaijan, Ukraine, Turkey, Russia, Armenia Import: Turkey, Ukraine, China, Azerbaijan, Russia	Steel, electronics products, Mining, lumber, wine
Azerbaijan	9,686	102.7	10,800	Export: 34.5 Import: 10.7	Export: Italy, Indonesia, Thailand, Germany, Israel, France, India, Russia, USA Import: Russia, Turkey, UK, Germany, Ukraine, China, France	Crude oil, oil products, LNG, exporation equipment, iron ore, cement, textiles

□ Selection criteria of business entry and cooperation

Priority selection criteria are consisted of Six major items and Six specific sub-items.

Evaluation item	Specific items
Profitability	Operability of own assets of logistics company, sales, profits, etc.
Cost	Various expenses for business entry
Entry easiness Entry easiness	Business environment such as regulations, competition and business practices
Urgency or Necessity	Advantages of entry at present
Future prospect Future prospect	Future prospect and market growth potential
Demand situation of the partner country	Situation and necessity of the partner country, example) Korea or Japan

□ Business entry areas and cooperation

The following is business entry areas and cooperation agenda.

Evaluation item	Specific items
Operation of port terminal	Construction/operation of port terminal
Operation of logistics warehousing	Operation of on-port/inland logistics warehousing
Customs clearance and freight forwarder	Customs clearance agency, international logistics service, freight forwarder
Trucking business	Trucking transport
Logistics service of crude oil and natural resources	International logistics services for crude oil and natural resources
Education and training of professional manpower	Education and training of shipping, port and logistics professional manpower(international cooperation and government support)

□ Example of relative importance of evaluation criteria

■ When entering into shipping and logistics market, please, check the priority business area of the relative importance as in the following.

Example

For example, if you consider that shipping is more important than trucking business, please, check as in the following.

Evaluation item	Absolute	Very important	Important	Little Important	Equal	Little Important	Important	Very Important	absolute	Evaluation item
Shipping	5	4	√3	2	1	2	3	4	5	Trucking business

<Questionnaire>

Ⅰ. Evaluation criteria

1. Among the three expert groups of 1) Shipping and port industries, 2) Logistics company and freight forwarder, and 3) Academic/business association/professional groups, what is your opinion of the relative importance?

Evaluation item	Absolute	Very Important	Important	Little Important	Equal	Little Important	Important	Very Important	Absolute	Evaluation item
Shipping and port industries	5	4	3	2	1	2	3	4	5	Logistics company and freight forwarder
Shipping and port industries	5	4	3	2	1	2	3	4	5	Academic/business association/professional
Logistics company and freight forwarder	5	4	3	2	1	2	3	4	5	Academic/business association/professional

2. Second evaluation criteria: profitability, cost, urgency, entry easiness, demand situation of the partner country, what is your opinion of the relative importance?

Evaluation item	Absolute	Very Important	Important	Little Important	Equal	Little Important	Important	Very Important	Absolute	Evaluation item
Profitability	5	4	3	2	1	2	3	4	5	Cost
Profitability	5	4	3	2	1	2	3	4	5	Entry easiness
Profitability	5	4	3	2	1	2	3	4	5	Urgency
Profitability	5	4	3	2	1	2	3	4	5	Future prospect
Profitability	5	4	3	2	1	2	3	4	5	Demand situation of the partner country
Cost	5	4	3	2	1	2	3	4	5	Entry easiness
Cost	5	4	3	2	1	2	3	4	5	Urgency
Cost	5	4	3	2	1	2	3	4	5	Future prospect
Cost	5	4	3	2	1	2	3	4	5	Demand situation of the partner country
Entry easiness	5	4	3	2	1	2	3	4	5	Urgency
Entry easiness	5	4	3	2	1	2	3	4	5	Future prospect
Entry easiness	5	4	3	2	1	2	3	4	5	Demand situation of the partner country
Urgency	5	4	3	2	1	2	3	4	5	Future prospect
Urgency	5	4	3	2	1	2	3	4	5	Demand situation of the partner country
Future prospect	5	4	3	2	1	2	3	4	5	Demand situation of the partner country

Ⅱ. Survey of the relative importance of entry areas and policy agenda

1. From the profitability point of view, what is your opinion of the relative importance?

Entry areas and policy agenda	Absolute	Very Important	Important	Little Important	Equal	Little Important	Important	Very Important	Absolute	Entry areas and policy agenda
Operation of port terminal	5	4	3	2	1	2	3	4	5	Operation of logistics warehousing
Operation of port terminal	5	4	3	2	1	2	3	4	5	Customs clearance and freight forwarder
Operation of port terminal	5	4	3	2	1	2	3	4	5	Trucking business
Operation of port terminal	5	4	3	2	1	2	3	4	5	Logistics service of crude oil and natural resources
Operation of port terminal	5	4	3	2	1	2	3	4	5	Education and training of professional manpower
Operation of logistics warehousing	5	4	3	2	1	2	3	4	5	Customs clearance and freight forwarder
Operation of logistics warehousing	5	4	3	2	1	2	3	4	5	Trucking business
Operation of logistics warehousing	5	4	3	2	1	2	3	4	5	Logistics service of crude oil and natural resources
Operation of logistics warehousing	5	4	3	2	1	2	3	4	5	Education and training of professional manpower
Customs clearance and freight forwarder	5	4	3	2	1	2	3	4	5	Trucking business
Customs clearance and freight forwarder	5	4	3	2	1	2	3	4	5	Logistics service of crude oil and natural resources
Customs clearance and freight forwarder	5	4	3	2	1	2	3	4	5	Education and training of professional manpower
Trucking business	5	4	3	2	1	2	3	4	5	Logistics service of crude oil and natural resources
Trucking business	5	4	3	2	1	2	3	4	5	Education and training of professional manpower
Logistics service of crude oil and natural resources	5	4	3	2	1	2	3	4	5	Education and training of professional manpower

(Other contents are skipped for shortening.)

2. Please, check the following items.

2-1.Company

1) Shipping company 2) Port operator
3) Freight forwarder 4) Logistics company
5) Business association 6)Academic/research Institute/professional
7) Government
8) Others

Years in service : years

We would like to express our warm thanks for your kind response.