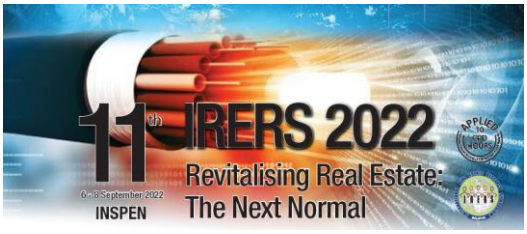

SUSTAINABLE URBAN INFRASTRUCTURE AND COMMUNITY SATISFACTION: A CASE IN MARINA PARKCITY SARAWAK

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Abstract

The coastal region of Miri is undergoing rapid development along the urbanization process promoted by the oil field's discovery. Growing demand for infrastructure is a great challenge to achieve sustainability in urban growth, social climate, and the environmental domain. It was mandatory to examine the community satisfaction towards the urban infrastructure provided as they are the main user of such infrastructure. This study aims to determine the significance of sustainable urban infrastructure indicators in influencing community satisfaction towards the infrastructure provided in the coastal reclamation in Marina ParkCity, Sarawak. A total of five (5) indicators of sustainable urban infrastructure and its associated indicators ascertained from the literature review was examined through an online questionnaire survey. Convenience sampling is adopted resulting in a total of 421 valid responses was collected and analysed through PLS-SEM Path Analysis assisted by SmartPLS 3.0 software. The findings show that sustainable urban infrastructure that provides social benefit has a significant effect on community satisfaction. The result of the present study will be useful to policymakers, urban planners, and developers to design a better blueprint that can enhance the development of the urban infrastructure of the coastal reclamation region.

Keyword: Indicator, community satisfaction, sustainable urban infrastructure.

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INTRODUCTION

Development must always match the sustainable standard to ensure the wellness of the current generation without exploiting the rights of our heirs to enjoy and fulfil their needs. Aligned with the increased size of population, the states of Malaysia located in coastal line region such as Pulau Pinang, Melaka, Johor, Sarawak and Sabah made the choice of expanding the land area by conducting coastal reclamation. Regrettably, there is lack of research is done on the urban infrastructure sustainability in coastal reclamation area in Malaysia although there was a lot of reclaimed areas in the country coastal line city.

According Du et al. (2019), the published literatures relating to the topic of "sustainable urban infrastructure" shows an emerging trends. Infrastructure sustainability is widely discussed in engineering field especially civil engineering. Previous research is done by focusing only on single type for infrastructure, for example, road infrastructure (Danilina & Chebotarev, 2018) and sewerage infrastructure (Fuente et al., 2016). Limited number of studies have been carried out to examine the user's satisfaction towards the urban infrastructure developed within a region. According to the researchers such as Zhang et al. (2019) and Parker and Simpson (2018) there is a need to identify the urban infrastructure user's satisfaction as it affecting the people's desire to use the public infrastructure and the information is useful for the determination of the actions and decisions by the local authorities and operators to improve the site management. Efficient urban infrastructure helps to reduce the input and output of materials to achieve the goal as a sustainable city. Sustainable urban infrastructure ensures efficient material flow; however, the user's expectation should not be overlooked. It is essential to ensure the urban infrastructure provided within a region meets the user's expectation. Therefore, this study aims to identify the significance of the sustainable urban infrastructure in influencing community satisfaction.

LITERATURE REVIEW

Sustainable Urban Infrastructure

Infrastructure offers utilities such as heating, electricity, accessibility, and sanitation that are crucial for urban society. The notion of infrastructure is one of the basic physical and organizational systems and facilities that are crucial to the performance of a society or enterprise (Greenwood et al., 2018). Infrastructure was specified as the amount of the material, institutional, and personal facilities and data at the disposal of economic agents that lead to the realization of equalization of the remuneration of comparable inputs in the event of an

acceptable allocation of capital, for example, full integration and maximum degree of economic activity.

Infrastructure is a key concern in both developing and developed countries. It is important to provide a reliable infrastructure because it directly impacts all sustainable development initiatives. As stated by Lee (2011), academicians and legislators have long reported and recognized the importance of the infrastructure sector for economic growth and sustainability. The importance of infrastructure in Malaysia have been promoted and highlighted in the Ninth Malaysia Plan (2006-2010), the Tenth Malaysia Plan (2011-2015) and the Eleventh Malaysia Plan (2015-2020). In terms of the standard of its infrastructure, Malaysia is ranked 29th out of the other 144 countries, helping to render Malaysia as a competitive investment destination (Azam & Bakar, 2017).

Infrastructure sustainability has been identified as a vital criterion for assessing the sustainability lifecycle of a project, region or country (Meng et al., 2018). From a project viewpoint, sustainable urban infrastructure preserving practical principles for long-term infrastructures, such as protection, legitimacy and longevity. Sustainable urban infrastructure offers a sustainable and efficient mechanism to enhance the living standards and quality of life of communities. Besides, sustainable urban infrastructure also contributes to social survival and development while fostering the environmental, economic and human growth of regions (Meng et al., 2018). Many experts believe that without the introduction of a plan to reduce incidents and unforeseen failures in urban service services, the resilience of the urban economy is unachievable (Mugume et al., 2017).

Indicators of Sustainable Urban Infrastructure

According to Alnoaimi and Rahman (2019), the sustainability of urban infrastructure is defined as the combination of environmental, economic, and social dimensions. It was expected to stabilize the development of the three aspects. Sustainable urban infrastructure performing specific functions and services fulfil the needs of present and future generations. By focusing on the three pillars of sustainability, a sustainable infrastructure system can be accomplished. By this, the goals such as minimizing the impact on the environment, life quality improvement and low maintenance and life cycle cost can be achieved. In this study, the sustainable urban infrastructure indicators were identified by literature review method. A total of four (4) sustainable urban infrastructure indicators with eighteen (18) sub-indicators for the sustainable urban infrastructure is identified and use to access the community satisfaction.

Table 1: Indicators and sub-indicator

Indicators	Sub-indicators	Description	Reference
Transportation	• Accessibility of public transport • Availability of public transport • Low rate of traffic accident • Quality of road • Low level of traffic congestion • Quality of the sidewalk path and facilities	The transportation infrastructures improve the quality of life by providing accessibility and mobility.	Azwar et al., 2013; Persada et al., 2018; Persada et al., 2020; Baek, 2015; Danilina & Chebotarev, 2017; Chen et al., 2019
Infrastructure network	• Adequate service for transporting solid waste and waste-water • Availability of water, electric and gas supply • Quality of the infrastructure services • Integration of various infrastructure systems	The infrastructure network should highly integrated as it enables the neighborhood to operate to achieve a better efficiency.	Azwar et al., 2013; Danilina & Chebotarev, 2017; Wang et al., 2018; Chen et al., 2019; Liu et al., 2020
Environment	• Water and air quality • Optimum use of the built-up space • Condition of the landscape • Availability of green covered area	Infrastructure was both relational and ecological, relating technological systems to society and the environment.	Persada et al., 2014; Persada et al., 2018; Persada et al., 2020; Liu et al., 2020; Chen et al., 2019
Social	• Community's awareness towards sustainability concept • Availability of amenities for communities • Availability of the infrastructure that provide connectivity among community • Availability of open space for social activity	Infrastructure that support public engagement is necessary in stimulating democratization and minimize social and environmental tensions.	Persada et al., 2014; Persada et al., 2018; Persada et al., 2020; Liu et al., 2020

METHODOLOGY

Literature review is adopted to identify the sustainable urban infrastructure indicators of coastal reclamation region. Before the actual survey was conducted, pre-test of questionnaire is carried out and the result is showing a high internal consistency of the indicators as the Cronbach's alpha of each indicators exceed the threshold of 0.7. Thus, the study is proceeded by distributing questionnaire to the targeted respondent. The respondents are the individuals that live in Miri city, Sarawak. Convenience sampling is adopted in the study and a total of 421 valid sample is obtained and analysed. Online platform is adopted in the effort of questionnaire distribution. The collected data is submitted for PLS-SEM analysis assisted by SmartPLS software.

Conceptual Model of the Research

A conceptual model or hypothetical model is established from a review of previous research was shown in Figure 1, serve as a foundation for examining the interactions between dependent and independent variables (Fellows et al., 2008). Table 2 shows the indicators and corresponding sub-indicators in analysing the community satisfaction towards the sustainable urban infrastructure in the Marina ParkCity, Sarawak.

Four (4) hypothesis is developed based on the indicators are listed as below:
H1: Environment has significant effect on community satisfaction.
H2: Infrastructure network has significant effect on community satisfaction.
H3: Social has significant effect on community satisfaction.
H4: Transportation has significant effect on community satisfaction.

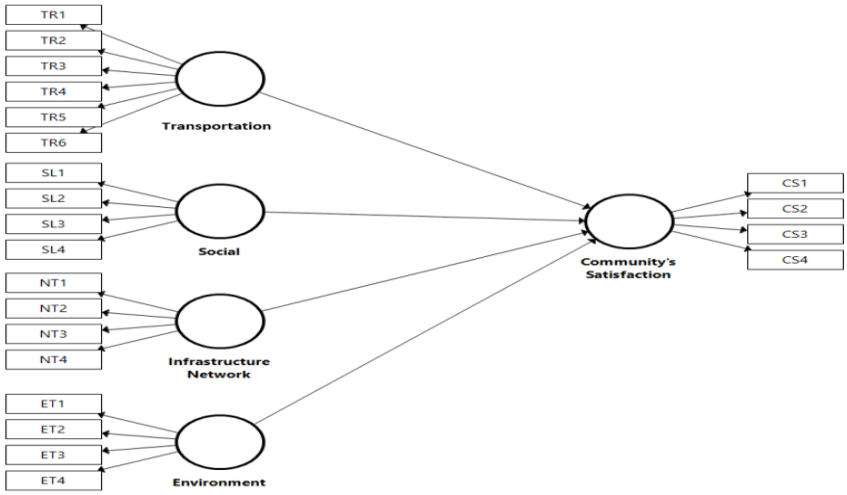

Figure 1: Proposed conceptual model of the sustainable urban infrastructure

RESULT AND ANALYSIS

Respondent's Profile

Frequency analysis was adopted as the approach for reviewing the background of the targeted respondents. Table 3 shows the summary of the respondent's background.

Table 3: Respondent's background

Respondent's Background	Frequency
Gender	52% female (*n=220*)
	48% male (*n=201*)
Age	43% 25 years old and below (*n=181*)
	39% 26 to 35 years old (*n=166*)
	16% 36 to 55 years old (*n=65*)
	2% 55 years old and above (*n=9*)
Frequency travel to Marina ParkCity in a Week	54% 2 times and below (*n=227*)
	36% 3 to 5 times (*n=153*)
	10% 6 times and above (*n=41*)

PLS-SEM Analysis

The hypothesised model is tested using Partial Least Squares-Structural Equation Modelling (PLS-SEM). Measurement and structural model are assessed by using various test as follows.

Assessment of Measurement Model

The measurement model is assessed by internal consistency reliability, indicator reliability, convergent validity, and discriminant validity to examine the validity and reliability of the measurement model for this study. The results show that all the collected sample are reliable as the Cronbach Alpha coefficient, rho_A and CR are exceeding the threshold of 0.70 (Faraj & Wasko, 2005; Gelhard & Delft, 2016; Zhang et al., 2019). Besides, the loading of all indicators of the reflective measures for PLS path model was in the range of 0.533 to 0.862 which are all greater than the threshold of 0.5, as recommended by Hulland (1999) and Hair et al. (2011). Moreover, the AVE of the data set range from 0.471 to 0.596, indicating the convergent validity is achieved. Two approaches are applied to assess the measurement of discriminant validity, namely heterotrait-monotrait ratio of correlations (HTMT) and Fornell-Larcker criterion respectively. The

HTMT ratio of the dataset ranges from 0.188 to 0.914 and Fornell Larcker's criterion have achieved discriminant validity.

Table 4: Assessment of Measurement Model

Indicators	Items	Item Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Environment	ET1	0.670	0.759	0.861	0.834	0.559
	ET2	0.841				
	ET3	0.735				
	ET4	0.735				
Infrastructure Network	NT1	0.862	0.727	0.798	0.823	0.541
	NT2	0.642				
	NT3	0.673				
	NT4	0.745				
Social	SL1	0.862	0.785	0.826	0.853	0.596
	SL2	0.781				
	SL3	0.825				
	SL4	0.591				
Transportation	TR1	0.774	0.776	0.795	0.840	0.471
	TR2	0.774				
	TR3	0.690				
	TR4	0.650				
	TR5	0.667				
	TR6	0.533				
Community satisfaction	CS1	0.805	0.743	0.749	0.838	0.564
	CS2	0.696				
	CS3	0.747				
	CS4	0.753				

Assessment of Structural Model

The structural model (inner model) is accessed to examining the hypothesized relationships between indicators in the community satisfaction towards the sustainable urban infrastructure indicators. The structural model is assessed by collinearity assessment such as r square test, and the determination of path coefficient, t value and p value. Bootstrapping analysis (5000 samples) is adopted to access the direct effect of all hypothesis relationships that are represented by statical testing of the hypothesis. Table 5 showing the path coefficients and hypothesis testing of the study.

Table 5: Significance testing results of the structural model path coefficient

Hypothesis	Relationship	Path Coefficient	T-value	p-value	Decision

H1	Environment-> Community Satisfaction	0.037	0.583	0.560	Rejected
H2	Infrastructure Network -> Community Satisfaction	0.004	0.064	0.949	Rejected
H3	Social -> Community Satisfaction	0.144	2.189	0.029	Accepted
H4	Transportation -> Community Satisfaction	0.096	1.363	0.173	Rejected

DISCUSSION

Out of four (4) stated hypotheses, the result of PLS-SEM analysis of the data showed H3 was supported while the other three (3) of the hypotheses were not. H3 is supported and proving there is a significant value of the relationship between Social and Community satisfaction. The significant relationship between Social and Community satisfaction has been discussed in the previous work of Crowe (2010). This is mainly due to the questionnaire survey is participated by the citizen with higher education levels and younger ages which is according to Guo et al. (2018), have a higher awareness of the sustainability concept. Individual satisfaction with their local community is influenced by experience with social infrastructure, which adds to a community's liveability (Davern et al., 2017). As most of the respondents only travel 2 times or lesser in a week to the site, it can be explained that the site is not a necessary route for them to commute to their working place or education hub. They only travel to there during leisure and this makes them cherish the infrastructure that provide social connectivity more than the other urban infrastructure. The open space in Coco Cabana, Miri is usually crowded during the weekend. Roadshows and various carnivals that were held in the Maritime Museum attracted a lot of visitors before the pandemic. Moreover, social activities that involved public participation such as volunteer activities and marathons are regularly held on the site. The site is also acts as a leisure spot that providing exercise and jogging space for the public. In short, it can be concluded that Marina ParkCity function as a site that support connectivity among the local community satisfies the users.

This study unable to identify significant relationships between environment, infrastructure network and transportation (H1, H2 and H4). H1 is rejected showing the Community satisfaction is not affected by the Environment. However, according to Parker and Simpson (2018) the environment is significantly impacting user satisfaction. A pleasant environment provides good psychological and physiological benefits, as well as spiritual well-being. The variation that arises from the result is due to there will not have two identical environments provided in two different locations. The difference in site of study arises different result. Besides, H2 is rejected which is not aligned with Rode's (2020) findings that shows the infrastructure network provided is significantly

influencing society as a well-developed infrastructure network improves the standard of living of people. The other rejected H4 indicates the Transportation does not influence the Community satisfaction significantly. Although the relationship observed between the Transportation and Community satisfaction is not significant in the study, however, the indicator is still important as argue by Zhang et al. (2016). Transportation has a less significant positive effect on the Community satisfaction in this study. This is due to most of the residences in Miri commute with their own vehicle and there is no public transportation available other than city bus and taxi. Hence transportation was found not significant in influencing the community's satisfaction towards the infrastructure provided in Marina ParkCity,

CONCLUSION

The purpose of this study is to determine the significance of the sustainable urban infrastructure indicators in influencing community satisfaction towards the infrastructure provided in Marina ParkCity, Sarawak by collecting survey data from a sample of 421 Miri's residents to provide a full picture of the extent coverage of sustainable urban infrastructure dimension. Only one (1) out of four (4) hypothesis is accepted. The findings of this research are expected to assist authorities in setting the benchmark in the development on coastal line region. This research will contribute to help researchers to get an overview of the importance of sustainable urban infrastructure in coastal reclamation region and will be used by researcher who will dive deeper in this topic. This study identified the significance of the sustainable urban infrastructure indicators in influencing community satisfaction towards the infrastructure provided in the coastal reclamation in Marina ParkCity, Sarawak. Although the objective is achieved, there is limitation found in this study. The generalizability of the result is limited which it merely represents the perception of community in Miri, Sarawak. The same study carried out in other sites results in different outcomes. The study carried out in the other locality may yield different results and insights. Thus, similar methodology can be adopted in future study that cover wider scope and across various locality.

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