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The Heritage City Sustainability Index in Malaysia

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Abstract: This research aimed to build an index of heritage city sustainability in Malaysia. The method used was quantitative with a field survey design. Ten heritage cities listed in the Malaysian Architectural Heritage Inventory Study Report were utilized as the study areas: George Town, Melaka City, Taiping, Kuala Kubu Bharu, Jugra, Tampin, Muar, Kota Bharu, Kuala Lipis, and Kuching. A total of 1000 respondents were recruited utilizing cluster sampling and a simple random sampling method. The data were analysed with factor analysis methods as well as descriptive and index formulas. The results show that the sustainable heritage cities are Melaka City (0.85) and Muar (0.75). The moderately sustainable ones are Kota Bharu (0.71), George Town (0.68), Taiping (0.67), Kuching (0.67), Jugra (0.63), Tampin (0.60) and Kuala Lipis (0.58). Meanwhile, Kuala Kubu Bharu (0.47) is less sustainable. This analysis implies that heritage cities can be arranged according to their respective levels of sustainability and can act as a reference for the authorities for future development.

1. INTRODUCTION

Sustainable development, which includes three main components: social, economic, and environmental, builds on the initial idea of sustainability (World Commission on Environment and Development [WCED], 1987). Sustainability is the use of resources in a way that does not harm the environment, the health of the planet's inhabitants, or the capacity of future generations to sufficiently meet their requirements. The sustainable development disclosure movement in Malaysia began with the Second Malaysia Plan. It continues to this day with Malaysia's commitment to achieving the Sustainable Development Goals (SDGs), which were first introduced in 2015 and form the core of the 2030 Agenda for human well-being and development.

Referring to the urban context, the 11th goal of the SDGs aims for sustainable cities and communities (United Nations Development Programme [UNDP], 2017). This agenda has received strong support expressed through

the New Urban Agenda, which aims to make the cities and settlements of human beings inclusive, resilient, safe, and sustainable (Habitat III., 2016). Nevertheless, sustainable urban development cannot be carried out only in general, but must also encompass the scope of cultural heritage (Appendino, 2017). One of the reasons for the failure of urban development today is due to the marginalization of cultural heritage, which is a key element in an urban area (Wiktor Mach, 2019).

Despite the fact that Malaysia has an estimated 162 cities with a substantial legacy, uniqueness, and aesthetic appeal, no serious attempts have been undertaken to properly analyse the sustainability of its existing heritage towns (Syed-Zainol, 1992). While the Malaysian Urban Indicators Network (MURNINet 2.0), a set of indicators developed by the Department of Town and Country Planning in 2019, evaluates urban sustainability in Malaysia, the assessment tool outlined in this paper aims to measure the sustainability of all types of cities in Malaysia, including large, small, advanced, and heritage cities, without specific indicators dedicated to cultural heritage.

Therefore, the issue of heritage city sustainability in Malaysia can be resolved with the construction of indicators and an index of heritage city sustainability. The setting of a standard index allows the preparation of heritage urban sustainability programmes tailored to its level. This heritage city sustainability index summarizes urban sustainability based on social, economic, environmental, government, cultural heritage, and community roles. It is a comprehensive one because it covers all aspects found in the city and it is also based on the characteristics of the urban environment in Malaysia.

2. LITERATURE REVIEW

The phrase ‘sustainable development’ refers to a type of development that satisfies present-day requirements without threatening the ability of future generations to likewise fulfil their own wants. This strategy combines economic, social, and environmental sustainability with the fundamental aims of poverty eradication and equitable income distribution. The emergence of the notion of sustainable development on a global level can be traced back to various historical milestones, such as the publication of the *Limits to Growth* report in 1972 and the Brundtland Report in 1987, followed by the Rio Summit in 1992, the Decade of Education for Sustainable Development from 2004 to 2014, and the United Nations’ SDGs consisting of 17 key objectives, which serve as a framework for sustainable development.

Various modifications have been undertaken in the context of the global urbanization agenda, such as the Healthy Cities Movement, Local Agenda 21, and the latest New Urban Agenda. The New Urban Agenda is a recent agenda that aspires to make the future better and more sustainable (Habitat III., 2016; Satterthwaite, 2016). The United Nations Conference on Housing and Sustainable Urban Development in Quito, Ecuador, accepted this agenda on 20 October 2016 (Caprotti, Cowley et al., 2017). One of the goals of the New Urban Agenda is to create sustainable, healthy, and habitable cities at all phases of development, regardless of whether a country is developed, developing, or underdeveloped.

The New Urban Agenda also emphasizes the importance of cities’ cultural and natural heritage in urban planning, including the best restoration and adaptation efforts, as well as the promotion and diffusion of knowledge about the city’s tangible and intangible cultural past. This is in addition to the

association between good urbanization and aspects like livelihood opportunities, job creation, and a better quality of life (Habitat III., 2016). This demonstrates that cultural heritage has been identified as an important component in the creation of a sustainable city (Bandarin, Hosagrahar et al., 2011; Kashihara, Nguyen et al., 2022; Runnalls, 2007; Tweed and Sutherland, 2007; Wang, Zhang et al., 2023). Cultural heritage is positioned as the fourth dimension of sustainable development. At the same time, Appendino (2017) articulates a paradigm shift towards sustainability foundations, citing heritage aspects as one of the main pillars of sustainability advocates.

A city's distinctiveness is characterized by its natural or cultural features, whether tangible or intangible, regardless of its size. Each city, according to Salvatore (2018), Akil, Pradadimara et al. (2022) and Wu, Dang et al. (2023), has its own particular identity. According to Guzmán, Pereira Roders et al. (2014) and Caratelli, Misuri et al. (2019), cultural legacy is an important part of urban identity that transcends economic success and deserves policy attention. Van Oers and Pereira Roders (2012) study the impact of cultural heritage on sustainable urban development in Belfast (Ireland), finding that cultural heritage promotes a unique urban character and strengthens a sense of belonging among residents across generations and thereby contributes to sustainable urban development. Although Coccossis (2008), Al-hagla (2010), and Throsby (2016) claim that tourist sustainability is the primary focus of analysing heritage cities, the relevance of cultural heritage in building sustainable cities has never been overlooked.

Numerous countries and cities have developed their own global sustainability indices, such as the Australian Conservation Foundation's Sustainable Cities Index (Australian Conservation Foundation, 2010) and the Thailand Environment Institute's Sustainable Development Index (United Nations Economic and Social Commission for Asia and the Pacific [ESCAP], 2007). The Department of Town and Country Planning (PLANMalaysia) governs the London Sustainable Development Indicator (London Sustainable Development Commission, 2004) and MURNINet 2.0 assessments, which measure urban and rural sustainability in Malaysia. Each year, the Urban Sustainability Index and the Urban Happiness Index are released as performance indicators for every Malaysian city (Ghazali, Saleh et al., 2021). However, none of these official measurements include cultural heritage components as a category; all the indices solely consider the economic, social, and environmental domains.

The availability of instruments and indicators encompassing all aspects of sustainability can provide answers to queries about the sustainability of Malaysian heritage cities. To accomplish this, this study aims to create and apply an instrument with five complete constructs in Malaysia, drawing on the Report (1987) foundation of sustainability of Brundtland (1987), cultural heritage construct of Appendino (2017), and government and community role construct of Leus and Verhelst (2018), as well as the work of Tan, Tan et al. (2018), Ghazali, Saleh et al. (2021) and Pramono, Palupi et al. (2022). The specifications of each construct, sub-construct, and item are established based on the local environment of Malaysian heritage cities, with references to the United Nations Educational, Scientific and Cultural Organization (UNESCO), Healthy City Movement, New Urban Agenda, Local Agenda 21, and others.

3. METHODOLOGY AND STUDY AREA

This work uses a quantitative method with a survey study design utilizing a questionnaire instrument as a data collection tool.

3.1 Study Area

The study area covers 10 heritage cities in Malaysia, divided into three tiers: large cities, medium cities, and small towns. The cities were selected from five regions: the northern (Penang – George Town and Perak – Taiping), southern (Negeri Sembilan – Tampin, Melaka – Melaka City, and Johor – Muar), central (Selangor – Kuala Kubu Bharu and Jugra), and east coast (Pahang) zones (*Figure 1*). These are cities that are 'old,' i.e., have existed since before World War II, and (i) are inhabited by multi-cultural communities resulting from external influences such as Malay, Chinese, Indian, Peranakan Chinese, and Peranakan Jawi people, (ii) highlight the significance of changes in human values over time or in the span of world cultures, such as the development of architecture or technology, the uniqueness of monuments, urban planning, and landscape design, (iii) are unique or have had a great influence on cultural traditions or civilizations that have survived or have been lost, and (iv) have become a model and a source of inspiration, notably in the fields of building design, architecture, and urban planning.

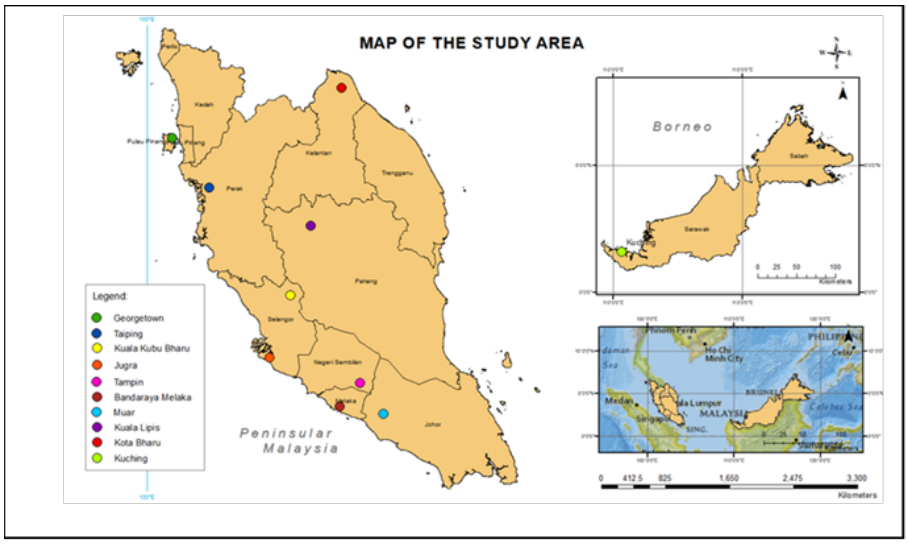

Figure 1. Map of the study

3.2 Instrument Formation

The research instrument utilized was a questionnaire. The constructs, sub-constructs, and questionnaire items were constructed based on previous studies. The main basis of the construction of the questionnaire was centred on the sustainability theory of the Brundtland Report (World Commission on Environment and Development [WCED], 1987) and the sustainability theory of Appendino (2017). Results from previous works have successfully produced five main constructs, 14 sub-constructs, and 154 items. All of these aspects were rated on a five-point Likert scale. The constructed questionnaire went through several processes, as described below.

3.2.1 Content Validity

Upon completion of the process of constructing the questionnaire instrument, the next step was to perform content validation. Six academics from Malaysian public institutions who are specialists in the relevant field evaluated the accuracy of the information contained in this study. The appointed experts assessed the level of applicability of each item in the construct and sub-construct and authorized the use of this questionnaire in the research.

3.2.2 Face Validity

After a modification of the questionnaire form as a result of the experts' comments and suggestions, face validation was performed. This involved three residents residing in the town of Tanjung Malim, which is also one of the heritage cities, according to Syed-Zainol (1992). As a result of the face validation, several views and comments from the participants were researched and used to improve the study instrument. Upon completion of all pretest processes, a set of questionnaires with 154 items was issued for the pilot study.

3.2.3 Pilot Study

Next, a pilot study in the heritage city of Kajang was conducted to test the questionnaire. Kajang was selected as a pilot area because its characteristics are similar to the actual study area, as a heritage city that is the centre of society in the context of social, economic, and cultural heritage, environmental, and the role of government and community. A total of 100 sets of questionnaires were distributed to residents in Kajang. The results of this pilot study have been assessed in reliability tests. The Cronbach's Alpha value is based on the reliability index classification, i.e., the value of 0.90–1.00 is very high, 0.70–0.89 is high, 0.30–0.69 is moderate, and 0.00–0.30 is low (Babbie, 1992). The analysis results from the pilot study showed that the Cronbach's Alpha value was between 0.7 and -0.95 at a very high and high level. Therefore, according to the classification set by Babbie (1992), this investigation's instrument has a high reliability level. The actual questionnaire was then distributed to respondents between 2019 and 2020 (over one year).

3.2.4 Exploratory Factor Analysis (EFA)

A factor analysis was conducted during the pilot study stage to identify and rearrange a large number of questionnaire items into components under each specific variable from a sample that was truly representative of the variables. The main purpose of the EFA was to identify the components present in the selected variables used in the analysis. This process required dropping unrelated items to form single components in the questionnaire. The EFA was also performed to provide an interpretation of new components. The EFA results confirmed that five constructs, 14 sub-constructs, and 134 items met the goodness-of-fit condition (*Table 1*).

Table 1. Goodness-of-Fit EFA

EFA Analysis Model Index	**Suggested Values**
Bartlett's Test of Sphericity/x^2 (sig.<0.005)	<0.05
Kaiser-Mayer-Olkin Sample Adequacy Test (KMO)	>0.05
Factor Loading (FL)	≥0.50

Values of Uniformity (Communalities)	≥0.30
Eigen Value	≥1.00
Percentage Value of Variance Change	≥8.00
Percentage Contribution of Variance to Factor	≥3.00

3.2.5 Confirmation Factor Analysis (CFA)

The items successfully passed the EFA analysis procedure and were used for the CFA analysis. First, the CFA for each construct was developed based on the dimensions already identified in the EFA. Next, a modification process was carried out to ensure that each CFA model achieved model-matching accuracy. After that, a construct validity assessment was performed to ensure all the loaded items had convergent validity. The three indicators were constructed with a reliability value (pc) > .70, factor weighting value (λ) > .50, and extracted mean variance (AVE) value .50. The findings from grouping and deleting elements at the CFA level benefitted the questionnaire preparation process for the actual investigation, where there was a reduction of items compared to those in the pilot study questionnaire. Five constructions, 14 sub-constructs, and 57 items successfully built a fit CFA model (*Table 2*).

Table 2. Sustainable indicators

Construct	Sub Construct	No.	Indicator
Economic Welfare	Human Mobility	4	Number of tourists
			Presence of foreign tourists
			Weekend tours
			Seasonal tourism
	Business Activities	4	Price standards
			Acceleration of business activity
			Business opportunities
			User's choice
	Economic Growth	5	Job opportunities
			Development of services sector
			Development of MNC sector
			Working hours
			Employee focus
Social Well-being	Basic Facilities	4	Educational facilities
			Sports/recreational facilities
			Convenience of gathering space
			Hospitality facilities
	Relationships and Utilities	4	Disabled facilities
			Walkaway
			Parking
	Public Safety and Order	2	Safety of Women
			Security
Environmental Well-being	Environmental Health	3	Clean water
			Disaster free
			Green plant coverage
	Land Use	5	Ease of access
			Development planning
			Green area reserve
			Open space reserve
Cultural Heritage	Tangible Culture	6	Building functionality
			Image retention
			The value of patriotism
			Tourist's attraction
			Research
			Historical value
	Intangible Culture	3	Performing arts
			Classical music/songs
			Traditional games

Construct	Sub Construct	No.	Indicator
Government and Community Role	Role of Community	7	Survival of cultural heritage Preservation and conservation Foster a patriotic spirit Community programs Cultural programs Cultural campaigns Cultural seminars
	Enivronmental Management	3	3R programs Environmental education programs
	Tourism and Heritage Management	4	Financial assistance Tourism campaigns Prominence of cultural assets Moral support
	Risk Management	4	Traffic safety Recognition Guide/manual Inspection/empowerment

3.3 Data Collection Method

The cluster sampling approach was utilized to choose the sample. This was because the study area and population were too big and included a wide range of topics. Chua (2006) states that group sampling is best for obtaining significant results. In the first stage, five zones were chosen, and in the second stage, 10 heritage cities were chosen at random as research sites using simple random selection. Based on the population of the area, a sample of 1000 people was employed. Next, in the third stage, 100 samples were selected randomly in each study area consisting of various demographics such as gender, age, race, educational level, social status, type of employment, and income. The sample included individuals of 18 years of age and older living or working in urban heritage areas, as they act as local communities driving the economy and witnessing development changes, and as policy makers and beneficiaries of the positive and negative impacts of urban heritage sustainability. Therefore, the sampling procedure applied was three-tier cluster sampling because the random sampling was conducted three times.

3.4 Data Analysis Method

In this study, the sustainability indicators comprised five constructs, 14 sub-constructs, and 57 items, and coordination of these units was necessary for aggregation, as noted by Mayer. The standardization method [0,1] was adopted, in which the minimum and maximum values of each indicator serve as goal indicators. This method was selected because using a numeric range of 0 to 1 facilitates computational work and comprehension. Furthermore, it simplifies the determination of indicator weights in the future, as pointed out by Choon, S.-W., Siwar et al. (2011). The standardization formula is as follows:

$$Index = \frac{\text{Actual X Value} - \text{Minimum X Value}}{\text{Maximum X Value} - \text{Minimum x value}} \quad (1)$$

This study used the highest construct value obtained among heritage cities at census time as the maximum value and the lowest as the minimum value to adjust the indicators. At the same time, the real value for the index calculation

was the sum of the constructs for each city. Thus, the heritage city's overall index, average construct achievement, and construct-based index value all fell between 0 and 1. A value closer to 1 meant more sustainable conditions, while a value nearer to 0 indicated the opposite situation.

Determining the weights was an essential step, as this changes not only the index score but also the position of the index with other indices, affecting sustainability policy and planning. There is not a single standard weighting system in most of the existing works. Wendling, Emerson et al. (2020) suggest that different indicators be given the exact weighting. Alba-Hidalgo, Benayas del Álamo et al. (2018) state that assigning different weights to each variable is an arbitrary operation or only adheres to its laws. The use of varied weights will bring a subjective component into the index's development. As a result, the precise weights were determined by this paper, since each criterion was deemed equal based on the studies conducted and recommended by Choon, S.-W., Siwar et al. (2011), Choon, S. W., Chamhuri et al. (2014), and Noor, Gandhi et al. (2014). The average method was used to aggregate the indicators. Thus, this research utilized the same weighting method to develop a composite index and analyse sustainable development flow in heritage cities throughout Malaysia. For analysis and discussion, the sustainability classification table introduced by Pearc and Giles (1995) was adopted. Van Dijk and Mingshun (2005) apply this classification table to classify the sustainability index of small and medium cities in China. Choon, S.-W., Siwar et al. (2011) and Choon, S. W., Chamhuri et al. (2014) also employ this concept to provide a sustainability index of cities in Malaysia (*Table 3*).

Table 3. Classification of heritage city sustainability

Score	Description
≥ 0.75	Sustainable
≥ 0.50, < 0.75	Moderate
≥ 0.25, < 0.50	Weak
< 0.25	Unsustainable

4. RESULTS

4.1 Heritage City Index

Figure 2 illustrates Malaysia's overall sustainability index for the 10 selected heritage cities. The results showed that Melaka City (0.85/sustainable), Muar (0.75/sustainable), Kota Bharu (0.71/moderately sustainable), George Town (0.68/moderately sustainable), Taiping (0.67/moderately sustainable) and Kuching (0.67/moderately sustainable) reached an average index level of 0.65. The cities of Melaka, Muar, and Kota Bharu demonstrated the highest index of more than 0.7. Meanwhile, Jugra (0.63/moderately sustainable), Tampin (0.6/moderately sustainable), Kuala Lipis (0.58/moderately sustainable) and Kuala Kubu Bharu (0.47/less sustainable) did not reach the average index.

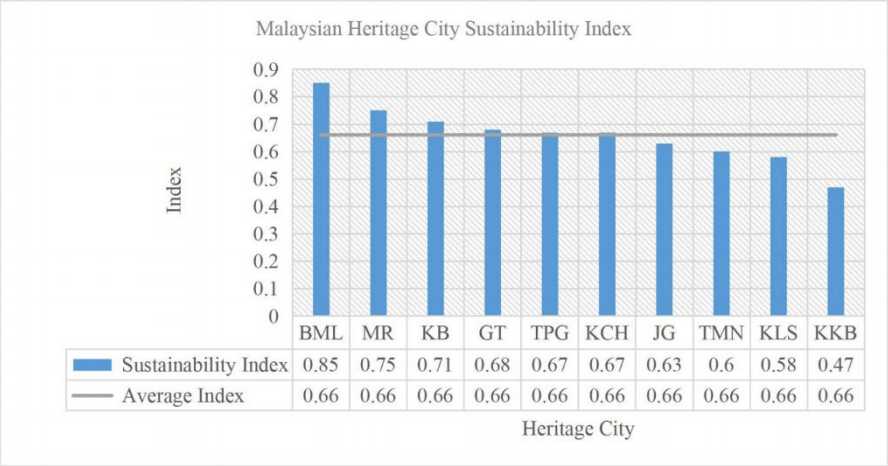

Figure 2. Malaysian heritage city sustainability index graph

4.2 Construct Index

Table 2. Sustainable indicators depicts Malaysia's economic prosperity index for the 10 selected heritage cities. As for the economic prosperity index, the results indicated that Muar (0.63), Kuala Lipis (0.56), Kuala Kubu Bharu (0.54), and Kota Bharu (0.5) are moderately sustainable. At the same time, Tampin (0.47), Jugra (0.46), Taiping (0.45), Melaka City (0.36), Kuching (0.33), and George Town (0.3) are less sustainable. Next, for the social well-being index, the results showed that Kuala Kubu Bharu (0.64), Kuala Lipis (0.55), and Taiping (0.5) are moderately sustainable. Kota Bharu (0.48), Jugra (0.46), George Town (0.45), Tampin (0.43), Melaka City (0.41), Kuching (0.38), and Muar (0.37) are less sustainable. In terms of the environmental well-being index, the outcomes demonstrated that Taiping (0.5), Jugra (0.5), Melaka City (0.5), and Kuala Lipis (0.5) are moderately sustainable. At the same time, George Town (0.49), Tampin (0.48), Muar (0.48), Kuching (0.48), KB (0.46), and Kuala Kubu Bharu (0.37) are less sustainable. As for the cultural heritage index, the results revealed that Kuala Kubu Bharu (0.67), George Town (0.5), Jugra (0.5), Melaka City (0.5), and Kota Bharu (0.5) reached the level of the moderately sustainable index. Muar (0.49), Kuala Lipis (0.49), Taiping (0.48), Tampin (0.48), and Kuching (0.48) are less sustainable. Lastly, the government and community role index outcomes illustrated that Muar (0.71), Melaka City (0.59), Taiping (0.54) and Kota Bharu (0.53), Kuala Kubu Bharu (0.53), George Town (0.5), Tampin (0.5), Kuching (0.5) are moderately sustainable. Kuala Lipis (0.46) and Jugra (0.33) are less sustainable.

Table 4. The index value of each construct for the heritage city

Construct	**BML**	**MR**	**KB**	**GT**	**TPG**	**KCH**	**JG**	**TMN**	**KLS**	**KKB**	**Average**
Economic prosperity	0.36	0.63	0.5	0.3	0.45	0.33	0.46	0.47	0.56	0.54	0.46
Social Well-being	0.47	0.37	0.48	0.45	0.5	0.38	0.46	0.43	0.55	0.64	0.47
Cultural Heritage	0.5	0.49	0.5	0.5	0.48	0.48	0.5	0.48	0.49	0.67	0.5
Government & Community Roles	0.59	0.71	0.53	0.5	0.54	0.5	0.33	0.5	0.46	0.53	0.52

Environmental Well-being	0.5	0.48	0.46	0.49	0.5	0.48	0.5	0.48	0.5	0.37	0.48

4.3 Construct Average Achievement

Figure 3 shows Malaysia's average achievement of the five heritage city sustainability constructs. Based on the value of the index depicted, the economic prosperity construct is the lowest compared to other constructs, which is only 0.46 (less sustainable). The social well-being construct comes in second, with an index rating of 0.47 (less sustainable), followed by the environmental well-being construct, which has an index reading of 0.48 (less sustainable). Finally, the government and community role construct had the highest index of 0.52 (moderately sustainable), and the second highest was the cultural heritage construct of 0.5 (moderately sustainable).

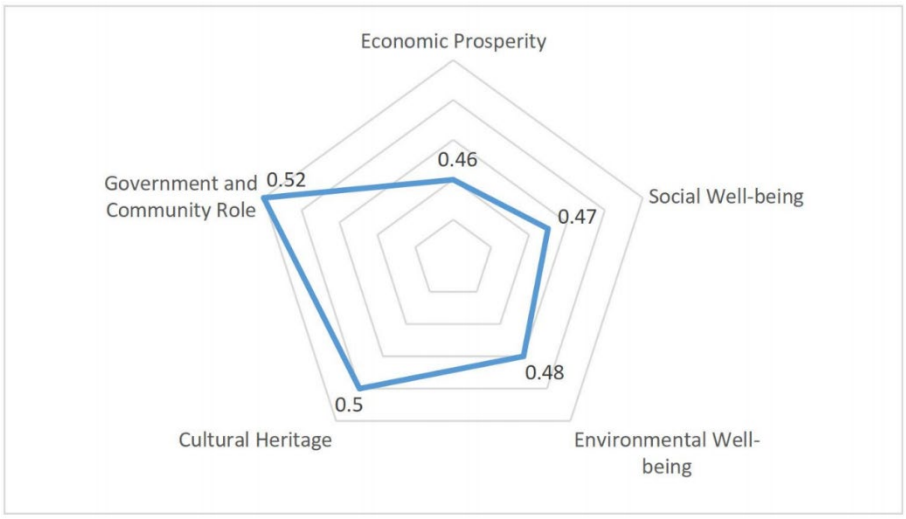

Figure 3. Average achievement of the construct index

5. DISCUSSION

5.1 Sustainable Heritage Cities

The cities that recorded the overall sustainable index were Melaka City and Muar City, at ≥ 0.75. This is because all factors measured in these two cities, including economic prosperity, environmental well-being, cultural heritage, social well-being, and the role of government and community, scored highly and very highly. The cities of Melaka and Muar showed good livability for all residents in terms of economic, social, environmental, and cultural heritage, as well as the role of government and community. Although these two cities are more than 100 years old, they can provide an inclusive, safe, and sustainable life to the community in the present and the future. The heritage elements that underlie the city's appearance and development are not an obstacle to economic, social, and environmental growth. Therefore, Melaka and Muar should be cited as examples for the development of other heritage cities. According to Ban Ki-Moon (as cited in (Wiktor Mach, 2019), the integration of cultural heritage components in urban development can lead to the creation of a sustainable city. Cultural heritage contributes to sustainable economic development, the formation of vibrant communities, a healthy environment, and sustainable economic growth. In addition, heritage can serve

as a foundation for heritage tourism, promote social harmony by fostering a sense of belonging, and conserve natural resources by reusing existing heritage elements. The values embodied in cultural heritage are boundaryless and complement all aspects of sustainable urban development (UNESCO, 2019). This is evident in the case of the cities of Melaka and Muar, which have successfully maintained their heritage elements while achieving a sustainable index.

5.2 Moderate Sustainable Heritage Cities

A moderately sustainable overall index is also something to be proud of for a heritage city. This is because the value of the index recorded is close to a sustainable level. The cities that recorded sustainable medium index values were Kota Bharu, George Town, Taiping, Kuching, Jugra, Tampin, and Kuala Lipis, which were ≥ 0.50 and < 0.75. Sustainability efforts need to be slightly increased in relation to these cities so that the value of the index can be enhanced. Constructs and sub-constructs that record a moderate level of value need to be inspected by relevant parties, and improvement strategies should be implemented to achieve the goal of sustainable development. Large gaps between medium- and high-level constructs need to be narrowed so that each of these constructs can function equally. This is because every element in the city is related to the others. If some constructs are poor, this will impact other ones. For instance, because human mobility is a less stimulating sub-construct, it will impact company operations and economic growth, which will affect other constructions like social well-being, cultural heritage, environmental well-being, and the role of government and community.

5.3 Less Sustainable Heritage Cities

This shortcoming can be seen clearly in the city of Kuala Kubu Bharu, which, despite its history, was the first garden city in Asia. Kuala Kubu Bharu recorded the lowest overall index value and deviated from the average index value. This is because many sub-constructs and constructs that record average mean values are at a moderate level. In fact, some sub-constructs almost fall to low levels. This deficiency affects the overall index of the city, although there are sub-constructs that record high values, such as basic facilities, public safety and order, environmental health, and significant culture. The high value of this sub-construct cannot increase the value of the overall index. There is a large gap between sub-constructs and sustainability constructs in the city of Kuala Kubu Bharu. More aggressive measures need to be taken to increase the capability of sub-constructs and constructs of moderate value. If proactive efforts are made based on this index's value, a sustainable heritage city can be formed in the future.

6. CONCLUSION

In conclusion, this examination of the construction of the sustainability index has succeeded in identifying sustainable, moderately sustainable, and less sustainable heritage cities in Malaysia. Prior to reaching that level, this study successfully developed a questionnaire instrument consisting of five constructs (i.e., economic prosperity, cultural heritage, environmental well-being, social well-being, and the role of government and community), 14 sub-

constructs (i.e., business activities, human mobility, basic services, economic growth, communications and utilities, public safety and order, environmental health, land use, material culture, intangible culture, roles in communities, tourism, and heritage, environmental, and risk management) and 57 items or indicators. After undergoing a long process of development, this instrument was used to measure the level and index of sustainability of Malaysian heritage cities. As a result, an index ranking 10 heritage cities in Malaysia was constructed. The cities that recorded the highest index of sustainability were Bandaraya Melaka and Muar. The cities with a moderate, sustainable index were Kota Bharu, Georgetown, Taiping, Kuching, Jugra, Tampin, and Kuala Lipis.

Meanwhile, Kuala Kubu Bharu was the only city with a less sustainable index. Nonetheless, proactive steps must be taken to improve performance for heritage cities with moderate and less sustainable indexes. A realistic strategy needs to be implemented by the parties involved to achieve the goal of sustainable heritage city development in line with the 2030 Agenda so that all inhabitants can enjoy a prosperous life in these heritage cities.

This work also aids the development of sustainability measuring indicators. Prior to this study, heritage indicators were not typically included in sustainability indicators; however, they are now. The advancement of sustainability theory is another benefit. Economic, social, and environmental sustainability are the three primary pillars of sustainable development. However, this paper has included two new pillars: cultural legacy and the function of the state and society. This complies with the New Urban Agenda's and the SDGs' calls for the inclusion of historical components in sustainable development.

Finally, this study is also significant for the measurement of sustainable heritage city development in countries in the Asian region that have essentially the same heritage city demography. Regional countries also have similar geographical characteristics, ways of life, cultures, and customs to Malaysia. These various cultural heritages were left by the ancestors of present and future generations. This heritage needs to be preserved for the future. Therefore, this indicator can be used as a reference for regional countries to measure the level of sustainability in their state.

AUTHOR CONTRIBUTIONS

Conceptualization: Saleh, Y, Methodology: Mahat, H & Ghazali, M.K.A, Field investigation, Data Collection & Analysis: Hashim, M. & Nayan, N, Writing (Original Draft Preparation): Ghazali, M.K.A. & Saleh, Y, Writing (Review & Editing): Hayati, R., Miswar & Ghazali, M.K.A., Supervision: Saleh, Y & Mahat, H.

ETHICS DECLARATION

The authors declare that they have no conflicts of interest regarding the publication of the paper.

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REFERENCES

Akil, A., Pradadimara, D., et al. (2022). "Spatial Historical Evolution of Urban Tosora Cultural Heritage". *International Review for Spatial Planning and Sustainable Development*, 10(3), 188-212. doi: https://doi.org/10.14246/irspsd.10.3_188.

Al-hagla, K. S. (2010). "Sustainable Urban Development in Historical Areas Using the Tourist Trail Approach: A Case Study of the Cultural Heritage and Urban Development (Chud) Project in Saida, Lebanon". *Cities*, 27(4), 234-248. doi: http://dx.doi.org/10.1016/j.cities.2010.02.001

Alba-Hidalgo, D., Benayas del Álamo, J., et al. (2018). "Towards a Definition of Environmental Sustainability Evaluation in Higher Education". *Higher Education Policy*, 31, 447-470. doi: https://doi.org/http://dx.doi.org/10.1057/s41307-018-0106-8

Appendino, F. (2017). "Balancing Heritage Conservation and Sustainable Development–the Case of Bordeaux". Proceedings of IOP Conference Series: Materials Science and Engineering, IOP Publishing 062002. doi: https://doi.org/:10.1088/1757-899X/245/6/062002.

Australian-Conservation-Foundation. (2010). "Sustainable Cities Index—Ranking Australia's 20 Largest Cities in 2010". Retrieved from https://www.acf.org.au/sites/default/%EF%AC%81les/resources/2010_ACF_SCI_%20Report_Comparative-Table_and_Fact-Sheets.pdf on September 4, 2022.

Babbie, E. (1992). *The Practice of Social Research.* Wadsworth Publishing Company, Belmont, CA.

Bandarin, F., Hosagrahar, J., et al. (2011). "Why Development Needs Culture". *Journal of cultural heritage management and sustainable development*, 1(1), 15-25. doi: https://doi.org/10.1108/20441261111129906.

Brundtland, G. H. (1987). "Report of the World Commission on Environment and Development: Our Common Future". Retrieved from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf on September 4, 2022.

Caprotti, F., Cowley, R., et al. (2017). "The New Urban Agenda: Key Opportunities and Challenges for Policy and Practice". *Urban research and practice*, 10(3), 367-378. doi: https://doi.org/10.1080/17535069.2016.1275618

Caratelli, P., Misuri, M. A., et al. (2019). "Al-Ain's Cultural Landscape: Identity, Innovation and Sustainability in a Challenging Economy". *International Review for Spatial Planning and Sustainable Development*, 7(3), 45-62. doi: https://dx.doi.org/10.14246/irspd.7.3-45

Choon, S.-W., Siwar, C., et al. (2011). "A Sustainable City Index for Malaysia". *International Journal of Sustainable Development and World Ecology*, 18(1), 28-35. doi: https://doi.org/10.1080/13504509.2011.543012

Choon, S. W., Chamhuri, S., et al. (2014). "Aplikasi Indeks Bandar Lestari Bagi Beberapa Ibu Negeri Terpilih Di Malaysia.". *Pembangunan Lestari Di Malaysia: Harapan Dan Kenyataan*. Dewan Bahasa dan Pustaka, Bangi.

Chua, Y. P. (2006). *Kaedah Dan Statistik Penyelidikan: Kaedah Penyelidikan (1st Ed.).* McGraw-Hill (Malaysia), Kuala Lumpur.

Coccossis, H. (2008). "Cultural Heritage, Local Resources and Sustainable Tourism". *International journal of services technology and management*, 10(1), 8-14. doi: https://doi.org/10.1504/IJSTM.2008.02034.

Ghazali, M. K. A., Saleh, Y., et al. (2021). "Pembinaan Kerangka Konstruk Kelestarian Bandar Warisan Di Malaysia". *Geografia-Malaysian Journal of Society and Space*, 17(1), 211-226. doi: https://doi.org/https://doi.org/10.17576/geo-2021-1701-16.

Guzmán, P., Pereira Roders, A., et al. (2014). "Bridging the Gap between Urban Development and Cultural Heritage Protection". Proceedings of IAIA14 Conference Proceedings, Citeseer.

Habitat III. (2016). "New Urban Agenda". Retrieved from http://habitat3.org/the-new-urban-agenda/ on September 4, 2022.

Kashihara, S., Nguyen, V. D. Q., et al. (2022). "Exploring Measures for Urban Heritage Conservation in Its Early Stages a Comparative Study between Ho Chi Minh City and Yokohama City". *International Review for Spatial Planning and Sustainable Development*, 10(3), 213-239. doi: https://doi.org/10.14246/irspsd.10.3-213

Leus, M. and Verhelst, W. (2018). "Sustainability Assessment of Urban Heritage Sites". *Buildings*, 8(8), 107. doi: https://doi.org/doi:10.3390/buildings8080107.

London Sustainable Development Commission. (2004). *2004 Report on London's Quality of Life Indicators.* Greater London Authority City Hall, London.

Noor, N. M., Gandhi, A. D., et al. (2014). "Development of Indicators for Family Well-Being in Malaysia". *Social indicators research*, 115, 279-318. doi: https://doi.org/DOI/10.1007/s11205-012-0219-1

Pearc, D. W. and Giles, A. (1995). *Measuring Sustainable Development, in the Handbook of Environmental Economics.* Blackwell Publishers, UK.

Pramono, R. W., Palupi, L., et al. (2022). "Urban Development Project Evaluation Using Multi-Stakeholder Cost–Benefit Analysis". *International Review for Spatial Planning and Sustainable Development*, 10(4), 240-259. doi: https://doi.org/10.14246/irspsd.10.4_240.

Runnalls, C. R. (2007). *Choreographing Community Sustainability: The Importance of Cultural Planning to Community Viability.* Centre of Expertise on Culture and Communities, Simon Fraser University, Canada.

Salvatore, C. L. (2018). *Cultural Heritage Care and Management: Theory and Practice.* Rowman & Littlefield, Lanham.

Satterthwaite, D. (2016). "A New Urban Agenda?". *Environment and Urbanization*, 28(1), 3-12. doi: https://doi.org/10.1177/0956247816637501

Syed-Zainol, A. I. (1992). *Pemuliharaan Warisan Rupa Bandar.* Badan Warisan Malaysia, Kuala Lumpur.

Tan, S.-K., Tan, S.-H., et al. (2018). "Sense of Place and Sustainability of Intangible Cultural Heritage–the Case of George Town and Melaka". *Tourism Management*, 67, 376-387. doi: https://doi.org/https://doi.org/10.1016/j.tourman.2018.02.012

Throsby, D. (2016). "Tourism, Heritage and Cultural Sustainability: Three 'Golden Rules'". *Cultural Tourism and Sustainable Local Development* (pp. 31-48). Routledge.

Tweed, C. and Sutherland, M. (2007). "Built Cultural Heritage and Sustainable Urban Development". *Landscape and urban planning*, 83(1), 62-69. doi: https://doi.org/10.1016/j.landurbplan.2007.05.008.

UNESCO. (2019). "World Heritage Convention". Retrieved from https://whc.unesco.org/en/about/ |on September 4, 2022.

United Nations Development Programme [UNDP]. (2017). "Sustainable Development Goal". Retrieved from http://www.un.org/sustainabledevelopment/ on September 4, 2022.

United Nations Economic and Social Commission for Asia and the Pacific [ESCAP]. (2007). *Some Sustainable Development Indicators Sets and Indices.* United Nation Economic and Social Commission for Asia and the Pasific, Bangkok.

Van Dijk, M. P. and Mingshun, Z. (2005). "Sustainability Indices as a Tool for Urban Managers, Evidence from Four Medium-Sized Chinese Cities". *Environmental impact assessment review*, 25(6), 667-688. doi: https://doi.org/10.1016/j.eiar.2004.10.001.

Van Oers, R. and Pereira Roders, A. (2012). "Historic Cities as Model of Sustainability". *Journal of cultural heritage management and sustainable development*, 2(1), 4-14. doi: https://doi.org/10.1108/20441261211223298.

Wang, S., Zhang, L., et al. (2023). "Determining How Historical Sites Create Value an Empirical Study on the Restorative Value of Two Pagoda Courtyards in Xi'an, China". *International Review for Spatial Planning and Sustainable Development*, 11(2), 150-167. doi: https://doi.org/10.14246/irspsd.11.2_150.

Wendling, Z. A., Emerson, J. W., et al. (2020). "Environmental Performance Index". *New Haven, CT: Yale Center for Environmental LawPolicy. epi. yale. edu*.

Wiktor-Mach, D. (2019). "Cultural Heritage and Development: Unesco's New Paradigm in a Changing Geopolitical Context". *Third world quarterly*, 40(9), 1593-1612. doi: https://doi.org/https://doi.org/10.1080/01436597.2019.1604131

World Commission on Environment and Development [WCED]. (1987). *Our Common Future.* Oxford, New York.

Wu, G., Dang, A., et al. (2023). "Study on Historical Cities Conservation Monitoring Supported by High-Resolution Remote Sensing". *International Review for Spatial Planning and Sustainable Development*, 11(2), 240-258. doi: https://doi.org/10.14246/irspsd.11.2_240.