AN INSIGHT INTO DOMESTIC SOLID WASTE RECYCLING FACILITIES AND URBAN HOUSEHOLDS’ BEHAVIOUR IN SHAH ALAM, MALAYSIA

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Abstract. Domestic solid waste management and recycling have been a continuous effort for local authorities. However, recycling activities are still participatory practices in Malaysia. To date, there is no specific law that enforces urban residents to recycle their solid waste. Therefore, this study is intended to investigate recycling facilities (a mechanism) and the urban household’s behaviour towards recycling in Selangor. Shah Alam was selected as the Case Study using six (6) administrative sections (Seksyen 2, 6, 7, 8, 10 and 11) comprising of landed and high-rise housing schemes as the study areas. Research methods included Site Observation, Questionnaire Survey and a Focus Group Discussion (FGD). The questionnaire survey employed the Convenient Random Sampling technique owing to the new norm of the effect of the COVID-19 pandemic. Results demonstrated significant differences in households’ behaviour for residents living in landed properties compared to the high-rise households. The residents are more inclined to recycle when the recycling facilities are closer to their vicinity. This relates very much to the facilities and recycling program delivered by the city council for areas with landed houses and apartments. The study suggested an improvement in domestic solid waste management through proposals put forward by the FGD participants, including the creation of recycling software Applications, enhanced policies and strategies for recycling and further educate the public on the importance of protecting their environment through recycling. The outcome of this study may be a reference to the authority and waste operators in improving their practice for the benefit of Shah Alam's environment and public well-being.

Keywords: Domestic Solid Waste, Recycling Facilities, Urban Household’s Behaviour

1. Introduction

The issues of solid waste management have long been debated due to the consequences of poor management. Irresponsible and illegal dumping of solid waste had resulted in many negative impacts on the environment and the state of human health. Solid waste management is aggravated by imprudent human activities, which often lead to disease and soil contamination [1][2]. Also, dumping sites which often include chemical waste, can easily contaminate groundwater. This situation becomes worse in squatter areas when density is high and other issues like air and water pollution [1]. In some areas, open dumping is seen as a standard feature where waste is burned openly, contributing to air pollution, thus affecting the quality of air and human health. Activities like informal e-waste recycling can also release multiple hazardous substances [3]. Therefore, the absence of appropriate and systematic solid waste management may damage our environment and inevitably destroy our ecosystem. As a result, local authorities generally had to spend a lot of money to remedy the destructions caused by irresponsible ways of managing solid waste. On top of that, natural resources are widely used for new development.
Recycling is part of the many solutions in trying to reduce the amount of solid waste produced by human activities. It is a process generally known as the 3R (Reduce, Reuse, Recycle) approach that practices waste reduction or minimisation, including clothing, appliances, or any recyclable products [4][5]. It was recorded in 2018 that the amount of solid waste generated in Malaysia had increased to 1.17kg every day [5]. Malaysians are therefore encouraged to apply the 3R practice and potentially reduce the amount of waste they produce, especially for city inhabitants, due to the scarcity of new areas for landfills or dumping grounds. Aside from that, urban populations, mainly urban households, significantly contribute to waste production [6].

Generally, Malaysia’s waste management system and waste industries (including recycling facilities) faced tremendous challenges during the COVID-19 pandemic lockdown since early March 2020, when people are forced to stay home. The pandemic had pressured local authorities and waste operators to change their approach and adapt to the new scenario. Not only that, waste generations from housing areas were also recorded as increased to 30 per cent since the Malaysian government placed the Movement Control Order (MCO) from March 2020 [6][7]. This was not strange because people had to stay home, forcing them to buy their food and personal needs via online method, postage and home delivery, which led to a tremendous amount of packaging waste, including plastic and paper bags, as well as boxes and food containers. Even worse, if each mealtime, food is delivered to more than one household in each house. As a result, wastes from single-use items like cups, food containers and utensils had risen [7]. However, it was also claimed that despite the amount of waste generated from residential areas had escalated, the government was not ready to take the risk of allowing recycling operators to open up their facilities in order to curb the spread of the COVID-19 virus [7].

The other issue concerning waste management is the shortage of landfills and new areas for landfills. Back in 2018, it was reported that almost 74 per cent of the total waste are sent to landfills, and the remaining (of less than 30 per cent) are recycled and go through waste separation [8]. Each person was said to contribute at least 1kg of waste each day, and that the waste ends up in landfills [9]. Not to mention, food waste is reported as overwhelming, whereby 44.5 per cent of the total 16,67.5 tonnes of food waste produced come from residential areas [6]. Nevertheless, since the MCO ruling by the government in March 2020, there has been a significant decrease in landfill waste collection due to the reduction of economic activities from the industrial and manufacturing sectors and commercial activities and construction sites [10]. However, this was not the case when the government had relieved its restrictions and opened up businesses. Food waste had mounted after July 2020 to an average of 2.2 to 2.3 tonnes for Kuala Lumpur alone [10].

Recycling activities are not new to Malaysians, but we face low engagements from the community to be involved [11] willingly. Efforts should be emphasised to encourage the community to separate their domestic wastes and lead the recycling culture. The main issue here is not the effectiveness of waste managers to persuade the public to recycle but the inclination and motivation of the people to recycle. Previous studies revealed that the public's behaviour and attitude towards recycling play an essential role in elevating the practice of recycling domestic waste [11][12].

Therefore, the essence of this paper is to look into domestic solid waste management, particularly by examining recycling facilities (a mechanism) and the urban households’ behaviour towards solid waste recycling in a highly urbanised city in Malaysia. The purpose is to evaluate recycling facilities and households' behaviours in recycling to reduce the amount of waste generated in the city. Results from this study are expected to provide guidance to the city council and improve its domestic waste management based on households' behaviour. Other than that, it is likely that domestic waste operators and managers can apply lessons from this study, which will promote a better living environment for the urban residents. And most importantly, it minimises the environmental impacts and use of natural resources due to practical recycling activities.
2. Solid Waste Management and Recycling

Solid waste management is an important activity in protecting and conserving the environmental condition and maintaining public health. Solid waste management is part of the Sustainable Development Goals (SDGs), addressing Goal Number 11 (Sustainable Cities and Communities) indirectly and Goal Number 12 (Responsible Consumption and Production) directly. Sustainable solid waste management has the primary objective of tackling issues on contamination, management of resources, public health and the environmental effects of excessive waste disposal. SDG 12 consciously expresses the need to ensure sustainable consumption and production patterns by 2030 by reducing waste generation and promoting recycling and re-use of materials. Authorities play a significant role in ensuring wastes are systematically managed and that towns and cities are provided with waste management facilities and services. Waste management comprises regular waste collection, transportation, processing, disposing, and even reusable materials. Many previous kinds of research have been highlighting the issues of waste management and recycling in Malaysia. Ten (10) years ago, in 2011, researchers had pointed out the lack of 3R practice among the Malaysian [13][14]. Consequently, other scholars have also argued on waste management issues and the culture of recycling. And today, we are still facing the same problem [15] [16].

Domestic waste can be organic or inorganic waste that comes from residential premises. These types of wastes are commonly the items and materials that are unwanted or no longer needed, either wrecked or still functioning. Domestic waste can either be hazardous waste like kitchen cleaners or non-hazardous. Most often, the things considered unwanted yet still usable are clothes, furniture and electronic goods. These items can be recycled and made good to be used again. But domestic wastes can also be broken or non-reusable items like bottles, boxes, papers and cans or even batteries, which can be processed again and become a by-product [5]. In short, the unwanted things or wastes that can be converted to reusable materials is called recycling. The recycling process is a series of procedures involving collecting, sorting and processing the waste and producing it to a new material (by-product) [4]. The significant benefit of recycling is that it reduces the consumption and use of raw materials and potentially reduces energy and pollution by reducing the need for conventional waste disposal [16].

Planning and managing solid waste are a complex process requiring a balance between environmental protection and social interests. In the waste hierarchy, waste reduction is the highest rank in waste management, followed by recovery, recycling / composting, re-use and prevention [4][17]. In Malaysia, the Waste Management and Public Cleansing Act 2007 (Act 672) was introduced whereby controls waste management and general cleaning and preserve adequate sanitation for the country. Act 672 addresses the laws relating to business, industrial, institutional and building waste and stresses residential or domestic waste. Meanwhile, the Environmental Quality Act 1975 is also applicable in preventing, reducing and controlling pollution and improving the environment. This delineates the regulations in limiting the impacts of waste on the environment.

Solid waste management in Malaysia is the duty of local authorities and being assisted by other parties engaged by the authorities like waste consultants and operators [7]. Often, the community voluntarily participates in recycling activities, and authorities can only encourage the public to separate their waste and recycle. To this end, there is still no specific law that commands urban households to recycle. Nevertheless, local authorities stimulate the public's interest and motivation to separate their wastes and be involved in recycling programs [14][16]. Authorities are strengthening their efforts in recycling with the provisions of facilities and services to which participation is still voluntary. And because of this, authorities are continuously planning strategies and programs to build the spirit and culture of recycling among the public.

3. Methodology

To study households' behaviour and domestic recycling facilities (mechanism), this study, therefore, employs the Case Study method, using Shah Alam as the case study. Shah Alam, situated in the State of Selangor, is known for its highly urbanised City, with a total estimated population of 617,149 in 2021.
Domestic waste is systematically managed by the Shah Alam City Council (SACC), which also introduced the Clean Zone Project (Zon Bersih) throughout several sections within its administrative boundary. The city council initiated many efforts in trying to maintain its environmental condition. Also, several policies relating to environmental protection and sustainability were created and implemented, which included strategies for waste management. Some of these strategies were addressed in Shah Alam Low Carbon City Action Plan 2017-2030, Shah Alam Sustainable Development Goal 2020 Roadmap, Shah Alam Low Carbon City Blueprint Implementation Document 2015-2019 and Shah Alam Voluntary Local Review 2021: Implementing the 2030 Local Agenda in the City. With so many strategies put into operation, Shah Alam still cannot claim that its domestic waste management had achieved its target with 30% recycled waste. Also, the selection of Shah Alam as a case study is because there are many recycling mechanisms in place. So, this scenario provides a reason to investigate the relationship between the provisions of facilities and households' behaviour in recycling activities.

The site areas for this study involved several Sections (Seksyen) in Planning Block 1, as referred to the Shah Alam Local Plan 2020, which delineate 24 Sections of urban areas in Shah Alam. According to the Shah Alam Local Plan 2020, the Planning Block 1 area are highly recognised as most populated area in Shah Alam, which then requires for a rather more robust approach and pay greater attention in waste management. Since the Shah Alam City Council had prepared its strategic initiative for waste management in this part of Shah Alam, it is therefore important to examine the implementation of the city council’s strategic plan and its compliance. Additionally, the selected areas for the case study were chosen because these areas are mainly residential and fit the purpose of investigation comprising landed and high-rise housing schemes, with low, medium and high-cost houses. Considering the sections designated for the Clean Zone Projects by the city council and the allocation of recycling centres within the areas, the study had therefore involved Seksyen 2, 6, 7, 8, 10 and 11 from Planning Block 1 (Figure 1). This condition enables the researchers to assess the residents' attitude and behaviour towards recycling when facilities are provided within their vicinity and examine the provision of facilities.

Figure 1: Case Study Areas
The study involved three main approaches, namely: (1) Site Observation; (2) Questionnaire Survey; and (3) Focus Group Discussion (FGD). The site observation was conducted to examine the provisions of recycling facilities. At the same time, a questionnaire survey was intended to uncover households’ behaviour in recycling, and the FGD helped gain insight from the city council, stakeholders (relating to waste management) and community concerning recycling facilities, planning and development.

The Study Context: The study concentrates on domestic solid waste from the residential areas of the site areas. As mentioned earlier, household wastes are categorised into two categories, i.e., organic and inorganic waste. Organic wastes can be card boxes, papers, food waste and garden waste. Meanwhile, inorganic wastes consist of clothes, furniture, electrical items, batteries, cans, tins, glasses and plastics [19]. However, this study limits its study focus to just solid materials or objects, and not liquid. Therefore, the study excluded domestic waste like used oil, new detergents, or any other liquid form. This is because the researchers wanted to concentrate on solid waste, which is often substantial in terms of materialisation, sizes and weight and spaces the wastes take.

Site Observation: The site observations had taken place throughout the selected study areas, mainly investigating the types of recycling facilities, their location and accessibility for users, the variety of services and functions. The purpose of this site observation was to collect the data on the distance of recycling facilities to the residents’ houses, in order to analyse the convenience aspect, and accessibility for recycling. Observations took place on 5th – 11th September 2020, when the government had eased the MCO restrictions. For site observation, the approach had involved an inventory examination using a checklist form which was designed according to subject matters like character, location, accessibility, benefit, function, issues and other aspects. Besides taking notes and filling-up the checklist form accordingly, the researchers had also recorded photos of the scenes and facilities. Other than that, the surrounding areas close to the vicinity were also examined in terms of the placement and distribution of recycling facilities. Also, the process of waste separation at recycling facilities was observed, and the schedule of the waste collection was tracked to monitor the services. In addition to that, the recycling activities of the residents were also monitored to see their engagement in recycling. The data collected from this technique was then analysed using a qualitative approach, namely through Thematic Analysis, by classifying data into designated topics and subjects from the checklist form. This thematic procedure helped to analyse the information systematically.

Questionnaire Survey: This study had applied a mixed-method approach, using the qualitative data and analysis from the site observation, and a quantitative approach through the analysis of questionnaire survey. The questionnaire survey was conducted between 24th August to 20th September 2020 online. Survey forms were distributed through emails and sent to representatives of the community to circulate among the residents. A QR Code and a survey online link were provided to accommodate the respondents to allow them to fill up the survey forms anywhere and whenever they decide to do so. Following the new norms where social distancing is highly required during the pandemic and the cautious fear of COVID-19, the researchers opted for the electronic approach. The survey answers were then recorded electronically and analysed using the qualitative approach by employing the SPSS software.

To examine the household’s behaviour (including beliefs and perceptions), the researchers needed to survey the residents. The questionnaire form was designed based on the literature review, which had included an enquiry on the practice of domestic waste management among the households, the factors for recycling, the common process of the 3R (which examined which process is commonly carried out), as well as the motivation for recycling. Other than that, the households were asked about their types of items for recycling and were also asked about how they manage their food waste. Since the literature review had also informed about community involvement, the questionnaire had also included questions on the households’ involvement as a community in recycling activities.
Since there were six (6) sections involved as the study areas, the study applied the Convenient Sampling Method to frame the sampling and specify the number of samples to represent the community of the areas. The choice for this method suits the study based on previous scholars [20]. The population was calculated based on the number of houses, and data were obtained from the latest available Geographical Information System (GIS) record from the city council in 2019. In 2019, the total number of houses in Shah Alam was recorded as 84,646 units [21]. For the study areas (Seksyn 2, 6, 7, 8, 10 and 11), there were 11,404 landed houses and 10,300 units of high-rises listed. These houses (a total of 21,704 units) are then considered potential households as respondents and after that calculated for the proportionate number of samples of the Convenient Sampling approach. The sampling calculation applied a 7% margin error, with a 90% confidence level, resulting in 138 samples for the survey. This calculation was decided in response to the current condition where people are restricted to social movements. Therefore, the only possible way was to conduct via online. Because of that, the researchers had also considered the availability of internet access among the residents. However, despite targeting 138 samples, the study only managed to gain 90 returned and completed survey forms. Therefore, only 90 responses were analysed.

**Focus Group Discussion (FGD):** The study included the FGD session to gather information and inputs from several key players of domestic waste management at the sites, as well as representatives from the community. The FGD was conducted on the 16 June 2021 online for 5 hours (9.00 am – 2.00 pm) involving 14 participants, which included four (4) staff from the city council’s Department of Waste Management, two (2) representatives from the waste management company engaged by the city council (the KDEB Waste), one (1) representative from the Ministry of Housing and Local Government, two (2) waste consultants from Waste Management Association Malaysia, one (1) representative from the Malaysian Institute of Architects and four (4) from the local community.

The session was framed structurally, dividing the discussion into three main topics; (1) Current practice, (2) Experience and Viewpoints, (3) and Way Forward. Questions were carefully addressed according to the issues and notes were taken and recorded from the session. Participants could provide their ideas, experience and comments freely, and the discussion was not rigid to the questions prepared to enable the participants to discuss further. Also, this flexibility permits the researcher to gain an in-depth investigation. The data obtained from the FGD were analysed using a qualitative approach by categorising the answers according to the themes (topics) and categories of responses.

4. Results and Discussion
The study revealed several critical vital findings that inform the current situation of domestic solid waste recycling facilities (mechanisms) and the households' behaviour and motivation in recycling activities (achieving the study's intention). The following discussions systematically organised the key findings according to the three (3) main approaches of investigations and encapsulate the whole discoveries into a reflection of the state of domestic waste management in an urban area where city council's had stimulated the efforts of domestic waste management through the provisions of recycling strategies, facilities and programs within the neighbourhood and the impacts of these initiatives towards the residents.

4.1. Results from Site Observation
The city council had fortifed its efforts to encourage the public in recycling activities through the provisions of recycling centres and recycling bins to every house but for landed residentials at the study areas (Figure 2). Each landed house is provided with two bins; a bin for non-recyclable wastes and another bin for recyclable wastes. For high-rises, recycling bins were not offered, and so the residents had to use the waste chambers at their apartment blocks, which makes it difficult to separate their waste. In this sense, those living in apartments had to find other solutions to recycle their waste. It was then discovered that when they wanted to recycle, they had to travel to the nearest recycling centre to send their recyclable wastes. This was seen as lowering their motivation to participate in recycling activity. Observation revealed that most households living in landed property practice separating their wastes
because they were provided with recycling bins. And so, they are more inclined to separate their wastes than those living in a high-rise. Most importantly, the recycling centres are provided within the neighbourhood, making it easily accessible to the residents even by walking. But this was not the case for high-rise households, and because of that, it was apparent that there appeared to be garbage piled up near the apartments (Figure 3).

Another effort imposed by the city council to encourage recycling among its residents is by offering door-to-door collection services every Sunday. During the site investigation, the researcher had monitored this activity and noticed that the residents do participate and leave their recyclable items outside of their gates a day before or early Sunday morning. The collection was then carried out by a recycling operator engaged by the city council using a lorry.

Besides the recycling bins, recycling centre, and door-to-door services, the city council also provides Roll-On Roll-Off Bins (RORO Bins) to the community whenever they request the facility (Figure 4). The RORO bins are therefore rented out to the residents to enable them to throw their recyclable items. Also, many bins for recyclable clothing were scattered within the study areas (Figure 5), which are provided by NGOs and approved by the city council.

Figure 2: Examples of Recycling Facilities (a & b) and Recycling Bin (c) at the Study Area

Figure 3: Issue of Piled-up Wastes at High-Rise Residential Areas

Figure 4: An Example of a RORO Bin for Recycling Program at the Site

Figure 5: An Example of a Recycling Bin for Clothing at the Site
Based on the site observations, the results demonstrated that the residents living in landed houses are more convenient regarding access and provisions to facilities than households living in a high-rise. The residents living in landed properties are equipped with recycle bins and experience the Door-to-Door recycling activity.

4.2. Results from Questionnaire Survey

Recycling is not mandatory, and the residents of Shah Alam (including at the study areas) participate upon their willingness and motivation. Key findings from the questionnaire survey are shown in Table 1 below, which demonstrated the summary statistic of Mann Whitney U Test of five factors. From the survey’s responses, the study discovered significant variations for spatial and physical factors (2 variables) and situational factors (1 variable) between the landed and high-rise households.

In terms of the spatial and physical factors, there was a substantial difference (p <0.05) in perception on less provision of dustbin (p=0.001) between both groups of households. The residents living in landed houses ranked first (mean rank =51.9), followed by those staying in high-rise residential areas (mean rank =33.3). Additionally, there was a significant difference in perception of no access for the responsible organisation to collect recyclable (p=0.022). Likewise, the residents of landed property ranked first (mean rank = 49.9) and followed by high-rise households (mean rank = 37.05). Moreover, for the situational factor, results indicated that the lack of accessibility to recycling facilities differs between both groups of respondents (p =0.03). It was also revealed that the households of landed houses ranked first (mean rank = 49.6), followed by those living in apartments (mean rank = 37.5). Despite that, the finding displayed that there were no significant differences at all (p >0.05) in the perception on the knowledge (5 variables), attitude (6 variables) and social (5 variables) between both groups of households. Based on the mean score, knowledge (5 variables), situational (4 variables), attitude (3 variables) and social (4 variables) between both groups of households were below the scale of 3. This finding indicates that households agreed with the issues highlighted based on the factors listed above.

Table 1: Mean Rank and p-value of Knowledge, Spatial, Situational, Attitude and Social Factor

| Factor                  | Variables                                      | Respondent’s Type of Housing | Mean Rank | z-value | p-value | Statistic |
|-------------------------|------------------------------------------------|-----------------------------|-----------|---------|---------|-----------|
| Knowledge               | Little concern about domestic recycling in family | Landed                      | 47.02     | -7.87   | .431    | Mean 2.92 |
|                         |                                                | High-rise                   | 42.61     |         |         | Mean 2.74 |
|                         | Less information in neighborhood community     | Landed                      | 45.97     | -2.44   | .807    | Mean 2.51 |
|                         |                                                | High-rise                   | 44.61     |         |         | Mean 2.42 |
|                         | Relatives and friends rarely carry out domestic waste recycling | Landed                      | 46.18     | -.353   | .724    | Mean 2.76 |
|                         |                                                | High-rise                   | 44.21     |         |         | Mean 2.68 |
|                         | Authority did not provide information and recycling program | Landed                      | 43.48     | -1.054  | .292    | Mean 2.29 |
|                         |                                                | High-rise                   | 49.34     |         |         | Mean 2.48 |
|                         | Little concern about environmental issues       | Landed                      | 44.09     | -.729   | .466    | Mean 2.37 |
|                         |                                                | High-rise                   | 48.18     |         |         | Mean 2.55 |
| Factor | Description | Landed | High-rise | Mean | T-statistic | P-value |
|--------|-------------|--------|-----------|------|-------------|---------|
| Spatial and Physical | Less provision of dustbin or public dustbin to each house | 51.90 | 33.32 | 3.69 | -3.405 | .001 |
| | No access for responsible organization to collect recyclables | 49.94 | 37.05 | 3.32 | -2.298 | .022 |
| | Narrow curbside space place dustbin | 46.08 | 44.04 | 3.31 | -2.298 | .022 |
| Situational | Lack of sufficient space storage facilities to do recycling | 48.16 | 40.44 | 2.73 | -1.374 | .169 |
| | Lack of access to the recycling facilities | 49.67 | 37.56 | 2.12 | -2.168 | .030 |
| | Frequent of recycling collections only once in a while | 45.25 | 45.97 | 2.44 | -.130 | .897 |
| | Recycling facilities are not within an appropriate location | 45.91 | 44.73 | 2.90 | -.210 | .834 |
| | Absence of recycling facilities at the area | 45.32 | 45.84 | 3.05 | -.092 | .927 |
| | No financial incentives or rewards are given to recycle | 42.85 | 50.55 | 2.10 | 1.378 | .168 |
| Attitude | Responsible authority should run recycling conveniently | 48.14 | 40.48 | 1.86 | -1.443 | .149 |
| | Recycling is worthwhile only if paid to do so | 47.14 | 42.39 | 2.34 | -0.858 | .391 |
| | Recycling only benefits people in the recycling business only | 48.48 | 42.85 | 2.53 | -1.559 | .119 |
| | Busy and do not have time to recycle | 48.30 | 40.18 | 3.39 | -1.468 | .142 |
| | Not willing to practice domestic waste recycling | 47.54 | 41.61 | 3.88 | -1.162 | .245 |
| | Segregation recyclable items should be done by garbage collector | 45.30 | 45.89 | 3.81 | -.113 | .910 |
| Social Factor | Recycling should be done by individuals and not the community | 46.39 | 43.81 | 3.20 | -.465 | .642 |
| | Recycling is a significant activity for folks who have time | 43.84 | 48.66 | 2.59 | -.863 | .388 |
| | Hard to be done due to fewer promotions on recycling programs | 43.64 | 49.05 | 2.03 | -.985 | .325 |
**Significant level at 0.05**

|                           | Landed  | Mean | High Rise | Mean |
|---------------------------|---------|------|-----------|------|
| Residents are not involved in waste management policies | 44.42   | 2.20 | 47.56     | 2.29 |
| Unclear Laws and Regulations on domestic waste management | 45.68   | 2.32 | 45.16     | 2.23 |

*Households’ Behaviours Towards Solid Waste Recycling*

The study uncovered that the residential areas in the study areas received attention from the city council regarding domestic waste management. However, the study showed that the high-rise houses (apartments) within the study areas lack recycling bins. Most apartment buildings have waste chambers with waste bins at the block. Highrise residents have to travel to the recycling centres if they want to recycle their waste. The residents living in landed properties is more fortunate as they were provided with recycling bin. Because of this, the high-rise households lack recycling access and services, which resulted in barriers to participating in recycling activities. The study also disclosed that most unemployed households do not complain about participating in recycling activities. This behaviour is explained that unemployed residents have more available time to go to recycling centres. Most recycling centres offer money in return as an exchange of wastes. Findings also demonstrated that most unemployed households hold a better understanding of the purpose and benefit of recycling, especially on the type of materials that can be recycled. This result relatively means that recycling is not widespread among the households in the study areas.

**Significant Difference in Waste Recycling Factors**

Results demonstrated significant differences in perception on the issue of recycling facilities like bins and recycling centres between the landed houses' households and the residents of high-rise. Satisfaction is therefore seen as having a strong connection with the factors associated with the quality of the services and facilities. Similarly, when assessing the residents' perception of the lack of access to recycling centres, it was revealed that the majority of the households living in landed property do not face much problem as they have easy access compared to those living in apartments.

**4.3. Results from FGD**

The FGD session had provided many important insights for the study. The current practice showed that SACC still appoints private companies (contractors) for waste operators, using their lorries to collect waste from residential areas. The current target by the city council is to focus more on food waste to be converted to organic compost or fertilisers. The program was initiated in the late 2020 and is considered as the prime effort for the authority. Nevertheless, the city council is continuously delivering recycling programs, including encouraging the residents to recycle solid waste and liquid like used cooking oil. In fact, before the pandemic, SACC had introduced an initiative to its residents that those bringing used cooking oil to recycle will be offered flour as an exchange. However, this initiative is reduced during the MCO to reduce the spread of the virus through physical contact and to adhere to social distancing regulation. Another important aspect shared by the city council was that the authority claimed it had received considerably good participation by the residents in recycling programs (before the pandemic) even though recycling activities are participatory and not compulsory. Despite the many efforts by the city council, the authority also expressed the issue of providing the same facilities for recycling to the residents of high-rise houses. It was mentioned that the authority faced difficulty in managing the program and gain participation from high-rise households because each apartment block has their head of committee. Therefore, there will always be issue in administering the recycling programs.

Findings from the FGD session also discovered that the practice of waste recycling during the COVID-19 pandemic if far different than before. Domestic waste had increased because of food containers and
packaging, as well as packages from online shopping. The amount of waste escalated especially from food containers because the public is not allowed to bring and use their food containers for take-away to avoid transmission of the virus. To make things worse, throughout the MCO, during most of the period, recycling operators were not allowed to operate their businesses or recycling centres resulting a rise in waste disposal at landfill areas. Finding showed that waste operators agreed that waste separation is better for landed houses than high-rise households.

Another important finding showed that the waste consultants thought that to improve recycling participatory, there should be strong policies supported by good enforcement in waste separation and recycling. The waste consultants suggested that the policies should be of high-impacts strategies to receive more participation from the public. Also, to turn it into a norm and culture in people's daily lives, there should be more programs between various parties involved in solid waste management. Other than that, the FGD captured a suggestion by a participant which recommended that one of the ways to move forward in solid waste management is for the city council to create a special software Application (App) for recycling. The idea was to have a complete information platform about recycling including the amount of waste generated, amount of recyclable waste collected, the location of facilities and recycling centres, recycling programs. The FGD also saw an idea by a consultant that proposed for the circular economy, especially focusing on food waste, which will gradually reduce the use of natural resources and raw materials. And finally, another important finding worth sharing from the FGD session is that most participants suggested for the habit of Separation-at-Source at home as it is thought to be an efficient approach to recycling process and thus lessens the wastes being sent to landfills. All in all, everyone agreed that it is vital to educate the public and create a sense of awareness in protecting their environment for sustainability purposes.

5. Conclusion
Domestic solid waste management has been an important component of environmental management since unmanaged wastes have evidently affected the state of the environment, including urban areas. This study was carried out with the intention to investigate and evaluate the recycling facilities (mechanisms) existed, as well as the residents' behaviour towards recycling activities. A highly urbanised urban area, namely Shah Alam was selected as the Case Study, using Seksyen 2, 6, 7, 8, 10 and 11 in Shah Alam as the study areas. The researchers had exercised three (3) main approaches to gather information and conduct the study involving Site Observations, Questionnaire Survey and a Focus Group Discussion were conducted to gather information and complete the assessment. Results demonstrated that the households are more inclined to recycle when recycling facilities and services are close to them. The city council had paid more attention to those living in landed properties as compared to high-rise apartments due to the issue of management. Nevertheless, the city council claimed that even though recycling is participatory, the authority is happy with the commitment by its residents. However, the recycling programs and situation had changed since the spread of COVID-19. The MCO and the fear of spreading the virus had curb many activities and recycling operators are forced to close their operations during the restriction of movement. The study concluded several important key ideas from the analysis which suggested several approaches for future improvement like the creation of specific software Application (Apps) to educate the public on recycling, to further deliver educational and awareness programs to encourage the residents to recycle, as well as the need to focus on strategic policies and enforcement in managing solid waste. These ideas or recommendations can be a guide for the Shah Alam City Council for their future action to improve their current practice in waste management. In addition, this study had added new literature of domestic waste recycling practice in terms of household behaviour in Shah Alam. In short, domestic solid waste management will remain as part of the important urban agendas for local authority like Shah Alam City Council.

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