RESIDENTS' PERCEPTION ON AN INLAND PORT DEVELOPMENT IN NORTHERN BORDER OF PENINSULAR MALAYSIA

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Abstract. The Bukit Kayu Hitam Inland Port which situated at the northern border of peninsular Malaysia will be completed in 2022, and it is capable of handling an annual throughput of 200,000 containers, alongside warehouses and cross-dock facilities for cargo consolidation and container stuffing. However, the Bukit Kayu Hitam Inland Port will be complete in 2022, this means that the inland port is still in the process of development, so we cannot directly get the impact of the development of Bukit Kayu Hitam Inland Port. Therefore, we can collect data through the online questionnaires that contain both closed-ended and multiple-choice questions on the Kubang Pasu residents' perception, which includes the environmental factor, economic factor, and social factor towards the development of Bukit Kayu Hitam Inland Port. Questionnaires are administered to respondents from Kubang Pasu residents by using a simple random sampling technique to ensure that every unit in the population has an equal chance of being selected. A total of 382 samples were distributed, but only 267 samples were received due to the COVID-19 pandemics. The data analysed using Pearson Correlation coefficients, Multiple Linear Regression, and Independent Samples t-tests. Overall, Cronbach's Alpha score was 0.819. As a result, the findings indicated that the environmental factor and social factor ($p=0.000<0.05$) can show a significant relationship with the perception of residents. Meanwhile, the economic factor ($p=0.612>0.05$) cannot show a significant result. Besides, there is no significant mean difference in the residents' perception between gender ($p=0.968>0.05$) and there is no significant mean difference in the residents' perception between the educational level of residents ($p=0.602>0.05$). Lastly, the outcomes of this study are expected to improve the development of the inland port in Bukit Kayu Hitam and let more Kubang Pasu residents know about Bukit Kayu Hitam Inland Port.
Keywords: *inland port, perception of residents, environmental factor, economic factor, social factor*

Introduction

The development of the Bukit Kayu Hitam Inland Port is a proposed plan by the Kedah state government to increase gross national income by enhancing the exports to the market of southern Thailand (Zulkifli and Majid, 2017). Kubang Pasu is one of the districts of Kedah, while Bukit Kayu Hitam is one of the towns of Kubang Pasu. According to JPBD (2018), the stock of houses in Kubang Pasu was 61,678 units in 2015, which has increased 42.73% compared to 2002. The number of houses has shown an upward trend based on the projected housing provision 2020 to 2035. So, we can expect that there will be an increase in population due to the increase of housing areas in Kubang Pasu in the future. Furthermore, the total population of Kubang Pasu has only slight changes from 2011 to 2018. It increased 12.23%, from 223,200 residents in 2011 to 250,500 residents in 2018. However, the population of Bukit Kayu Hitam was only 5.15% of the population of Kubang Pasu, which was 12,027 in 2015. The development

of the Bukit Kayu Hitam Inland Port is important as Kedah is a slow-developing state compared to other states. It is the second poorest state in Malaysia (NST, 2019). The industrial areas in Bukit Kayu Hitam are also insufficient, which its Special Border Economic Zone (SBEZ) including Kedah Science & Technology Park (KSTP) and Kota Perdana SBEZ (KPSBEZ) are still in the initial stage of development and there are only around 20 companies at the industrial areas.

The perception of the residents of Kubang Pasu is significant to the development of the inland port of Bukit Kayu Hitam, as it will directly affect them. Next, for the environmental factor, congestion in Bukit Kayu Hitam will cause air pollution and affect the health of the residents in Kubang Pasu (WHO, 2021; Alagesh, 2019; Moryadee et al., 2019; Zainuddin et al., 2019). Lastly, for the economic factor, Kedah is the second poorest state in Malaysia which has slow economic development and a widening income gap (Department of Statistics Malaysia, 2019; NST, 2019). For the social factor, Bukit Kayu Hitam has no railway connectivity. Yet, Bukit Kayu Hitam has a large volume of cargo and competitiveness, so it must have a train as the main option (Aziz, 2019; Zainuddin et al., 2019). Hence, this research intends to investigate the residents' perception towards the development of the inland port in Bukit Kayu Hitam with five intended objectives: (a) to examine the effect of the environmental factor on residents' perception towards the development of the inland port in Bukit Kayu Hitam; (b) to examine the effect of the economic factor on residents' perception towards the development of the inland port in Bukit Kayu Hitam; (c) to examine the effect of the social factor on residents' perception towards the development of the inland port in Bukit Kayu Hitam; (d) to investigate the mean difference of the residents' perception towards the development of the inland port in Bukit Kayu Hitam between male and female residents; and (e) to investigate the mean difference of the residents' perception towards the development of the inland port in Bukit Kayu Hitam among the educational level of residents.

Literature review

The inland port is a key multimodal transport node that requires a minimum of one barge or ship terminal as well as is linked to various ports such as maritime terminals and inland ports before accessing the marine trade (Seguí et al., 2016). In Malaysia, inland ports are important because they give connection to seaports. It serves as commercial gateways for the country's manufacturers and suppliers. The Bukit Kayu Hitam Inland Port is an intermodal terminal that has the potential to become a new transhipment centre due to the strong growth of the NCER Industrial Zone and solve the high congestion issues of the Padang Besar inland port. The development of Bukit Kayu Hitam Inland Port also can perform a more strategic and innovative role in handling needs and planning to become a significant distribution hub as well as provide a rail link to Port Klang to provide more connectivity (Zainuddin et al., 2019).

The study focuses on the development of Bukit Kayu Hitam Inland Port and residents' perception to understand the gap of research and select the right research method. According to Chen (2021), compared with cities without ports, cities with ports will gain a better advantage in increasing GDP and population, which will indirectly affect the living standard of residents. Most of the residents would have a positive perception towards the development of the port after understanding its advantages in terms of economic, environmental, and socio-cultural (Brida et al., 2014). However, it also stated that there are a few residents having a negative perception towards port

development as the majority of them are concerned about the environmental effect of port development such as congestion and pollution. Therefore, it can be concluded that the potential effects of inland port development may affect the residents' perception, whether they are positive or negative. In the literature, it is investigating three crucial effects of inland port development that may affect the residents' perception towards the development of the inland port in Bukit Kayu Hitam: (a) environmental factor-The inland port development can reduce congestion and air pollution to enhance the health of the residents; (b) economic factor-The development of inland ports can help accelerate the development of business to enhance economic growth; and (c) social factor-The development of inland ports will provide public infrastructure and rail transit to the society, thereby increase social welfare.

All these three factors are adopted and adapted for the framework (*Figure 1*). The reason for selecting these factors is because these three are the significant influencers on developing the inland port based on the previous study related to inland port development. For the environmental factor, previous studies found out that the activities of port and inland port operations had a significant environmental effect on the local people and the regions (van Duin and Van Der Heijden, 2021). It was highlighted that the development of inland ports could reduce the congestion and pollution issues caused by the seaport (Kwateng et al., 2017). Meanwhile, the congestion will increase carbon emissions and reduce air quality, thereby significantly increasing the mortality rate of drivers and affect the health of nearby residents (Zhang and Batterman, 2013). As for the economic factor, previous studies stated that the development of the inland port could bring positive economic impacts to the regions. According to the Shan et al. (2014) stated that port throughput was beneficial to the economic development of the city in which it was located. For instance, Jeevan et al. (2015) also mentioned that Malaysia's inland port could accelerate the development of domestic and international business. Lastly, in the social factor, previous researchers had pointed out that the implementation of rail transportation rather than road transportation to transport goods from the interface inland of the seaport could promote more effective port access and bring extensive social and environmental benefits (Roso, 2013; Hanaoka and Regmi, 2011; Henttu and Hilmola, 2011). Moreover, the increased usage of rail transportation reduces traffic congestion, resulting in lower demand for additional roadways, reducing public health problems related to noise as well as enhanced transportation safety and environmental effect (Dolinayova et al., 2016).

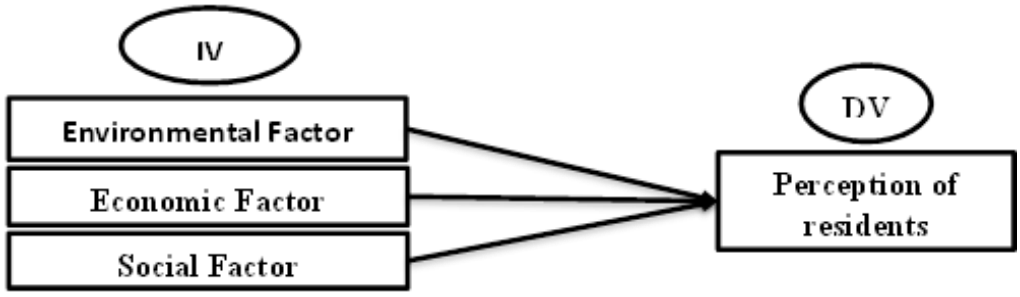

Figure 1. *Research framework.*

Materials and Methods

The descriptive and correlational studies were employed to suit the study nature and its specific objectives. The descriptive design is used for generating quantitative descriptors or descriptive and analytic statistics of the attributes of a population based on selected samples (Trochim, 2021). A correlational study is used to seek and figure out if two or more variables are related and in what way (Catherine, 2021). Therefore, in this research, we want to determine the relationship between the environmental factor, economic factor, and social factor with the perception of Kubang Pasu residents and also investigate the mean difference of perception between the gender and educational level of residents. The research setting is using a non-contrived setting. A quantitative research design was adopted for this research by obtaining useful information from primary and secondary data (Bhandari, 2020; Streefkerk, 2018; Hox and Boeije, 2005). For primary data, our data collections are based on a questionnaire that contains both closed-ended and multiple-choice questions. The questionnaire has three language versions which are English, Malay, and Mandarin and it is distributed to the respondents online through WhatsApp, WeChat, and Messenger. The questionnaire is distributed during the pilot test (via Google Form) and field survey which was conducted at Kubang Pasu, in Kedah. The total response obtained during the pilot test and field surveys were 30 respondents (Cronbach' Alpha value is 0.726) and 267 respondents (Cronbach' Alpha value is 0.819) respectively.

The target population for this study was residents in Kubang Pasu. Kubang Pasu district has a total of 250,500 residents. Hence, the unit of analysis is every resident in Kubang Pasu (individual). A simple random sampling technique which is probability sampling, and was used in selecting residents. A simple random sample is an unbiased surveying technique that follows a lucky draw procedure, where every unit in the population has an equal chance of being selected (CFI, 2021).

Results and Discussion

Correlation analysis is a bivariate analysis that measures the strength of association between two variables and the direction of the relationship. Based on Guilford's rule of thumb, the strength of correlation- interpreting Pearson correlation coefficient divided into 5 stages which are negligible or little correlation (0.0 to 0.29), low correlation (0.3 to 0.49), Moderate (0.5 to 0.69), High correlation (0.7 to 0.89), and Very high correlation (0.9 to 1.00). Pearson correlation was performed to determine the association between perception of residents, environmental factor, economic factor, and social factor. Based on *Table 1*, the results show there is a positive and low correlation between the economic factor and the perception of residents (p=0.000, r=0.375). These two variables are positive and moderate or marked correlation between environmental factor and perception (p=0.000, r=0.643) and between social factor and perception (p=0.000, r=0.614). The result indicates that the environmental factor and social factor are more correlated than the economic factor to the Kubang Pasu residents.

Table 1. *Correlation analysis.*

Category		Perception of resident	Environmental factor	Economic factor	Social factor
Perception of resident	Person correlation	1	.643**	.375**	.614**

	Sig. (2-tailed)	-	.000	.000	.000
Environmental factor	Pearson correlation	.643**	1	.433**	.631**
	Sig. (2-tailed)	.000	-	.000	.000
Economic factor	Pearson correlation	.375**	.433**	1	.496**
	Sig. (2-tailed)	.000	.000	-	.000
Social factor	Pearson correlation	.614**	.631**	.496**	1
	Sig. (2-tailed)	.000	.000	.000	-

To test the hypothesis of our research, we have run the regression analysis by using multiple linear regression analysis. Multiple linear regressions are to test how the dependent variable is affected by two or more independent variables. This type of statistical test also pointed out the relationship between the variables with discussion on the total variance between the items.

Based on the Model Summary, the R-squared of 0.486 implies that the four predictor variables explain about 48.6% of the variation in the perception of residents (*Table 2*). This is a quite good and respectable model. Based on the ANOVA, it showed the P: (0.000<0.05) means that we are going to reject our null hypothesis (*Table 3*). We could conclude that the perception of residents is significantly influenced by the environmental factor, economic factor, and social factor. Based on the Coefficients in *Table 4*, there are 2 predictors variables which are an environmental factor and social factor (p=0.000<0.05). Meanwhile, the economic factor (p=0.612>0.05) is not able to show a significant result. The largest beta coefficient is found in environmental factor (beta=0.420) followed by social factor (beta=0.335), and economic factor (beta=0.026). This means that the environmental factor makes the strongest contribution to explain the perception of residents.

***Table 2**. Multiple linear regression analysis.*

Model summary[b]				
Model	R	R square	Adjusted R square	Std. Error of the estimate
1	.697[a]	.486	.480	.28498

**Note: a. Predictors: (Constant), social factor, economic factor, environmental factor; b. Dependent variable: Perception of resident.*

***Table 3**. Anova analysis.*

Anova[a]						
Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	20.159	3	6.720	82.745	.000[b]
	Residual	21.359	263	.081	-	-
	Total	41.518	266	-	-	-

Note: a. Dependent variable: Perception of resident; b. Predictors: (Constant), social factor, economic factor, environmental factor.

***Table 4**. Coefficient analysis.*

Coefficient[a]					
Model	Unstandardized coefficients		Standardized coefficient		
	B	Std. Error	Beta	t	Sig.

1	(constant)	.460	.288	-	1.599	.111
	Environmental factor	.472	.065	.420	7.242	.000
	Economic factor	.033	.065	.026	.507	.612
	Social factor	.399	.071	.335	5.576	.000

Note: a. Dependent variable: Perception of resident.

H0: Perception of residents significantly not influenced by an environmental factor, economic factor, and social factor.
H1: Perception of residents significantly influenced by an environmental factor, economic factor, and social factor.

Independent samples t-test is done to see if there are any significant differences in the means for two groups in the variable of interest. The independent sample t-Test was performed to investigate the mean difference of gender between Kubang Pasu residents. Levene's test for equality of variances was found to be not violated for the present analysis (f=0.548, p=0.460) (*Table 5*). Thus, the assumption of homogeneity of variance was met. However, the significant 2-tailed (p=0.968>0.05) means that we need to reject H1. According to table Group Statistics, there is a not significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam male residents (mean=4.4444) and female residents (mean=4.4464) (*Table 6*).

***Table 5**. Independent sample test.*

Category		Levenes' test for equality of variances		t-test for equality of means		
		F	Sig.	t	df	Sig. (2-tailed)
Perception of resident	Equal variance assumed	.548	.460	-.040	265	.968
	Equal variances not assumed	-	-	-.040	211.597	.968

H0: There is a not significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam between male and female residents.
H1: There is a significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam between male and female residents.

***Table 6**. Independent sample t-test (Gender).*

Group statistics	Gender	N	Mean	Std. deviation	Std. error mean
Perception	Male	99	4.4444	.38686	.03888
	Female	168	4.4464	.40098	.03094

The independent sample t-Test was performed to investigate the mean difference of gender between Kubang Pasu residents. Levene's test for equality of variances was found to be not violated for the present analysis (f=0.791, p=0.375) (*Table 7*). Thus, the assumption of homogeneity of variance was met. However, the significant 2-tailed (p=0.602>0.05) means that we need to reject H1. According to table Group Statistics, there is a not significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam the educational level of residents,

which non-tertiary educational level (mean=4.4356) and tertiary educational level (mean=4.4615) (*Table 8*).

Table 7. *Independent sample test.*

Category		Levenes' test for equality of variances		t-test for equality of means		
		F	Sig.	t	df	Sig. (2-tailed)
Perception of resident	Equal variance assumed	.791	.375	-.523	265	.602
	Equal variances not assumed	-	-	-.502	190.529	.616

H0: There is a not significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam the educational level of residents.
H1: There is a significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam among the educational level of residents.

Table 8. *Independent samples t-test (Educational level).*

Group statistics	Gender	N	Mean	Std. deviation	Std. error mean
Perception	Non-tertiary educational	163	4.4356	.36539	.02862
	Tertiaty educational	104	4.4615	.43895	.04304

The objectives of this research are to examine the residents' perception of the development of the inland port in Bukit Kayu Hitam. The findings showed that the two independent variables had a positive and moderate or marked correlation relationship with the residents' perception towards the development of the inland port in Bukit Kayu Hitam and were significant. However, there is one independent variable that showed a positive but low correlation results on the residents' perception towards the development of the inland port in Bukit Kayu Hitam and was not significant. Moreover, the findings also showed that there were no mean differences in the residents' perception towards the development of the inland port in Bukit Kayu Hitam between genders and educational levels.

Based on results from regression analysis (refer to Table 2), the result shows a significant effect of the environmental factor on residents' perception towards the development of the inland port in Bukit Kayu Hitam ($p=0.000<0.05$). Most of the residents agree that the development of Bukit Kayu Hitam Inland Port can reduce congestion between Bukit Kayu Hitam and Sadao as they think that the development of Bukit Kayu Hitam Inland Port can increase the use of rail transportation rather than the use of road transportation such as trucks. The finding is supported by a previous study which pointed out that the development of inland ports could reduce the congestion and pollution issues (Hanaoka and Regmi, 2011). The largest beta coefficient is found in environmental factor (beta=0.420). This means that the environmental factor makes the strongest contribution to explain the perception of residents towards the development of the Bukit Kayu Hitam Inland Port.

Furthermore, based on correlation analysis (*Table 1*), the results show a positive but low correlation between the economic factor and the perception of residents towards the development of Bukit Kayu Hitam Inland Port (p=0.000, r=0.375). Besides, based on results from regression analysis (*Table 2* to *Table 4*), the result shows the economic factor is not able to show the significant result on residents' perception towards the development of Bukit Kayu Hitam Inland Port (p=0.612>0.05). This is because from the perspective of residents, the development of inland ports has an intangible impact on economic growth, and it takes a longer time to make contributions compared with the environmental factor and the social factor. This finding is consistent with a previous study conducted, which stated that the development of the inland port has no significant relationship with the employment development in the regions as the development of cargo throughput will not affect job opportunities (Wiegmans et al., 2015). Thus, the residents' perception is not affected by the economic factor.

Based on results from regression analysis (*Table 2* to *Table 4*), the result shows a significant effect of a social factor on residents' perception towards the development of the inland port in Bukit Kayu Hitam (p=0.000<0.05). Most of the residents agree that the development of Bukit Kayu Hitam Inland Port will improve public infrastructures such as the railway system, roads, communications, and water pipes in Kubang Pasu. The finding is supported by Black et al. (2018), which stated that the development of the inland port would improve the environment and provide a better quality of life to the regions by transferring from roads to railways. Hence, the social factor will affect the residents' perception. Moreover, based on the mean statistics among genders of Kubang Pasu residents (*Table 5* and *Table 6*) as well as the mean statistics among the educational level of Kubang Pasu residents (*Table 7* and *Table 8*), there is a not significant mean difference in the residents' perception towards the development of the inland port in Bukit Kayu Hitam between genders (p=0.968>0.05) and the educational level of residents (p=0.602>0.05). The residents have almost the same perception towards the development of BKH inland ports, whether they are men or women and whether they are highly educated or non-highly educated. Therefore, the genders and educational levels will not affect the residents' perception.

Conclusion

This study seeks to examine the residents' perception towards the development of the inland port in Bukit Kayu Hitam. The independent variables were selected after reviewing numerous past related studies. Concerning that, the major finding of this research study has shown that the environmental factor and social factor are significantly related to the residents' perception towards the development of the inland port in Bukit Kayu Hitam. However, the economic factor is not significantly related to the residents' perception towards the development of the inland port in Bukit Kayu Hitam. In addition, there are also no significant results in the mean difference of the residents' perception towards the development of the inland port in Bukit Kayu Hitam between genders and educational levels. As a result, all parties involved with the development of Bukit Kayu Hitam Inland Port should pay close attention to the environmental factor and social factor to provide a beneficial result for the residents in Kubang Pasu. The study also increases the overall awareness level from Kubang Pasu residents towards the development of the inland port in Bukit Kayu Hitam through the surveys as 74.9% of respondents did not know about the development of the inland port

in Bukit Kayu Hitam. Due to the limitation of time, the results obtained are relatively hasty. Therefore, we recommend extending the study period and use observations as well as interviews to collect data to obtain better results.

Last but not least, the study aims to enhance the understanding of the development of Bukit Kayu Hitam Inland Port and its impact on regional residents' perception under different factors. By understanding the perspectives of Kubang Pasu residents, the authorities and organizations that are involved in the project of Bukit Kayu Hitam Inland Port can further improve their existing plans to meet the expectations of the residents. The study is also hoped to be useful for future researchers in providing information to conduct their research.

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Conflict of interest

The author confirms that there is no conflict of interest with any parties involved with this study.

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