



EE489 : Seminar in Industrial Economics

Chao Phraya Express Boat's Safety Improvement Plan

Presents

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Chao Phraya Express Boat's Safety Improvement Plan

Abstract

This research paper concentrates on safety improvement plan in case of Chao Phraya Express Boat. Commuters reviewed that one of the main problems concerning when travel with CPEX is an unsafety of the pier and crowded. In order to solve this problem and prove whether it is worthwhile for company to reconstruct the pier, demand and supply analysis are applied. Demand analysis helps identify the factors that draw passengers to use CPEX service, forecasts demand and analyzes commuters' sensitivity to change in price following the implementation of the improvement plan. Meanwhile, supply analysis determines the cost of investment and reconstruction of the pier. To measure the investment efficiency, Net present value (NPV) and Internal rate of return (IRR) are used to evaluate the attractiveness and to assess the profitability of the project from the Free Cash Flow receiving under 5 possible scenarios. Each scenario represents the difference in growth of revenue per projection year according to the passengers' demand forecast while taking into account the external environment risks that could possibly happen, ranking from worst-case to best-case possible. Altogether, 5-years performance is being calculated. The result shows that the improvement plan should be accepted as it generates positive value in all scenarios under NPV rule and has IRR greater than the minimum cost of capital. Moreover, the majority of respondents were satisfied with our improvement due to an increase in safety and the lessened crowd. Therefore, our improvement plan has high possibility of generating a cash advantage that will exceed the investment cost within the time period and will therefore add value to the company in the future.

1. Introduction

Transportations in Thailand have been continually improved for a decades especially in Bangkok that tons of people prefer to travel by public transportations including buses, BTS sky trains, MRT subways or even and express boats in which decision making depends on several factors affected how individual selects which methods to use. Under traffic congestion, BTS sky trains, MRT subways are also preferable but the price is sometimes not cheap. People have to pay at a higher price to reach faster. However, given limited time and budget, Chao Phraya Express Boat is another best alternative because it cut through several congested roads. Therefore, express boat has been another essential method to travel.

Thailand's geography has benefited to Thai people since our ancestors. Almost 6 regions of the country have river as a part of it so it is obvious that we are familiar with boat in order to travel, trade and transportation. Up until now, Chao Phraya Express Boat (CPEX) that was established by Khunying Supatra provided river transportation service to passengers after she had received a concession right by the Harbor Department since 1971. CPEX calculate fare according to distance and type of service. Even though they have been trying to develop the whole system, there are some problems especially less safety of the pier that unable to solve. Hence, we come up with safety improvement plan to reconstruct a pier to be more safety and analyze whether it is a worthwhile investment for CPEX.

2. Business Background

In September 1971, Chao Phraya Express Boat Co., Ltd. (CPEX) was established by Khunying Supatra Singhulaka after she had received a concession right by the Harbor Department to provide river transportation service to passengers who commute along the Chao Phraya River. Currently, its route starts from Nontaburi Pier in Nontaburi province and ends at

Ratburana Pier in Bangkok, , covering a distance of 21 km. with 38 piers and serves on the average of 35,000 to 40,000 passengers each day. CPEX divided services into five different routes under these two main types, express boat and tourist boat. (See Appendix 1.1 and 1.2)

2.1 Current Pier conditions

Pier structure mainly consists of steel as an essential component in which useful life is over than ten years. (See Appendix 1.3) The interior structure was designed as a room according to size of the pier that each room is covered by manhole allowing machinist to examine the defects and decaying condition. Every pier has wheel attached as a shockproof in order to reduce impact of the boat and each piers has carrying capacity of 60 people. This format would prevent water flow inside and therefore, probability that pier will be sunk remains at very low level. According to vice director general of Marine Department, he accepted that standard of oversea piers in developed countries are far better than Thailand's in terms of facilities and safety.

2.2 Responsibility and Regulation

Currently, Marine Department under the Ministry of Transport of Thailand is responsible for over 84 commercial piers in Bangkok on Chao Phraya river including **every piers** that operate under Chao Phraya Express Boat (CPEX), who received a concession from Marine Department of Thailand, to give commuter boat pool services in the Chao Phraya Bangkok area since 1971.

Hence, the rights to improve or development of the piers belong solely to the Marine Department. In our study, we assume **Build-Operate-Transfer (BOT)** Agreement is made between the two parties where Marine Department grants Chao Phraya Express Boat (CPEX)

the right to develop and operate a facility or system for a certain period (the "Project Period"), in what would otherwise be a public-sector project, then transfer ownership back to the government.

The Marine Department under the Ministry of Transport of Thailand regulations and permit conditions are relevant to construction of the commercial piers and docks and other structures. Therefore, the structure of commercial piers should meet their criteria to guarantee the safety of all the passengers [see Appendix 1.3, 1.4]

2.3 Problem statement

This research paper concentrates on the boat service system in case of Chao Phraya express boat that if CPEX improves facilities in order to solve the problem mentioned in the previous topic, whether it would be more profitable to the company so we plan to study supply analysis, demand analysis and pricing strategy. Therefore, we came up with the following research questions for both the commuters side and the operator (firm) side;

- (1) Given an improvement of safety, if Chao Phraya Express Boat increases the price, how would the commuters react?**
- (2) Is piers safety improvement plan a worthwhile investment for the Chao Phraya Express Boat?**

3. Literature review

3.1 Factors and determinants of public transport demand

The first research paper is *Transformation of Water Transportation in Bangkok from the "Venice of East" towards the "Jungle of Concrete"* (Pawinee Iamtrakul, Waleerat

Thongplu, 2008) It mentioned about CPEX by explaining the characteristics of service based on their distribution and capacity of service. This paper focused on accessibility and attractiveness of CPEX as the main demand determinants for using express boats. Accessibility involves the trip purpose, travel time, and travel distance. The paper stated that majority of the piers provide an inappropriate accessibility. However, water transport service is clearly recognized as sustainable mode of transportation when comparing the average travel speed with road transportation in a vicinity area. Moreover, it states that the improvement of accessibility could attract more number of passengers. Attractiveness involves intangible values as followed; comfort, safety, convenience and landscape. All of which can directly affect the demand for water transportation.

An academic paper of University of Leeds, 2006, *The Demand for Public Transport: The Effects of Fares, Quality of Service, Income and Car Ownership* also mentioned that quality of service affects the demand forecasting. Quality of service attributes to service interval and in-vehicle time, safety, reliability. Demand also depends on time whether it is peak or off-peak. This paper is mainly used revealed preference method (RP) based on actual behavior to illustrate aggregate price elasticities. Not only does the quality of service affect demand, the fare rate also does. An increase in fare rate results in a decrease in quantity demanded. The authors had expressed through elasticity of demand which was found out it was low. Therefore, an increase in fare might increase revenue. The authors also states that income and car ownership were related to use of public transport. When income rises, people could travel more, but whether they will use public transportation depended on the level of car availability.

According to *Transit Elasticities and Price Elasticities Victoria Transport Policy Institute* (Todd Litman, 2004) mentioned that user type is one of the factors affecting transit elasticities. Transit dependent riders such as low incomes people, non-drivers, high school students, and elderly people are normally less price sensitive and tend to be transit dependent riders than choice riders (people who have other transport alternatives for that trip). This paper also support the article mention above that an increase in fare might increase the revenue since transit dependent riders are less sensitive to change in price.

In order to improve transportation system, the paper *Improving bus service Modes investments to increase transit ridership* (Transport Canada, 2012) provides the strategy to help transportation planners who seek to manage transportation demand by improving the quality of public transportation system. One of strategies mentioned is always based on increasing convenience, affordability and on other aspects of passenger's experience that influence feeling of safety, trust and ease-of-use.

Not only the safety of transport itself affects passengers demand, facilities and its components provided also matters. As mentioned in *Transport for Sustainable Development: The case of inland transport* (United Nation, 2015) at the global level, overall development of transport safety is sluggish while the need for safety in transport is increasing. The development in safety and security have a huge impact on increasing demand for public transportation. Therefore, UN and member states have been trying to improve overall safety system since it is important for economic and social development of all countries.

3.2 Market Structure

In Bangkok, several types of public transports such as bus, taxi, BTS, MTR and express boat have been continually competed to provide service and satisfy passenger's need. In

economics aspect, this competition can be classified into a perfect competition market structure since it is matched with some of market structure characteristics mentioned in *Market structure differences and pricing strategies* (Blackburn, 2012) that all firms in a particular industry sell a homogenous product. For this case, the product is moving from one place to another. Consumers know the nature of the product being sold and the price charged by each firm. The output that each firm can provide is small relative to total output of the industry such that the firm is a price taker and the change in their output does not have significant effect on the market price of the product.

Nevertheless, along Chao Phraya River the only public transport provider belongs to CPEX that can be explained in economics term as a monopolist since it is matched with some characteristic of monopoly market structure. In *Capitalism Power, Profits, and Human Flourishing* (Eric A. Nilsson, 2004) mentioned about monopoly industry that there is only one seller in the market with very high barrier to entry and no close substitute for its product in the same industry.

Even though CPEX takes control over public transport along Chao Phraya River and it is considered to be a monopolist in express boat service, commuters remain have other alternatives to move from one place to another. Therefore, CPEX is one of public transports modes in competitive market.

3.3 Law and regulations

We need to study the law that allow CPEX to achieve the plan since the right to improve pier solely belonging to MD. Build Operate Transfer (BOT) agreement would be the most suitable method between CPEX and MD. As mentioned in *Build, Operate and Transfer (BOT) Project Delivery System in Saudi Arabia (Thesis)* (Sameer Al-Mubarak, 2003) It is a

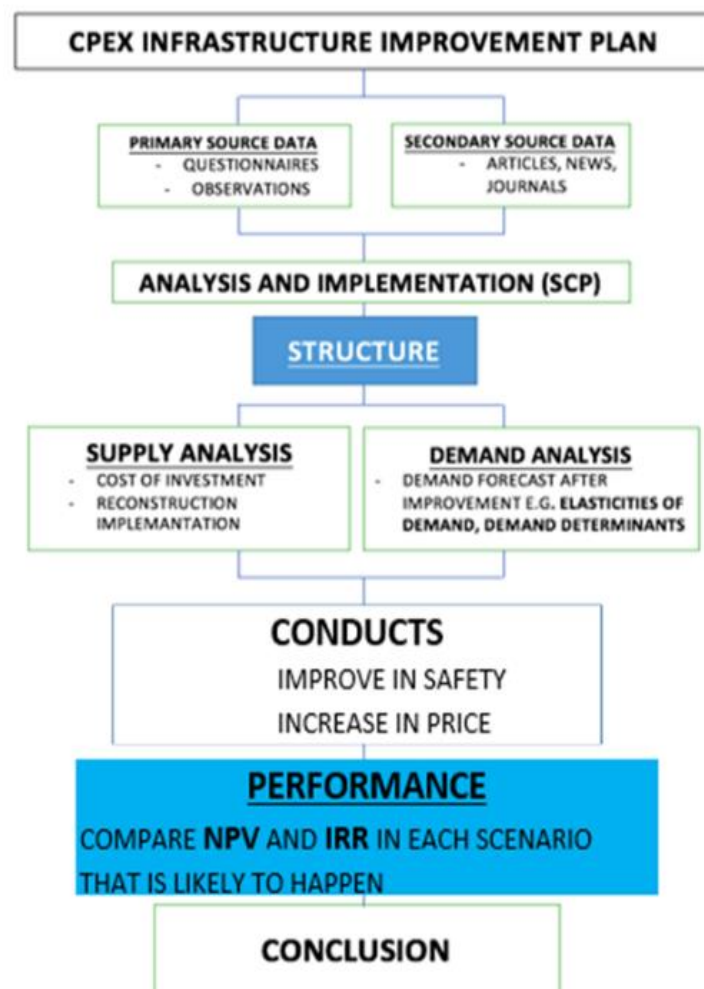
type of arrangement that private sector builds an infrastructure project and take responsible for all financing, construction and operation for a period of time and at the end of period, private sector will transfer ownership of the facility to host government.

According to *BOT, BTO, BOO, BOOT, BOOST, and BRT* in the column *From Tha phra chan to Sanam luang* (Rangsan Thanapornpan, 1993) mentioned about the benefits of BOT. For instance, it helps reduce financial limitation of the governments and transfer economic role to privatization. Also, benefits to the concessionaire in term of employment and income distribution. Moreover, World Bank and its teams become financial sources to provide loan facilities since BOT agreement corresponds with Liberalism economics system.

4. Methodology

To answer our research questions recently mentioned above, the following methodology and conceptual framework will be applied:

4.1. Conceptual Framework



4.2. Type of Data and Data collection technique

This research would employ both primary and secondary source data using qualitative and quantitative method of research.

4.2.1. Primary Source data

o Questionnaires

For the major part of our primary sources, the surveys and questionnaires will be conducted in order to get the regular and non-regular commuters of Chaophraya Express Boat's opinions. The questionnaires will be processed through physical handling and via online form.

Objective: To learn what factors draw passengers to use CPEX service and to see their response to the change in fare price given the improvement of safety.

Sample size: Total of 320 respondents from Bangkok Metropolitan area.

Sampling Technique: *Stratified* random sampling technique was used in this study. Since we will have to divide the respondents into groups according to their commute behavior i.e. **(1) User**, the frequent commuter of Chaophraya Express Boat and **(2) Non-user**. The participants in group (1) will be randomly selected from the people who had just boarded the CPEX from the busiest piers e.g. Sathorn (Taksin), Wang Lang, Rachawongse and from the less-crowded piers e.g. Rajinee, Payap, Wat Khema. And respondents will be randomly selected in the popular destination located within the close reach of the CPEX piers for both (1) and (2) groups. Some, will be randomly handling an online form. Both groups will be randomly selected under no other specified conditions.

Approaching Questions: The questions will be conducted in Thai to minimize misunderstandings since the targets are native Thai. We will carry out the same questionnaires use for both groups which will be mainly sectioned into four main parts: personal information,

commute behavior, opinion on the piers facilities and their price sensitivity. (See the questionnaire in appendix 2.1).

o Observation

We will travel to the major busiest piers and the less-crowded piers to observe and to interact with the commuter of the Chao Phraya Boat Express' on the facilities and safety in each of its pier to identify the problem and what needs to be improve for the commuters to have a safe and pleasant journey.

After that, a descriptive analysis would be used as data analysis approach of the price sensitivity of the respondents in the first place and to help us determine the new fare price later in the study. And then, the qualitative analysis will seek to identify the satisfying piers facilities & safety improvement according to the respondents and the answer from the surveys will be used for the Demand analysis.

4.2.2 Secondary Source Data

To get the most accurate result, the secondary data source is needed. The related research, journal and articles including news and information on Chao Phraya Express Boats will be used in the analysis too. The research will use an available data collected to examine (1) the fares tickets and price information of the boat services, and (2) the cost structure of the piers construction cost and infrastructure to be used further in the demand & supply analysis along with the assumption of our infrastructure reconstruction plan to determine the appropriate market price (market equilibrium) and (3) the price elasticity of demand. Then, the descriptive analysis will be conducted pass through the economic theory; Market equilibrium and Price Elasticities of Demand as it has been written in a theoretical framework. The secondary sources

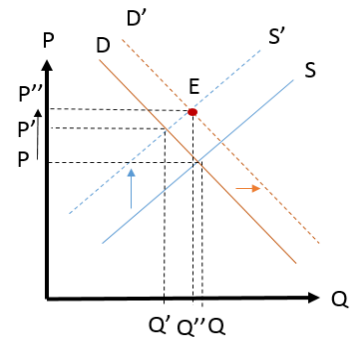
will help us understand the concept of price elasticity of demand of CPEX passengers rather than calculating for price elasticity due to limited time and resources. Also, the structure of this paper will follow SCP Framework to help scope the idea of our study.

5. Theoretical Framework

Market Equilibrium

Given that CPEX plays in competitive market since there are other modes of transportation to substitutes. An investment leads to a higher fixed cost assuming other cost constant, supply curve shifts upward from S to S' , quantity decreases from Q to Q' , price increases from P to P' leading to a reduction in quantity demanded, other things constant.

Figure 1) Market equilibrium after an investment in safety



Source: Author's own compilation

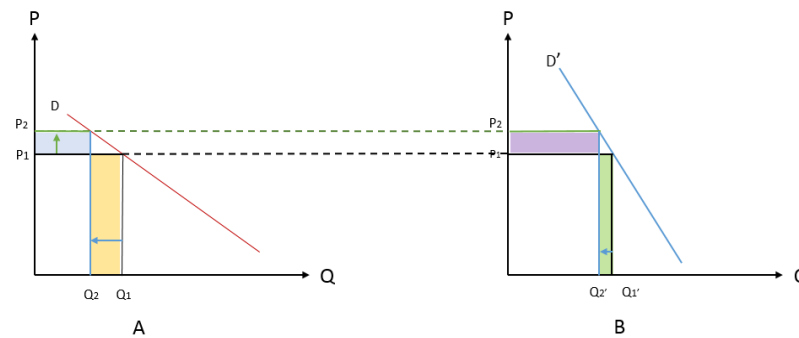
However, at a global level, one of essential factors that would have an impact on demand for public transportation of passengers is safety and security of transport itself and other facilities provided. The higher level of safety and security, the higher demand for each public transportation as commuters experience the feeling of safety, trust and ease-of-use. An increase in demand can be illustrated by a shift in demand curve to the right from D to D' , quantity increases from Q' to Q'' , price increase from P' to P'' , other things constant. New equilibrium is at point E at P'' and Q'' . However, the change in quantity depends on the magnitude of the shift.

Price Elasticity of Demand

Price elasticities indicates the sensitivity of consumer towards the change in price of the product. Different elasticity has different responsiveness. Elasticity is the steepness of demand curve. A steeper demand curve reflect a lower elasticity and a flatter demand curve reflect a higher elasticity. An equal increase in price (as shown in graph A and B), given

different steepness of demand curve, gives different decrease in quantity demanded. The flatter demand curve has greater reduction in quantity demanded than the steeper has. Therefore, the more elasticity of demand curve, the greater change of quantity demanded. (Todd Litman, 2013)

Figure 2.) Price Elasticity of demand



Source: Author's own compilation

Considering the area under the demand curve, since the area under the demand curve is $P \times Q$ which is the revenue. For graph A, an increase in price leads to a greater reduction in revenue than an increase in revenue to the company. For graph B, an increase in price contributes to a greater increase in revenue than the reduction in revenue from losing some customers. Therefore, for a lower elasticity of demand, company tends to have more revenue when increasing the price. Price elasticity values are negative but here will use absolute term to see only the degree to which demand is elasticity or inelasticity.

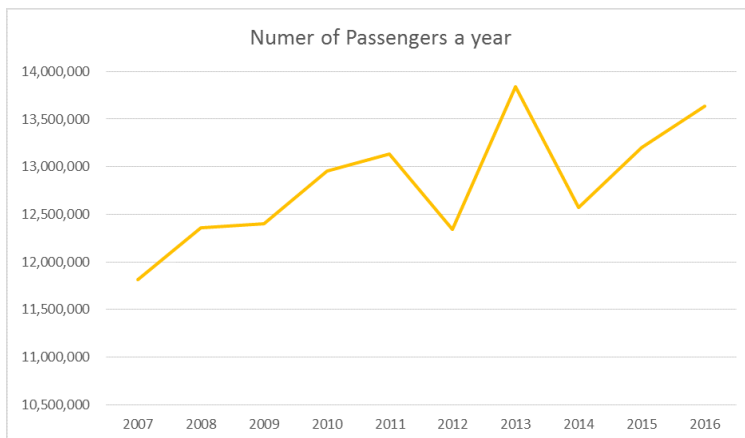
6. Analysis and Findings

6.1 Structure

6.1.1 Demand Analysis

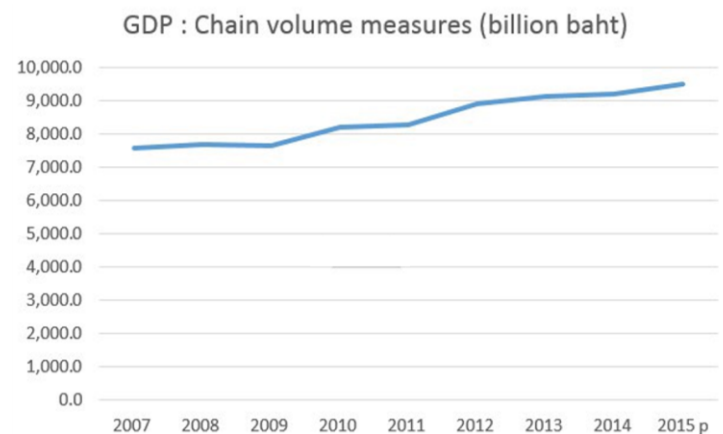
Throughout the decade, CPEX had an increasing number of passengers. Despite the year of Thailand's political protest in 2010 and severe flooding in 2011, number of passengers increased again in 2012 after recovering from the flood and the minimum wage raised up to 300 baht. However, number of customers dropped by around 9% in 2013 due to Anti-government protest. In 2014-2015, government announced policies to stimulate consumption and CPEX decreased fare rate by averagely 1 baht, so number of passenger increased by 5% but this might be because include the end of the political situation. In 2016, higher investment and tourism expansion helped increase employment. So, number of passenger increased by around 3%. It can be seen that number of passengers goes in the same direction with GDP as shown below.

Figure 3: Number of passenger a year in 2007-2016



*Source: Author's own compilation
from Marine Department*

Figure 4: GDP volume measures (Billion Baht)



*Source: Author's own compilation
from Bank of Thailand*

Government has been trying to increase credibility through short-term economic stimulation policies by using the investment in large infrastructure project as an economics driver to improve the overall system and be able to increase employment. Moreover, according

to TAT, tourism in Thailand will be continually increasing due to popularity among Chinese and will become the second top countries that visitors come to travel. Therefore, our pier safety improvement plan will benefit from both economics and tourism aspects that people will travel more when their income increases. Also, from traveler who would commute along Chao Phraya River. However, political instability remains questionable and it might affect CPEX same as the past years so the number of passenger might drop again since they are unable to travel because of political crisis.

To answer the research question, there are more than just safety and price that passengers take into consideration. It depends on individual's sensitivity towards the change which varies in different situation.

From the survey, 33% of the passengers have income less than 15,000 Baht and followed by passengers who have income in the range of 15,000-25,000 Baht which is 32%. And only 11% of them who have income greater than 40,000 Baht. (See appendix 2.2) This can imply that people who have low income tend to rely more on public transportation and become less sensitive to change relative to higher income people. (Todd Litman, 2004) However, factors affecting the demand for Chao Phraya Express Boat can be mainly divided into two main types. Firstly, Chao Phraya Express Boat accessibility which involves the trip purpose, origin-destination, travel time, and travel distance (Pawinee Iamtrakul, Waleerat Thongplu, 2008) which can support the survey in part of factors affecting travel decision (See appendix 2.3) Passengers concern travel time by 89% of total respondents. They choose this mode of transportation because it best saves their time of travelling. In part of factors affecting the demand for travelling and reasons why taking CPEX, 89.4% and 86.4% (See appendix 2.3) of passengers said that it saves time the most. Not only from the survey, but also from the

annual report fiscal year 2016 of Marine Department (See appendix 3) indicating that passengers will use this service a lot in the morning and in the evening. Therefore, in the peak time, passengers will be less sensitive relative to the off-peak time of travelling. (Todd Litman, 2004).

In term of origin-destination, 76.2% use it because it is near to their home or in other words, it suits their location used. (See appendix 2.3)

In term of trip purpose, 84.6 % and 77.4% of passengers take the boat to work or study and to transit to other mode of transportation. And 54% and 50% of them take the boat because of shopping and travelling respectively. (See appendix 2.5) It can be seen that for high value trip such as work and study, passengers tend to rely more on this mode, vice versa. It is because, as mentioned, it saves the time. Therefore, Todd Litman (2004) can support this that people will be less sensitive to high value trip, and more sensitive to low value trip.

Second, attractiveness involves intangible values as followed; comfort, safety, convenience and landscape. From the survey, in part of factors affected travel decision (See appendix 2.3), 83 % of passenger concern convenience and 75.4% concern on safety. In part of problems found during the operation, 82.4% of passenger of think that it comes from crowded boat. (See appendix 2.6) And in term of comfort, this can include the service of staff, payment method and seat. Crowded people is the biggest problem. However, staff service is poor as well stated by 67.4% of passengers. Moreover, 58.8% of them think that method of payment is unorganized that passengers can both buy the ticket both before taking the boat and when taking the boat. (See appendix 2.6)

However, safety is ranked as the lower position for the passengers' reason to take CPEX (See Appendix 2.4) but if looking at the problem, safety and crowded boat are the concerning

point of passengers (See Appendix 2.6) Moreover, safety is the basic need of human as stated in Marslow's hierarchy of needs. Therefore, CPEX should not avoid to improve safety.

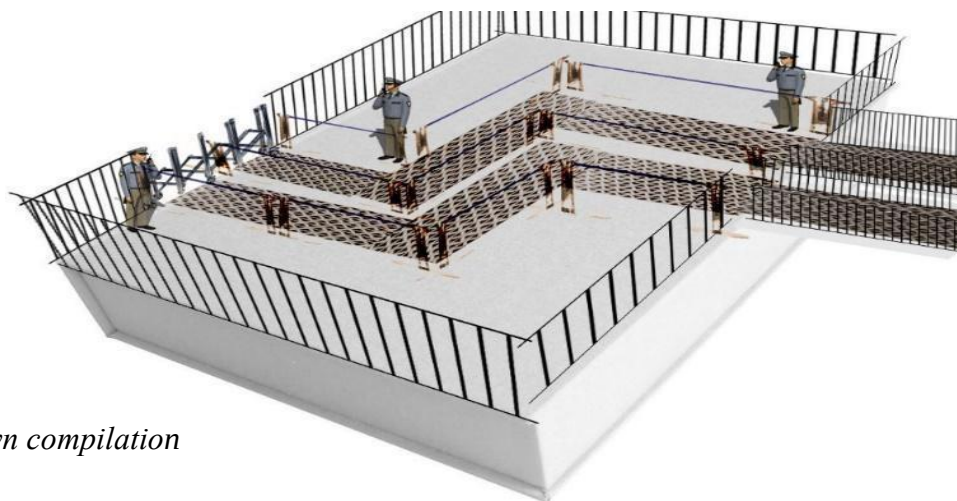
6.1.2 Supply Analysis

Assuming this is a build-operate-transfer, therefore, an investment in infrastructure causes the price to rise up as described in theory framework, other cost constant.

Cost of Investment details

Since floating piers has been built since long time ago. The company will build all new piers for more safety with new different model. The old model has no fence in the front of pier and wide space that passengers can pass through. Also, the floor is slippery. Moreover, there are many passengers in each pier. When the boat comes, passengers will glue standing side by side at the front of the pier they will get into the boat chaotically. (See appendix 4) The new model will add the fence at the front of the pier to prevent people from falling into the water. And the company will put the more protective fence that there will be small space that people cannot pass through. Moreover, the company will put the carpet to prevent passengers from sliding. Also, there will be the line to shape passenger to stay in line when getting into the boat.

Figure 5.) Author 2017. *The model of new pier*



Source: Author's own compilation

Table 1). The summary of cost

Cost of Reconstruction					
No.	item	cost/unit	unit	pier	cost
1	Floating Pier 5x10 m.	1,400,000	2	38	106400000
2	Fence 7.5 m	30,000	1	8	240000
3	Posts	10,000	2	8	160000
4	Slide Protection rubber	5,000	1	8	40000
5	Training	200,000	1	1	200000
total					107040000

note 1. The price of floating pier construction is from the information of Engineering section, Marine Department
 2. Assuming the operation cost the same due to an over supply of labor in each pier.
 3. Training for new style of pier

Source: Author's own compilation

6.2 Conduct

6.2.1 Increase Safety by building new pier and other security support stuffs.

6.2.2 Increase the service fare.

According that almost 60% of the respondents are willing to pay for an increase in fare rate by 10%-20% at the maximal. (See appendix 7) Before increasing, the weighted average price is 15.51 Baht each. After investment, the price will be increased by 2 Baht, therefore, the new price will be weighted averagely 17.51 Baht each.

6.2.3. Demand forecast on growth of Revenue for Scenario Analysis

According to the variation in passengers' responses, we assumed the reaction from passengers for the proposed improvement project to be separated into 5 scenarios. Each scenario represents the difference in growth of revenue per projection year according to the passengers' demand forecast while taking into account the external environment risks that could possibly happen, ranking from worst-case to best-case possible.

The timeframe to measure the performance of the improvement project on revenue of the company (using NPV and IRR evaluation technique) is equal to 5 years which is the appropriate time period for the return on an investment to repay the total initial investment cost (see 6.3. Performance). In this case, we assume the implementation of the project started in this year of the study (2017) and the performance measured last until year 2021, in which;

- 1.) 1st projection year (2017) is the year of construction
- 2.) 2nd projection year (2018) will have an election that might lead to political unrest
- 3.) 3rd projection year (2019) is an aftershock from political unrest and the situation is getting normal
- 4.) 4th projection year (2020) and 5th projection year (2021) are the foresight future that we assume the average performance

The following Table 1.) shows Timeline Assumption on performance of the company under each scenario;

Table 1. Timeline Assumption on performance in each scenario

Case	2017 - First Year of Construction	2018 - Year of Thailand Election	2019 - After Shock Effect	2020-Normal Situation	2021-Normal Situation
1.Worst	-0.48% Passengers are sensitive to an increase in price and indifferent to an improved safety, there is inconvenient in construction	-7.74% Passengers are half less sensitive to an increased price but indifferent to safety, political unrest	-0.7% After shock restoration, tourists reduce a lot due to a doubtfulness in political situation	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks
2.Bad	0.72% Passenger are less sensitive to an increasing price and indifferent to an improved safety, there is inconvenient in construction	-2.64% Passengers are half less sensitive to an increased price than the first year but indifferent to safety, political unrest	1% After shock restoration, tourists reduce half less than the first case due to a doubtfulness in political situation	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks
3.Normal	3% Passengers do not response to any changes	2.5% People are affected by the election slightly, tourists are slightly beware of Thai political situation.	3% The restoration brings the growth back to be as past average performance.	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks
4.Good	4.5% Passengers are indifferent to an increasing price. Safety attracts more use of both existing users and non-users.	3.5% People are not affected by the election slightly, tourists are slightly beware of Thai political situation.	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks
5.Best	5% Passengers are indifferent to an increasing price. Safety attracts much more use of both existing users and non-users.	4.3% People are affected by the election slightly, tourists are slightly beware of Thai political situation.	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks	3% Past average performance of the company regardless of shocks

According to our assumption, the most-likely-to-happen scenario is the ‘Good-case’ scenario which its elasticity of demand with respect to price is absolutely below 1 which implies inelasticity (Mayeres, 2000) Therefore, passengers seem to be insensitive to price change. Also, safety is important that everyone needs. Therefore, this can convince new users to use more CPEX. Therefore, good case most likely to happens after the improvement of the plan.

6.3 Performance

Result and Interpretation

Following the cost of investment analysis in the previous section. This section is going to determine whether Chao Phraya Express Boat (CPEX) should or should not make an investment decision. The methodology is to determine total investment cost use to reconstruct, and find the Operating revenue receiving each year to calculate for the Free Cash Flow during the projected period which will be use for the calculation of the Net Present Value of the project to ensure whether CPEX should accept the project if it yields positive NPV, and reject if the NPV is negative as it will incur loss. Moreover, the (Internal Rate of Return) IRR method is also used to evaluate the attractiveness of a project. If the IRR of a new project exceeds a company’s required rate of return, that project is desirable. The NPV and the IRR are the most used indicators for measuring the investments efficiency in the feasibility studies.

Given an improvement of safety, if Chao Phraya Express Boat increases the price to 17.51 Baht, according to the previous section of our study, we had come up with 5 main scenarios of how the outcome of the passengers will likely be, instead of relying on a single scenario. In the next following step, NPV and IRR analysis will be performed under several

scenarios to provide a plausible idea of what might happen and to evaluate an investment decision.

First, we calculate for the value of free cash flow generates from the company. As shown in Appendix 7.) on 'EBIT and FCF Table' shows the Free Cash Flow (FECF) Calculation from the Operating Revenue receiving in each year under a range of scenarios, from worst to best case scenario. This is the cash flow a new reconstruction project would generates (Operating Revenue) calculated from the number of passengers in the previous year (2016) multiplied by the new fare price (17.51 Baht) minus other operation and other financial costs.

Under every scenario, in order to forecast a projected cash flow in each year period, an assumption for growth rates or changes in revenues & expenses and other financial costs has been made in regards to company's historical performance as explained in Appendix 6.) For the project timeframe, we use the Payback Method to determine the project period, which is equal to 5 years for the return on an investment to repay the total initial investment cost. The sole purpose of these assumptions is to see the effect from an increase in fare price on revenue to the firm given the safety and infrastructure improvement.

According to the Table 1.) Worst-case scenario, 2.) Bad-case Scenario, 3.) Normal-case scenario, 4.) Good-case scenario and 5.) Best-case scenario. The result shows positive Cash Flow under every scenario ranking from roughly 30 million (Worst-case scenario) Baht to 41 million Baht (Best-case scenario). This mean that the improvement plan generates a positive net worth and cash balances during the projection period. However, from the entrepreneur point of view, a positive cash-flow of an investment is by far not enough reason for investing. The positive cash flow result alone cannot define that the project will be profitable to the company.

This is when NPV and IRR Analysis comes to the importance in which it will be done in the next step.

Table 2.) NPV and IRR Yield Comparison

Cases	1) Worst-case scenario	2) Bad-case scenario	3) Normal-case scenario	4) Good-case scenario	5) Best-case scenario
Initial Investment	-107,040,000	-107,040,000	-107,040,000	-107,040,000	-107,040,000
Projected Cash Flow					
Year 1 (2017)	฿34,607,931	฿35,016,624	฿35,793,142	฿36,304,009	฿36,474,298
Year 2 (2018)	฿31,984,509	฿34,111,024	฿36,670,131	฿37,549,674	฿38,012,008
Year 3 (2019)	฿31,765,613	฿34,444,999	฿37,748,827	฿38,654,756	฿39,130,961
Year 4 (2020)	฿32,697,173	฿35,456,941	฿38,859,884	฿39,792,991	฿40,283,482
Year 5 (2021)	฿33,656,681	฿36,499,241	฿40,004,272	฿40,965,372	฿41,470,578
Total Projected Cash Flow	฿ 164,711,907	฿ 175,528,829	฿ 189,076,255	฿ 193,266,802	฿ 195,371,327
NPV (at 13%)	฿ 8,971,500	฿ 16,090,942	฿ 25,061,480	฿ 27,924,179	฿ 29,342,019
IRR (at 13%)	16.4%	19.0%	22.0%	23.0%	23.5%

Note: Data calculation from Appendix 7.)

The table 2.) shows the calculation for the NPV including the NPV yield and IRR result comparing between scenarios. The Total projected cash flow from each scenario is calculated from the total of cash flow company receiving per year, together with the initial investment cost, The NPV is calculated using Discounted Cash Flow technique. Upon coming up with the NPV, we assume the worst-case possible of the discount rate for calculation to be equal to 13 percent which is the highest rate for normal consumer loan (MRR + 5) from most commercial banks in Thailand. (see Conclusion)

Calculation result is shown in the table above. The normal, base-case generates NPV at (13% discount rate) of 25 million baht compared to the best-case scenario that generates extra of roughly 4 million baht (29 million Baht) whilst the worst-case scenario gives the lowest

NPV of roughly 9 million baht, which is over 17 million baht difference, lower operating revenues and relatively higher cost of investment than the any other cases.

However, the improvement plan generates positive NPV outcome in all scenarios. Even under the worst condition of over 9% decrease in a number of passengers, the NPV up to 5 years' period of cash flows is still positive and enough to cover the cost of investment. Although, NPV result may positive but we have a little concern on its value that is not as high as we expected but according to the investors' view, NPV is a measure of wealth creation relative to the discount rate, hence, an absolute value of NPV does not indicate that it will be the "exact value" that company will generate, we are optimist that the real result might reach at higher level that predicted.

Furthermore, using the same calculation technique as NPV, the IRR result from every scenario are higher than 16% which exceeds the discount rate of 13%, given the IRR from the worst-case scenario that is equal to 16.4%, from a financial standpoint, this project will generate at least 16.4% return for the company higher than the 13% return available from other investments. An IRR that is higher than the cost of capital indicates that the sum of post-investment cash flows is more than the initial investment.

7. Conclusion

According to the result given by NPV and IRR investment evaluation criteria, the proposed improvement plan should be accepted because 1.) Under the Net Present Value rule theory, the project generates positive value in all scenarios 2.) Under the Internal Rate of Return rule, the project generates IRR that is greater than the minimum cost of capital (discount rate) 3.) Even under the worst-case scenario, the project still provides NPV and IRR that meets the acceptable criteria.

Moreover, according to the surveys, safety and crowd management are among the highest concerns by the respondents when using CPEX service. We found that majority of the respondents were satisfied with our improvement plan because of the increase in safety and lessened crowd. However, if the fare price was to increase by 10-20% (17.51 Baht), the passengers responsive are varies. But within appropriate time frame, the passengers is expected to return to use the service and increase in the near-future (partially from the trust gained from non-regular users). Furthermore, according to previous sections regarding the demand forecast, the scenario with the highest probability to happen in the reality is the Good-case scenario. We are optimistic that the safety improvement plan would attract more passengers to use the service.

With these underlying reasons, our proposed piers safety improvement plan proves to be a worthwhile investment for Chao Phraya Express Boat (CPEX) regardless of any circumstances that can happen in the future as predicted by our study e.g. political turbulence, economic instability or the change in behavior of the passengers due to the increase in fare price. Therefore, our proposed plan has high possibility of generating cash benefit that will exceed the cost of the investment within the projected time period and will therefore add value to the company in the future.

8. Limitation and Recommendation

8.1 Limitation

According to one of methodologies applied in the research related with demand and supply analysis, however, most of company information is limited. Therefore, we are unable to directly observe price sensitivity of passengers, forecast growth revenue, and calculate IRR as well as NPV accuracy. So, we need to refer data from secondary sources but they are less corresponding with Thai current situation. Possibly with CPEX along with the

Marine Department, Ministry of Transportation constraints on their engineering and development team for the development of more sophisticated piers. Also, the current piers model that we proposed is the current model using by the Marine Department Engineering Team, they have no comment on any development plan in the near future and we ourselves lack of specific knowledge and understanding on the nature of water transportation, number of passengers, and Chao Phraya River's water condition and environment. Hence, we cannot propose a whole-new developed piers model that are more innovative and appropriate piers model in this study. Furthermore, the piers and harbors controlled are not directly under CPEX operation so we cannot improve pier without Marine Department permission. In doing so, it is necessary to create Build-operate-transfer agreement with MD in order to develop the piers in which CPEX will responsible for all the construction cost. However, in practical, Build-operate-transfer contract might not exist as we assume and the person who bear the cost might not be CPEX neither.

8.2 Recommendation

The results and analysis mentioned in this research might not be completely accurate and cover all aspects. So, CPEX and The Marine Department need to improve other issues by themselves as well. These are the recommendations that we would like to suggest;

1). The Marine Department should hire expertise or external technician in water transportation to help develop the whole system.

2). CPEX might need to evaluate staff performance and offer annual training in order to serve passengers more effectively.

3). Both CPEX and The Marine Department should disclose more information publicly to increase confidence of commuters

Appendix 1.) Basic information

1.1) Route map

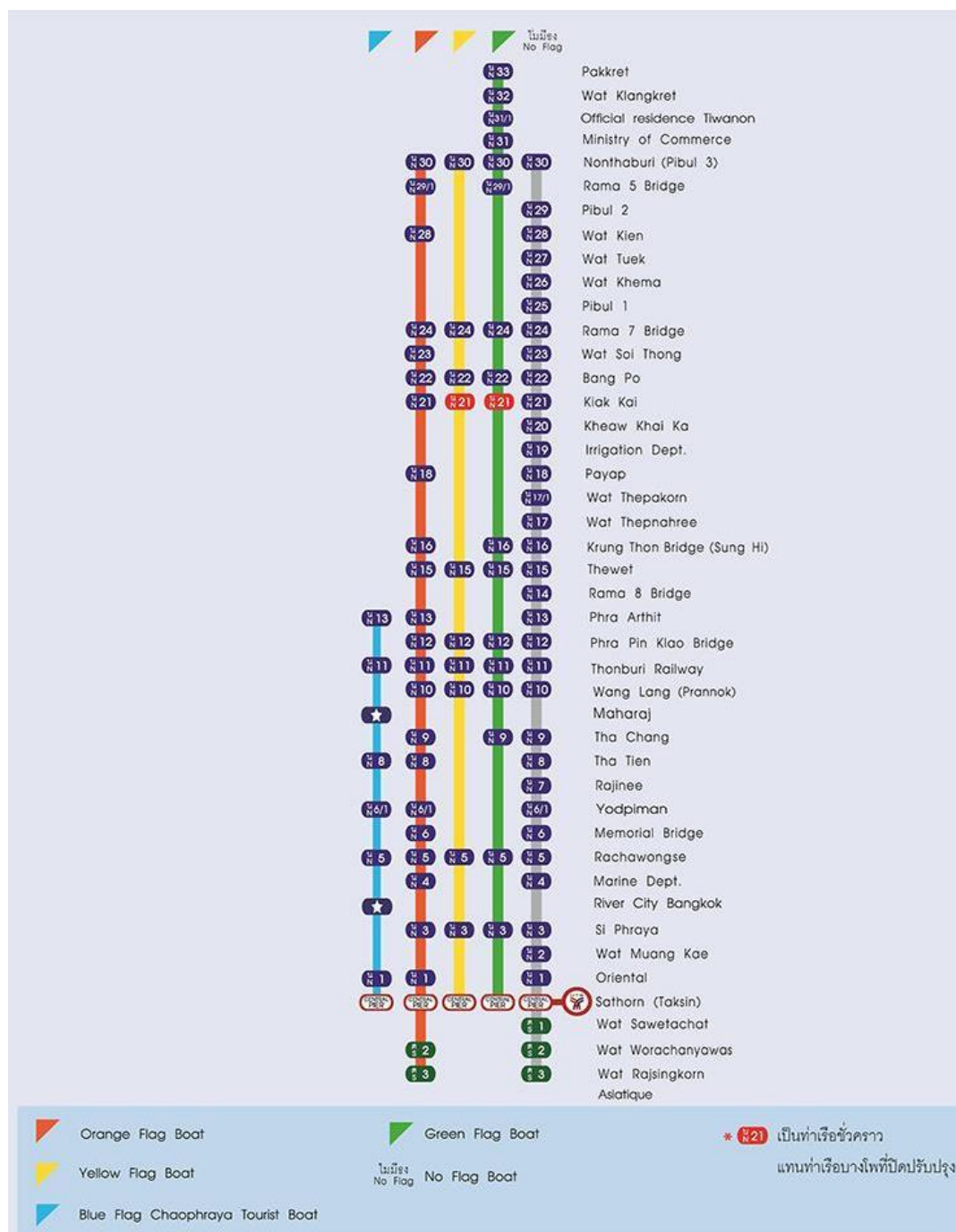


Figure 1.1) Chao Phraya Express Boat, 2016. Route Map

1.2) Boat Routes, Operation Service and Fare rate

Boat type	Route	Operation	Fares
Local line (No flag) 	Nonthaburi - Wat Rajsingkorn	Date : Monday – Friday Morning Service 06.45 - 07.30 hrs. Afternoon Service 16.00 - 16.30 hrs.	8 / 10 / 12 Baht (Depends on distance)
Orange flag boat 	Nonthaburi - Wat Rajsingkorn	Date : Everyday 06.00 - 19.00 hrs.	14 Baht
Green flag boat 	Pakkred - Nonthaburi - Sathorn (Centre)	Date : Monday – Friday Morning Service 06.10 - 08.10 hrs. Afternoon Service 16.05 - 18.05 hrs.	10 / 12 / 19 / 31 Baht (Depends on distance)
Yellow flag boat 	Nonthaburi - Sathorn (Centre)	Date : Monday – Friday Morning Service 06.15 - 08.20 hrs. Afternoon Service 16.00 - 20.00 hrs.	19 / 29 Baht (Depends on distance)
Blue Flag Chaophraya Tourist Boat (CTB) 	Sathorn pier (Central) - Phra Arthit Pier	Daily 09:30 hrs. - 16:00 hrs Every 30 minutes from Sathorn Pier	150 Baht Valid for unlimited service per day OR 40 Baht One way ticket sale on boat

Figure 1.2) Author's own compilation from Chao Phraya Express Boat, 2016. Boat Routes, Operation Service and Fare rate

1.3) Pier Characteristics

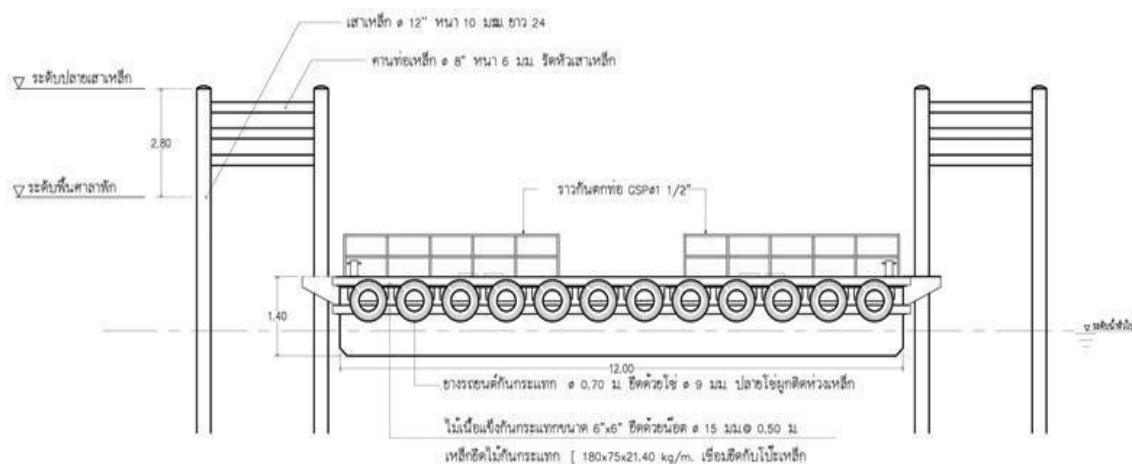


Figure 1.3) Matichon online, 2015. Pier Characteristic



Figure 1.3.1) Tumsikwae, 2014. Mooring and anchorage



Figure 1.3.2) Soi DB, 2010. Chaophraya Crossing - Wat Rakang

1.4. แนวทางการตรวจสอบท่าและโป๊ะเทียบเรือ

โป๊ะเทียบเรือ

๑. โป๊ะต้องอยู่ในสภาพมั่นคงแข็งแรง และปลอดภัยต่อการเข้าเทียบท่าของเรือ
๒. บริเวณที่ผู้โดยสารขึ้น – ลงเรือทุกแห่ง ต้องเขียนป้ายหรือแสดงจำนวนคนโดยสารที่โป๊ะสามารถรับน้ำหนักได้ไว้ที่ที่เห็นได้ชัดเจน
๓. ต้องจัดให้มีเครื่องช่วยชีวิต เช่น พวงชูชีพ แพชูชีพ ให้มีจำนวนพอสมควรและแขวนหรือวางไว้ในบริเวณที่สามารถนำมาใช้ได้ทุกขณะ
- โอกาส
๔. ต้องมีทุกผูกเรือที่แข็งแรงสำหรับผูกเรือหัวท้าย
๕. โป๊ะเทียบเรือต้องมีเสาและอุปกรณ์ยึดโป๊ะกับเสาเพื่อมิให้ตัวโป๊ะเทียบเรือเลื่อนไปมา
๖. หน้าโป๊ะเทียบเรือต้องมีอุปกรณ์กันเรือกระทบโป๊ะเทียบเรือ
๗. บนโป๊ะต้องมีราวจับสำหรับให้ผู้โดยสารจับยึดทรงตัวในระหว่างอยู่บนโป๊ะหรือขึ้น-ลงเรือ
๘. พื้นโป๊ะต้องเป็นพื้นที่เรียบ ไม่ลื่น และต้องไม่มีสิ่งกีดขวางใดๆ
๙. ต้องจัดให้มีทางขึ้นหรือลงโป๊ะแยกออกจากกัน และให้มีเครื่องกันสำหรับคนโดยสาร เมื่อเห็นว่าจะมีจำนวนมากเกินไป
๑๐. ต้องจัดให้มีแสงสว่างเพียงพอในบริเวณทางขึ้นลง และบนโป๊ะ
๑๑. ต้องจัดทำเครื่องหมายแสดง แนวการบรรทุก (Load Line) ของโป๊ะ
๑๒. ต้องจัดให้มีเจ้าหน้าที่หรือผู้ควบคุมรับผิดชอบ เกี่ยวกับจำนวนคนโดยสารที่จะลงโป๊ะโดยปลอดภัย เมื่อเห็นว่าจะมีจำนวนมากเกินไป
๑๓. จัดให้มีการอบรมเจ้าหน้าที่ที่ปฏิบัติงานที่เกี่ยวข้อง เช่น ผู้จำหน่ายตั๋ว ผู้ควบคุมท่า ผู้ควบคุมเรือหรือเครื่องจักร ฯลฯ ให้รู้ถึงหน้าที่ความรับผิดชอบที่มีต่อผู้โดยสาร
๑๔. ออกประกาศขอความร่วมมือจากผู้โดยสารหรือประชาชนทั่วไป แจ้งหรือส่งข่าวเกี่ยวกับสภาพโป๊ะไม่ปลอดภัย โดยแจ้งให้กรมเจ้าท่าทราบ

หมายเหตุ ในกรณีที่เป็นท่าเทียบเรือสำหรับขนถ่ายสินค้าโดยเฉพาะ ให้พิจารณาอนุโลมใช้มาตรการดังกล่าวตามความเหมาะสม และสภาพของท่าเทียบเรือ

Source: Based on Marin Department, แนวทางการตรวจสอบท่าและโป๊ะเทียบเรือ (2016)

Appendix 2.) Survey

2.1 Survey Question

2.1.1 First Survey

แบบสอบถามเรื่องการใช้เรือด่วนเจ้าพระยา

- 1 เพศ ☐ ชาย ☐ หญิง อายุ ☐ น้อยกว่า 18-22 ☐ 23-35 ☐ 35 ขึ้นไป
- 2 รายได้ ☐ ต่ำกว่า 15,000 ☐ 15,000-25,000 ☐ 25,000-40,000 ☐ มากกว่า 40,000 ขึ้นไป
- 3 ปกติท่านเดินทางจากบ้านไปที่ทำงาน/สถานศึกษาอย่างไร (ตอบได้มากกว่า 1 ข้อ)
 - ☐ เรือ
 - ☐ แท็กซี่
 - ☐ รถยนต์ส่วนตัว
 - ☐ รถโดยสารสาธารณะ (รถตู้ รถเมล์)
 - ☐ จักรยานยนต์/ จักรยาน
 - ☐ รถไฟฟ้า/รถไฟฟ้าใต้ดิน

4 ปัจจัยสำคัญที่ใช้ในการตัดสินใจในการเดินทาง

ความสำคัญ มาก=5 น้อย=1	5	4	3	2	1
ความสะดวกสบาย	☐	☐	☐	☐	☐
รวดเร็วประหยัดเวลาในการเดินทาง	☐	☐	☐	☐	☐
ประหยัดค่าใช้จ่าย	☐	☐	☐	☐	☐
ปลอดภัย	☐	☐	☐	☐	☐
ใกล้บ้าน	☐	☐	☐	☐	☐
ไม่มีทางเลือกอื่น	☐	☐	☐	☐	☐
อื่นๆ.....	☐	☐	☐	☐	☐

- 5 ท่านเคยใช้บริการเรือด่วนเจ้าพระยาหรือไม่ ☐ ไม่เคย ☐ เคย

6 เหตุใดถึงไม่ใช้บริการเรือด่วนเจ้าพระยา	5	4	3	2	1
☐ ไม่ปลอดภัย	☐	☐	☐	☐	☐
☐ สภาพแวดล้อมสกปรก	☐	☐	☐	☐	☐
☐ บริการไม่ดี	☐	☐	☐	☐	☐
☐ มีทางเลือกอื่นที่สะดวกกว่า	☐	☐	☐	☐	☐

7 ความถี่ในการใช้บริการเรือด่วนเจ้าพระยา

- ☐ ทุกวัน ☐ ๑-๒ ☐ 3 วัน/สัปดาห์ ☐ สัปดาห์ละครั้ง ☐ เดือนละ 2 ครั้ง

8 วัดอุปสรรคในการใช้บริการเรือด่วนเจ้าพระยา กรุณาเรียงลำดับความสำคัญ (5 = มากสุด, 1 = น้อยสุด)

	5	4	3	2	1
ทำงาน/เรียน	☐	☐	☐	☐	☐
เป็นทางผ่านเพื่อไปใช้บริการสาธารณะอื่นๆ	☐	☐	☐	☐	☐
ข้อบกพร่อง	☐	☐	☐	☐	☐
ท้องเที่ยว	☐	☐	☐	☐	☐
เหตุฉุกเฉิน	☐	☐	☐	☐	☐

9 เหตุผลที่ท่านเลือกใช้บริการเรือด่วนเจ้าพระยา

ความสำคัญ มาก=5 น้อย=1	5	4	3	2	1
ความสะดวกสบาย	☐	☐	☐	☐	☐
รวดเร็วประหยัดเวลาในการเดินทาง	☐	☐	☐	☐	☐
ประหยัดค่าใช้จ่าย	☐	☐	☐	☐	☐
ปลอดภัย	☐	☐	☐	☐	☐
ใกล้บ้าน	☐	☐	☐	☐	☐
ไม่มีทางเลือกอื่น	☐	☐	☐	☐	☐
เป็นทางผ่านเพื่อไปใช้บริการสาธารณะอื่นๆ	☐	☐	☐	☐	☐
อื่นๆ.....	☐	☐	☐	☐	☐

10 โปรดให้คะแนนความพึงพอใจในการให้บริการเรือด่วนเจ้าพระยา 5=มาก 1=น้อย

☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1

11 ปัญหาที่พบระหว่างการให้บริการ	5	4	3	2	1
☐ ความปลอดภัยของโป๊ะและท่าเรือ	☐	☐	☐	☐	☐
☐ การให้บริการของพนักงาน	☐	☐	☐	☐	☐
☐ ความไม่เป็นระบบในการเก็บค่าโดยสาร	☐	☐	☐	☐	☐
☐ ความแออัดของผู้โดยสาร	☐	☐	☐	☐	☐

12 ถ้ามีการพัฒนาท่าเรือ/โป๊ะเรือให้มีความปลอดภัยมากขึ้นคุณจะมี

(สำหรับผู้เคยใช้บริการ) ☐ เห็นด้วย ☐ ไม่เห็นด้วย

(สำหรับผู้ไม่เคยใช้บริการ) ☐ ใช้แน่นอน ☐ อาจจะ ☐ ไม่ใช้บริการแน่นอน (ใช้/อาจจะ กรุณาตอบข้อ 13)

13 หลังจากการพัฒนา ถ้ามีการขึ้นราคาค่าโดยสาร คุณสามารถจ่ายเพิ่มได้มากที่สุดเท่าไร

☐ 10-20% ☐ 20-30% ☐ 40-50%

2.1.2 Second Survey

แบบสำรวจความคิดเห็นการใช้บริการเรือ ด่วนเจ้าพระยา

วัตถุประสงค์ของการทำแบบสอบถามนี้ เพื่อการทำวิจัยการใช้บริการเรือด่วนเจ้าพระยาหากมีการพัฒนาและปรับปรุงให้มีความปลอดภัยมากยิ่งขึ้น ข้อมูลของท่านจะไม่ถูกนำไปเผยแพร่แต่อย่างใด

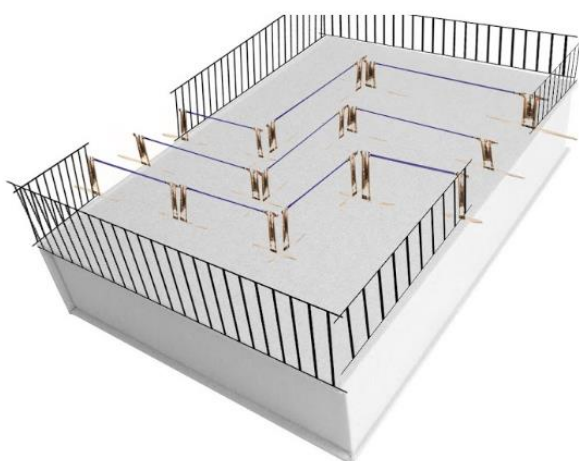
*จำเป็น

1.คุณเป็นผู้ใช้บริการประจำของ เรือด่วนเจ้าพระยา หรือไม่ *

☐ ใช่ (ไม่ต้องตอบข้อ 2)

☐ ไม่ใช่

โปรดดูภาพแล้วตอบคำถามข้อต่อไปนี



2.หากคุณต้องเดินทางไปยังสถานที่ที่มี เรือด่วนเจ้าพระยาผ่าน หลังจากเห็นภาพโป๊ะที่พัฒนาแล้ว คุณจะตัดสินใจมาใช้บริการหรือไม่ (พร้อมระบุเหตุผล)

คำตอบของคุณ

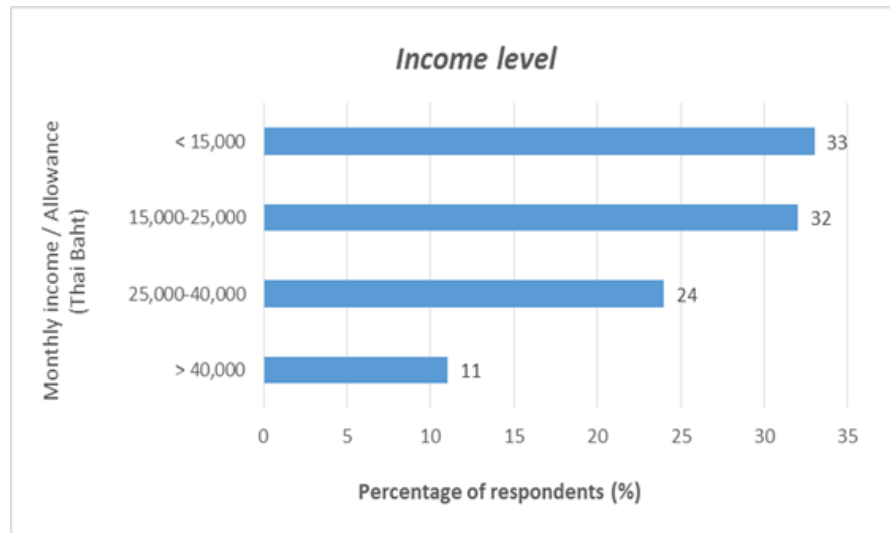
3.หากมีการพัฒนาโป๊ะเรือด่วนเจ้าพระยาดังแสดงในภาพ คุณคิดว่าจะเต็มใจจ่ายค่าโดยสารเพิ่มขึ้นกี่ % จากราคาปกติที่นั่น *

คำตอบของคุณ

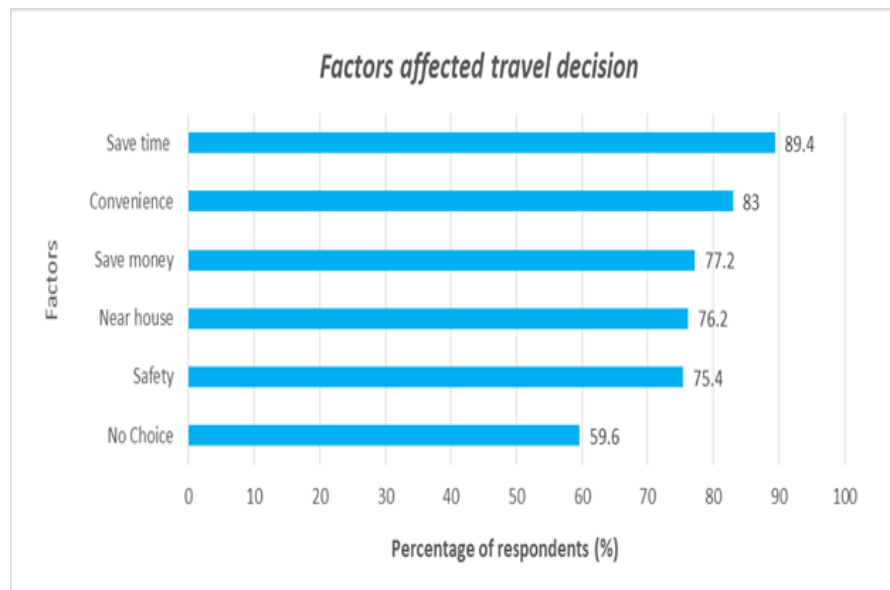
ส่ง

ทำแบบสำรวจผ่าน Google ฟอร์ม

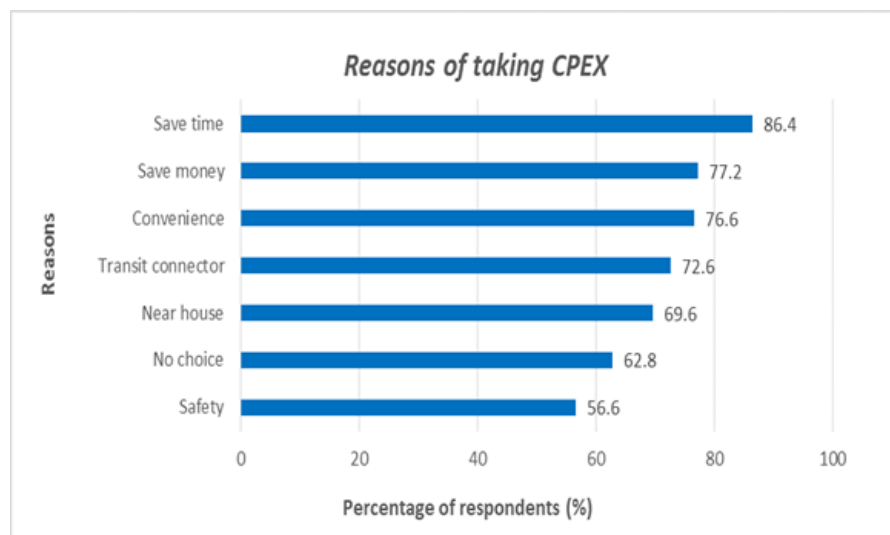
2.2



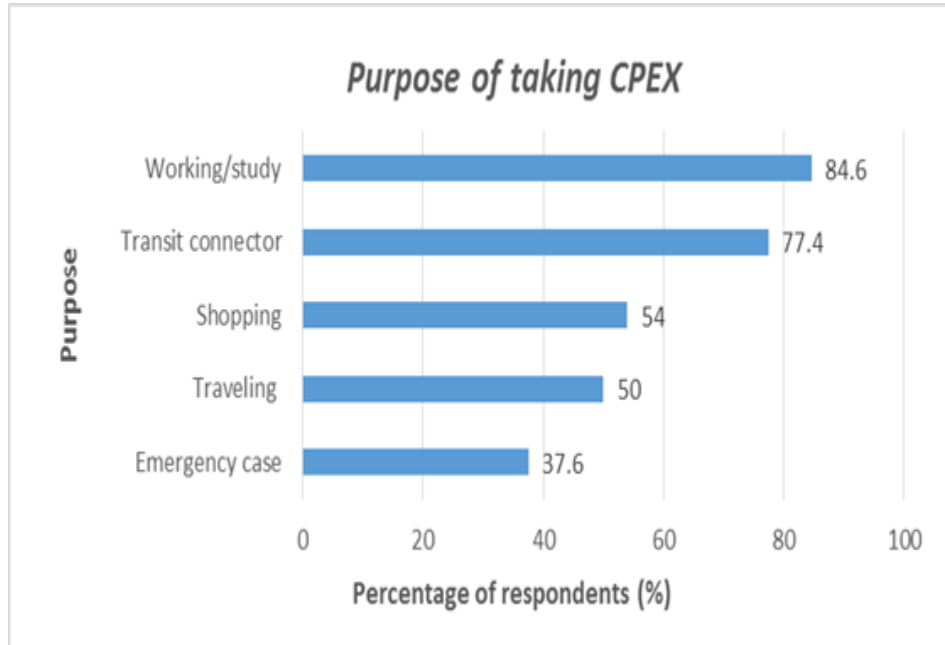
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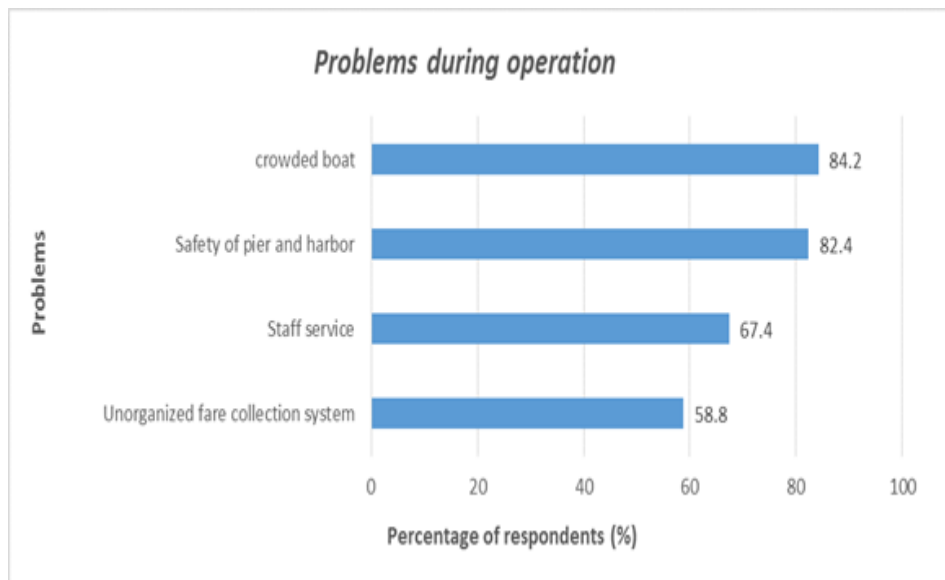
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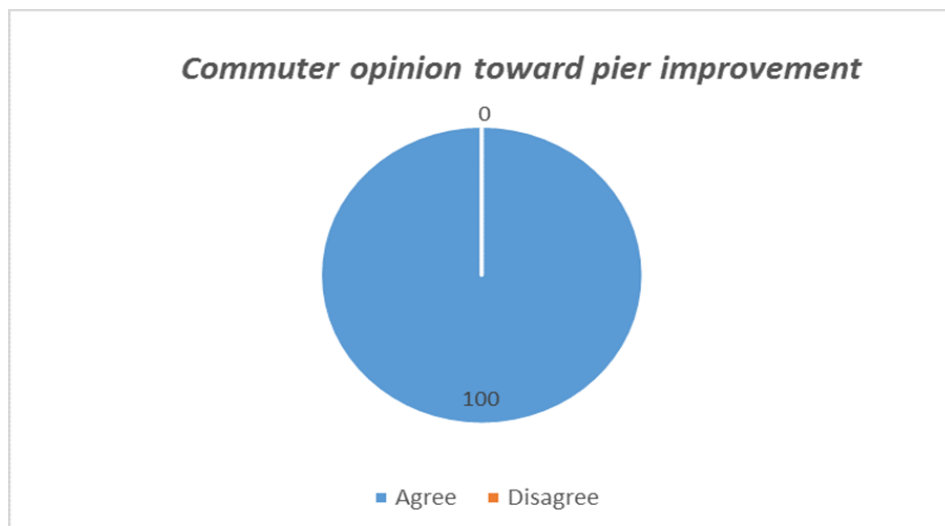
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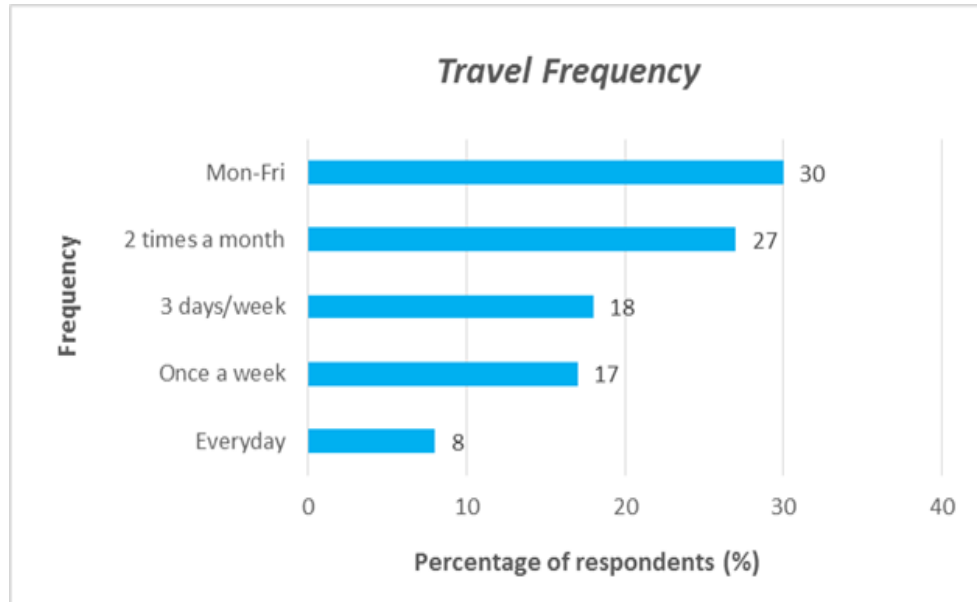
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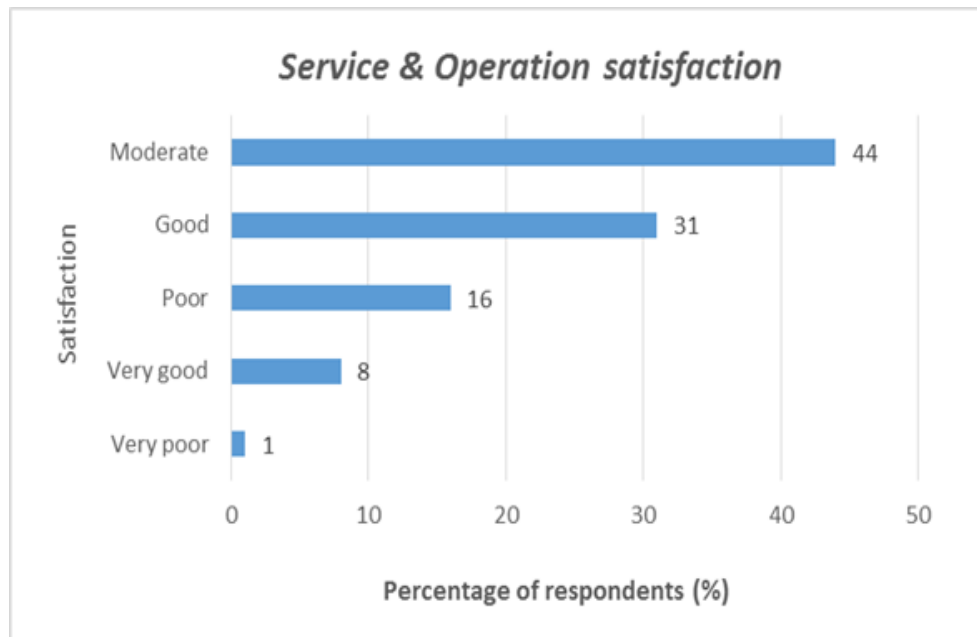
2.7



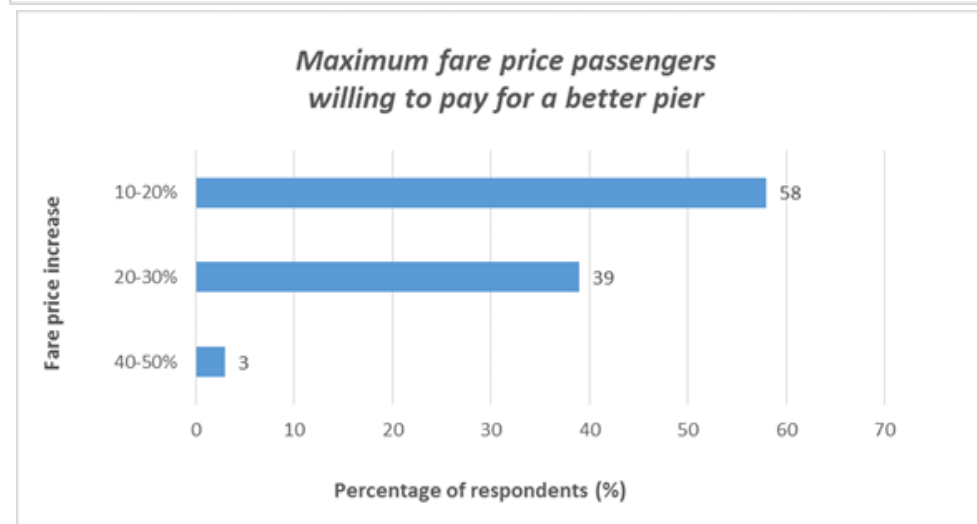
2.8



2.9



2.10



Appendix 3.) Statistics

3.1 Number of passengers in each survey period

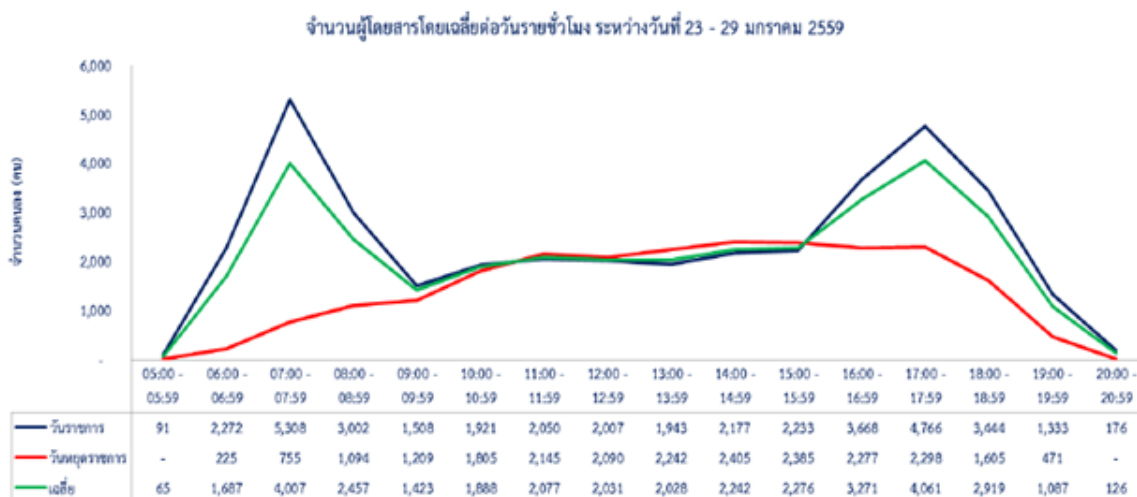


Figure 3.1.) Marine Department, 2016. Number of passengers in each survey period

Appendix 4.) Passengers

4.1 Characteristic of passengers



Figure 4.1) Author's own compilation

Appendix 5.)

The explanation on the assumption on performance of the CPEX in each scenario

5.1. Worst-case scenario

In 2017, we assume the growth to be -0.48%. We assume this situation is the most sensitive situation where passengers are regardless of safety. And the elasticity with respect to price in off-peak time in which it will be the most sensitive to the change in price is -0.29 (Mayeres 2000) Therefore, a 1% increase in price lead to the decrease in quantity demanded by 0.29%. And since the average price has changed from 15.51 to 17.51 which is approximately 12.89%. Hence, a 12.89% increase in price lead to the decrease in quantity demanded by approximately 3.48%. However, the past performance quantity of the passengers go in the same direction with GDP growth. Therefore, the growth of GDP might lead to an increase number of passengers that then will offset the reduction number of customer. And even worse in 2018 that there is going to have election in Thailand that reduce the number tourists and consumption dramatically which is around 9% deceased. However, we suppose that the situation will not be as severe as the past experience. Therefore, this year's growth is assumed to be -7.74%. And after-shock period in 2019, we assumed the growth to be -0.7%, and in 2020 onwards will be 3% growth due to the past performance.

5.2. Bad-case scenario

In 2017, we assume the growth to be 0.72% of growth. We assume this situation is sensitive situation but less than the first case assuming passengers response to change in price under the elasticity of -0.19 given a peak period (Mayeres 2000) Therefore, 12.89% change in price lead to a 2.28% reduce in quantity demanded. But as GDP growth reflects an increase in growth. Therefore, it offset each other. And even worse in 2018 that there is going to be election

in Thailand that reduce the number of tourists by some degree. However, customer might get used to an increased in price. Therefore, this year's growth is assumed to be -2.64%. And after shock period in 2019, we assumed that the growth to be 1% due to a recovery, and in 2020 onwards will be 3% growth due to the past performance.

5.3. Normal-Case scenario

In 2017, we assume the growth to be 3% of growth. We assume this situation passengers are indifferent to any changes. Therefore, the growth will be based on the past performance of the company. In 2018 that there is going to be election in Thailand that reduce the number of tourists by some degree by little and customer might get used to an increased in price. Therefore, we assume growth in 2018 to be 2.5%. And after shock period in 2019 and onwards, we assumed that the growth to be 3% based on the past performance.

5.4. Good-case scenario

We assume that passengers will not be sensitive to the change in price and the new safety attracts more user and more use of the existing passengers. Therefore, in 2017, growth will be 4.5% which is better than the normal growth by 1.5%. We also assume that the effect of election in 2008 will reduce to 3.5%. And year 2019 onwards the growth will be 3% due to the forecasted growth of GDP and company average performance at this rate.

5.5. Best-case scenario

We assume passengers are not sensitive to the change in price at all and the new safety attracts new passengers. In 2017, the assumed growth is 5%. However, in 2018, the overall consumption will be reduced affecting the company growth to fall a bit. Therefore 2018, we

assumed 4.3%. And in year 2019 onwards customer will get used to change, the growth will be declined and remain at 3%.

Appendix 6.) Financial Assumption

Table 6.1) Assumptions on Operating Revenue Growth and Other Financial Variables

Assumption	Historical year*	2017	2018 – Year of Political uncertainty	2019 – After Shock Effect	2020	2021
	Currency: Baht	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
Income Statement						
Operating Revenue Growth	3.0%	Growth Assumption depending on scenario				
Other Revenue (as % of opr. Revenue)	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Cost of goods & services sold (as % of opr. Revenue)	69.8%	69.8%	69.8%	69.8%	69.8%	69.8%
Selling admin. expenses as % of opr. revenue	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Interest Expense as % of opr. revenue	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Tax rate % of income before Taxes	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%

*Historical Year performance from 2012 to 2015 see Appendix 8.) for full income statement

Note on the assumption:

- 1.) **Operating Revenue Growth** – Average growth over the past four years equal to 3.0%. However, in our study we assume different revenue growth in each year according to the projected scenario.
- 2.) **Other Revenue (as % of Operating Revenue)** – This is the revenue from the operation of other activities of CPEX company. And, the average growth is at 3.0% based on the evidence from their past four years' performance.
- 3.) **Cost of goods & services sold (as % of Operating Revenue)** – COGS is usually calculated as a % of revenue. The average over the past four years' performance was at 69.8%. And, we expect it to remain at the same level throughout the whole forecasting period.
- 4.) **Selling administrative expenses as % of Operating Revenue** – It is expected to remain at the same level as the past four years as the company will continue to use an unchanged operating and administrative structure.
- 5.) **Depreciation** - Depreciation was kept flat for simplicity sake. Depreciation expense spread equally over the equipment's lifespan of 30 years equal to 3.57 million Baht per year. (From the total equipment cost of 107,400,00 Baht)
- 6.) **Interest Expense as % of Operating Revenue** – The company seem to have very low interest expense over the years and is expected to remain at the same level of 0.02%.
- 7.) **Tax rate % of income before Taxes** – The corporate income tax rate in Thailand for the company that has net profit over 3 million baht is at 20% on net profit.

Appendix 7.) EBIT –FCF TABLE

1.) Table 7.1.) Worst-case scenario

Income Statement	Historical year*	2017	2018 - Political uncertainty	2019 - After Shock Effect	2020	2021
	Currency: Baht	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
Operating Revenue		237,554,882	219,168,134	217,633,957	224,162,976	230,887,865
Operating Revenue (%)	3%	-0.48%	-7.74%	-0.70%	3.00%	3.00%
Other Revenue	2.65%	6,295,204	5,807,956	5,767,300	5,940,319	6,118,528
Total Revenue		243,850,086	224,976,090	223,401,257	230,103,295	237,006,393
Cost of goods & services sold	69.8%	165,813,308	152,979,358	151,908,502	156,465,757	161,159,730
Selling administrative expenses	15%	35,633,232	32,875,220	32,645,094	33,624,446	34,633,180
Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Total Expense		205,014,540	189,422,578	188,121,596	193,658,203	199,360,910
Interest Expense	0.02%	35,633	32,875	32,645	33,624	34,633
EBIT		38,799,913	35,520,637	35,247,016	36,411,467	37,610,851
Less: Taxes (on EBIT)	-20.0%	-7,759,983	-7,104,127	-7,049,403	-7,282,293	-7,522,170
Plus: Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Free Cash Flow (FCF)		34,607,931	31,984,509	31,765,613	32,697,173	33,656,681

2.) Table 7.2.) Bad-case scenario

Income Statement	Historical year*	2017	2018 - Political uncertainty	2019 - After Shock Effect	2020	2021
	Currency: Baht	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
Operating Revenue		240,419,290	234,072,220	236,412,943	243,505,331	250,810,491
Operating Revenue (%)	3%	0.72%	-2.64%	1.00%	3.00%	3.00%
Other Revenue	2.65%	6,371,111	6,202,914	6,264,943	6,452,891	6,646,478
Total Revenue		246,790,401	240,275,134	242,677,886	249,958,222	257,456,969
Cost of goods & services sold	69.8%	167,812,664	163,382,410	165,016,234	169,966,721	175,065,723
Selling administrative expenses	15%	36,062,893	35,110,833	35,461,941	36,525,800	37,621,574
Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Total Expense		207,443,558	202,061,243	204,046,175	210,060,521	216,255,296
Interest Expense	0.02%	36,063	35,111	35,462	36,526	37,622
EBIT		39,310,780	38,178,781	38,596,248	39,861,176	41,164,051
Less: Taxes (on EBIT)	-20.0%	-7,862,156	-7,635,756	-7,719,250	-7,972,235	-8,232,810
Plus: Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Free Cash Flow (FCF)		35,016,624	34,111,024	34,444,999	35,456,941	36,499,241

* For the clarification on the assumptions on Operating Revenue Growth and Other Financial Variables see Appendix 6.)

3.) Table 7.3.) Normal-case scenario

Income Statement	Historical year*	2017	2018 - Political uncertainty	2019 - After Shock Effect	2020	2021
	Currency: Baht	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
Operating Revenue		245,861,664	252,008,206	259,568,452	267,355,506	275,376,171
Operating Revenue (%)	3%	3.00%	2.50%	3.00%	3.00%	3.00%
Other Revenue	2.65%	6,515,334	6,678,217	6,878,564	7,084,921	7,297,469
Total Revenue		252,376,998	258,686,423	266,447,016	274,440,427	282,673,639
Cost of goods & services sold	69.8%	171,611,442	175,901,728	181,178,780	186,614,143	192,212,567
Selling administrative expenses	15%	36,879,250	37,801,231	38,935,268	40,103,326	41,306,426
Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Total Expense		212,058,691	217,270,959	223,682,047	230,285,469	237,086,993
Interest Expense	0.02%	36,879	37,801	38,935	40,103	41,306
EBIT		40,281,428	41,377,664	42,726,033	44,114,854	45,545,340
Less: Taxes (on EBIT)	-20.0%	-8,056,286	-8,275,533	-8,545,207	-8,822,971	-9,109,068
Plus: Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Free Cash Flow (FCF)		35,793,142	36,670,131	37,748,827	38,859,884	40,004,272

4.) Table 7.4.) Good-case scenario

Income Statement	Historical year*	2017	2018 - Political uncertainty	2019 - After Shock Effect	2020	2021
	Currency: Baht	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
Operating Revenue		249,442,174	258,172,650	265,917,830	273,895,364	282,112,225
Operating Revenue	3%	4.50%	3.50%	3.00%	3.00%	3.00%
Other Revenue	2.65%	6,610,218	6,841,575	7,046,822	7,258,227	7,475,974
Total Revenue		256,052,392	265,014,225	272,964,652	281,153,592	289,588,199
Cost of goods & services sold	69.8%	174,110,637	180,204,510	185,610,645	191,178,964	196,914,333
Selling administrative expenses	15%	37,416,326	38,725,898	39,887,674	41,084,305	42,316,834
Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Total Expense		215,094,964	222,498,407	229,066,319	235,831,269	242,799,167
Interest Expense	0.02%	37,416	38,726	39,888	41,084	42,317
EBIT		40,920,012	42,477,092	43,858,445	45,281,238	46,746,715
Less: Taxes (on EBIT)	-20.0%	-8,184,002	-8,495,418	-8,771,689	-9,056,248	-9,349,343
Plus: Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Free Cash Flow (FCF)		36,304,009	37,549,674	38,654,756	39,792,991	40,965,372

* For the clarification on the assumptions on Operating Revenue Growth and Other Financial Variables see Appendix 6.)

5.) Table 7.5.) Normal-case scenario

Income Statement	Historical year*	2017	2018 - Political uncertainty	2019 - After Shock Effect	2020	2021
	Currency: Baht	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
Operating Revenue		250,635,677	261,413,011	269,255,402	277,333,064	285,653,056
Operating Revenue (%)	3%	5.00%	4.30%	3.00%	3.00%	3.00%
Other Revenue	2.65%	6,641,845	6,927,445	7,135,268	7,349,326	7,569,806
Total Revenue		257,277,523	268,340,456	276,390,670	284,682,390	293,222,862
Cost of goods & services sold	69.8%	174,943,703	182,466,282	187,940,270	193,578,478	199,385,833
Selling administrative expenses	15%	37,595,352	39,211,952	40,388,310	41,599,960	42,847,958
Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Total Expense		216,107,054	225,246,234	231,896,581	238,746,438	245,801,791
Interest Expense	0.02%	37,595	39,212	40,388	41,600	42,848
EBIT		41,132,873	43,055,011	44,453,701	45,894,352	47,378,222
Less: Taxes (on EBIT)	-20.0%	-8,226,575	-8,611,002	-8,890,740	-9,178,870	-9,475,644
Plus: Depreciation	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000	3,568,000
Free Cash Flow (FCF)		36,474,298	38,012,008	39,130,961	40,283,482	41,470,578

* For the clarification on the assumptions on Operating Revenue Growth and Other Financial Variables see Appendix 6.)

Source: Data adapted from Chao Phraya Express Boat Co., Ltd. (2016) *2012-2015 Financial Statement*

Appendix 8.)
Chao Phraya Express Boat's 2012 – 2015 Financial Statement

Table 8.1) 2012 – 2015 Financial Statement

หน่วย : บาท	2555		2556		2557		2558		2559	
งบกำไรขาดทุน	จำนวนเงิน (บาท)	% เปลี่ยนแปลง	จำนวนเงิน (บาท)	% เปลี่ยนแปลง	จำนวนเงิน (บาท)	% เปลี่ยนแปลง	จำนวนเงิน (บาท)	% เปลี่ยนแปลง	จำนวนเงิน (บาท)	% เปลี่ยนแปลง
รายได้หลัก	199,640,946.84	14.40	203,299,295.34	1.83	218,986,581.60	7.72	204,838,977.93	-6.46	0.00	0.00
รายได้รวม	206,929,075.23	16.53	208,277,269.49	0.65	222,823,657.46	6.98	212,412,901.38	-4.67	0.00	0.00
ต้นทุนขาย	150,494,631.61	10.41	146,376,262.29	-2.74	148,638,018.95	1.55	131,725,403.10	-11.38	0.00	0.00
กำไร(ขาดทุน) ขั้นต้น	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ค่าใช้จ่ายในการขายและบริการ	34,326,788.45	21.38	27,511,802.41	-19.85	33,021,284.91	20.03	29,098,144.36	-11.88	0.00	0.00
รายจ่ายรวม	184,821,420.06	12.29	173,888,064.70	-5.92	181,659,303.86	4.47	160,823,547.46	-11.47	0.00	0.00
ดอกเบี้ยจ่าย	94,791.81	33.17	1,881.11	-98.02	6,040.21	221.10	22,614.14	274.39	0.00	0.00
กำไร(ขาดทุน) ก่อนภาษี	22,012,863.36	70.53	34,387,323.68	56.21	41,158,313.39	19.69	51,566,739.78	25.29	0.00	0.00
ภาษีเงินได้	5,953,279.65	3.74	7,018,221.15	17.89	9,407,639.46	34.05	9,729,774.52	3.42	0.00	0.00
กำไร(ขาดทุน)สุทธิ	16,059,583.71	123.99	27,369,102.53	70.42	31,750,673.93	16.01	41,836,965.26	31.77	0.00	0.00

Source: Data from Chao Phraya Express Boat Co., Ltd. (2016) *2012-2015 Financial Statement*

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