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# The Sustainable Construction Practices Influence on Malaysia Project Performance

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**KEYWORDS**

Unsustainable construction
Sustainable construction
Project performance
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Water conservation

**ABSTRACT**

In this paper, an investigation into unsustainable construction practices is a hindrance to sustainable development in Malaysia. The need to be achieved is the extent of construction firms in the adoption of sustainable construction practices and influence on project performance. To attain this study, a questionnaire used as a quantitative method. From these findings, construction firms highly adopted sustainable construction practices and significant influence on project performance except water conservation. From this result, it can be concluded that the more attention required from the practitioners to increasing water conservation practices for affecting project performances.

## 1. INTRODUCTION

Malaysia together with other 192 world leaders adopted the Sustainable Development 2030 Agenda towards a more sustainable, resilient and inclusive development, with 17 Sustainable Development Goals (SDGs) [1]. Moreover, according to National Construction Policy (NCP) 2030 in thrust 2, embrace a sustainable built environment, gas emissions and building sector implementation has a significant environmental impact [2]. The suggestions for improving sustainable practices, productivity and the construction industry perform better with the aid of the advantages of technology over the conventional construction system [3]. However, the use of conventional construction processes is an unsustainable construction practice and affects project performance which is also a major obstacle to sustainable construction practices in sustainable development in Malaysia [4].

In order to enhance the project performance through sustainable practices, the practitioners in construction firms could take into account the influences of the effective implementation of sustainable construction practices, it is important to identify possible drivers and constraining factors at the beginning to the end of the project. Frontline industry professionals such as government authorities, consultants, contractors and developers can successively act professionally in making it a success [5]. Thus, the adoption of sustainable practices in construction project involves collaboration between various entities across disciplines, thorough systems, analysis of highly sophisticated design, careful selection of practices and managing of resources, from the beginning to the end of the project [6].

## 2. EXPERIMENTAL PROCEDURE

This study will carry out through a critical literature review to address the research objectives with the most appropriate method. Sources of information and data through literature review allow identifying the theoretical basis, facts and gaps based on previous researchers as well as references related to this field and from the survey.

A pilot study was conducted to ensure that the questionnaire is valid and reliable. Base viewpoint opinions and comments from the subject matter experts then were considered for distribution as the main questionnaire survey. The main questionnaire survey is a structured questionnaire with closed-ended questions were distributed to Architects, Civil Engineers, Mechanical Engineers and Electrical Engineers. Method of distribution of the questionnaires to the respondents by email, Google forms and in person. The survey is among construction practitioners in construction firms and agencies in Malaysia who are actively involved in sustainable construction projects. A total of 300 questionnaires was disseminated. In addition, acceptable response rates have been reported from 40% to 75% across different specialities [7].

The strategy for measurement data and the statistical analysis method is used Statistical Package for the Social Sciences (SPSS) and Weighted Average of the Recursive Partial Least Squares (WARP-PLS) software. The SPSS is used to analyse the respondents' demographics, the reliability and validity, mean and others. Further, conducting hypothesis testing using WARP-PLS for assessing the significance of the relationships between independent and dependent variables. Figure 1 shows the research methodology flowchart.

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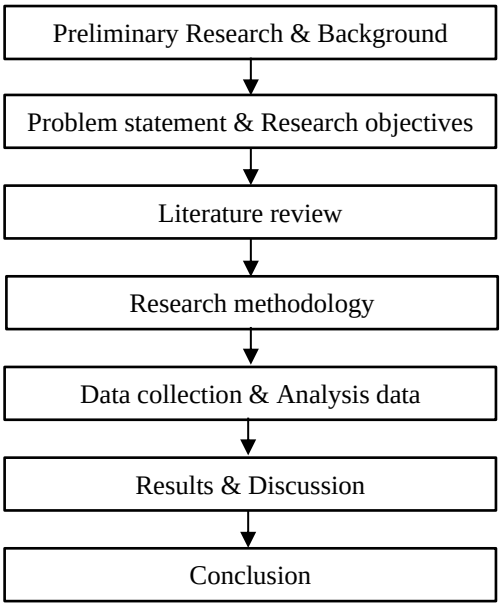


**Figure 1.** Research methodology flowchart.

## 3. RESULTS AND DISCUSSION

From the results shows in Table 1, all the adoption of sustainable construction practices by the Malaysian construction firms is a high level which is Mean (M) values from 3.70 to 4.15.

**Table 1** Mean and level of sub construct in sustainable construction practices

| Sub construct | Mean | Level |
|---|---|---|
| Energy conservation | 4.15 | High |
| Water conservation | 3.70 | High |
| Physical planning | 4.03 | High |
| Urban transportation | 4.07 | High |

The results indicate that mean value for energy conservation which is M = 4.15, water conservation M = 3.70, physical planning M = 4.03 and urban transportation is M = 4.07 respectively. The highest mean among sub-construct was energy conservation with M = 4.15 and the most adopted practices in sustainable construction.

The adoption of energy conservation to reduce energy use supported by the findings of [8] stated that energy use reduction can be measured based on energy-saving efforts achieved through sustainable practices and efficient systems.

In addition, the statement tandem by [9] stated that water conservation and recycling tools should be prioritised, such as rain harvesting systems and retention ponds.

The approaches of physical planning adopted for the avoidance of consuming undeveloped and greenfield lands through the reuse of derelict areas, refurbishment zones, re-development and infill sites of existing developed areas is measured through land use and rehabilitation indicators.

Urban transportation helps to improve affordability, sustainability and the proximity and compactness of amenities close to public transportation [10].

The significance P-values of relationships among the variables under investigation was obtained from WARP-PLS analysis. A small p-value $< 0.05$ suggests that the significant effect, while a large p-value $\geq 0.05$ indicates non-significance effect.

The hypothesis H1 is sustainable construction practices have a significant positive effect on project performance. The hypothesis H1 is accepted for the results of hypothesis testing of direct effect for the four sub hypotheses of H1a to H1d as shown in Table 2. Three supported are H1a, H1c and H1d and one not supported is H1b.

**Table 2** Hypotheses testing of direct effect for H1a to H1d

| Sub hypothesis | P-value | Remarks |
|---|---|---|
| H1a: Energy conservation has a significant effect on project performance | < 0.05 | Supported |
| H1b: Water conservation has a significant effect on project performance | > 0.05 | Not supported |
| H1c: Physical planning has a significant effect on project performance | < 0.05 | Supported |
| H1d: Urban transportation has a significant effect on project performance | < 0.05 | Supported |

Currently, policies and acts such the National Energy Policy, specifically under the following utilisation objective to encourage energy production and prevent unsustainable and inefficient energy use habits through National Energy Efficiency Action Plan for the period 2016–2025 [11].

Moreover, by adopting water conservation practices, it does not necessarily influence the performance of the project. This finding is consistent with the findings of [12] that may partly explain why research finds that many of the previous efforts have not had a substantial impact on project performance through water conservation and the use of conventional construction processes is a hindrance to sustainable development.

A comprehensive understanding in land-use of physical planning and the factors that relate to urban transportation such the performance of project development of public transportation to others such as securing the passenger in safety, healthy, cost-savvy and greener environment [13].

## 4. CONCLUSION

All the practices of sustainable construction have been adopted by construction firms, it shows that the level of awareness and support to the NCP and SDGs is in line with the current agenda of the construction industry on sustainable development in Malaysia. However, the more attention required from the practitioners to increasing water conservation practices for affecting project performances. Therefore, sustainable construction practices are very crucial significantly aid the realisation of SDG 11 (sustainable cities and communities), SDG 7 (affordable and clean energy) and SDG 6 (clean water and sanitation).

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## REFERENCE

[1] Michael, F. L., & Salleh, S. F. (2023). National Sustainability Planning in Malaysia. In: Brinkmann, R. (eds). The Palgrave Handbook of Global Sustainability. Palgrave Macmillan.

[2] Chia, C. W. (2024). Assessing the readiness of Malaysian construction industry towards construction 4.0 (Doctoral dissertation, UTAR).

[3] Shahpari, M., Saradj, F. M., Pishvaee, M. S., & Piri, S. (2020). Assessing the productivity of prefabricated and in-situ construction systems using hybrid multi-criteria decision-making method. Journal of Building Engineering, 27, 100979.

[4] Omopariola, E. D., Olanrewaju, O. I., Albert, I., Oke, A. E., & Ibiyemi, S. B. (2022). Sustainable construction in the Nigerian construction industry: unsustainable practices, barriers and strategies. Journal of Engineering, Design and Technology.

[5] Toriola-Coker, L. O., Alaka, H., Bello, W. A., Ajayi, S., Adeniyi, A., & Olopade, S. O. (2021). Sustainability barriers in Nigeria construction practice. In IOP Conference Series: Materials Science and Engineering (Vol. 1036, No. 1, p. 012023). IOP Publishing.

[6] Zhang, R., Wang, Z., Tang, Y., & Zhang, Y. (2020). Collaborative Innovation for Sustainable Construction: The Case of an Industrial Construction Project Network in IEEE Access, vol. 8, pp. 41403-41417.

[7] Sataloff, R. T., & Vontela, S. (2021). Response rates in survey research. Journal of Voice, 35(5), 683-684.

[8] Peterson, T. C. (2023). Applying customer commitments to natural gas utility energy conservation. Energy Efficiency, 16(5), 48.

[9] Chang, T. W., & Kumar, D. (2021). Overview of Environmental Management Practice for Construction in Malaysia. Civil and Sustainable Urban Engineering, 1, 15−25.

[10] Knowles, R. D., Ferbrache, F., & Nikitas, A. (2020). Transport's historical, contemporary and future role in shaping urban development: Re-evaluating transit-oriented development. Cities, 99, 102607.

[11] Abd Aziz, A. J., Baharuddin, N. A., Khalid, R. M., & Kamarudin, S. K. (2024). Review of the policies and development programs for renewable energy in Malaysia: Progress, achievements and challenges. Energy Exploration & Exploitation.

[12] Hunt, D. V., & Shahab, Z. (2021). Sustainable water use practices: Understanding and awareness of master's level students. Sustainability, 13(19), 10499.

[13] Yusoff, Z. M., Shuib, A., Ishak, S. Z., Mokhtar, E. S., Othman, F., & Ramazan, N. A. (2023). Mobility planning for urban employee to workplace: an analysis of bus routes network and stop locations. In IOP Conference Series: Earth and Environmental Science (Vol. 1151, No. 1, p. 012003). IOP Publishing.