

Deep Sea Port Development in Myanmar¹

缅甸深水港开发

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Abstract: Myanmar has special geopolitical importance and it is located in the middle of three very large consumption markets: comprised of China to the north, India to the west, and the Association of Southeast Asian Nations (ASEAN) countries to the south. As a main port of the country, Yangon port is a river port and a number of capacity constraints are persisting therein. Based on the maritime trade statistics provided by Myanmar Port Authority (MPA), the values for number of vessels calling, container throughput, and cargo volumes are gradually increased year by year. Therefore, it is obviously seen that Myanmar needs deeper and wider ports for larger vessels to allow for uninterrupted growth of the seaborne trade, and establishment of deep sea port is the only option ahead. The main motivation for deep sea port development in Myanmar is to cater for the growing economy of country itself, which means serving its own hinterland as logistics hub. The primary objective is establishing alternative shipping routes to reduce dependency on the Strait of Malacca by accessing sea routes through the Bay of Bengal and the Andaman Sea. According to the standards and guidelines for site selection process, there may be many criteria. Among them, four “must-have criteria”: water depth, natural shelter, hinterland connectivity, and available land are selected for initialize the site selection framework. There are four potential sites for deep sea port projects along Myanmar coastline: Kyauk Pyu, Pathine, Kalegawk and Dawei. They are ranked by stakeholders' inclusive and the most suitable sites are selected by using Analytical Hierarchy Process (AHP).

摘要: 缅甸具有特殊的地缘政治重要性，它位于三个非常大的消费市场的中间：北部是中国，西部是印度，南部是东盟国家。仰光港作为我国的一个主要港口，是一个内河港口，其运力约束问题一直存在。根据缅甸港务局（MPA）提供的海运贸易统计数据，所有船舶停靠数量、集装箱吞吐量和货运量均逐年递增。因此，可以明显看出，缅甸需要更深、更宽的港口来建造更大的船只，以使海上贸易持续增长，而建立深海港口是今后唯一的选择。缅甸发展深海港口的主要动力是为了满足本国经济的增长，也就是说要把自己的腹地作为物流枢纽。主要目标是通过孟加拉湾和安达曼海的海路建立替代航线，以减少对马六甲海峡的依赖。根据选址过程的标准和指南，可能有许多标准。其中，初步选址框架选择了4个“必须具备的标准”：水深、自然遮蔽、腹地连通性和可用土地。沿缅甸海岸线有四个潜在的深海港口项目地点：皎漂、帕辛、卡莱古克和大伟。它们按利益相关者的包容性进行排序，并使用层次分析法（AHP）选择最合适的地点。

Keywords: deep sea port; logistics hub; Myanmar

关键词: 深海港口；物流枢纽；缅甸

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1 Introduction

Maritime transport is a major transportation mode of international trade and lies at the heart of cross-border transport networks that provide supply chains and enable international trade^[1]. In the Republic of the Union of Myanmar (Burma), water transportation served as one of the most important modes of transport for country's exports and imports. Maritime transport and logistics infrastructure are vital components for the sustainable development of the nation. Ports are the gateway to access global trading partners and maritime transport is one of

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the most cost-effective modes of transport over long distance. New deep sea port construction and existing port development are important processes for any country to get involved in international trade. Consequently, port development and port reform are essential components of a country's economic prosperity ^[2]. The development of ports has been a major indicator of the development of the society as via them goods were imported and exported and enhanced the spreading of culture and science all over the world.

Marine and offshore structures are constructed worldwide for a variety of functions and in a variety of water depths and environmental conditions. The consideration of the water depth and environment conditions are very important for selection the location of ports and terminals, type of structures, right planning, design, fabrication, transportation and installation of marine and offshore structures.

2 Purpose and significance of the research work

The purpose of this article is to make clear the government plan for the selection of deep sea port locations for regional development in Myanmar, and examine the connectivity between the designated regions within ASEAN countries. Myanmar needs deep sea ports to address the requirement to accommodate Post-Panamax vessels in the nearby future ^[3]. The main motivation for deep sea port development in Myanmar is to cater for the growing economy of Myanmar itself, which means serving its own hinterland ^[3]. For Myanmar, there are at least three significant reasons for establishing a deep sea port at the most suitable location ^[4], such as:

- * To support the country's growing seaborne trade needs in the future,
- * To go along with the global shipping trend of moving towards larger tonnage,
- * To utilize its geographical advantage to become a regional access door to the sea.

The growth of container volumes during the last decades and the capacity constraints encountered by Yangon Port including Thilawa port area, major port of Myanmar, indicated that it is an urgent need to expand existing port and to construct new deep seaports in the maritime business.

There are some potential sites for deep sea port project along Myanmar coastline. The most suitable location for deep sea ports is proposed based on influenced factors such as geopolitical interests, commercial considerations, corridor developments, influence of neighboring countries, development of road, rail and/or pipeline connections to the key ports etc. The proposed sites are ranked by Analytical Hierarchy Process (AHP) depending on the various site selection criteria.



Fig.1 Location of Myanmar and neighboring countries (Source: Myanma Port Authority)

The location of Myanmar with neighboring countries is described in Figure 1. Myanmar is bordered by five neighboring countries: Thailand and the Lao PDR to the east; China to the northeast; India to the northwest; and Bangladesh to the west. The seacoast faces the Andaman Sea and the Bay of Bengal with the length of more than 2,200 km coastline ^[5].

The four potential sites for deep sea port projects along Myanmar coastline: Kyauk Pyu, Pathine, Kalegauk and Dawei, and main port of Myanmar, Yangon Port, are also located in Figure 1.

Physical connectivity with Myanmar's coastline and to the Indian Ocean has become a priority for Myanmar's neighbors. Their primary objective is to establish alternative shipping routes to reduce their dependency on the Strait of Malacca^[6]. By using transport corridors can significantly reduce the distance and the delivery time of the goods^[7]. As a result, Myanmar's infrastructure program is focused on constructing deep sea ports and upgrading of existing port.

3 Selection of Locations for Deep Sea Port in Myanmar

Especially in the past, port sites were often allocated based on the government's political considerations. However, nowadays many criteria and considerations for site selection are combined with environmental impact, social & political impact, and economic impact. Although each country and each site selection process has different drivers and objectives, this section deals with three sources of site selection in standards and guidelines: Permanent International Association of Navigation Congresses (PIANC), United Nations Conference on Trade and Development (UNCTAD), and working practices from Arcadis were used in this research. There are four 'must-have criteria' listed for initial site selection framework in those guidelines^[3], which are water depth, hinterland connectivity, natural shelter, and available land.

There are four potential sites for deep sea port along Myanmar coastline. The most suitable location for deep sea ports is chosen not only based on influenced factors such as geopolitical interests, commercial considerations, corridor developments, influence of neighboring countries, development of road, rail and/or pipeline connections to the key ports etc., but also ranked by Analytical Hierarchy Process (AHP) depending on the various site selection criteria to provide the government plan for selection of deep sea port locations in regional development of Myanmar.

The available data were collected for proposed locations of deep sea port based on the selected criteria: water depth from ETOPO1 (Earth Topography and Ocean Bathymetry Database, 1 Arc-Minute Global Relief Model) and checked with regional navigation charts, hinterland connectivity and available land from MPA and National Transport Master Plan, and shelter from the dominant SW direction of wave based on monsoon wind.

In the end of 2017, a multi-stakeholder workshop on "Capacity building on deep sea port development opportunities in Myanmar" was held in Yangon. This workshop served as source for data as well as an opportunity to bring public and private stakeholders together for capacity building on deep sea port development. Stakeholders can have large influence on the site selection and their values and insights are of great importance. During the workshop, stakeholder consultations were carried out for "Views of stakeholders on the selection of location for deep sea ports in Myanmar" from twenty stakeholders from the government officials, business stakeholders and also from the academic institutes.

AHP, which uses the pairwise comparison for weighting of selection criteria, is a very suitable method for site selection (Saaty, 1988)^[8]. The four basic criteria mentioned above were used in pairwise comparison method to get parameter weighting for ranking of sites.

Firstly, **OBJECTIVE** is state as "***Selection of Deep Sea port Location***", and then "***Water Depth, Natural Shelter, Hinterland Connectivity and Available Land***" are defined as **CRITERIA**. After that four possible sites "***Kyauk Pyu, Pathine, Kalegauk and Dawei***" are picked as **ALTERNATIVES**.

4 Results

Using pairwise comparisons from the stakeholders' judgments, the relative importance of one criterion over another could be estimated. The preferences of each alternative over another were also determined. Table 1 is showing the weighted value of main criteria, potential sites of deep sea ports and their overall ranking. The results showing in the table tell us that Dawei is the highest ranking and Kyauk Pyu is the second highest ranking among

four potential sites for deep sea port.

Tab.1 Deep Sea Port Ranking on each Criterion by AHP

Criteria / Alternative	Kyauk Pyu	Pathine	Kalegauk	Dawei
Water Depth (0.3681)	0.2581	0.1404	0.1944	0.4071
Natural Shelter (0.2147)	0.3481	0.1166	0.1871	0.3481
Hinterland Connectivity (0.2025)	0.1075	0.3860	0.2540	0.2540
Available Land (0.2147)	0.3206	0.3925	0.1435	0.1435
Overall Ranking	0.2603 (2)	0.2391 (3)	0.1940 (4)	0.3068 (1)

The location of selected deep sea ports and access sea routes through Myanmar are shown in Figure 2.

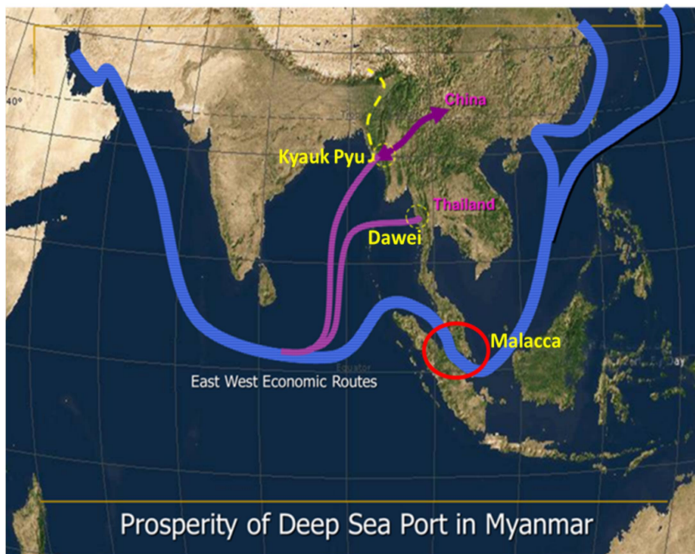


Fig.2 Deep sea port location and access of sea routes through Myanmar

Dawei deep sea port project will serve as hub connection to Greater Mekong Sub-regions (GMS), south and south-east Asia countries, and also can lessen the dependence on the congested Straits of Malacca and reduce transportation and logistics costs as well.

Kyauk Pyu Deep Sea Port is the most appropriate approach to cope western corridor. It is the shortest route from Indian Ocean to China, and also a main outlet of ocean route for land locked regions' trade.

5 Conclusion

After completion of deep sea port projects, some benefits are ^[9]

- * Reduce logistics and labor costs for Greater Mekong Sub-regions (GMS) members by providing an alternative sea route to India, China, Middle-East, Europe, and Africa,
- * Reduce dependence on the congested Strait of Malacca,
- * Provide an industrial location so that private firms and factories in China, Thailand and other neighboring countries may consider relocating, and
- * Supporting Myanmar's strategic importance as a regional logistic and trading hub.

As Myanmar aims to become Southeast Asian maritime hub, the substantial improvements in logistics related transport and trade has been initiated. Deep sea ports together with Special Economic Zones will provide the maritime industry with an opportunity of increased cargo volume in international trade. Moreover, job opportunities for local people would be generated and living standard also would be upgraded from those projects. Therefore, developments of ports are extremely important not only for the country's economy and regional development, they are also principal for reducing trade barriers between neighboring countries and within the regions.

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