Construction Waste Profile for Take Back System in Malaysia

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ABSTRACT

In this paper, the investigation of how to enhance construction waste management practices in Malaysia by evaluating the potential of a Take Back System tailored to the local context. Then, investigate the construction waste profile assisting the implementation of a Take Back System (TBS) in the Malaysian construction industry. To achieve this the methods to be followed in this study are divided into two categories qualitative and quantitative methods need to be applied. From the experimental works a framework for TBS implementation was designed. From these results, it can be concluded that implementing TBS in Malaysia will be beneficial for all stakeholders in the construction industry to improve construction waste management.

Keywords: Take back system, sustainable construction, construction waste management, construction and demolition waste.

1. INTRODUCTION

The Malaysian economy have been benefited significantly from the construction sector. Nowadays, due to the influencing factors such as growing populations, demands on infrastructure project, consumer behavior changes, and lifestyle improvements, the construction business is growing quickly. However, the construction industry often results in adverse impacts on the environment. Simultaneously, the amount of waste resulting from construction activities rises along with the number of projects, which causes numerous detrimental impacts on the environment and the health of the public as a whole. Proper construction waste management practices must be subsequently followed in all construction industries in order to limit the quantity of waste produced by construction projects. Waste produced by the construction industry is often characterized as construction and demolition waste. Construction activities including building renovation, civil and building construction, clearing construction sites and demolition and excavation activity produced this waste. Each construction project needs to incorporate sustainable waste management since environmental degradation is continuing to be worsen as a result of the growing numbers in construction waste. Waste management is the process of eliminating or removing the unusable or polluted waste materials which demand for efficient and sustainable management, including "collection, reuse and recycling, handling, and waste disposal, which requires an appropriate management of disposal at construction areas (Saiful Amry *et al*., 2023).

This problem have been heavily impacting the environment and arises the awareness from the industry due to the huge damages made. However, there have been lack of effort being made to tackle this issue successfully. Rising illegal disposal activities as well as a lack of expertise and education regarding the proper flow of managing building waste are just a few examples of the current issues facing by construction waste management. Additionally, according to SWCorp, in 2019 there were approximately 1446 locations where illegal waste disposal had been discovered (Khairul Nizam Anuar, 2021).

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This research seeks to bridge the existing knowledge gap by comprehensively assessing the viability of a Take Back System as a mechanism to improve construction waste management performance in Malaysia. By analysing current practices, evaluating international best practices, and engaging with key stakeholders, this study aims to provide critical insights and recommendations that can inform policy decisions, industry practices, and contribute to Malaysia's sustainable development goals.

The targeted construction waste material that can go for the secondary market will be targeted and recognised (timber, paper packs, pallets, bricks, tiles etc.).

2. LITERATURE REVIEW

With more and more end-of-life products in daily life, many companies are engaging in remanufacturing, including backward production capacity (BPC) enterprises. Meanwhile, take-back regulation always asks the manufacturer to take back end-of-life products to reduce pollution. However, the effect of take-back regulation on remanufacturers remains unclear (Li *et al*., 2021).

Under the constraints of take-back regulation, competition between manufacturer and remanufacturer is inevitable in the remanufacturing market. Whether an appropriate regulation level could eliminate BPC remanufacturers indirectly is unclear. Manufacturers may complain that high-level take-back regulation places too much burden on them (Chen *et al*., 2018).

The German packaging ordinance is an example of legislated extended producer responsibility (also known as product take-back). Consumers can leave packaging with retailers, and packagers are required to pay for their recycling and disposal. It can be considered to be successful in reducing waste, spurring the redesign of packaging to be more environmentally sustainable, and increasing refilling and recycling. The exception is waste packaging made of plastics, which faces the problems of export due to lack of markets for recycled products within Germany, the lack of capacity for recycling, the allowance for energy recovery within the ordinance, and the manufacturers' focus on back-to-feedstock rather than back-to-plastics as a solution (Nakajima & Vanderburg, 2006).

Interest in sustainable construction is a global phenomenon, with significant bodies of research emerging not only from Anglo-American-European countries, but also from other regions of the world. Indeed, the global breadth and depth of research on 'sustainability' appears to be far greater in construction than in other sustainability management domains. The dominant theme surfaced by co-word analysis concerned investigations of innovative and alternative materials for sustainable construction. These include the increased use of different types of aggregates in cement, concrete and asphalt, as well as geopolymers, fly ash, industrial and agricultural solid waste, plastic and foam, and concrete recycled from demolished buildings. In addition to identifying alternative materials to reduce the unsustainable use of natural resources, this research has also examined the mechanical properties and durability of these alternatives (Det Udomsap & Hallinger, 2020).

Infrastructure projects have a high diversity of stakeholders. The stakeholder engagement is spread across the various life cycles of infrastructure development and operations. The greater the cost of the infrastructure project, the more complex the stakeholder engagement. In implementing sustainable lean construction, the organizations involved can be generalized into government agencies, owners, contractors, planning consultants, architects, suppliers, project investors, and non-governmental organizations (NGOs) (Wu *et al*., 2018).

Designing a conceptual framework which provides a structured basis for exploring the relationships between the variables, aiming to understand the complex dynamics of TBS implementation in the Malaysian construction industry. By testing these hypotheses, the research aims to uncover critical insights that can inform policy-making and industry practices, leading to a more sustainable and efficient construction waste management system.

3. METHODOLOGY

The methods to be followed in this study are divided into two categories: first, qualitative methods used to understand and explore complex phenomena through in-depth examination of individuals' perspectives, behaviours, and experiences. It typically employs non-numerical data and seeks to uncover the underlying meanings, motivations, and social contexts associated with TBS in CWM. Second are the quantitative methods, which focus on collecting and analysing numerical data to identify patterns, relationships, and statistical significance. It aims to generalise findings to a larger population and is often used to test hypotheses and quantify trends.

Both qualitative and quantitative methods have tools to be used to collect data, gather information, or measure variables in a systematic and standardized manner. The choice of research instruments depends on the research objectives, the type of data needed, and the research methodology (qualitative or quantitative).

For qualitative instruments having interview guides that can help in semi-structured interviews with G6 and G7 contractors and building material suppliers in related CWM projects in Klang valley and the state of Selangor by using a structured or semi-structured set of questions used to guide one-on-one interviews with participants to gather in-depth insights and narratives Also, preparing observation protocols can serve as an instrument during the observations, which specify what to observe, how to record observations, and any codes or categories for classifying observed behaviours.

For the quantitative research instruments that will be used in this study is the questionnaire, which consists of structured surveys with closed-ended questions, often using Likert scales or multiple-choice format. Also, observation checklists can serve as an instrument in data collection, which consists of structured checklists used to systematically record specific behaviours, events, or characteristics in a quantitative manner.

Using existing datasets serves as an instrument in secondary data analysis obtained from sources such as government agencies, research organisations, or previous studies to help form a reference for the image of the situation in the field of the study.

There will also be a systematic literature review (SLR) conducted in order to collect and analyse previous researches data that will give a view and supported by the qualitative and quantitative surveys with contractors and construction material suppliers that will be conducted in the future.

4. EXPECTED OUTCOME

The factors affecting the implementation of TBS in Malaysia which should be economical, environmental and stakeholders and government engagement, and the waste profile of the targeted materials will be identified according to the European waste catalogue the construction and demolition waste. Waste materials will be timber, glass, tiles, bricks, metallic material, plastic and paint. By forming waste profile it will help improving construction waste management system in Malaysia.

5. CONCLUSION

In conclusion, this research has examined to the critical realm of construction waste management within the Malaysian context, aiming to explore the potential of Take Back Systems (TBS) as a transformative solution. The study clarified the complexity of factors influencing TBS implementation, unveiling the critical roles of regulatory support, economic incentives, stakeholder engagement, technological infrastructure, and awareness. The findings highlighted the interaction among these variables, shaping the adoption rates, waste reduction, material recycling, cost efficiencies, and stakeholder satisfaction associated with TBS practices.

The qualitative stakeholder interviews and quantitative surveys yielded valuable insights that allowed for a more detailed knowledge of the opportunities and problems associated with integrating TBS into the Malaysian construction industry. Support from the government turned out to be crucial for success, emphasising the necessity of strong laws to encourage the use of TBS. Furthermore, it was discovered that collaborative stakeholder engagement and financial incentives were the primary catalysts for sustainable waste management practices.

The created conceptual framework lays the groundwork for additional research and real-world application. It is supported with factors that clarify the TBS landscape. The research's hypotheses provide guided avenues for legislative improvements, focused funding, and training programmes meant to provide a supportive environment for TBS integration.

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