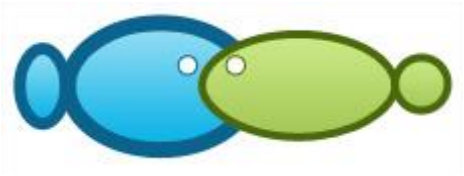

Towards a professional service: Improvement of infrastructures and facilities of traditional shipping business in Tanjung Emas Port, Semarang, Indonesia

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Abstract. Appropriate infrastructure and facilities are an important factor needed to support maritime transportation sector. This research was aimed to identify the availability, current condition, the importance of each component and to analyze the urgency for improvement of ports infrastructure and facilities related to the traditional shipping sector in Tanjung Emas Port Semarang. The research was carried out through a field survey of traditional shipping practice in Tanjung Emas Port Semarang, focusing on the condition of seven infrastructure and facility items, including pool/basin, breakwater, warehouse, clean water supply, terminal, drainage system and wharf/stacking yard. Data collection was carried out using questionnaires applied to three respondent groups, including academics, officials and practitioners. Data analysis was carried out through a descriptive method, using a classification model to determine the importance, appropriateness and priority of improvement. The research found that the pool/basin, breakwater, warehouse and clean water supply hold an absolute importance for the traditional shipping activity, while terminal, drainage system and wharf/stacking yard hold a high importance. Among the seven items, only the pool/basin was in appropriate condition. The breakwater, warehouse, clean water supply and terminal were in fairly appropriate condition, while the drainage system and wharf/stacking yard were in less appropriate condition. The finding of this research suggested that an improvement of infrastructure and facility is needed, especially for drainage system and wharf/stacking yard.
Key Words: appropriateness, importance, improvement, pool/basin, wharf/stacking yard.

Introduction. Since 2015, the Government of Indonesia has officially started the development and implementation of a marine toll program (Rumaji & Adiliya 2019). It is expected to improve the inter-island connectivity as well as to expedite the logistic distribution among regions, especially to the remote areas (Wicaksana 2017). Moreover, it is also expected to promote the integration of other transportation modes, such as coasts, rivers, and land (Kusuma & Tseng 2019). Specifically, the occupation of other water transportation means such as through rivers and nearshore waters is carried out using smaller ships and boats. Therefore, the long existed traditional shipping is empowered to support the marine toll program (Lazuardy et al 2018).

To ensure the success of marine toll program, a professional practice of shipping industry is needed. Professionalism is an important factor that determines the performance and competitiveness of a business (Lutz & Tadesse 2017). Professional business practice means that a business is carried out through appropriate management practice to utilize available resources efficiently to produce the expected outcomes (Bhattacharyya et al 2013). Thus, the company could attain better benefit from the business. Professionalism should be able to lead a business to a good performance (Randhawa & Ahuja 2017). Professionalism in business practice is presented in various aspects, such as human resources (competency) and working culture (Oberhuemer 2013; Watling et al 2013). However, professional business practice is not enough to enable the maximization of business performance. Appropriate environment such as infrastructure and facility are also needed to utilize available resources (Munim & Schramm 2018).

Professional business practice should be applied in any business activity, including those of the traditional practices such as traditional shipping. Traditional shipping is a sector of maritime transportation that has been existed since centuries ago (Sutherland 2015). Various goods were transported using traditional (wooden) ships that were typically moved by winds (Pan et al 2021). There are various kinds of traditional ships used for various purposes, such as mean of goods transportation, people transportation and fishing (Amron et al 2021; Lindstad et al 2016; Cerchiello 2014). Aside from the functions, traditional shipping also represents a socio-cultural value. Therefore, traditional ships typically have a unique construction design (Holmes 1906). Among the purposes, its use as the mean of transporting goods had become a crucial sector in maritime transportation, namely the traditional shipping sector.

The traditional shipping sector in Indonesia still persisted until now. Unfortunately, traditional shipping sector meets sustainability issues. It is shown by the decreasing traditional business traffic, especially prior to 2015 (BPS-Statistics Indonesia 2018). As the first industrial revolution took place, traditional ships were replaced by steamships (Mohajan 2019), and further replaced by diesel engines (Okubo & Kuwahara 2019). On the other side, the size of the ship also keeps increasing over time (Tchang 2020). Therefore, the revolution in ship engineering had significantly improved the mobility and effectiveness of shipping activity (Cullinane & Bergqvist 2014). As an impact, the preference of the shipping business stakeholders was pointed to more modernized vessels (Tran & Haasis 2015). The shipping performance had become a major issue in traditional shipping business. Currently, traditional shipping performance can no longer keep up with a more modern shipping sector, due to the lack of technological advancement (Aiello et al 2020). Moreover, traditional ships typically have smaller cargo capacity and slower cruising speed because the ships are only driven by wind or small motor (Humang 2021). This causes more delays in the shipment process. Moreover, the traditional shipping sector obtained less attention compared to the modern shipping sector, causing further decrease to its performance.

The value of traditional shipping sector is not limited to the economic aspect, but also includes the social and cultural aspects (Papadopoulou 2019). In many maritime countries, water transportation becomes a great necessity to support people's livelihood. On the other side, the difference of the landscape promotes the differentiation of ship design, thus traditional ships will have unique forms. Therefore, traditional shipping becomes a representation of the identity of a country as a maritime country (Rochwulaningsih et al 2019). The performance of a business sector requires the support regarding various aspects, including the appropriate infrastructure and facilities. Infrastructure and facilities play important roles in promoting the shipping business performance (Skorobogatova & Kuzmina-Merlino 2017). Without proper infrastructure and facility, the shipping activity would face various obstacles, causing a decrease of performance (Deng 2013). There are various kind of infrastructure and facility needed in shipping business, such as pool/basin, breakwater, terminal, wharf yard, warehouse, drainage, clean water supply, etc. (OCDI 2002). Each component needs to be sufficient to enable the effective operation of the port, such as loading – unloading activity (Rødseth et al 2018). However, the term "sufficient" is strongly dependent on the necessity or demand of the users. In term of maritime logistic transportation, it is related to the cargo volume and/or the volume of ships traffic.

The sufficiency of infrastructure and facilities becomes an issue in the traditional shipping sector. Traditional shipping is expected to be able to support the marine toll system, while the activity keeps decreasing over time. This research aimed to identify the availability, current condition and importance of each component and to analyse the urgency for improvement of ports infrastructure and facilities related to the traditional shipping sector in Tanjung Emas Port Semarang.

Material and Method

Participants. The participants of this research include several related stakeholders, such as port officials, academics and traditional shipping practitioners (ship owners,

managements, and captains). As many as 18 respondents were involved in the research, including 3 port officials, 7 academics, and 8 practitioners. The academics involved in the research are those who specialized in maritime transportation.

Procedures. The focus of the research was on the infrastructure and facilities in the Tanjung Emas Port Semarang, specifically in the traditional shipping wharf. Data collection was carried out through interview with related stakeholders, including port officials, academics and practitioners. Data collection was carried out on site and through visitation. On site interview was carried out specifically for port officials and practitioners, while interview with the academics was carried out through online communication. Data collection was carried out in July 2022 for three weeks. The respondents used in the research were selected through an incidental sampling, especially for port officials and practitioners. Thus, only officials and practitioners that were met in the traditional shipping wharf were selected as the respondents. Among the academics, only those who had experience and knowledge related to traditional shipping sector in Tanjung Emas Port were selected. Assessment was performed for seven infrastructure items, including: pool, terminal, warehouse, stacking yard, drainage system and clean water supply. An assessment of the importance and current condition of each item was carried out.

Instruments. The instrument used for data collection was a questionnaire. The questionnaire was distributed to the respondents directly online (digital form). Assessment was carried out for the aforementioned infrastructure and facilities. Some simple questions were used to collect information from the respondents, including the availability, importance and current condition (appropriateness) of the infrastructure and facilities.

Analysis. Data analysis was carried out through descriptive ranking. Collected data was used to justify the importance and current condition of the available infrastructure and facilities. A lognormal unequal interval class marking as proposed by Aigner (1968)was used with the formula as follows:

$$CI = \frac{e^{I_{max}} - e^{I_{min}}}{n}$$

Where:
CI-class interval;
I_{max}-maximum index value;
I_{min}-minimum index value;
n-number of intervals.

Based on the scale used in the research, the minimum and maximum index of importance were 0 and 1, respectively. Five class intervals were used to determine the importance of the infrastructure and facility. Based on the scale of importance index and on the number of class intervals, the classification of importance index is shown in Table 1.

Table 1

Importance index classification

Importance index interval	*Importance*	*Importance factor (IF)*
0.91 – 1.00	Absolutely important	5
0.81 – 0.91	Very important	4
0.66 – 0.81	Important	3
0.45 – 0.66	Less important	2
0.00 – 0.45	Not important	1

Similarly to the importance index case, the respondents' feedback was also used to justify the condition of the available infrastructure and facilities. However, the justification

of their condition's appropriateness was carried out using the equal interval method. Table 2 shows the classification of appropriateness index used in the analysis.

Table 2

Appropriateness index classification

Appropriateness index interval	*Appropriateness*	*Appropriateness factor (AF)*
0.80 – 1.00	Appropriate	1
0.60 – 0.80	Fairly appropriate	2
0.40 – 0.60	Less appropriate	3
< 0.40	Inappropriate	4

Further analysis was carried out to determine the priority of infrastructure and facilities improvement. An analysis on their development priority was carried out based on the classified importance and condition of the respective items. The following formula adapted from Effat & Hegazy (2007) was used to justify the priority.

$$PR = IF \times AF$$

Where:
PR-priority rank;
IF-importance factor;
AF-appropriateness factor.

Results. The research found that all of the studied items hold an importance for the traditional shipping activities. However, the condition of most items is below expectation. A detailed analysis result of traditional shipping-related infrastructure is presented in Table 3.

Table 3

Importance and current condition of infrastructures related to traditional shipping

Item	*Importance index*	*Importance*	*Appropriateness index*	*Appropriateness*	*PI (Rank)*
Pool / Basin	1.00	Absolutely important	0.80	Appropriate	5 (4)
Breakwater	1.00	Absolutely important	0.79	Fairly appropriate	10 (2)
Warehouse	1.00	Absolutely important	0.64	Fairly appropriate	10 (2)
Clean water supply	1.00	Absolutely important	0.61	Fairly appropriate	10 (2)
Terminal	0.88	Highly important	0.61	Fairly appropriate	8 (3)
Drainage system	0.75	Highly important	0.59	Less appropriate	12 (1)
Wharf / stacking yard	0.88	Highly important	0.43	Less appropriate	12 (1)

Referring to the analysis result, the pool/basin, breakwater, warehouse and clean water supply are of an absolute importance for the traditional shipping practice. However, the remaining three, including terminal, drainage system and wharf/stacking yard, also hold a high importance. Therefore, all of the studied items are important to the traditional shipping activity. This suggests that all of the items need serious attention in order to support traditional shipping business.

Based on the result, the conditions of infrastructure needed in traditional shipping activity were varying from appropriate to less appropriate. Among the seven items, the pool for traditional shipping vessels was the only one that had appropriate condition. Unfortunately, the drainage system and stacking yard were considered as less appropriate. Considering the importance of each item, improvements of infrastructure are needed to support the traditional shipping activity. Based on the importance and current condition, the priority of infrastructure and facilities improvement is as follow: wharf/stacking yard, drainage system, clean water supply, warehouse, breakwater, and terminal.

Discussion. Appropriate infrastructure and facilities, in terms of types, numbers and condition, are needed to promote the performance of a logistic transportation (Ekici et al 2019), being required to enable the optimum operational practice. Typically, optimum logistic transportation service would lead to time and cost efficiency (Bensassi et al 2015) which maintain the quality of the goods (Ekici et al 2016; Hertog et al 2014). Therefore, the development of infrastructures becomes a top priority in order to promote the advancement of business practice (Wibowo & Alfen 2014). Currently, the traditional shipping activity in Tanjung Emas Port was concentrated in the "Pelabuhan Dalam" area which has the wharf length of 1,351 m. However, the activity is undergoing a relocation to "Kali Baru Timur" area which is planned to have the wharf length of 500 m. The relocation is expected to improve the performance and capacity of traditional shipping.

The finding of this research suggests that the improvement of infrastructure and facilities of the traditional shipping port in Tanjung Emas Port Semarang is indeed needed. Wharf / stacking yard and drainage system have the utmost priority due to their condition that are currently less appropriate, in order to support traditional shipping. In the traditional shipping practice, goods are shipped without containers or in bulk, such as minor bulk, break bulk and liquid bulk (Lindstad et al 2016). Thus, there is a limit of how much of it could be stored in the yard for shipping queue. Therefore, appropriate space for stacking is needed (Ramírez-Nafarrate et al 2017). Appropriate wharf / stacking yard is expected to improve the efficiency of loading – unloading activity. Aside from the stacking yard, another facility that needs improvement in Tanjung Emas Port Semarang is the drainage system. Cargoes or containers that are stored in the stacking yards and not in warehouses are vulnerable to damages due to weather and environmental factors such as rain and flood (Allen et al 2022). Therefore, appropriate drainage system is expected to reduce the risk of the risk of flooding, which further hinders cargo damage (Gou & Lam 2019).

Another improvement needed in traditional shipping port in Tanjung Emas are clean water supply, warehouse and breakwater. The establishment of marine toll system requires the integration of traditional shipping sector. An increase of traditional shipping traffic is expected (Hidayat 2019), therefore, the availability of supporting infrastructure and facility should be sufficient. Without sufficient infrastructure and facility, the performance would be reduced (Wanke 2013). The infrastructure and facilities such as clean water supply, warehouse and breakwater are at fairly appropriate condition. Appropriate clean water supply is needed to support the port's operations, in particular for sea ports such as Tanjung Emas Port in Semarang. Clean water is one of the basic supply needed for cruise vessels, and its availability becomes a crucial factor for seamen in selecting berthing location for their vessels (Wang et al 2014).

Warehouse is an important facility for traditional shipping activity. Typically, traditional shipping handles cargo in bulk, especially minor bulk and break bulk (Lindstad et al 2016). Thus, an appropriate storage facility is needed to secure the goods being transported. Cargo storage in warehouses reduces the risk of damage or thievery. It is also needed for certain types of goods that requires special handling such as refrigerated cargo, electronics and garments (Islam et al 2013). The importance of warehouses is even greater for traditional shipping activity. Traditional shipping activity nearly use no warehouse in the shipping activity. In traditional shipping practice, the vessels are also used as storage (Hidayat 2019). The cargo is frequently stored in the vessel until it is retrieved by the owner. Breakwaters are a crucial infrastructure to secure the ports and ships from hydro-oceanographic activities, especially waves and storms (Le et al 2019). The Tanjung Emas

Port is located in the coastal area of Semarang which directly face the Java Sea. Thus, hydro-oceanographic activities could directly surge into the port. This could cause the pool/basin where ships are berthing to be wavy (Mondal et al 2017), which is inappropriate for cargo loading and unloading (Weiyi et al 2022). Improvement of breakwater is needed to further calm the wave entering the pool/basin.

Conclusions. Various kinds of infrastructure and facilities are currently available to support traditional shipping activity in Tanjung Emas Port Semarang, such as pool/basin, breakwater, warehouse and clean water supply which hold an absolute importance as well as terminal, drainage system and wharf/stacking yard which hold a high importance. However, some infrastructure and facilities, such as drainage system and wharf/stacking yard, are in less appropriate condition. Currently, only the pool/basin for ship berthing is in appropriate condition. infrastructure and facilities improvement is needed, with a high priority for the wharf/stacking yard and drainage system, which obtained lowest condition index.

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Conflict of interest. The author declares no conflict of interest.

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