

# The Development of Marine Transportation System in Supporting Sustainable Tourism

## Case Study: Nusa Penida Island, Bali Indonesia

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### Abstract

Bali Island is well-known tourist destination in the world. As well as Bali Island, several small islands amongst Bali Island such as Nusa Penida, Nusa Lembongan and Nusa Ceningan have good potential for tourist destination. Infrastructure for inter-islands transportation which is located in Southern Bali needs to be improved to support the economy in such region. Various issues are found in improving the infrastructure provision which is related to existing harbor infrastructure such as lack of support from the relevant institutional and port site selection. This study reviewed the factors considered in the development of infrastructure for marine transportation. Supports from relevant institutions, improved infrastructure, transportation network construction, and support then participation of local communities are the factors which can use as strategies and recommendation in strengthening the marine transportation.

**Keywords:** marine transportation, factors, institution, infrastructure, networks, local community

### 1. Introduction

Bali Island is an island of Indonesia which is surrounded by several small islands such as Nusa Penida, Nusa Lembongan and Nusa Ceningan. Those islands cover two-third of Klungkung region area (Adnyana, 2012). Astronomically, this region located in the southern side of main cluster of maritime archipelago called Nusa Penida islands. It covers an area of approximately 202 square kilometers. The length of the coastline is 80 kilometers which includes those three islands (Nusa Penida, Nusa Lembongan and Nusa Ceningan). This island group located in the southern island of Bali and is directly adjacent to the Indian Ocean which can be regarded as one of the outer islands group of Indonesia (Ralahalu, 2013) (Figure 1).

In recent years, the marine transportation sector in this island cluster has experienced a rapid growth in capacity and a significant improvement in almost all cruise lines which is still largely dominated by private sector. This is made possible by a substantial investment in infrastructure due to the tremendous growth of tourism in this region. Despite this impressive rate of development, the results are far from uniformity. Many ports still suffer from poor productivity and deteriorating assets. Many shipping lines continue to operate on a marginal basis with very slight contribution to regional economic activities (Budiarta, 2011).

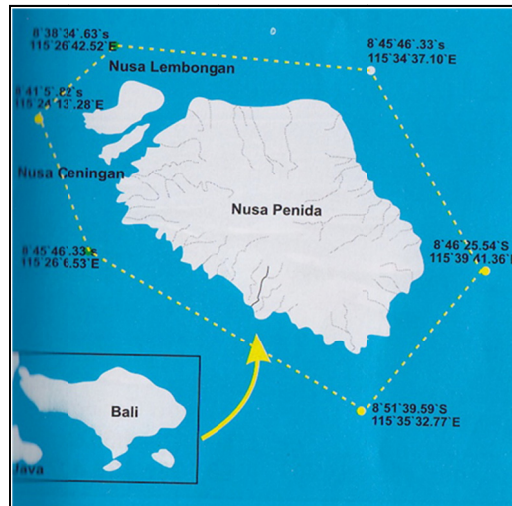


Figure 1. Islands group (Nusa Penida, Nusa Lembongan and Nusa Ceningan)

Based on these descriptions, it needs a study to assess and solve the issues or problems faced. This paper is aimed to identify factors in strengthening the marine transportation. These factors include strategies and recommendation to improve and strengthen marine transportation. It begins with transportation demand and initial benchmarking of the existing tourism transportation performance and followed by the issues in improving marine transportation, which is related to existing harbor.

**2. Transportation Demand**

One of the factors that influence the demand for transportation is mobility. People mobility arises from a variety of needs and motivation such as: 1) economy, 2) politic, 3) security, 4) health, 5) housing, 6) religion, 7) education , 8) culture, 9) family relationships, and 10) recreation in a broad sense, 11)visiting places to satisfy curiosity, admiring the art and culture or exploring the area visited.

Public transportation is indicated by people mobility. It can be measured by people’s movement ability. The movements of goods usually follow the movement of passengers, population growth and density, as well as the economy of a region.The purpose of transportation is to provide access to transportation services and facilities, such as ports and ships (cruise, sailing ship, boat, etc). Therefore, it can be explained that transportation activity is the moving people, goods, services and information from one place to the other place.

Fulfilling the mobilization needs of these areas is very challenging. Both local and central government still have many tasks to be carried out in order to ideally develop the relationship between needs, wants and activities as shown in Figure 2.

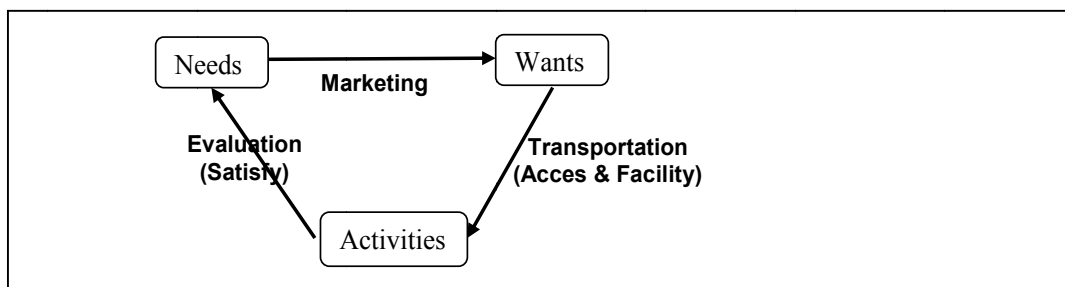


Figure 2. Relationship between needs, wants and activities

**3. Issue Related to Existing Harbor Infrastructure**

The following will identify the issues in the maritime transportation sector of small islands in Bali in terms of institutions, infrastructure and sea transportation networks and services.

Nusa Penida, Nusa Lembongan and Nusa Ceningan islands are experiencing several problems related to the economic and social development. The island group has several characteristics that make it very special, such as a

relatively small population, the community spread in many islands, economic dependence on agriculture and fisheries, and the limited industry or trade opportunities. All of these characteristics are though and permanent challenge for the transportation sector, such as high transportation costs and seasonal transportation demand which cause fluctuating and limited incomes. On the other hand, this island group has potency for tourism transportation, due to the attraction of exotic natural beauty.

The maritime infrastructure inventory consists of Padang Bai Port in Karangasem regency and Sanur Port in Denpasar city. Padang Bai Port serves ro-ro vessel Nusa Jaya Abadi which is a cruise that operated in 2006 and Sanur Port in Denpasar city which served a traditional canoe with outboard engine which has power of about 120 PK, speed boat with a force of up to 1000 PK and capacities ranging from 2 to 6 GT. These cruises are mostly owned by the local communities (private). Table 1 shows services in Sanur Port.

Table 1. Loading/Unloading in Sanur Port

No	YEAR	BOAT				LOADING/UNLOADING						BOARDING			
		LOCAL		TOURISM		SEA WED	MOTOR CYCLE	ANIMAL	PASSENGER		SEA WED	MOTO RCYCL	ANIMAL	PASSENGER	
		ARRIVED	DEPART	ARRIVED	DEPART				LOCAL	TOURISM				LOCAL	TOURISM
1	2011	1,090	1,089	1,397	1,397	-	198	2,100	24,271	37,767	-	231	-	22,414	41,556
2	2012	2,446	2,447	1,264	1,263	-	61	2,120	42,347	33,598	-	131	-	44,817	40,799
3	2013	2,787	2,787	1,248	1,248	-	96	1,060	47,535	35,181	-	191	-	58,685	44,973

Source: Syahbandar Sanur, 2014

None of these boats uses dock because the economic benefit has not existed. Moreover, the results expected by using dock are not enough to cover the actual costs because of inadequate funding for operation and maintenance. In fact, lack of the dock will hinder the provision of services and create security risks and a reduction in the accessibility and user productivity.

Others classic problem are many local boat services in Indonesia are overloaded ship, ineffective safety regulations, and poor compliance to international obligations, weak environmental management, inadequate hydrographic charts and aids to navigation, and limited search and rescue capacity. Most shipping operators do not prioritize safety measures due to a lack of safety awareness.

Currently, the ports which provide shipping to Nusa Penida, Nusa Lembongan and Nusa Ceningan islands are Banjar Bias and Banjar Tribuana in Klungkung; Sanur and Benoa which provide cruise service in Denpasar city; and Padang Bai which provide ro-ro service in Karangasem region. Meanwhile, there is only one port that provides ro-ro service in such islands which is located in Mentigi, and the rest is still traditional ports such as Toya Pakeh, Buyuk and Banjar Nyuh (Budiarta, 2011).

Low efficiency in some collection and distribution nodes has also caused high cost and operating time of transportation systems. Distance and low demand for passenger and cargo are constraints for commercially feasible shipping services to some isolated destinations. Remote communities lack reliable maritime services among the poorest areas of cluster islands. As the remote areas which have small populations, regular shipping services to those locations are commonly economically unviable and vice versa. This has affected the performance and mobility of that service and will also affect its service capacity. Table 2 shows that there is a difference for transportation and administration costs from its origin to shipping harbors.

Table 2. The total estimation of transportation cost to the value of goods (million rupiah)

	Estimate		Presentence of Transportation Cost to the Value of Goods
	Transportation Cost of Goods	Value of Goods	
	Nusa Penida	56	
Nusa	64	190	33.68
Lembongan	40	83	48
Nusa Ceningan			

Table 3 shows the port option to cross over to the island group and vice versa. Rates are valid for domestic users. Discrimination imposed tariffs for domestic users and tourism due to differences such as shuttle service to the hotel and other services.

Table 3. Price for each destination

<i>Departure</i>	<i>Destination</i>	<i>Moda</i>	<i>Price</i>	<i>Travel Time</i>
<i>Padang Bay Harbor</i>	<i>Mentigi Harbor</i>	<i>Roro</i>	$\pm$ Rp.29,000	$\pm$ 60 minutes
<i>Padang Bay Harbor</i>	<i>Buyuk Harbor</i>	<i>Fast Boat</i>	$\pm$ Rp.45,000	$\pm$ 30 minutes
<i>Padang Bay Harbor</i>	<i>Buyuk Harbor</i>	<i>Boat</i>	$\pm$ Rp.40,000	$\pm$ 40 minutes
<i>Tri Buana Harbor</i>	<i>Mentigi Harbor</i>	<i>Boat</i>	$\pm$ Rp.40,000	$\pm$ 60 minutes
<i>Banjar Bias Harbor</i>	<i>Buyuk Harbor</i>	<i>Boat</i>	$\pm$ Rp.40,000	$\pm$ 60 minutes
<i>Kusamba Harbor</i>	<i>Sampalan Harbor</i>	<i>Boat</i>	$\pm$ Rp.40,000	$\pm$ 60 minutes
<i>KusambaHarbo</i>	<i>ToyaPakeh Harbor</i>	<i>Boat</i>	$\pm$ Rp.40,000	$\pm$ 60 minutes
<i>Sanur Harbor</i>	<i>BanjarNyuh Harbor</i>	<i>Express Fast Boat</i>	$\pm$ Rp. 80,000	$\pm$ 30 minutes
<i>Sanur Harbor</i>	<i>Buyuk Harbor</i>	<i>Express Fast Boat</i>	$\pm$ Rp. 80,000	$\pm$ 30 minutes
<i>Sanur Harbor</i>	<i>JungutBatu Harbor</i>	<i>Express Fast Boat</i>	$\pm$ Rp. 80,000	$\pm$ 30 minutes
<i>Sanur Harbor</i>	<i>Lembongan Harbor</i>	<i>Express Fast Boat</i>	$\pm$ Rp. 80,000	$\pm$ 30 minutes

#### 4. Finding and Discussion

In order to strengthen and improve the marine transportation in-depth interview was conducted to obtain the expert and stakeholder opinion in addition to literature review. Based on the issue related to existing harbor in such islands, there are several factors that can strengthen the marine transportation. These factors are strategies and recommendations to improve marine transportation.

##### **Institutional restructuring and support from related institution**

In order to strengthen marine transportation amongst Small Island (Nusa Penida, Nusa Lembongan and Nusa Ceningan) and mainland (Bali), it is essential to provide several aspects namely physical aspects (ships, route, and harbor facilities) and non physical aspects (regulation and policy).

One of the major challenges in marine transportation study for small islands in Bali is to identify the link between transportation and production centers such as tourist areas, residential areas, as well as the degree of dependency between the movement of passengers and intra cluster. A draft marine transportation facility should be capable of serving the growing demand arising from the growth region of the island cluster and can support increased access to the travelers and make waterfront that has appeal and benefit from the financial aspect. This planning approach is needed not only for attractiveness reasons. It is more intended for economic reason. Furthermore, the impact of port existence is not just limited to the port industry itself, but it needs to be seen the degree of dependence of the port on the tourism industry as a whole, which will affect the growth of the regional economy. In the meantime, the private sector is actively investing in managing the company's operations and providing services in the transportation and tourism sectors.

Due to the specific characteristics of the sub region, the private sector cannot successfully reach the target of economic, social and environment or maintain a sustainable development. In order to reduce expenses and improve efficiency of management and operation of the private sector, the government seems irresponsible and is in the process of withdrawing from the implementation of inter-island shipping services. To reduce expenses and improve efficiency of management and operation of the private sector, the government should provide fiscal and industry support. Therefore, development of sustainable fleet will be achieved.



Figure 3. Harbor location

Region, province and central government which have been encouraging the private sector to provide services, need to take actions to facilitate the development of the better and sustainable domestic fleet. Moreover, the government has to encourage and support the private sector in replacement of old vessels, monitoring and facilitating in order to achieve the level of security and convenience in accordance with applicable standards. Consequently, the government has to realize the development of Sanur and Gunaksa harbor which have not been finished in realization process. Figure 3 shows the location of harbor.

### Infrastructure improvement

Potential infrastructure is the most important factor to attract tourists. The first step in determining the feasibility of a site for a marina development is to completely determine the viability of the area. It needs to determine the type and shipping activities and tourism aspects which support the environment and the area around (Daisuke, 2013). It is intended to attract foreign or tourist interest.

While a beach tourism facility is still a novelty for developing countries, it has made it viable to be developed for the port industry. Both cases can be complementary, for instance, the construction of the facilities do not exist, but many attractive tourist facilities such as tourist or trading facilities on marine resort are complementary and mutually beneficial. Provision of facility equipment combinations mentioned above can generate economic sectors and also for infrastructure equity and cost of maintenance (Budiarta, 2015). Ports have always played a strategic role in the growth of domestic and international trade within a country. Therefore, in the era of globalization whereby the tourism sector is becoming the fastest industrial development in the world, tourism port plays an active role in supporting the growth of tourism and economic the growth of a region.

### Maritime transportation network and service

The transportation network is part of the domestic connectivity expected to connect rural communities, urban (cities, counties, and provinces), the centers of economic growth in the islands in the economic corridors.

Inadequate numbers of trips crossing ro-ro vessel cause the goods delivery and services to Nusa Penida becoming expensive. The drivers often can only carry goods twice a month. This is due to the large number of trucks which is reached 130 trucks causing accumulated long queues in Nusa Penida and Goa Lawah area. Extra charge for parking and deposit rates become very high stuff while waiting for their turn. Indirectly, this will impact on the high cost of shipping and operational.

Accessibility is an ability to connect amongst zones, which is realized in the form of inter-zone transportation facilities in a broad sense, including transportation networks, the capacity of the terminal (port), road networks, and network services such as the availability of vehicle or fleet (mode of transportation), the reasonable cost, reliable service, and network route. In addition, the frequency and speed of service can accelerate achieving destination. Improved accessibility can accelerate time and reduce cost of the trip. A tourist destination only has meaning for the area development if such area is accessible. Destinations will form a tourism network. If the transportation network service can support the existence of destination, a tourist attraction in tourist destinations can be promoted.

## Support and Participation of Local Community

The success of the marine transport development in the small islands of Nusa Penida is inherent to the support of local communities. Local communities totally support the development of road transportation which is revealed in the Feasibility Study of Nusa Penida Ring Road (Institute for Research and Community Services Udayana University, 2015). The active participation of local communities appears from the results contained in the socialization of land acquisition study Larap Nusa Penida (Institute for Research and Community Services Udayana University, 2016). The success of the participation of local communities is influenced by (a) the consortium and risk factors; (b) Socio-cultural factors; (c) legal factor; (d) technical factors; (e) economic factors; and (f) the marketing factor (Adnyana, 2015a). Success Model Public-Private-Partnership in infrastructure development of tourism in Bali is largely determined by socio-cultural factors (Adnyana, 2014). Sustainable development of maritime transportation in the area of small islands in Bali from the beginning is the aspect of social culture. Support and Community participation will be reflected in the social and cultural aspects. Nine dominant factors determining the success of Public-Private-Community Partnership (PPCP) on tourism infrastructure development, namely: social and cultural, legal, procurement, risk, consortium, technical, economic, financial, and technology. Strength model of PPCP interests have the accuracy to distinguish groups interest of 58.9%, scattered in the interests strength of the public groups of 56.7% (factors interests priority: legal, technical, and financial), the interests strength of private groups 46.7% (technical, economic and financial) and the interests strength of community groups at 73.3% (social and cultural). Interest priority of PPCP in the development of tourism infrastructure in Bali is determined by the "Community Groups" (Adnyana, 2015b)

## 5. Conclusion

The current port has not been able to accommodate the demand from users. The relation between tourism industry and other sectors has not been considered and realized. The current approach is a "top-down" (from planner to user) while it needs interaction between them. Therefore, there are four factors which need to consider. These factors are strategies and recommendation in strengthening marine transportation namely, (a) support from related institution; (b) infrastructure improvement; (c) availability of maritime transportation network and service; (d) Support and participation local community.

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