



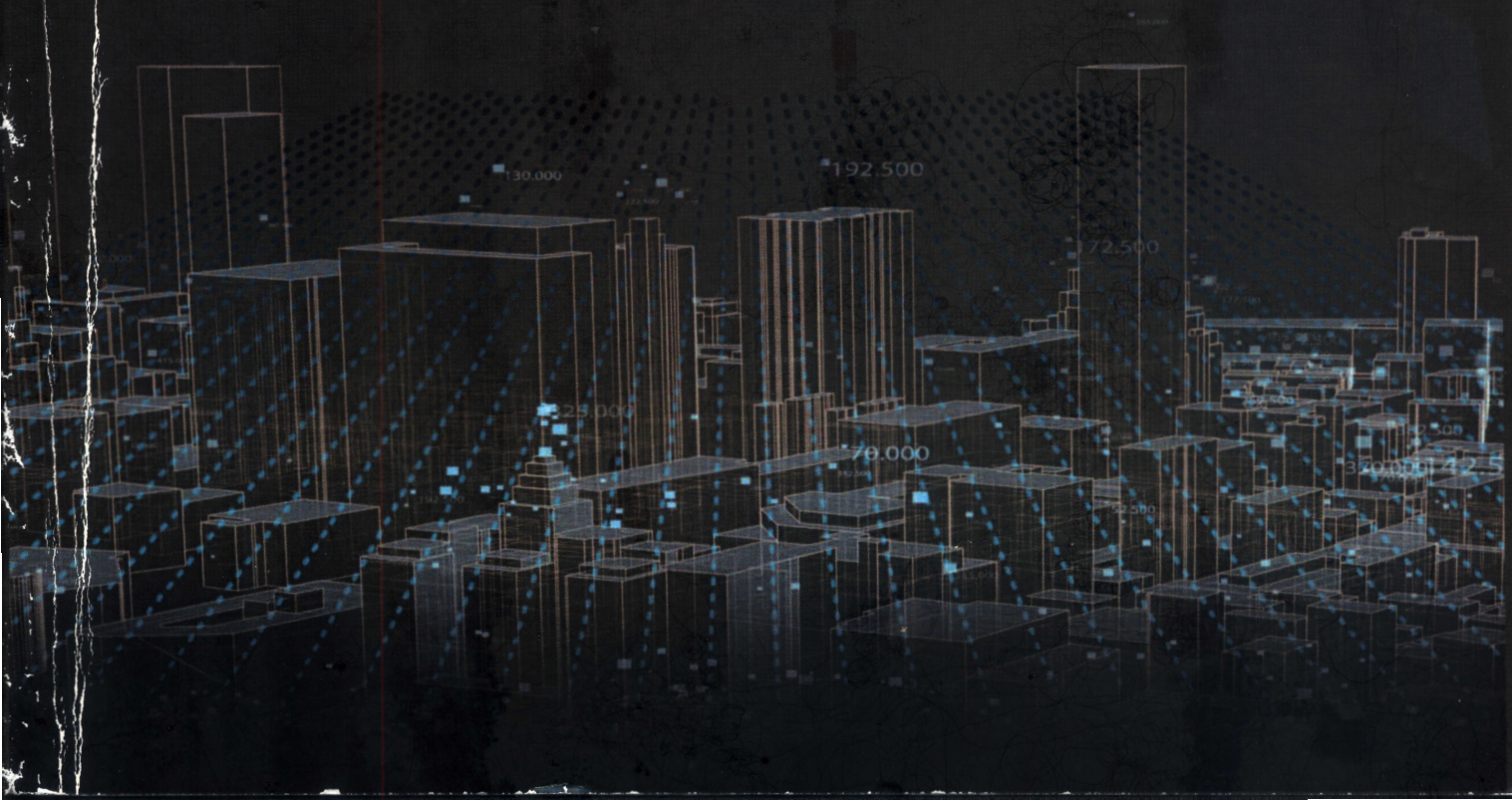
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PROCEEDING
PROPERTY TALK 2021
INDUSTRIAL REVOLUTION 4.0 IN MALAYSIAN PROPERTY



PROPERTY TALK 2021: INDUSTRIAL REVOLUTION 4.0 IN MALAYSIA PROPERTY

HOUSING AND LOCAL GOVERNMENT TRAINING INSTITUTE
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Program of Estate Management
Department of Built Environment Studies and Technology
Faculty of Architecture, Planning and Surveying
Universiti Teknologi MARA, Perak Branch, Seri Iskandar.
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UNDERSTANDING WASTE MANAGEMENT TOWARDS INDUSTRY 4.0

Nur Qistina Ahmad Faisal¹ and Lizawati Abdullah²

Department of Built Environment Studies and Technology, Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Perak Branch, 32610 Seri Iskandar, Perak, Malaysia

Abstract

Sustainability and industry 4.0 are closely related. Industrial revolution 4.0 can enhance and achieve sustainable development. Waste management is part of sustainable development. Thus, recycling and making source separation is important although it is not commonly practice by most developed countries Are Malaysian ready for industrial revolution 4.0 in waste management technologies? This research aims to study Malaysian households' understanding on recycling benefits. Further, to examine their perception towards the 3r's concept. This concept has become popular back in the 1990s to represents Reduce, Reuse and Recycle. The concept of reduce is by reducing raw material that will be modified and manufactured as packaging, plastic bags, and others. While the concept of reuse is the repeated use of materials or goods without throwing them while the material is still in good shape and safe to be used. Besides that, the concept of recycle is when waste can be turned into new products without having to dispose it. To achieve the objectives, this research adopts an online survey. The surveys were distributed via social media. The main findings showed that the respondents have the knowledge, awareness on the 3r's concept as well as the benefits. It is expected that the results can help the government, municipal council, and households to have an advance solution to improve the recycling program which will lead to efficient solid waste management towards industry 4.0.

Keywords: Sustainable, Recycling, Industry 4.0

1.0 INTRODUCTION

The word "Industry 4.0" has been used in 2011, as part of the German government's high-tech campaign to encourage the computerization of production. In the same year, the concept was revealed to the public at the Hannover Fair. The Working Group on Industry 4.0 then provided the German government with a package of Industry 4.0 proposed amendments in October 2012. The movement has since expanded to other nations, especially Malaysia. Malaysia was also seeking Industry 4.0 to improve productivity, focusing on the manufacturing sector first, with hopes to expand it to other industries in the future (Moreira, C., 2019).

Industry 4.0 is still dealing with the need to produce under environmental limits to be more sustainable in today's world. The most significant environmental threats that emerging innovations face are attributed to the steep rise in energy consumption and the immediate need to transition to low-carbon energy generation. (Wang, S., Wan, J., Li, D., & Zhang, C., 2016)

Although the Industrial Revolution 4.0 (IR) seems unavoidable, its effect on waste management should be realised soon. This revolution will include the integration of emerging technology with waste management and advancements for every category of waste management, from robots to sensors. The improvement in the IR would be remarkable, developing new opportunities such as communication capacity, three-dimensional (3D) printing and module processing, automatic self-driving vehicles, access to waste information and others. The effect of the IR on the waste sector would be significant, with the majority of

improvements anticipated in waste management materials consumption. It is already clear that robots play an important role in IR, such as the supply chain of plastics (Periathamby, A., 2017).

2.0 LITERATURE REVIEW

Malaysians are reported to produce domestic waste at alarming rates, which is faster than the natural degradation process. In addition, they reduce resources at speeds that exceed these rates of substitution. Although "Recycling" has been accepted worldwide as a form of waste disposal, Malaysia's domestic recycling rate is still low. It is vital to realise that reducing waste and recycling activities are no longer an option but a necessary step towards a healthier lifestyle while at the same time protecting our environment. Recycling can save more energy than burning waste because the process is simple, causes less pollution, and creates more new things from the waste (Othman, A. R., & Yuhaniz, M., 2012).

2.1 3Rs CONCEPT

In the waste management hierarchy, the idea of reducing is created and is important. It is clear that by reducing, no resources are recycled or reused which leads to less pollution. The reduction process starts by examining what you use and what it is used for. Reduction of waste is both environmentally and economically positive for society itself, including businesses as well as for the economy (Williams P. T, 2005). In a waste hierarchy, the first alternative is the strict avoidance of waste production by introducing techniques for source reduction in all development activities. It is "the avoidance of waste" method of reduction. Waste reduction is closely related to enhancing production practices by modifying market patterns such as minimizing packaging and affecting buyers so that they want more goods and less packaging (Samiha, B., 2013). It can only be accomplished by efficient waste management through a source, which requires the implementation of acceptable methods, changes in the use of raw resources, as well as in processes of development and production. A shift in habits of consumption and lifestyle by awareness-raising efforts to educate the public and suggestion or advice to demand goods that produce less packaging will drive the creation of a more resource-efficient market (Commission, E. (2010) and compact garbage by producers such as reducing the amount of packaging by the individual which include the use of plastic bags, reducing the use of plastic and paper plates, cups and plastic utensils, and consume more reusable items or use of more recyclable materials (Ramachandra TV, 2011).

Reuse requires the repeated use of products and components for the similar purpose for which they were conceived. The reuse of products or materials such as clothes and furniture that would otherwise become waste has social, economic and environmental benefits, creating jobs and making products available to the user who could not certainly afford to buy a new one (Commission, E. (2010). Moreover, it helps people to save time, money and energy (Yogini, C. S. K., Reddy, B. D., & Chitturi, C. M. K., 2020).

The recycling process is taking a product or material at the end of its useful life cycle and turning it into a usable raw material to make another product which would otherwise be thrown away as trash (Samiha, B., 2013). Recyclable products can give environmental benefits, which is energy saving in the production process and reduce air, water, and soil pollution (Williams P. T, 2005). One of the biggest challenges faced in the recycling process is the separation of recyclable products from non-recyclable products. Effective plans need to be developed for the proper collection, separation, and recycling of waste materials. Municipal companies should collect garbage material and isolate it properly instead of removing it without evaluating recycling. Most importantly, people should be encouraged to use recyclable products, and the benefits of recycling should be explained in order to educate them because recycling saves time, money, and energy (Yogini, C. S. K., Reddy, B. D., & Chitturi, C. M. K., 2020).

3.0 RESEARCH METHODOLOGY

Data collection were derived from primary data and secondary data. Primary data were collected via Google form. It means that the questionnaires were distributed via the internet using applications and social media to the residents of Bandar Universiti in Seri Iskandar. Secondary data refers to printed sources from journals, magazines, reports, articles, and others. It can also be obtained for a reason besides that for which it is used. The questionnaire was designed in two languages to enable the respondents to understand the questions and to be able to answer the questionnaire confidently without any confusion. This questionnaire consists of closed-ended questions. The questionnaires were distributed to the residents of Bandar Universiti via Google Form by using an online application platform which include WhatsApp, Facebook, and others. Due to the current situation of the COVID-19 pandemic, it is conducted online to reduce physical interaction between researcher and respondent. The study area consists of approximately 3,462 houses, with 17,310 residents.

4.0 RESULTS AND DISCUSSION

This research paper was conducted based on two objectives. The first objective is to study the understanding of households on benefits of 3r's. The results that had been collected through the questionnaire show the understanding of households on the benefits of 3r's—a total of 150 respondents responded to the questionnaire. Results show that the level of understanding of each question on the benefits of 3r's among respondents was high with the number of answers between "Moderate" and "Very" all the mean are between 3.00 to 5.00. The results showed an average mean between 3.81 to 4.17. In the literature review, arguments by some authors have shown the benefits of the 3r's concept. The arguments of reducing Green House Gas (GHG), enriches soil condition, and less pressure on the economy are the arguments often discussed.

Table 1: Understanding of 3r's benefit on the environment

Environmental Benefit	1	2	3	4	5	Average mean
Do you know the environmental effects from 3r's concept?	3	7	18	75	47	4.04
Do you know 3r's can decrease water pollution?	3	4	14	66	63	4.21
Did you know 3r's can produce less air pollution such as CO2 and Green House Gas?	5	6	21	64	54	4.04
Did you know that 3r's can reduce disease and reduce insect infestation?	1	5	23	78	43	4.05
Did you know that 3r's can conserve natural resources such as air, water, soil, tree, forest, wildfire, and others?	2	3	22	63	60	4.17

Table 2: Understanding of 3r's benefit on the economy

Economy Benefit	1	2	3	4	5	Average mean
Do you know the economy effects of the 3r's concept?	5	13	25	70	37	3.81
Do you know 3r's can decrease the cost of landfill incineration?	1	11	15	65	58	4.12
Do you know 3r's can provide more employment opportunities?	4	20	28	59	39	3.73

Did you know that 3r's can lessen pressure to the economy such as reusing the materials rather than making new items from raw material?	4	8	24	67	47	3.97
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Table 3: Awareness and perception on 3r's Concept

	Measurement	Mean
1. Solid Waste Management	Do you know about solid waste management?	3.86
	Are you personally satisfied with your solid waste management?	3.43
	Are you satisfied with municipal waste management in your household area?	3.55
	If recycle bins are provided by the municipal council, would you dispose your garbage there?	3.96
	If the municipal holds a 3r's campaign, will you join it?	3.70
2. 3r's Concept Knowledge	Have you ever known of 3r's concept of solid waste management?	4.07
	Have you ever been informed on proper waste management and the 3r's concept?	3.91
3. 3r's Concept - Reduce	Do you know what is Reduce of the 3r's concept?	3.97
	Do you know that Reduce of 3r's concept refers to "the avoidance of waste" method?	4.09
4. 3r's Concept - Reuse	Do you know Reuse of 3r's concept?	4.04
	Do you know Reuse of 3r's concept is about repeatedly using products and components for the similar purpose?	4.28
	Do you think Reuse can help people to save time, money and energy?	4.27
5. 3r's Concept - Recycle	Do you know Recycle of 3r's concept?	4.17
	Do you know recyclable products can give an environmental benefit?	4.38
	Do you think separation of recyclable products from non-recyclable products is a problem?	3.50
6. Awareness	Do you think with 3r's concept we can lead a more eco-friendly life?	4.43
	Do you think the concept of 3r's takes a bit of work?	4.09
	Do you think the 3r's concept was inconvenient because 3r's bins are located further from residential areas?	3.68
	Do you think the 3r's concept will make the home area have less space with the garbage already separated?	3.53
	Would you voluntarily follow 3r's concept for your household solid waste management?	4.00

5.0 CONCLUSIONS

Based on the literature review, there are thirteen (13) benefits as stated by various authors. It can be outlined as follows: reduce Green House Gas (GHG), reduce the Carbon Dioxide (CO₂) emission, create employment opportunities, enrich soil condition, generate reusable power and energy, decrease the amount of disposed waste in the landfill or incinerator, less air pollution, decrease water pollution, create a disease-free environment, less pressure on the economy, reduce insect infestation, and reduce the cost of production. According to the findings, most respondents know the environmental benefits of 3r's include conserving natural resources such as air, water, soil, tree, forest, wildfire, and others. While the respondents' knowledge about the economic benefits of 3r's such as decreasing the cost of

landfill incineration is minimal. Moreover, the perception of 3r's concept was mainly moderate. The findings show that the Bandar Universiti community have a high awareness of the 3r's concept.

The government needs to improve the municipal corporation, provide financial and human resources assistance and maintain a record of its operations on a daily basis. The government can also collaborate with non-governmental organizations (NGOs) and third-party companies that can assist with waste management. In addition, the government can establish recycling centers where regular citizens can dispose of their old garbage in exchange for useful items. The centers would indeed not only recycle waste but also would create job employment opportunities for people. Other than that, governments could enforce and implement policies, legislation and national policy mechanisms that have been improved and extended to move the priority from the edge solution to comprehensive waste management focussing on 3r's alternatives. Moreover, the municipal can promote public participation by making sufficient preparation for recycling services and utilities. They will carry waste to recycling centres. This waste will then be exported to manufacturers where it is used to produce new goods, and consumers will buy new products and then recycle them, and the entire process will continue again. There is also a need to provide training to sensitize householders via mass media with the 3r's approach which will lead to organized solid waste management. Besides that, the residents should be practicing the 3r's by themselves by reusing shopping bags. The household residents can send old clothing and books to community sales and also to the flea market. Thus, help generate income by selling the products.

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