The Role of Management Information Systems Towards Maritime Logistics Management in Myanmar

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Abstract

Maritime transportation is a major mode of transportation and trade and Maritime logistics management is crucial for the nation to develop the economy. Better logistics management can reduce trade costs, help nations to compete globally and increase the competitive advantage as logistics is the backbone of the trade. Myanmar needs to improve its Maritime logistics industry for the country's economic growth as Asia becomes the focal point for economic growth, trade, and geopolitical transformation. Procedures for logistics management and port cargo handling in Myanmar are currently done by the conventional paperwork, making significant delays and economic loss for the nation. Myanmar's Ministry of Transport and Japan cooperated and implemented the Port EDI System in Yangon Port. However, other ports of Myanmar are still lacking the information system to manage the maritime logistics processes and have negative effect on Maritime Logistics Management, Maritime Pilots and Maritime Security.

The research investigated how Port EDI System of Yangon Port has benefited the port operation and maritime logistics industry of Myanmar. Based on the benefits and experiences of Yangon's Port EDI System, implementation of Management Information System is suggested. The research also highlighted possible benefits of implementing the system for maritime pilots, reducing corruption and maritime security. In addition, the research has recommended the implementation of National Single Window (NSW) System by integrating

the various information systems and other stakeholders concerned based on the experiences of Japan, Korea, and Singapore.

Keywords: Management Information System (MIS), Maritime Logistics Management, Port EDI System, Myanmar

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Table of Contents

Abstract 1

Acknowledgement 3

1 Introduction 5

1.1 Research Background 5

1.2 The problem to be investigated 6

1.3 The objective of the study 8

1.4 The scope of the study 8

1.5 Research Significance 8

2 Literature Review 9

2.1 Maritime Logistics Management 9

2.2 Myanmar in Maritime Logistics Industry 9

2.2.1 Yangon Port Development 10

2.2.2 Deep Sea Ports and Special Economic Zones development 10

2.2.3 Privatization of the Port Sector 11

2.3 MIS 11

2.4 Port EDI System 12

2.4.1 Oversea systems review 12

2.4.2 Local System Review 14

2.5 Benefits of Yangon's Port EDI System 14

3 Findings 16

4 Conclusion and Recommendation 17

4.1 Recommendation for Maritime Logistics Industry of Myanmar 18

4.2 Recommendation for the System Implementation 18

5 References 19

1 Introduction

1.1 Research Background

Nowadays, one of the transportation modes called maritime logistics becomes very crucial as trade mainly relies on maritime transport because this can carry the cargoes at the lowest cost, with maximum transport capacity, through free waterways, and optimize mass transportation of goods. Moreover, Maritime logistics dominate among other modes of transportation in international transport. Maritime transportation is the most profitable and cost-effective than other kinds of transportation (Kovačević, 2014). Besides, the Asia region has become an important region for global economic, trade, and geopolitical transformation. For this transformation, the Indian Ocean has become a hub for maritime industry making transregional connectivity and China Myanmar Economic Corridor becomes one of the important parts of the Maritime Silk Road (Kharl et al., 2020).

To catch up with the global economic and geopolitical transformation in Asia, Myanmar needs to increase its capacity to mobilize its resources and improve both soft and hard infrastructure for the country's economic growth (Than, 2015). Myanmar is the largest country in Mainland Southeast Asia and has access to the Andaman Sea to its South and Bay of Bengal to its Southwest and adjacent to the Indian Ocean Region. Myanmar has a coastline of 2228 km (more than 1300 miles) stretching along the Bay of Bengal and the Andaman Sea. All ports of Myanmar are administered by a single and main organization known as Myanma Port Authority. There are altogether nine ports under the Management of Myanma Port Authority which is under the supervision of the Ministry of Transport and Communications (JICA, 2014). Yangon Port is the river port which is located in Yangon river and there are eight-out ports which are located along Myanmar's coastline. They are regionally grouped as Sittwe, Kyaukphyu, and Thandwe ports in Rakhine State; Pathein port in the Ayeyarwaddy Region; Mawlamyine port in Mon State; and Dawei, Myeik, and Kawthoung ports in Tanintharyi Region. Yangon port is the major port of Myanmar which handles more than 90% of the imports and exports of the country. Moreover, there are Deep Sea Ports in Myanmar. Dawei Deep Sea Port Project and Kyauk Phyu Deep Sea Port Project (*Port Information | Myanma Port Authority*, n.d.). All of these ports are critical for Myanmar's economic growth.

Having awareness of the importance of maritime trade and economic growth in Asia, the ten member states of the Association of Southeast Asian Nations (ASEAN) has the ambition to minimize delays and paperwork in trade by the use of the National Single Window (NSW) concept (ASEAN, 2006) that all members of ASEAN should introduce as part of the ASEAN Economic Community (AEC) (Walsh, 2015).

In compliance with the progress of NSW, ASEAN countries are highly expected to develop information systems for port administrative procedures (Shibasaki, 2018). Myanmar is one of the Southeast Asian Nations and by the realization of the AEC blueprint to implement Single Market Production Base, the government decided to implement the Port EDI project in Yangon Port which will serve as the groundwork to join the ASEAN Single Window Initiative (About Port-EDI | Myanma Port Authority, n.d.). The information system that processes port administrative procedures which include port entry and departure, requests for berthing and other port related information between private and public sectors is called the port EDI system. The port EDI system provides a one-stop service for port administrative procedures. Therefore, the port EDI system can be a single window (SW) system when integrated with other management information systems in the maritime shipping industry (ASW, n.d.) (Shibasaki, 2018).

Moreover, Myanmar is also one of the seven-member states of BIMSTEC (The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) which was founded on the 6th of June 1997 with the signing of the Bangkok Declaration. The seven-member states are Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand. Myanmar joined BIMSTEC on the 22nd of December 1997. One of the major seven sectors for cooperation among the member states in BIMSTEC is the 'Connectivity' sector which is formerly known as the 'Transport and Communication' sector. The BIMSTEC master plan for Transport Connectivity represents a ten-year strategy and action plan from 2018 to 2028 and is supported by the Asian Development Bank (ADB). The reason is to improve the region's transport network and promote the well-balanced development of the waterfront facilities (*BIMSTEC*, n.d.). Therefore, Myanmar has the responsibility to follow the BIMSTEC master plan for the 'Transport and Communication' sector.

1.2 The problem to be investigated

There is an urgent need to address the problems caused by not having an effective management information system in the maritime industry. The lack of a management information system in the maritime industry in Myanmar made its major setback in the maritime field. Presently, procedures for logistics management and port cargo handling in Myanmar are operated by the conventional paperwork and basic way of data processing resulting in the cargo staying in the port area for over one week or more making a significant economic loss for all the stakeholders. Moreover, most of these procedures and the documents application related to port arrival or leaving are done by passing by hand between the concerned parties. This kind of procedure takes time for the approver to get information and this would be one of the reasons

for the delay. Before the arrival of a vessel at the port, some information is needed for preparation and it has to be obtained in advance. The information is transmitted by telephone, Fax, and email. However, the data entry work is duplicated and difficult for reusing data because the information is not gathered and saved in the database. To solve this problem, the Myanmar Ministry of Transport and Japan cooperated and the ministry asks for grant aid for the Port EDI system from Japan in August 2013 which would reduce the processing time of application and notification to be sent to the port authority. Implementing the Port EDI system in Yangon Port makes the processes of Maritime logistics management in Yangon port more effective and efficient than before. However, there is a Port EDI system in Yangon Port only and other ports of Myanmar are still lacking the system to manage the maritime-related processes (JICA, 2015).

There is increasing concern that maritime pilots are being disadvantaged by not having effective MIS. According to a survey by (Oldenburg et al., 2021), Maritime pilots need twenty-four-hour standby to navigate ships through challenging sometimes difficult waterways which is a very stressful working situation. Moreover, it is important to consider maritime pilots' safety behavior such as maritime pilots' mental health, psychological health consultation, and safety training which are maritime pilots' risky behavior (Xu et al., 2021). Without effective management information systems, maritime pilots have to deal with stress and strain because of poor management in maritime logistics. As maritime pilots are also key stakeholders, it would be beneficial a lot for them if there is effective management by using MIS.

Another problem to be investigated is corruption. The maritime industry remains vigilant to corruption and there are still many corruption challenges in the maritime field. Many stakeholders exist in the transportation of cargo and so chances for corruption increase. In addition, numerous port calls, limited supervision of ports in developing nations, unfamiliar maritime laws, and different bureaucracies faced by ships, officers, crew, and agents lead to corruption in the maritime industry. Corruption can also occur in custom processes, chartering, and procurement processes (DiDomenico, 2021).

Maritime security is one of the most frequently stated problems with the maritime industry. Therefore, maritime security has already become one of the major areas to prioritize for many countries. The development and security of many coastal countries are challenged by piracy, trafficking, and environmental crime at sea (Bueger et al., 2020). Vessels information can be tracked and traced in Port EDI systems and MIS. This could help identify the ships and help prevent the vessels from coming to port for their security. The system could also identify the ships which are in an emergency and prevent environmental crimes at sea.

1.3 The objective of the study

This research examines the emerging role of Management Information Systems in the context of Maritime Logistics Management. This study aims to contribute to this growing area of research by exploring Port EDI systems and various researched systems in the maritime industry.

The specific objectives of this study are:

- To introduce the Management Information System for Myanmar's ports and maritime logistics industry, based on the findings on Yangon Port and its Port EDI system benefits, to handle the maximizing demand of service.
- To help and assist in designing and developing the effective Management Information System in the future based on the findings and analysis of the study.

1.4 The scope of the study

This study is documentary research which is mainly based on journals, related websites from government bodies such as Myanmar Port Authority, articles, books, survey report papers relating to maritime industry and management information systems. In addition, the study aims to use primary data, online surveys, and previous research findings for the advantages of using technology in maritime logistics management. Moreover, the study will be based on the port surveys done by the agencies such as the Japan International Cooperation Agency (JICA), which has helped a great deal in the implementation of the Port EDI system in Myanmar's Maritime Logistics industry, to support the study.

1.5 Research Significance

The significance of this study is how information systems such as Port EDI Systems and Management Information System (MIS) can support Maritime Logistics Management in Myanmar. The importance and originality of this study are that it explores various Management Information Systems used in the field of Maritime Shipping Logistics and learns Port EDI Systems of the leading country in this field such as Japan, Korea, and Singapore for the development of Myanmar's Maritime Industry. Therefore, this study makes the contribution to research on MIS for Myanmar's Maritime Logistics by demonstrating the benefits of using Port EDI System in Yangon Port and decent literature review on information systems and the experiences of Maritime Logistics Management leading countries. The study also highlights the possible

benefits for Logistics operations, Maritime Pilots, and Maritime Security because of introducing the Port EDI System and MIS in Myanmar. Moreover, the study should make a contribution to the future development of the Single Window (SW) System of Myanmar based on the findings of the study.

2 Literature Review

2.1 Maritime Logistics Management

The maritime logistics and shipping business have been essential to the development of economic activities because business transactions and trade rely on ships to transport cargoes. Hence, the movement of goods through maritime transportation is the economic lifeblood of many countries (Lun et al., 2010). According to (Yi, 2019), the port is the major center for maritime logistics being the focal point for modern commodity collection and scheduling transportation and ports efficiencies are important as it will affect the competitiveness of all the enterprises in maritime logistics and supply chain. Maritime logistics management directly indicates the status of a country's maritime transport. Shipping logistics enterprises can offer the satisfaction of customers by improving the logistics service systems (Zhao, 2020).

Maritime and shipping market is important to economic development that the two-way interaction between developments in shipping and developments in the world economy are intertwined and cannot be separated. Therefore, the strategic importance of the maritime and shipping industry cannot be underestimated as seaborne trade is at the apex of the world economy. Moreover, the maritime industry has supported an extraordinary growth of trade for international businesses and newly industrialized countries (Stopford, 2013).

From the strategic point of view, maritime transportation is the most important part of the logistics system because if maritime transport is not well integrated into the entire logistics stream, this may result in unnecessary waiting and additional costs. Besides, maritime transport serves as a bridge between all the units in the logistics network including customers, suppliers, other channels, and stakeholders. Maritime transportation is the most preferred and important type of logistic and global supply chain management under the influence of international trade and the global economy (Yorulmaz & Birgün, 2017).

2.2 Myanmar in Maritime Logistics Industry

Myanmar's logistics infrastructure needs to increase in investment vividly. The reason is most of the logistics infrastructure of Myanmar was established during the British colonial era. Myanmar also needs

to have policy simulations proposed on its logistics infrastructure guaranteeing the effective use of limited resources to improve the national economy (Yamaguchi et al., 2021). To measure Trade Logistics, there are six key import components which are Customs, Infrastructure, Tracking and Tracing, Ease of international shipments, Logistics Services Quality, and Timeliness. Better logistics management can reduce trade costs, help nations to compete globally, and increase competitive advantage as logistics is the backbone of the trade (*Logistics Performance Index World Bank*, n.d.). According to the World Bank LPI ranking in 2018, Myanmar ranks 137th which is the lowest position among the neighboring countries such as China which was ranked 26th, India 44^{th,} and Thailand 32nd globally. Other ASEAN member countries were ranked as Indonesia 46th, Cambodia 98th, Laos 82nd, Philippines 60th, Vietnam 39th, Singapore 7th, Malaysia 41st, and Brunei 80th respectively. Therefore, it can be said that Myanmar has poor performance in the Maritime Logistics Industry than other countries in the region (*Country Score Card: Myanmar 2018 | Logistics Performance Index*, n.d.).

2.2.1 Yangon Port Development

Improvements in port infrastructures are important to reduce maritime transport costs. Hence, with the help of local and foreign investment, port development at Yangon and Thilawa port area are carried out (S.N.S. Thein, H. L. Yang, 2019). Currently, international cargoes are handled at existing port facilities of Yangon Main Port which are Asia World Terminal, MIP Terminal, Sule Terminal, Bo Aung Kyaw Terminal, and Inland Container Depots. However, expansion of facilities in Yangon Main Port Area is not possible due to the limited land area. Therefore, to handle the future increasing cargo new port facilities are constructed at Thilawa Area Port in Yangon because it has got deep water and a wider land area (JICA, 2014).

2.2.2 Deep Sea Ports and Special Economic Zones development

Deep-Sea Ports and Special Economic Zones development plays one of the strategic roles for Myanmar Maritime logistics industry development. In this part, strategic deep seaports of Myanmar Kyaukpyu Deep Sea Port, Kaladan Multi-Modal Transit Transport Project, and Dawei Mega Project are reviewed.

Kyaukpyu deep seaport is constructed by the Ministry of Energy and South East Asia Pipeline Company-CNPC of China are being taken Joint-Venture. The project is located in Made Island, Kyauk Phyu Township, Rakhine State. It starts construction on 31st October 2009. Moreover, the construction of the Crude Oil Terminal was implemented on 1st April 2011 and completed on 31st May 2013. Crude Oil

Terminal can accommodate oil tankers of DWT 300,000 vessel with a draft of 22 meters, LOA 300 meter and 60-meter width (*Kyaut Phyu Port | Myanma Port Authority*, n.d.) (Hong, 2011).

Kaladan Multi-Modal Transit Transport Project is located Along the Kaladan River from Sittwe Port to Mizoram, India. The project objective is to facilitate the cargo transport to Mizoram through Rakhine State and the border of Myanmar and India. The project was signed in New Delhi, India on 2nd April 2008. Project execution includes the Development of Sittwe Port and Kaladan River, allocation of navigation aids along the Kaladan River from Sittwe to Paletwa, and construction of road link from Palatwa to India Myanmar border. The project cost is US$ 117.38 Million. Progress of pre-engineering works includes a hydrographic survey for navigation Channel and Sittwe harbor. Construction of road link from Palatwa to India Myanmar border (*Ministry of Development of North Eastern Region, North East India*, n.d.).

Dawei deep seaport and special economic zone project is located in Tanintharyi Region, Dawei District, Yephyu Township, Nabule District, the mouth of Pantininn creek, near the Ngapitat village, Myanmar. The company for execution is ITALIAN THAI DEVELOPMENT PUBLIC CO., LTD. However, ITD was stripped of its position as the sole developer of the project in 2013 after failing to attract enough investment. Myanmar granted the contract led by ITD in August 2015 and March 2016 again. Thailand and Myanmar also asked Japan to become third-party investors in the project. Japan finally agreed to involve in the project as the equal partner with Myanmar and Thailand and pledge technical and financial support for the project (*Deep Sea Port | Myanma Port Authority*, n.d.) (*Thai PBS News*, n.d.).

2.2.3 Privatization of the Port Sector

To modernize the logistics industry of Myanmar, MPA started transferring the construction and operation of terminals to the private sector in the late 1990s. The aim is to promote privatization of state enterprises in line with the government policy and to reduce the enterprises which are suffering from underutilization, lack of technological modernization, uneconomical use of inputs, etc. In Myanmar, privatization is done on a project basis and approved by the Privatization Commission. Therefore, several companies are operating the port terminals along the Yangon River (JICA, 2014).

2.3 MIS

Recently, researchers have shown an increased interest in Management Information Systems in the Maritime industry. Recent developments in the field of management information systems have led to a renewed interest in systems to apply in the maritime industry. Evaluation systems such as Analytic Hierarchy Process (AHP) can offer evaluation systems for shipping efficiency in logistics (Chen, 2019).

Tracking and tracing systems become a fundamental component in the shipping and logistics sector. Constant supervision and management are needed in logistics tracking and tracing so that it would be effective for dynamic logistics management these days (Garg et al., 2021).

Systems such as Multi-ARPA (MARPA) concept can support the navigator onboard ship for safe headings while encountering other ships. Using adopting multi-level or binary classification, the system may evaluate and visualize safe heading (O**Ż**oga & Montewka, 2018). Marine enterprise's information management system in (Levchenko, 2011) can do the high speed of data processing, keeping up a connection between events, reducing processed information volumes which are of great help. An automatic Matching System for Ocean-going Cargo can auto-match the cargo in international logistics based on fuzzy scheduling and wireless sensor communication networking technology (Liang, 2019). In addition, port emergency logistics distribution systems can reduce the adverse effects and impacts such as economic loss caused by emergencies that occurred in ports (Yang et al., 2020).

Information Management systems such as Financial Accounting system in (Lin, 2019) of a shipping company which is based on ERP and design the business flow in detail supporting more efficient information system aimed at the financial management of the shipping industry. Coastal line passenger traffic management systems (Rathman et al., 2016) can access and interact with the coastal transport service system and ensure the automatic data exchange and interaction and support to be efficient in transport service and the overall national economy. Logistics monitoring systems (Jiang et al., 2020) integrate the warehousing and distribution logistics process and based on the wireless sensor network software and hardware platform build a monitoring system framework combining sensor network and big data.

2.4 Port EDI System

Port EDI system is an electronic system that involves various application procedures for the management of Port Authority in the process of port arrival and leaving, allocation, billing, and statistics management (JICA, 2015).

In Port EDI System review, oversea Port EDI systems and local Port EDI system (Yangon's Port EDI System) are reviewed.

2.4.1 Oversea systems review

In the overseas systems review, the three countries Japan, Korea, and Singapore which have well-experienced port management systems are reviewed.

2.4.1.1 Japan

The Kobe Chamber of Commerce & Industry requested the Japanese Prime Minister to facilitate the port-related administrative procedures in 1996 and the Japanese government provided those procedures paperless in 1997. The Ministry of Transport established a port EDI in 1999. In 2003, the government of Japan introduced the single window (SW) make collaboration among the port EDI, the customs clearance system, and the immigration system. In 2008, it becomes a single system by integrating these systems with the import/export restriction systems. The system is called the Nippon Automated Cargo and Port Consolidated Systems (NACCS). The port EDI system can be called the NACCS Port Subsystem as the system became one feature of the NACCS after the system integration. The private sector can submit the data to multiple public offices by a single input and submission through the process of the port EDI system in Japan (Shibasaki, 2018).

2.4.1.2 Korea

Korea Customs Service (KCS) successfully implemented Electronic Data Interchange (EDI) system in 1998 after the long effort since 1992. The system can process electronically for all clearance-related applications and declaration documents with effective transportation management. The system is called UNI-PASS. It is connected and utilized by about 110 thousand businesses. The stakeholders who use the system include import-export companies, banks, and logistic businesses such as shipping companies, airlines, carriers, forwarders, and warehouse operators. The internet clearance portal system is established in 2004. The portal system also includes a Single Window System in which clearance-related applications can be assessed with just a single-entry point. The system is developed for the benefit of both the trading community and government agencies (Service, 2010).

2.4.1.3 Singapore

Singapore is home to one of the busiest ports in the world. To have better port management, Singapore has implemented the Port EDI system. To look back on how Singapore developed it's Port EDI System, Trade Development Board (TDB) was established in 1983. TDB processed 10,000 documents daily in 1986. However, it has been found out that growing trade with paper-based administration was infeasible. Therefore, Singapore has done an institutional approach to developing the system. Firstly, a steering committee that includes all relevant CEOs of involved public agencies and associations is formed. Then, Singapore Network Services Pte Ltd which involve TDB, SingTel, PSA, CAAS shareholders) is established. It took two years to develop the system and SGD 50 million are launched in January 1989. By 1992, thirty

public agencies are linked to the system. By 1994, 99 percent of trade declarations are taking place through the system (*Port Community System – Singapore Experience*, n.d.).

2.4.2 Local System Review

For local system review, the Port EDI system of Myanmar in Yangon port, which is the major port in Myanmar, is reviewed.

2.4.2.1 Myanmar

For a brief explanation for the Port EDI system background history, Myanmar is one of the Southeast Asian Nations which realizes the AEC blueprint for the implementation of a Single Market Production Base. Port EDI system will lay the groundwork for Myanmar to join the ASEAN Single Window Initiative, connecting the National Single Window to global economic integration. Therefore, Myanmar Government decided to implement the Port EDI Project with the help of the Japanese government. The Exchange of Notes (EN) between the Republic of the Union of Myanmar and the Government of Japan was signed on March 19, 2015. The Grant Agreement between MPA (on behalf of the Ministry of Transport of the Government of the Republic of the Union of Myanmar) and the JICA Myanmar Office (on behalf of JICA) was signed on March 26, 2015. As a consultant company of the Port EDI Project, Mitsubishi Research Institute Inc. (MRI) was chosen as a leading think-tank and consulting/IT solution Service Company. Myanma Port Authority (MPA) along with MRI carried out a preliminary study and a preparatory survey in August 2014. Afterward, Hitachi Solution Ltd., a globally leading technology company, was selected as the main developer. Since October 2015, MPA staff and experts from MRI have outlined the port EDI system with the best support of their experts. It was not an easy journey for the stakeholders to implement the Port EDI system in Yangon Port. After the hard struggle, the system launched successfully for Yangon Port (About Port-EDI | Myanma Port Authority, n.d.).

2.5 Benefits of Yangon's Port EDI System

According to the Myanma Port Authority, the systems in Yangon's Port EDI System have many benefits. The berth allocation system enables information management relating to the vessels' arrival and departure status. The system helps make berthing arrangements for the arriving vessels by providing tidal information, pilot assignment, and information, berth allocation, vessels in wharves and expected vessels, etc. The system also helps to do Movement Orders for vessels and pilots based on real-time information. The invoice issuing system can help to manage the charges by various departments of Myanma Port Authority, terminal operators and shipping agents, etc. issuing invoices for both the charging side and

charged side. Auditing can be done through the system according to the accounting procedures. The logistics monitoring system records the terminals' daily loading and discharging information, the status of cargo shifting, moving, and delivering and the cargo status can be checked by the consignee or shipper just by inputting container number and bill of lading (BL) number through the system. In port clearance procedures system of the Port EDI system, not only for the application procedures of incoming and outgoing vessels and calculating the estimated port disbursement account but also for the necessary inspections, issuing of port clearance certificates which are needed to be done by the Department of Marine Administration (DMA), Immigration Department, and Port Health Office can be done through the system. Moreover, the application for the inspection of cargoes, which needed to be done by the customs department for cargo loading and discharging, also can be accomplished once the vessel arrives in the territory of the port limit through this system. For the outgoing of the ship, the certificate for clearance will be automatically generated by the system after the necessary inspection is done by the respective officer and that approved certificate can be sent to the responsible person through the system. The statics management system of the Port EDI System can retrieve regular and analytical reports based on the data in the system timely, monthly, and annually based on users' requirements. In addition, the system can generate key performance indicators (KPI) of terminals which is a great help in setting the policy for Myanma Port Authority. The terminal operation system can manage cargo handling for incoming and outgoing vessels, vessel planning, yard planning, and pass generation automatically in the system. Moreover, the system can manage cargo-related information, vessel information, container information, and billing information (*Port Electronic Data Interchange System | Myanma Port Authority*, n.d.).

3 Findings

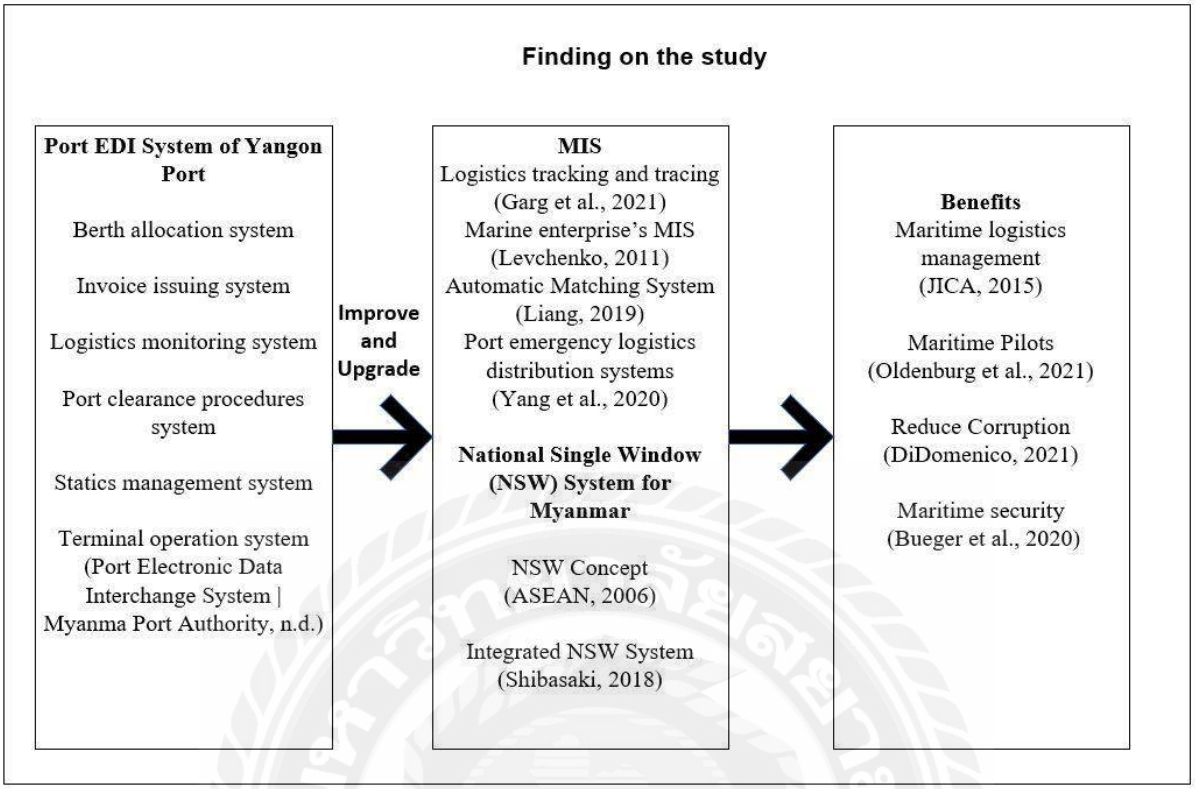

Figure 1: Finding on the study

The current study found that the various systems used in the Port EDI System of Yangon Port has benefited the Maritime Logistics Management of Myanmar. It is interesting to note from the experiences of the well-developed nation such as Japan that Port EDI Systems can be upgraded into better information management systems by integrating with other systems and departments which could have benefits more on maritime logistics management and maritime pilots, reduce corruption and enhance maritime security. The most obvious finding to emerge from the analysis is that the Port EDI system and MIS can be further integrated and upgraded into the National Single Window (NSW) System which could greatly enhance the maritime logistics management of Myanmar.

4 Conclusion and Recommendation

By using the management information system, staff productivity is increased by paperless processing. The system can provide the staff with accurate scheduling of ships' arrival and departures which can reduce turnaround times and congestion. The system can help to save the costs for the port management, businesses, logistics-related communities, and government associations. For example, saving the operating costs for traders and shippers. The system also helps for the smooth operation of logistics and boost economic growth. For example, it can reduce cargo delivery time and result in higher throughput of cargo, and optimize resource utilization. Moreover, important information can get from the system by retrieving real-time data from the system. That accurate information can help and support the stakeholders in decision-making and setting policies. Data exchange and communication between stakeholders through the system gives effective workflow, saving time and increasing efficiency for all parties.

Challenges likely to encounter when the Management Information System is implemented:

- Moving from paper documents to a “paperless” system would be tough to adjust.
- Adapting to the new system and integrating with other systems may require more budgets and data harmonization.
- Increasing user adoption and change management required customized training programs for different users of the community.
- A port community system is a ‘living’ system that needs to keep evolving with the changing times.
- Need to analyze the information and gather the Maritime Logistics Intelligence based on the information obtained from the system to enable the government to make decisions on policy matters.

4.1 Recommendation for Maritime Logistics Industry of Myanmar

Currently, there is only a survey report on Yangon Port done by the JICA, Japanese International Cooperation Agency (JICA, 2015). As there are research and survey limitations on other ports, decent research and survey on other ports rather than Yangon Port is recommended. This could be done by collecting primary data via the survey on the other ports and interviews with the related stakeholders so that can analyze whether the system can be implemented in these ports based on the data.

The suggested management information system needs to consider for integration and adding more features for other ports of Myanmar, which have not implemented the system, and related departments and government ministries. The reason is to have a connection and synchronize among the ports and all related stakeholders. Moreover, the research has lacked the analysis on the development of a possible Single Window (SW) System. Therefore, the feasibility study for implementing the Single Window (SW) System should be carried out for the benefit of the Maritime Logistics Industry of Myanmar. The use of the Management Information System and implementing the Single Window (SW) System would greatly benefit for better logistics management (Shibasaki, 2018) and would help in developing the Logistics Performance Index (LPI) ranking of Myanmar (Zar & Htun, 2021).

4.2 Recommendation for the System Implementation

To solve the limitation of the lack of development features integrating with other departments and government organizations, more analysis and addition of suitable features and functions are recommended. The reason is the system needs to be compatible regardless of any organizations in the port and shipping logistics sector and compatible with Myanmar's Maritime Industry.

There is a lack of development for the mobile platform which is a mobile application in the current suggested system. Therefore, the study's future plan is to develop the system for the mobile platform so that the users can access it from their smartphones easily.

The recommendation put forward by this study is that further studies, research, and development are needed to evaluate the impact of the system when we intend to introduce the system to other ports in Myanmar. A feasibility study should be carried out for upgrading to the Management Information System (MIS) based on Port EDI System. The system should consider including features and more information for the benefits of maritime pilots and maritime safety as well.

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