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DEVELOPING SUSTAINABLE URBAN REGENERATION (SUR) EVALUATION METHOD FOR THE MALAYSIAN CONTEXT

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Abstract

Sustainable urban regeneration (SUR) represents an advanced and comprehensive approach to urban regeneration, aiming to integrate the three key pillars of sustainable development. While various global framework exist for measuring sustainable urban regeneration performance, a dedicated method tailored to the specificities of the Malaysian context remains absent. This study addresses this gap by developing SUR evaluation method for Malaysia, utilising indicators as a means to gauge sustainability performance. A self-administered questionnaire was employed to solicit assessments from key experts regarding potential SUR criteria and indicators. The resulting data were analysed using the Analytic Hierarchy Process (AHP) to establish weightage based on priority scales. Results from the study identified ten (10) fundamental criteria and thirty-three (33) indicators, each assigned respective weightage, pivotal in achieving sustainable urban regeneration. This study contributes to the improvement of sustainability performance of urban regeneration initiatives in Malaysia by introducing a novel evaluation method. As a way forward, it is recommended that the practicality and capability of the proposed evaluation method be assessed through real-life case study in Malaysia.

Keywords: urban regeneration; sustainable urban regeneration (SUR); sustainability performance; indicators; evaluation method; Analytic Hierarchy Process (AHP)

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INTRODUCTION

The sustainable urban regeneration (SUR) approach is regarded as a vital solution for addressing the multi-faceted challenges of aging cities and reinvigorating their historical significance, characterised by intrinsic values such as heritage structures and unique local cultural attributes, all within a sustainable framework. Emerging in the late 1990s, SUR represents an evolved iteration of urban regeneration approach, which transitioned from a focus on mere demolition and reconstruction in the post-World War II era (Couch, Sykes & Börstinghaus, 2011; Rosly & Rashid, 2013) to a more comprehensive approach that integrates sustainability in urban regeneration practices (Korkmaz & Balaban, 2020; Shutkin, 2000; Berke, 2002; Chan & Lee, 2006).

Numerous studies have highlighted the necessity of sustainable development within urban regeneration efforts (Huang, Zheng, Hong, Liu & Liu, 2020; Lee & Lim, 2018; Zheng, Shen & Wang, 2014; Turcu, 2012; Yung & Chan, 2012; Burrage, 2011; Winston, 2009; Chan & Lee, 2008; Evans & Jones, 2008; Hunt, Lombardi, Rogers et al., 2008). According to these studies, positive results are anticipated after the completion of urban regeneration projects; attributing them to the incorporation of sustainability principles, such as fostering economic growth, enhancing the quality of both natural and built environments, as well as enhancing social well-being. Thus, it is crucial to evaluate and monitor the sustainability performance of these initiatives in order to ensure that the initiatives are implemented in a sustainable manner, aligning with the emphases of prior studies (Zheng, Shen, Song, Sun & Hong, 2017; Brandon, 2005; Hemphill, McGreal & Berry, 2002; Innes & Booher, 2000).

While the need to implement sustainable urban regeneration which aligns with the global '2030 Agenda for Sustainable Development', Malaysia's involvement in such initiatives is relatively new as compared to longstanding efforts in developed countries such as the United Kingdom, Germany and France, which embarked on urban regeneration as early as the late 1940s. Given the fledgling nature of urban regeneration experiences in Malaysia (Rosly & Rashid, 2013); a tailored SUR evaluation method applicable to the local context has yet to be established. Therefore, this study aims to develop a practical and quantifiable evaluation method tailored to the unique characteristics of the Malaysian context. This study involves an examination of existing evaluation framework from various global studies, which will be adapted to the specificities of the Malaysian context; (i) through collaboration with local experts; and (ii) by leveraging on locally relevant data sources. Subsequent sections of this paper present a comprehensive literature review, detailed methodology, presentation of the results and discussion on the findings, and a conclusive summary. The outcome of this paper is the proposed evaluation method as part of a monitoring mechanism poised to improve the sustainability performance of urban regeneration initiatives in Malaysia.

LITERATURE REVIEW

From a policy perspective, constant evaluation of regeneration initiatives throughout their life cycle holds paramount importance in formulating effective and practical strategies in order to achieve the most sustainable outcomes (Cahantimur, Öztürk, & Öztürk, 2010). Evaluation does not only provide insights into future trends (Zheng et al., 2014), but also enables the refinement or termination of existing programmes, if deemed unsuccessful (Hemphill, Berry & McGreal, 2004a). Despite various sustainability assessment tools and frameworks being studied and proposed (Korkmaz & Balaban, 2020), comprehensive studies focusing on urban regeneration achievements in economic, social, physical, and environmental sustainability remain limited, as the prevailing focus predominantly on social and economic evaluations (Zheng et al., 2014).

The evaluation framework garnering the most attention is the indicator-based approach (Huang et al., 2020; Zheng et al., 2014; Hemphill, Berry & McGreal, 2014; Wong, 2000; Audit Commission, 2002; Hemphill, McGreal & Berry, 2004b; Peng, Lai, Li & Zhang, 2015). This approach relies on key performance indicators that provide diverse metrics for evaluating achievement (Audit Commission, 2002), encompassing both qualitative and quantitative assessments. It has garnered the interests of both scholars and policymakers alike, as it serves to encapsulate the essence of sustainability (Turcu, 2012). Nonetheless, the classification of 'sustainability' into discrete indicators and the subsequent measurement of urban regeneration performance based on these indicators present inherent challenges (Turcu, 2012). While it is plausible to establish indicators to assess certain urban regeneration outcomes, such as job creation and leveraged private sector investment, the task becomes considerably more complicated when attempting to set indicators for multi-dimensional sustainability criteria, such as quality of life (Hemphill, Berry & McGreal, 2014).

Several indicator frameworks have been developed (Korkmaz & Balaban, 2020; Turcu, 2012; Chan & Lee, 2008; Zheng, Shen, Song, Sun & Hong, 2017; Hemphill et al., 2004a; Chan & Yung, 2004; Lee & Chan, 2008). However, there is a lack of consensus within the literature regarding the most appropriate framework for assessing regeneration initiatives (Balaban, 2013), particularly concerning the design and selection of indicators. Scholars such as Tanguay et al. (2010); Hemphill et al. (2004a); Shen et al. (2011); Langstraat (2006) contend that a universally applicable set of sustainability indicators, adaptable for use in any city or urban context, remains elusive. Nonetheless, it is generally accepted that urban regeneration initiatives must be attuned to local circumstances and tailored to their specific local contexts (Kleinhans, 2012), including the design or selection of sustainability evaluation methods (Korkmaz & Balaban, 2020).

An emerging consensus underscores the necessity for sustainability evaluation methods to be tied to the specificities of individual cities (Langstraat 2006), reflecting the nuances of local conditions and aligning with the values of the target audience (Dahl, 2012). Context is thus suggested to be "the most influential element of the assessment" (Conte & Monno, 2012).

RESEARCH METHODOLOGY

This study adopts a mixed-method approach, beginning with the identification of potential SUR indicators. Subsequently, local experts assess these indicators to determine their relative importance, followed by the development of a points scoring system for each measurement items. The Analytical Hierarchy Process (AHP), in conjunction with a questionnaire survey, are utilised for the purpose of assigning weights to each sustainability criterion.

Step 1: Identification of Sustainable Urban Regeneration (SUR) Indicators

The identification and selection of SUR indicators are conducted judiciously, considering their value and practical applicability of each potential indicator in terms of data availability, geographical condition, potential for time-series analysis, feasibility of implementation, and interpretability (Hemphill et al., 2004a). The initial step of this process is a comprehensive review of the extensive range of SUR indicators found in the literature. Employing content analysis, indicators related to sustainable urban regeneration are categorised and grouped based on shared and relevant characteristics. Only indicators that meet various criteria, including scientific rigour, technical robustness, clarity, sensitivity to change, measurability and able to be regularly updated (DETR, 1998) are selected for the next phase.

Step 2: Allocation of Weightage based on Expert Evaluation

Identified through a comprehensive literature review, the potential SUR indicators are further evaluated by local experts to establish their relative weightage. These experts, selected using purposive sampling, comprise a diverse group encompassing government authorities, professionals (including planners and urban regeneration consultants), and academicians. The selection criteria for experts include a robust publication profile in urban regeneration, sustainability, planning, and development, alongside substantial experience or reputation in their respective fields. Specifically, the chosen experts possess the following characteristics:

- Over 15 years of experience in the built environment, town planning, or property development.
- Hold at least an executive level position within their organisations.
- Have prior experience or are currently involved in projects or programmes related to urban regeneration.

A Delphi survey questionnaire was employed to obtain the experts' evaluation of each SUR criteria and indicator in a pairwise comparison scale to express the importance of one criterion over another. The Delphi survey questionnaire offers a more practical alternative to conventional brainstorming techniques that rely on open dialogue to solicit opinions (Lee & Lim, 2018). The questionnaire prompts experts to evaluate each SUR criterion and indicator through pairwise comparisons, allowing them to express the relative importance of one criterion over another, as shown in **Table 1** below.

Table 1: Example of Pair Wise Comparison Scale Asked in the Questionnaire

OPTION A	SCORE																OPTION B
	Extreme		Very Strong		Strong		Moderate		Equal		Moderate		Strong		Very Strong		Extreme	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
Job Availability													✓					Business Activity

Descriptive analysis is conducted using SPSS software to synthesise the assessments of each expert into a unified judgement through mean scores. These aggregated scores are then input into the Super Decision software to determine the respective weightage. This process involves the application of Multiple Criteria Decision Making (MCDM) using the Analytic Hierarchy Process (AHP) technique. AHP is chosen for its relevance in the Malaysian context (Hashim, 2021) as well as its capacity to improve consistency in judgements (Saaty, 2008). This methodology is a theory of measurement through pairwise comparisons, relying on expert assessments to establish weight and priority scales, where comparisons are made using a scale of absolute judgements that indicate the extent to which one element supersedes another in relation to a given attribute.

Step 3: Establishment of Measuring Item and Points Scoring

The evaluation of each indicator is through the use of several measuring items within an aggregated point scoring system. This approach is crucial, as the application of indicators lacks meaningful interpretation without an established scoring system that enables performance evaluation and quantification (Hemphill et al., 2004a). A range of scaling methods can be applied to assign points ranging

from direct methods based on a singular characteristic (such as frequency, weight, or value), or indirect methods grounded in multidimensional concepts (such as health or welfare) relying on a scale of acceptability or satisfaction (Horn, 1993).

ANALYSIS AND DISCUSSION

Sustainable Urban Regeneration (SUR) Criteria and Indicator

The literature review exploration has identified a comprehensive list of potential SUR indicators. Following rigorous screening of the identical indicators (indicators that share the same meaning but use different terminology), a set of potential SUR indicators is selected and subsequently categorised into ten (10) groups (criteria) according to three (3) dimensions of sustainability, which are economic, social, and environment.

Allocation of Weightage based on Expert Evaluation

Figure 1 illustrates the AHP Analysis Model, depicting the pairwise comparisons among sustainability dimensions (Level 1), criteria (Level 2) and indicators (Level 3). The first level encompasses the Sustainability Dimension, representing the three pillars of sustainability. Following this, the second level encompasses SUR Criteria, which group indicators based on shared characteristics. The third level comprises SUR Indicators, reflecting the level of achievement or sustainability performance, evaluated through a combination of quantitative and qualitative data.All evaluations by experts yielded Inconsistency Ratio (IR) values below 0.1 (<0.1), indicating good consistency and affirming the acceptability of the results.

i. Sustainability Dimension (Level 1)

Results from the pairwise comparison matrix of Sustainability Dimension (Level 1) indicate that Social and Environment sustainability are emphasised more as compared to Economic sustainability (**Table 3**).

Table 3: Weightage and Rank of Sustainability Dimension (Level 1)

Rank	Sustainability Dimension	Economic	Environment	Social	Normalised
3	Economic	1.00	0.33	0.20	0.11
2	Environment	3.00	1.00	0.50	0.31
1	Social	5.00	2.00	1.00	0.58
Idealised		0.19	0.53	1.00	
The Sustainability Dimension Inconsistency Ratio is 0.00					

Source: Author (2023)

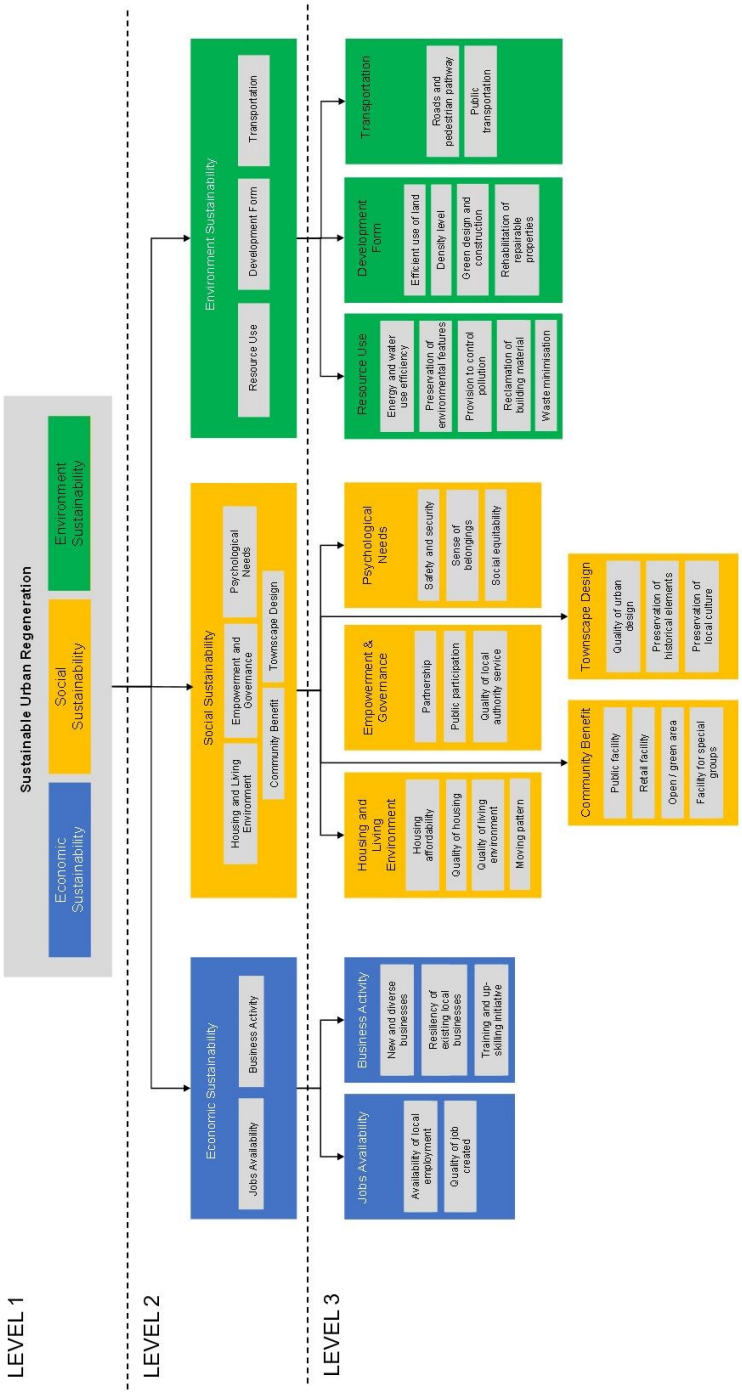

Figure 1 : AHP Model for Sustainable Urban Regeneration (SUR)
Source: Author (2023)

ii. Sustainable Urban Regeneration (SUR) Criteria (Level 2)

Within the Economic Sustainability dimension, two criteria (groups of indicators) were identified, in which the pairwise comparison matrix revealed that the Jobs Availability criterion carries significantly higher weight (0.86) compared to Business Activity (0.14). This indicates the imperative of prioritising employment generation within urban regeneration initiatives, a crucial aspect for achieving sustainable urban regeneration (**Table 4**). Urban regeneration efforts should aim to produce substantial job opportunities within the community and its surrounding areas (Chan & Lee, 2008), fostering a balanced distribution of both higher and lower-value employment opportunities (Hemphill et al., 2004a).

Table 4: Weightage of SUR Criteria (Economic Sustainability)

Description	Business Activity	Job Availability	Normalised
Business Activity	1.00	0.50	0.33
Job Availability	2.00	1.00	0.67
Idealised	0.50	1.00	
The Economic Sustainability Criteria Inconsistency Ratio is 0.00			

Source: Author (2023)

Within the Social Sustainability dimension, comprising five (5) distinct criteria, the Empowerment and Governance criteria were accorded the highest weight (0.34), followed by Housing and Living Environment (0.30), and Townscape Design (0.16), as shown in **Table 5**.

Table 5: Weightage of SUR Criteria (Social Sustainability)

Description	CB	EG	HL	PN	TD	Normalised
CB	1.00	0.33	0.33	2.00	0.50	0.11
EG	3.00	1.00	1.00	3.00	3.00	0.34
HL	3.00	1.00	1.00	3.00	2.00	0.30
PN	0.50	0.33	0.33	1.00	0.50	0.09
TD	2.00	0.33	0.50	2.00	1.00	0.16
Idealised	0.34	1.00	0.91	0.25	0.48	
The Social Sustainability Criteria Inconsistency Ratio is 0.02						

Source: Author (2023)

*Note:
CB - Community Benefit
EG - Empowerment and Governance
HL - Housing and Living Environment
PN - Psychological Need
TD - Townscape Design

This underscores the integral role of multiple stakeholders in shaping a sustainable future, a sentiment emphasised by Zawawi and Abdullah (2011). Establishing local partnerships and facilitating 'delegated power' among key stakeholders in urban regeneration initiatives not only can sustain but also increase community activity, both of which are critical aspects for ensuring the sustainability of the regenerated area (Turcu, 2012). In terms of Environment Sustainability, Transportation emerged with the highest weight (0.65), followed by Resource Use (0.23), and Development Form (0.12) as shown in **Table 6**. Given the pivotal role of transportation in driving developmental growth, its impact on environment sustainability is significant (Teh et al., 2019). A clear cause-and-effect example lies in the construction of roads to accommodate development, often at the expanse of depleting existing natural resources. This underscores the need to prioritise the implementation of sustainable transportation concepts, such as Transit Oriented Development (TOD), within urban regeneration initiatives. As emphasised by Ramlan, Osman, Rabe et.al (2021), TOD is a highly acclaimed concept that advocates for sustainable development by integrating land use and public transport stations as integral components of urban strategies.

Table 6 : Weightage of SUR Criteria (Environment Sustainability)

Description	Development Form	Resource Use	Transportation	Normalised
Development Form	1.00	0.50	0.20	0.12
Resource Use	2.00	1.00	0.33	0.23
Transportation	5.00	3.00	1.00	0.65
Idealised	0.19	0.35	1.00	
The Environment Sustainability Criteria Inconsistency Ratio is 0.00				

Source: Author (2023)

The results for pairwise comparison matrix among all SUR criteria (**Table 7**) indicate that the Jobs Availability (0.67) criterion holds the highest rank, followed closely by Transportation (0.65), Empowerment and Governance (0.34), Business Activity (0.33) and Housing and Living Environment (0.30). Employment plays a pivotal role in enhancing social well-being by not only generating incomes but also providing a platform for social interaction and contact (Omann & Spangenberg, 2002). Moreover, increased employment rate serves to alleviate issues such as poverty, social exclusion, welfare dependence, family problem, and social disorder (Stiglitz, 2001).

Table 7: Weightage and Rank of SUR Criteria (Level 2)

Rank	Weightage (Normalised)	Sustainability Criteria	Sustainability Dimension
1	0.67	Job Availability	Economic
2	0.65	Transportation	Environment
3	0.34	Empowerment and Governance	Social
4	0.33	Business Activity	Economic
5	0.30	Housing and Living Environment	Social
6	0.23	Resource Use	Environment
7	0.16	Townscape Design	Social
8	0.12	Development Form	Environment
9	0.11	Community Benefit	Social
10	0.09	Psychological Need	Social

Source: Author (2023)

The rankings derived indicate that while many SUR indicators demonstrate similarity and consistency, the significance of each criterion in contributing to sustainable urban regeneration varies based on the local context. For example, the ranking for the community benefits criterion in this study is relatively lower in comparison to the findings reported by Hemphill et al. (2004a).

iii. Sustainable Urban Regeneration (SUR) Indicator (Level 3)

The weightage results for the thirty-three (33) SUR indicators (Level 3) is summarised into rankings as illustrated in **Figure 2**. The top five (5) SUR indicators are *Public Transportation* (0.83), followed by *Availability of Local Employment* (0.67), *Safety and Security* (0.61), *Resiliency of Existing Local Business* (0.50) and *Provision of Access to Open / Green Area* (0.50).

Development of Measuring Item and Points Scoring Method (Level 4)

The performance of each individual indicator is evaluated through several measuring items, encompassing both quantitative and qualitative data, capable of allocating a maximum of 10 points for each item. While some indicators may be evaluated by using either quantitative or qualitative data, others require a combination of both, such as in the case of townscape design. Striking a good balance between quantitative and qualitative indicators is a pivotal characteristic of sustainability evaluation methods (Majid, Lim, Zaman & Ruslik, 2021) for urban regeneration (Korkmaz & Balaban, 2020), transcending beyond mere quantitative metrics (Hemphill et al., 2004a; Boyle, Michell, Viruly, 2018). In this study, a total of seventy-eight (78) measuring items are proposed to evaluate the identified thirty-three (33 SUR) indicators.

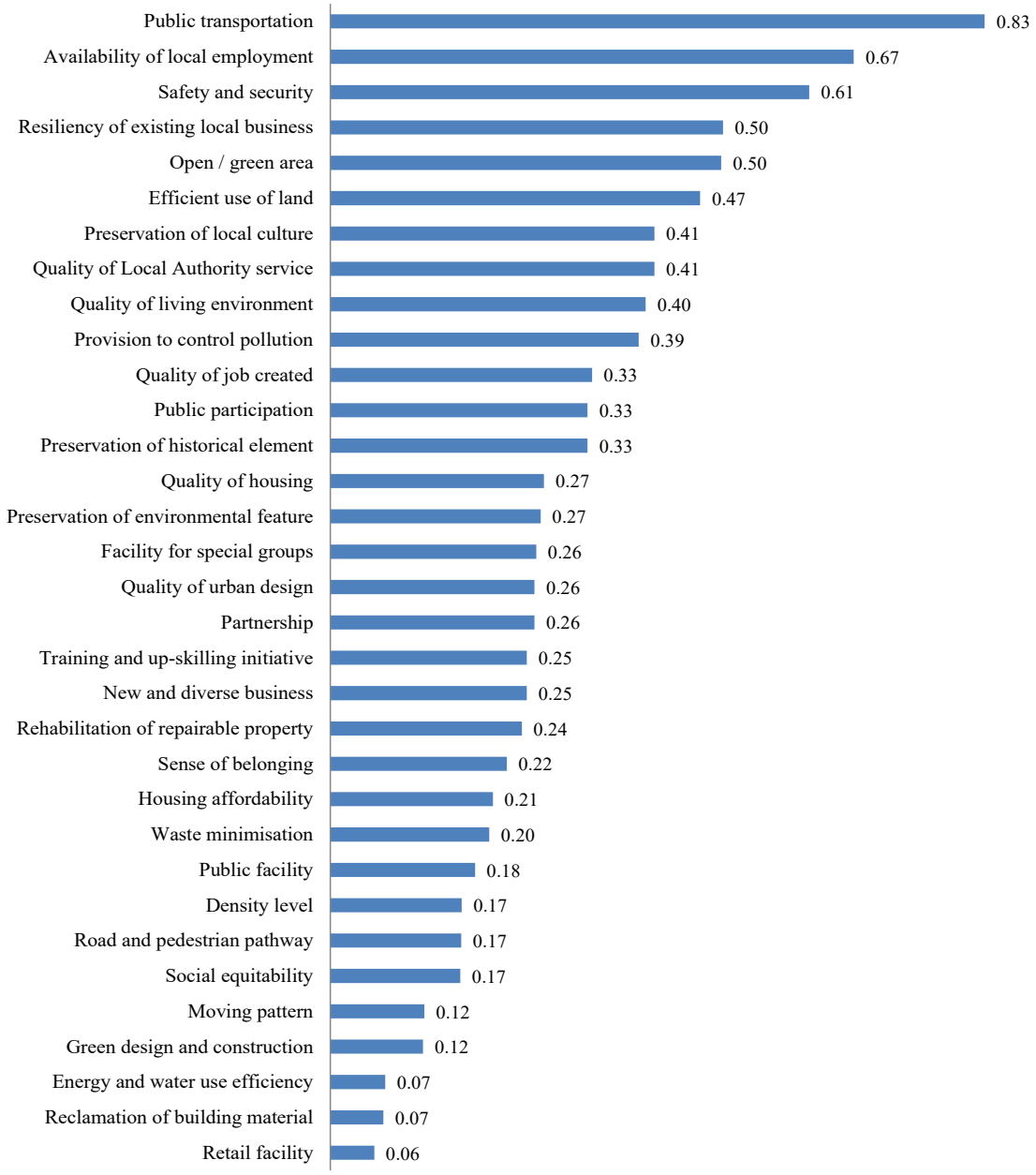

Figure 2: Ranking of SUR Indicator (Level 3) based on the Weightage
Source: Author (2023)

Sustainability Level Calculation

In order to measure the sustainability performance of an urban regeneration initiative, the total points obtained from the measuring items are subsequently multiplied by the weightage assigned to each criterion (**Table 8**).

Table 8 : Total Possible Points from SUR Scoring Method

Criteria	Criteria Weightage (%)	Number of Measuring Item	Max Points	Max points × Weightage
Job Availability	22.3	4	40	892
Transportation	21.7	7	70	1,519
Empowerment and Governance	11.3	6	60	678
Resource Use	11.0	5	50	550
Housing and Living Environment	10.0	8	80	800
Development Form	7.7	8	80	616
Townscape Design	5.3	10	100	530
Business Activity	4.0	7	70	280
Community Benefit	3.7	13	130	481
Psychological Need	3.0	8	80	240
Total	**100.0**	**76**	**760**	**6,586**

*Note: Technique adapted from Hemphill et al. (2004a) *Source: Author (2023)*

A sliding scale technique is adopted, involving the computation of the total weighted points attainable, which is further distributed as a range of percentages along a sliding scale from 'poor' to 'excellent' (**Table 9**). This scaling approach is calibrated to represent realistic goals for achieving sustainable urban regeneration (Hemphill et al., 2004a).

Table 9: Sustainability Level Based on Sliding Scale Technique

Sustainability Level (Scale)	Percentage Range
Very Poor	< 41
Poor	41 – 55.9
Average	56 – 70
Good	71 – 85
Excellent	86 – 100

*Note: Technique adapted from Hemphill et al. (2004a) *Source: Author (2023)*

The developed scoring and weighting system serves as a valuable tool, providing a comprehensive indication of performance while indicating areas that require improvement (Hemphill et al., 2004a).

CONCLUSION

The evaluation and monitoring of sustainability performance in regeneration initiatives are recognised as essential components in delivering a holistic and coherent strategy rooted in sustainability principles. Consequently, various evaluation methods have been proposed on a global scale, with the indicator-based approach emerging as one of the most widely adopted methods. This study has initiated the development of a tailored evaluation method in Malaysia, namely the SUR indicator and points scoring method. This method is designed to align with the local context, employing expert-led approaches wherein local experts provided their assessments on each sustainability dimension, criteria, and indicator. The selection of measuring items for each indicator also considers the availability and source of data that accurately reflects the local context. Notable findings of this study include the identification of ten (10) fundamental criteria and thirty-three (33) indicators, each with explicit weightage, signifying their relative importance in contributing to sustainable urban regeneration efforts. Moreover, the evaluation method is engineered to be adaptable, allowing local authorities to apply it in the selection of the most sustainable design proposals for urban regeneration initiatives, with the flexibility to modify the measuring items as needed.

This evaluation method has the potential for further refinement, transitioning from manual calculation, as shown in this study, to a computerised system. Users (local authorities) could easily derive results by inputting their evaluations for each measuring item. This tool offers the capacity to identify specific criteria that significantly affect the performance of urban regeneration, thereby enabling the implementation of necessary corrective actions. The contribution of this study lies in its practical guidance for the evaluation and monitoring of urban regeneration initiatives in Malaysia. The developed SUR Indicator and Points Scoring Method represents a novel approach within the Malaysian context, addressing a current gap in the availability of measuring tools for evaluating the sustainability of urban regeneration initiatives in Malaysia at the neighbourhood or site specific level. Nonetheless, it is recommended that the practicality and capability of the evaluation method be assessed through real-life case studies, demonstrating both the robustness of the selected indicators and the adaptability of the point scoring method in evaluating the sustainability performance of regeneration initiatives.

REFERENCES

Audit Commission (2002). *Suggested Key Indicators for Economic Regeneration*. HMSO: London.

Balaban, O. (2013). The use of indicators to assess urban regeneration performance for climate-friendly urban development: The case of Yokohama Minato Mirai 21. *Spatial Planning and Sustainable Development*. Dordrecht: Springer, 91–115.

Berke, P. (2002). Does Sustainable Development Offer a New Direction for Planning? Challenges for the Twenty-First Century. *Journal of Planning Literature*, *17*(1).

Boyle, L.; Michell, K.; Viruly, F. (2018). A critique of the application of neighborhood sustainability. *Assessment Tools in Urban Regeneration, 10*(4), 1005.

Burrage, H. (2011). Green hubs, social inclusion and community engagement. *Proceedings of the Institution of Civil Engineers: Municipal Engineer*, *164*(3), 167–174.

Cahantimur, A.I.; Öztürk, R.E.; Öztürk A.C. (2010). Securing land for urban transformation through sustainable brownfield regeneration – the case of Eskişehir, Turkey. *Environment & Urbanization*, *22*(1).

Chan, E.H.W.; Lee, G.K.L. (2006). Design-led sustainable urban renewal approach for Hong Kong. *The HKIA Journal*, *46*, 76–81.

Chan, E.; Lee, G.K.L. (2008). Critical factors for improving social sustainability of urban renewal projects. *Social Indicators Research*, *85,* 243–256.

Conte, E.; Monno, V. (2012). Beyond the building centric approach: A vision for an integrated evaluation of sustainable buildings. *Environmental Impact Assessment Review*, *34*, 31–40.

Couch, C.; Sykes, O.; Börstinghaus, W. (2011). Thirty years of urban regeneration in Britain, Germany and France: The importance of context and path dependency. *Progress in Planning. 75,* 1–52.

Dahl, A. (2012). Achievements and gaps in indicators for sustainability. *Ecological Indicators*, *17*, 14–19.

DETR (Department of the Environment, Transport and the Regions). (1998). *A New Deal for Transport: Better for Everyone*. HMSO: London.

Evans, J.; Jones, P. (2008). Rethinking sustainable urban regeneration: Ambiguity, creativity, and the shared territory. *Environment and Planning A., 40*, 1416–1434.

Hashim, N.H.N. (2021). *A Framework for Sustainable Urban Regeneration (SUR) in Historical Inner Cities: The Case of KL Sentral*. Unpublished PhD Thesis, University of Malaya, Kuala Lumpur, Malaysia.

Hemphill, L.; Berry, J.; McGreal, S. (2004a). An Indicator-based Approach to Measuring Sustainable Urban Regeneration Performance: Part 1, Conceptual Foundations and Methodological Framework. *Urban Studies*, *41*(4), 725–755.

Hemphill, L.; Berry, J.; McGreal, S. (2014). A financial appraisal of business improvement districts in the UK. *Environment and Planning C: Government and Policy*, *32*, 680–696.

Hemphill, L.; McGreal, S.; Berry, J. (2002). An aggregated weighting system for evaluating sustainable urban regeneration. *Journal of Property Research*, *19*(4), 353–373.

Hemphill, L.; McGreal, S.; Berry, J. (2004b). An Indicator-based Approach to Measuring Sustainable Urban Regeneration Performance: Part 2, Empirical Evaluation and Case-study Analysis. *Urban Studies*, *41*(4), 757–772.

Horn, R.V. (1993). *Statistical Indicators for the Economic & Social Sciences.* Cambridge University Press: New York.

Huang, L.; Zheng, W.; Hong, J.; Liu, Y.; Liu, G. (2020). Paths and strategies for sustainable urban renewal at the neighbourhood level: A framework for decision-making. *Sustainable Cities and Society*, *55,* 1–14.

Hunt D.V.; Lombardi D.R.; Rogers, C.D., et al. (2008). Application of sustainability indicators in decision-making processes for urban regeneration projects. *Proceedings of the ICE-Engineering Sustainability*, *161*, 77–91.

Innes J.E.; Booher, D.E. (2000). Indicators for Sustainable Communities: A Strategy Building on Complexity Theory and Distributed Intelligence. *Planning Theory & Practice*, *1*(2), 173–186.

Kleinhans, R. J. (2012). Housing policies and regeneration. *International Encyclopedia of Housing and Home*, 590–595.

Korkmaz, C.; Balaban, O. (2020). Sustainability of urban regeneration in Turkey: Assessing the performance of the North Ankara Urban Regeneration Project. *Habitat International*, *95,* 1–14.

Lee, J.H.; Lim, S. (2018). An Analytic Hierarchy Process (AHP) Approach for Sustainable Assessment of Economy-Based and Community-Based Urban Regeneration: The Case of South Korea. *Sustainability*, *10,* 4456, 1–14

Majid, M. R., Lim, N. H. H., Zaman, M., & Ruslik, N. (2021). Exploring the Link between BMI, Perceived Neighbourhood Environment and Health Behaviours in Malaysia. *Journal of Sustainability Science and Management*, 16(7), 190-208.

Omann, I.; Spangenberg, J.H. (2002). Assessing Social Sustainability: The Social Dimension of Sustainability in a Socio-Economic Scenario. Presented at the 7th Biennial Conference of the International Society for Ecological Economic" in Sousse (Tunisia).

Peng, Y.; Lai, Y.; Li, X.; Zhang, X. (2015). An alternative model for measuring the sustainability of urban regeneration: the way forward. *Journal of Cleaner Production*, *109*, 76–83.

Ramlan, N. H., Osman, M. M., Rabe, N. S., Azizan, A., Azmi, N. A., & Amiruddin, S. (2021). Assessing The Current Implementation of Compact and Mixed-Use Development Within Public Rail Transit Stations in Malaysia. *Planning Malaysia*, *19*(15). https://doi.org/10.21837/pm.v19i15.934

Rosly, D.; Rashid, A.A. (2013). *Revitalizing Urban Development in Malaysia Through the Implementation of Urban Regeneration Programme*. Paper presented at 43rd Annual Conference of the Urban Affairs Association, San Francisco California, United States of America, 3-6 April 2013.

Saaty, T.L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences, 1*(1), 83–98.

Shutkin, W.A. (2000). The Land That Could Be: Environmentalism and Democracy in the Twenty-First Century (Cambridge, MA, The MIT Press).

Stiglitz, J.E. (2001). *Employment, Social Justice, and Societal Well-being*. ILO Global Employment Forum 1, Columbia University.

Teh, B.T.; Shinozaki, M.; Chau, L.W.; Ho, C.S. (2019). Using Building Floor Space for Station Area Population and Employment Estimation. *Urban Science*, 3(1), 12. https://doi.org/10.3390/urbansci3010012

Turcu, C. (2012). Local experiences of urban sustainability: Researching Housing Market Renewal interventions in three English neighbourhoods. *Progress in Planning*, *78,* 101–150.

Zawawi, N.A.W.A.; Abdullah, A. (2011). Evaluating Stakeholders' Preferences: Reconciling Heritage and Sustainability in Kuala Lumpur Traditional Areas. Planning Malaysia, 9(2). https://doi.org/10.21837/pm.v9i2.84

Winston, N. (2009). Urban Regeneration for Sustainable Development: The Role of Sustainable Housing? *European Planning Studies*, *17*(12), 1781–1796.

Wong, C. (2002). Indicators in use: challenges to urban and environmental planning in Britain. *Town Planning Review*, *71*(2), 213–239.

Yung, E.H.K.; Chan, E.H.W. (2012). Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International*, *36,* 352–361.

Zheng, H.W.; Shen, G.Q.P.; Song, Y.; Sun, B.; Hong, J. (2017). Neighborhood sustainability in urban renewal: An assessment framework. *Environment and Planning B: Urban Analytics and City Science*, *44*(5), 903–924.

Zheng, H.W.; Shen, G.Q.P; Wang, H. (2014). A review of recent studies on sustainable urban renewal. *Habitat International*, *41,* 272–279.

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