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Solid waste management in Ulaanbaatar, Mongolia

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Abstract

Solid waste management has been topic of discussion in urban areas of many developing countries. Even though it is necessary to focus on institutional and technical factors when it comes to waste management, individual's attitudes and perceptions are crucial to maintain proper practices to manage household waste. While the role and impact of individual's attitudes and perceptions in household waste management have been studied in many contexts, little to none has been done in Mongolia. Therefore, the underlying study will address how and to what extent personal attitudes and perception affect household solid waste management using a mixed method approach with an emphasis on quantitative analysis. By conducting a survey among urban citizens in Ulaanbaatar, capital city of Mongolia and reviewing the existing literature on the topic, the thesis not only aimed at investigating the public attitude but also other specific factors including demographic differences and accessibility to waste services. Based on statistical and in-depth qualitative analyses, the thesis concludes that personal attitude and perception do play a significant role when engaging in waste management practices. But on the other hand, the findings show that a lack of access to waste services highly limits people's solid waste management despite their positive attitudes and high degree of responsibilities.

Key words: Solid waste management, Public attitudes and perceptions, Access to waste services, Mongolia.

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1. Introduction

In the era of rapidly increasing population, economic development and urbanization, the importance of waste management is given a very low priority in low-income countries compared to well-developed countries. It may not be the case in larger cities or in the capital cities, but it was estimated that “over 90% of waste is often disposed in unregulated dumps or openly burned in low-income countries” (The World Bank, 2018). From this statement, it can be thought that waste management practices are rather low in developing countries. Mongolia is not an exception when it comes to waste management. The Environmental Information Center of Mongolia reported that the amount of waste generated in urban areas increased to 2.3 million tons in 2015 (EIC, 2019). Hence, the role of waste management should be taken seriously in urban areas of Mongolia because waste generation tends to be higher in cities compared to rural areas (Larsson et al, 2010, p. 431).

In Ulaanbaatar, the capital of Mongolia, the center of economy, trade, culture, population density and urbanization, interdependent and interrelated environmental problems have arisen. Increasing consumption and subsequent waste generation by the growing population has started to impact the local environment and the citizen's health. However, inefficient services, ineffective policies and strategies, lack of proper regulations, as well as the low public awareness and behavior failed to make the waste management better over the years (Byamba, 2012). Thus, in order to effectively tackle the waste issues, not only the improvement and reinforcement in policies and services are needed but also changes in attitude and behavior are crucial. This is because attitude and behavior of the citizens play a key role in reducing their waste or improving the waste disposal practices.

1.1. Defining waste

According to the United Nations Statistic Division (UNSD), waste is defined as “materials that are not prime products for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose” (UNSD, 2018). There are several different types of waste such as municipal solid waste (MSW) and hazardous waste. Municipal solid waste is generated by various sources which include public spaces, households/residential and institutions (Byamba, 2012, p. 14). The focus of the research will be on household solid waste which is basically the everyday items people use and then throw away.

The management of the solid waste includes “the collection, transfer, treatment, recycling, resource recovery, and disposal of solid waste in urban areas” (Alabastor, 1995 cited in Agbaeze et al, 2014). The goals and plans of the solid waste management vary from place to place. However, generally, they aim to protect the health of the urban population, promote healthy environmental conditions and also, to ensure the efficient use of valuable materials and resources. Byamba (2012) emphasized that socio-economic, environmental, financial and institutional aspects should be considered in order to tackle the waste management issue. But they also noted the importance of individual level actions and also stated that public participation is essential in order to maintain the sustainability of solid waste management.

1.2. Research questions, aims and significance of the study

It has been argued that public awareness and participation, as well as people’s moral views are crucial for better solid waste management (Byamba, 2012, p. 66). For this reason, the aim of this paper is to examine people’s awareness, attitudes and perceptions towards solid waste management and to determine how they affect their solid waste practices and performances. In addition to the public’s attitude and knowledge, the level of accessibility to services might be influencing the waste management practices of individuals. Therefore, the thesis will aim to look at different factors including accessibility to services and demographic differences to see how they influence in people’s solid waste practices. Consequently, I have formulated the research questions as follows:

- 1. To what extent do personal perceptions and attitudes of the urban citizens in Ulaanbaatar city influence the household waste management practices?**
- 2. How do demographic factors (age, gender and education level) and accessibility to waste disposal and recycling services affect the household waste management practices?**

The research questions will be approached by using mixed methodology but giving more emphasis on the quantitative methods.

As waste management has garnered much attention in recent years several studies have been undertaken on the topic of solid waste in Mongolia as a whole. However, there is hardly any research specifically focused on urban people’s attitudes, perceptions and knowledge of waste management and its importance in the Mongolian context. Therefore,

this thesis will contribute to the existing literature by presenting new findings on public opinions, perceptions and practices of the capital's residents. Moreover, since the paper is not representative of the country's entire population, it could be taken as a cornerstone for conducting future research on different scales or different areas of the country.

This thesis is structured as follows: Chapter 2 discusses the previous literature on attitude towards waste management and on the importance of waste services. Chapter 3 expands on the main focus of the study by contextualizing it. Chapter 4 explains the theoretical framework on which the study is based on. Chapter 5 describes the research methodology of the data collection and analysis. Chapter 6 reports the obtained results and the analysis of the data. Lastly, Chapter 7 concludes this thesis with a discussion of its findings.

2. Literature review

2.1. Attitude and demographic characteristics concerning waste management

Overall, literature on solid waste management in the Mongolian context is scarce and, to the best of my knowledge, the public attitude towards solid waste management and disposal has not been studied or published. However, vast amount of materials and studies have been done on attitude towards waste management in other contexts, including other developing nations.

For instance, there is a study which was conducted in Bawku municipality of Ghana, aimed to show public awareness, perception and challenges on solid waste management (Douti et al, 2017). The research found that the respondents involved in the study did not show any positive attitude and even viewed that waste management as the sole responsibility of the local authorities and thus, people were not expected to contribute (Ibid, p. 502). Further, the authors emphasized that there was a lack of access to information and knowledge on waste management and sanitation. From this article, it can be concluded that poor education and lack of knowledge on waste issues and its proper management, lack of communication about it among the actors and citizens led to a worsened perception and attitude of the citizens towards waste management. As a result, the role and contribution of the public to improve the waste management were not viewed as important by the citizens. But the authors emphasized the role and responsibility of women in solid waste management. Because household chores tend to be seen as women's

job in developing countries, they argued that more women should be involved in order to improve their solid waste management (Ibid, p. 500).

Similar to the case of Ghana, a study was carried out in the Philippines. The focus of the study was on university students and aimed at investigating how their knowledge and attitude account for their practices of solid waste management. Using the knowledge-attitude-practice (KAP) model (Barloa et al, 2016), authors showed that the students' attitude and knowledge were correlated with their practices positively. Nevertheless, the rate of practices was relatively low even though the level of knowledge and attitude were high. This result contrasts to the case of Ghana discussed earlier where the lack of knowledge and attitude resulted in poor practices and contribution of the citizens. The authors concluded that high level of knowledge and attitude does not necessarily lead to sustainable practices (Ibid, p. 151). This would potentially lead to a discussion of value-action gap which will be elaborated in the theoretical framework. Moreover, the authors also looked at socio-demographic differences in relation to their waste management practices. The findings of the study suggested that socio-demographic profiles were highly significant for their practices; especially the increase in education level had the largest positive effect on recycling and waste separation at source (Ibid, p. 149).

Babaei et al (2015) aimed to examine the public attitude and knowledge in relation to their solid waste management practices including recycling, waste separating at source and solid waste reduction in Iran. The paper also employed the KAP model. The study found similar results to the paper done on the case of the aforementioned Philippines study. They concluded that the public attitude towards solid waste management was very positive and showed willingness to do the practices. However, the findings demonstrated that their knowledge and practice levels were inadequate despite the public attitude (Babaei et al, 2015, p. 97). The respondents showed low practices due to limited recycling opportunities and services. Furthermore, the findings also supported that solid waste management practices were influenced by demographic factors such as age, gender and occupation even though their strength of the influence was not that strong. Similar to the previous paper, education level also affected greatly in people's waste separating and recycling behaviors (Ibid). The findings of Fiorillo (2013) were also in line with this argument when examining various determinants influencing in household solid waste recycling behaviors in Italy. The author argued that gender, age and income were the biggest determinants in

recycling practices. For instance, it was found that women tended to engage more in recycling than men. Also regarding the age, the older the people get, the higher the recycling rates became (Fiorillo, 2013, p. 1130). Hence, it can be seen that demographics do play a role in practices of solid waste management and there are differences between various groups.

2.2. *“Incentives” of attitude towards waste and its management*

As prior studies suggest, attitudes and practices are positively correlated. But if we look more specifically, one can have different triggers when it comes to attitude and behavior towards waste and waste management. In other words, having a positive attitude towards recycling, for instance, does not necessarily mean people have good attitude because of environmental concerns. For that reason, here, I list various incentives or ‘motives’ of attitude towards waste.

It was stated that litter was primarily seen as aesthetic problem but eventually became a broader environmental issue (Al-Khatib et al, 2009, p. 449). However, scholars have argued that aesthetic value should not be overlooked when it comes to environment because, aesthetics can influence in the way people behave, their emotional responses and even the way people feel about their surrounding places. In other words, the aesthetic experience is not limited to the appearance of things but it is also derived from people’s emotions and perceptions (Wang and Yu, 2018, p. 2). Wang and Yu (2018) argued that the feeling of appreciating the nature triggers one’s aesthetic experiences. And that becomes the cornerstone of environmental attitude because the feeling of connectedness with the nature is accompanied by environmental consciousness (Ibid). The environmental attitude then becomes the driving force for effective behaviors and performances. Similarly, Brady (2006) also argued that aesthetic values are greatly linked to ethics, in a sense that aesthetic experiences encourage appropriate moral actions. However, the author also noted that the link between aesthetics and ethics cannot always be seen as a positive one, meaning that they sometimes conflict with each other (Brady, 2006, p. 282). But from the article it can be concluded that people’s moral attitude towards the environment can be shaped and driven through aesthetic experiences and to certain extent, it motivates people to protect the environment.

Furthermore, it seems that people have good waste disposal practices or recycling behaviors not because of environmental concerns but for the sake of hygiene and

cleanliness of their surroundings. For instance, Permana et al (2015) conducted a study in Makassar city of Indonesia to explore the relationship between sustainable solid waste management practices of the citizens and the sense of cleanliness of the community. By sense of cleanliness, they meant how the impact of waste affects the surrounding places' cleanliness. The study showed that there is a strong correlation between the sense of cleanliness of the citizens and waste reduction as well as separation practices of the people (Permana et al, 2015, p. 202). This resulted in much cleaner living environment. The study implied that people had strong motivation of having a clean and hygienic community. That triggered their attitudes to maintain more sustainable practices.

Moreover, the study also found that economic incentive was one of the triggers that made the citizens of Makassar city of Indonesia to keep sustainable solid waste management. Around 86% of the people claimed they were motivated because they could earn money from the recyclable waste (Ibid, p.200). However, the authors noted that those were mostly the people with low income level. If there are no financial incentives, their practices on waste reduction, waste separation and recycling would be unstable. Similarly, when a study was conducted to analyze the motivations for waste separation and recycling behavior in Malaysian universities, it was found that monetary incentives were the second most favorable incentive, particularly among the low income groups rather than non-monetary incentives (Sheau-Ting et al, 2016). This shows that cash rewards and incentives can stimulate people to engage more in recycling and waste separating practices.

2.3. Importance of accessibility and role of services in waste management

In economic geography, accessibility is considered a key concept. It was initially conceptualized as the ease to reach certain places or get certain services (Aoyama et al, 2010, p. 58). Further, it was stated that the lack of accessibility greatly influences people's economic and social life (Ibid).

At a national or city level, it is highly likely that the services the state or municipality offer greatly affect proper waste management. Zurbrugg (2003) discussed and pointed out several different challenges that developing countries face when managing solid waste. Those include inadequate service coverage, inefficiencies of service and limited recycling activities. The challenges he mentioned were essentially due to poor institutions with insufficient financial resources, inappropriate technology and lack of proper strategies (Zurbrugg, 2003, p. 2). Hence, it can be concluded that solid waste management is one big

complex issue which involves not only an environmental aspect but also social, institutional and financial as well as political aspects.

Similarly, McAllister (2015) also identified major factors that affect solid waste management and provided solutions and interventions to each of them. Apart from public attitude and awareness, she addressed the same constraints as Zurbrugg (2003)'s. Moreover, the author stated that if there are infrastructural and technological constraints, it would greatly influence individual's perception and practices (McAllister, 2015, p. 23). One of the solutions she mentioned was establishing accessible and convenient recycling centers with financial incentives to encourage participation in recycling.

Accessibility also includes the ability to gain information and knowledge (Aoyama et al, 2010, p. 58). The increasing use of different telecommunication media including the Internet helps overcome the limitations in distances to some degree. Although it was stated that accessibility through Internet and other communication devices depend on the services provided (Ibid). However, if obtaining the accessibility to waste services is limited via the Internet, it can also serve as a primary tool for gaining knowledge and information (Cukor and McKnight, 2001). This will further be discussed in the following section.

2.4. Information and knowledge for environmental awareness

Ors (2012) focused on the role of media when it comes to the environmental awareness. The paper reported that the concept of environmental awareness and issues started quite late in Turkey due to the increasing risk of urban environmental problems such as solid waste disposal and unplanned urbanization that are occurring in the country in recent years. The author explained that the environmental awareness is crucial as it aims to shape the individuals behavior towards the environment (Ors, 2012, p. 1340). Thus, the importance of environmental education and knowledge was argued to be the key foundation to raise the environmental awareness of the public. The author then emphasized that not only schools and institutions that offer formal environmental education but media also plays a significant role in raising awareness and educate people on the issue (Ibid, p. 1341). The study suggested that the internet and social media can be used as an alternative source for transferring information, increasing public awareness and environmental education as the viewer ratings of education programs through television channels and radios tend to be very low in Turkey. Since the usage of internet among the young population has

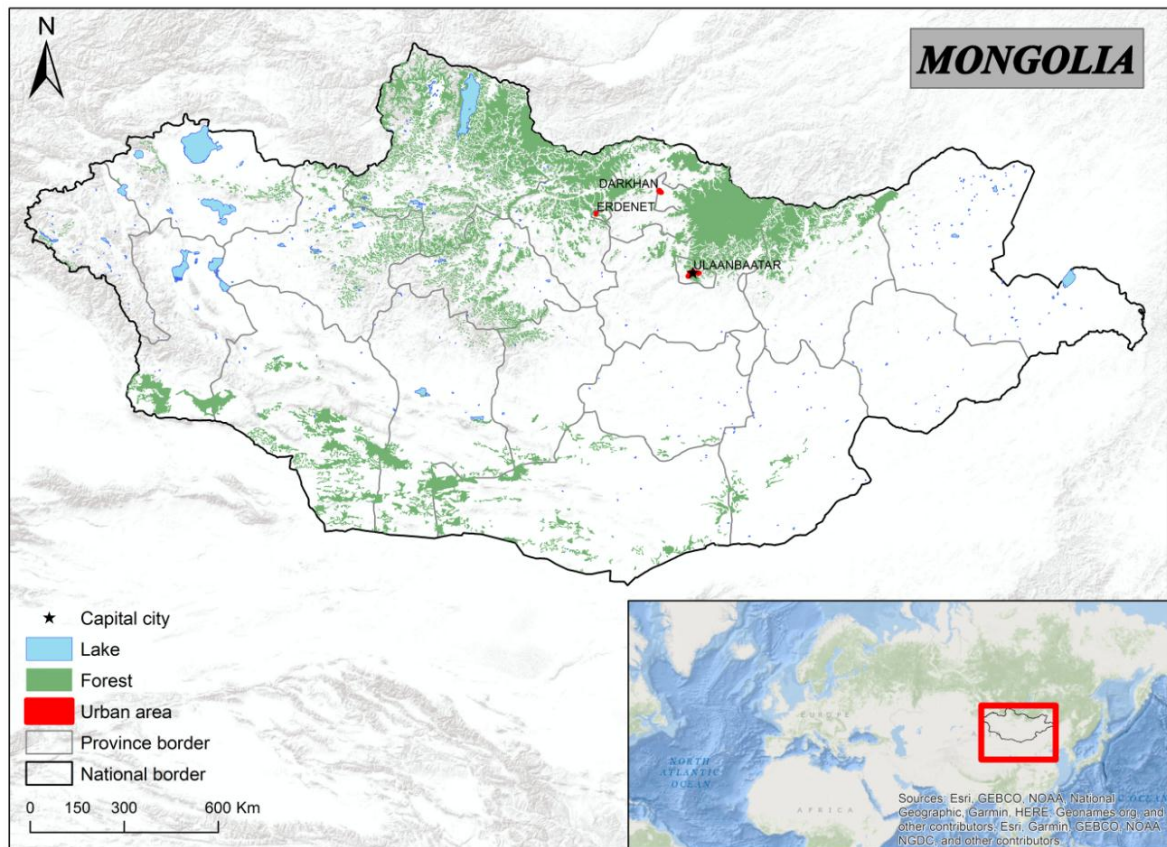
dramatically increased, the study emphasized to focus on education among young population through websites and social media (Ibid).

Similarly, Lee (2011) also concluded that media plays a significant role in raising environmental awareness and education in the case of Hong Kong. Exposing environment-specific content through media implies that environmental topics and issues are important to pay attention to. Environmental education exposed by the media then plays a role in forming environmental values and environmental attitude. Furthermore, the author argued that mass media should be included in the 'attitude-intention-behavior' model since the media serves as a social norm (Lee, 2011, p. 302). The article also found that apart from the traditional media types such as television and radio, adolescents seem to be using more electronic media like social media and websites on the Internet. The author then noted that adolescents need to transform their environmental awareness and attitude into action and engage more in environmental behavior because their role in their families and peer networks can be very influential.

3. Context of the study

3.1. Urbanization in Ulaanbaatar, Mongolia and background information

Situated in Central and North-East Asia, Mongolia is sandwiched between two large nations Russia and China. Mongolia is one of the largest countries in the world in terms of land area, but with total population of only approximately 3 million people, it has the lowest overall population density (Worldometers, 2019). Nevertheless, about half of the population resides only in the capital city Ulaanbaatar even though there are two other major cities. However, with only around 105 thousand population each (Mongolian Statistical Information Service, 2018), those two cities are relatively small. The rest of the area in Mongolia is rural where the population is sparsely populated. In those areas, access to jobs and other economic opportunities is low and agriculture and herding livestock are the main economic activities that citizens have (UNDP, 2003, p. 24).



Map layout: Tushigjargal Tseregjil 2019. Map data: DivaGIS, The Humanitarian Data Exchange, Administration of Land Affairs, Geodesy and Cartography of Mongolia, EIC GeoPortal.

Map 3.1.1. Map of Mongolia

Therefore, in order to seek more economic opportunities as well as better living conditions which includes improved access to education, health care and other services, migration from rural to urban areas has dramatically increased in the last few years (Byamba and Ishikawa, 2017, p. 8). Unfortunately, moving in to the city does not always meet their expectation; even worsening their situation in many cases. Due to population growth in the city, habitable areas are over-occupied and as a result, many social and environmental issues started to emerge such as insufficient housing, unemployment, water scarcity and lack of resources among others. Currently, due to lack of housing and affordability, almost half of the citizens are living in “Ger” districts (Byamba, 2012, p. 8). Ger, also known as Yurt, is a portable and round-shaped traditional housing which is unique to nomads in Central Asia. Ger districts have crudely developed infrastructure where access to services such as central heating, clean water and sanitation is very poor and lacking. It was further explained that “yurt areas are more vulnerable in terms of waste management issues and citizens committees are lacking in these areas” (Ibid, p. 35). Because of the increasing

amount of ash from burning coal and wood especially in winter season, it was estimated that compared to areas with apartment, much more waste is generated in those districts (Ibid). Hence, this movement of people from the countryside to cities, and the change of lifestyle are some of the biggest factors which contribute to the environmental and waste related problems. As the population and economy increase, consumption pattern changes which results in producing greater amount of waste (Giusti, 2009, p. 2228). Thus, solid waste is directly linked to urbanization and that, it can basically be considered as an urban issue because in rural areas waste generation tends to be lower than in cities (Larsson et al, 2010, p. 431).

3.2. *Strategies of waste management in Ulaanbaatar*

Giusti (2009) argued that waste management strategies and waste management practices are not the same among countries. It shows that depending on the desirability of waste minimization, the waste management strategies differ from country to country. Also, due to the economic and technical aspects, each country has its own approaches and practices (Ibid, p. 2230).

The Governor's office of Ulaanbaatar is in charge of the city-scale waste treatment. Within the office, the department of urban planning and waste management is responsible for encouraging the participation of citizens and NGOs in improving waste management practices, formulating and improving waste management strategies and policy implementation, among others. The latest strategy to improve the waste management in Ulaanbaatar set to be carried out from 2017 to 2020 (Citizens' Representative Khural, 2017), is based on newly approved waste legislations from 2017. Overall there were nine goals for better waste management.

The very first goal is to introduce a system on classifying household waste. By introducing a system of waste separation, recycling activities would be encouraged more. Recycling is not only a sustainable solid waste management but it also maintains waste separating practice, reduces waste disposal cost and extends the life span of landfills (Delgermaa and Matsumoto, 2016; Suttibak and Nitivattananon, 2008). It has been argued that higher-quality materials can be produced as a result of sorting out the recyclable waste products at source rather than recovering the materials from mixed waste products (Owusu et al, 2013, p. 116). However, up until now, there was no standard system of classifying the waste products appropriately in Mongolia. Therefore, this legislation aims to introduce the new

system to the citizens and educate people about the impact of waste on the environment in order to reduce waste at source. This could be done through workshops, educational programs and advertisements.

Byamba (2017) noted that active advertisement and educational programs are necessary to raise the awareness among the public and to educate them on better management. Also as discussed earlier, internet and social media can potentially be used for raising awareness and education on the topic (Ors, 2012). According to the Mongolian Statistical Information Service, the number of internet users in Mongolia reached over 2.6 million. Oidov (2018) stated that the rate of internet usage decreased with age and the majority of the internet users were youth and teenagers. The youth who use the internet mainly used it for communicating and receiving scientific information, current affairs of the country and such (Ibid, p. 244). Thus, media and internet is an important tool for environmental education and knowledge.

A further focus of Ulaanbaatar's latest waste management strategy is on improving the current transportation system so that the classified recyclable waste can be directly delivered to the recycling facilities. In 2018, there were about 16 small and medium-sized recycling facilities in the city (Ministry of Food, Agriculture and Light Industry, 2019). Apart from those facilities, organizations such as the Mongolian National Recycling Association buy and transport recyclable waste products through individuals who run their own recycling centers (Citizens' Representative Khural, 2017). There, the citizens can recycle their waste like plastic bottles and cans and get money in return. But as it can be seen from figure 3.2.1, recycling is not as convenient as in developed countries like Sweden where people can insert their recyclables into the automatic machines.



Figure 3.2.1: Recycling center in Ulaanbaatar

Source: Kh, Narantsatsral., 2018. *The urge to tackle the issues of recycling industry*. Available at: <http://www.trends.mn/n/8005> [Accessed 27 March, 2019]

3.3. *Services and practices of waste management*

Reducing the amount of waste at source is thought to be the key practice of a sustainable waste management but waste management also involves collecting, recycling and disposing of solid waste. However “in many countries, a large percentage of waste cannot presently be re-used, re-cycled or composted” (Giusti, 2009, p. 2229). For instance, according to the Environmental Information Center (EIC) of Mongolia, around 2.3 million tons of waste was generated in urban areas in 2015. 90.9% of all the waste was municipal solid waste and only 0.31% of all the recyclable waste was actually recycled (EIC, 2019). In Ulaanbaatar, proper and convenient waste facilities and equipment for citizens to classify, recycle or reuse the waste products are very scarce and deficient. Therefore, in order to make recycling more convenient and appealing for people, the strategy proposed that automatic recycling machine would be trialed and implemented for citizens to recycle plastic bottles, cans and glass bottles, (Citizens’ Representative Khural, 2017). Unfortunately, as of the time of writing this thesis, there is no such automatic recycling machine in the city. This might be due to financial issues because the municipal solid waste management system of Ulaanbaatar is dependent on waste collection fees from the citizens (Ibid).

According to the EIC, the rest of the solid waste was directly transported and dumped at the legally approved disposal sites (EIC, 2019). That waste is subsequently landfilled. Landfilling which is the oldest form of waste treatment has become the main method of waste management where people just throw and dump their waste at the disposal sites without any classification. Nevertheless, it has a number of shortcomings. For instance, landfilling requires available land space and secondly, the challenges include gas emission to the air and toxic chemicals polluting groundwater (Qrenawi, 2006; Bjerg et al, 2003). This leads to a great deal of environmental problems such as groundwater and soil pollution and through that polluted water or soil, serious health problems for populations may occur (Qrenawi, 2006, p. 16). It is very important to note that waste management and rubbish disposal have an essential role in sustainability and people's lives as well as resource efficiency. Poor practices of waste management can have serious negative impact on the environment and public health and hence, lead to both increasing health and environmental risks (Byamba, 2012, p. 5).

There are three landfilling disposal sites in the city where waste from all kinds of sources is dumped. Namely: Morin Davaa, Tsagaan Davaa and Narangiin Enger (Byamba and Ishikawa, 2017, p. 4). The disposal site Narangiin Enger was constructed with the assistance of the Japanese Government in 2008. Since waste management became the topic of discussion in Ulaanbaatar, many initiatives both from abroad and within the country have started in the past decade. A number of programs and support have been initiated by Japan since 2004. For instance, the Japan International Cooperation Agency (JICA) formulated a Master Plan for Ulaanbaatar to improve the existing solid waste management in 2006 (JICA, 2018). Furthermore, with the implementation of the Master Plan, the Japanese Government also assisted with trucks, vehicles and heavy machinery through their grant aid project and it was estimated that waste collection in Ger districts increased from 42% to 90% between 2006 and 2009 with the help of the trucks (Byamba, 2012). Overall, there are currently 265 trucks that are used for collecting and transporting waste in the city.

3.4. Attitude, knowledge and perception among citizens in Ulaanbaatar

Improper management of waste is not only linked to inadequate waste management policies and the services the state offer, but it is also dependent on individual level attitudes as those would influence their actions and performances. Byamba (2017) also

mentioned the public attitude and behavior as a challenge when dealing with waste management. However, to the best of my knowledge, no proper research has been conducted that investigates the attitudes of the citizens of Ulaanbaatar towards management, and that is the gap that this thesis intends to fill. Nevertheless, I will present in this chapter some anecdotal evidence reported by the media. By looking at those media sources, there is an indication that the citizens have a limited understanding, lack of knowledge and awareness on proper management of waste and its effects.

For instance, it was announced that starting from the 1st March, 2019, plastic bags would not be allowed to be used because they have harmful impact on the environment (News, 2019). Following the ban, public debate ensued. Whereas there were people in support of the plastic bag ban, some were against it. One of the interviewees in her early twenties even preferred convenience over the environment arguing that there should not be any plastic bag ban as plastics bags are convenient for daily life (Ibid).

Further, it appears that people who are self-employed showed the greatest opposition. In their interviews, they argued, for example, that using plastic bags is cheap whereas it is very costly to use reusable cotton bags or paper bags for their business, for example (Ibid). Nevertheless, at the end of their interviews, all stated that they would have to comply with the law in order to avoid fines and charges. Some of the workers did admit that it is truly the right decision for the environment. This shows that there is still environmental awareness to certain extent but very low. Even though some respondents showed positive attitude towards plastic bag ban, the interviews gave an insight that situational and additional factors are at play and thus, resulting in a gap between people's attitudes and actions when it comes to environmental issues. Both value-action gap and situational factors will be explained in the following chapter.

4. Theoretical framework

The following sections outline the theoretical framework of the research. The theories “the theory of planned behavior” and “the value-action gap” are central to this thesis. The reason is that, while the theory of planned behavior predicts an individual's behavior based on their attitudes and perceptions, the value-action gap complements the framework by focusing on external factors when people's behaviors and attitudes do not match.

4.1. *The Value-action gap*

The literature shows that people's attitudes and perceptions play a significant role in predicting their environmental behavioral commitment. Numerous studies have been conducted to explore how attitude influences people's commitment towards the environmental issues using various different approaches. For instance, Shove (2010) talked about ABC model of behavior when discussing climate change issue. He defined the ABC model as follows: "Social change is thought to depend upon values and attitudes (the A), which are believed to drive the kinds of behavior (the B) that individuals choose (the C) to adopt" (Shove, 2010, p. 1274). From this, it can be implied that having a positive attitude would be the starting point for adopting 'pro environmental behavior'. However, Spaargaren (2003) argued that when it comes to maintaining environmental sustainability, there is a big difference between having environmental friendly attitude and adopting a sustainable lifestyle. Having an environmental friendly attitude is naturally highly encouraged. However, that does not always guarantee positive actions towards the environmental problems (Ibid).

The term 'value-action gap' describes the gap between value and action when people do not behave accordingly to their values or beliefs (Chung and Leung, 2007, p. 604). In the specific context of this thesis, it refers to the inconsistency between individual's concerns towards the environmental harm due to the waste they generate and the limited action they make to minimize their waste or adopt other pro-environmental behaviors (O'Connell, 2011). The term is mostly used in environmental geography as well as other fields such as environmental psychology. When theorizing the value-action gap, Blake (1999) explained that apart from the personal attitude, other additional and situational constraints, including economic and demographic factors, were at work. These arguments are hence highly relevant to this research. This concept will be very useful in interpreting the analysis of the data because when analyzing the data, if the respondents' values might not align with their waste management performance, then the research will proceed on examining the other situational constraints like accessibility to services and demographic factors.

4.2. *The Theory of Planned Behavior*

As mentioned above, the significance of attitude and perception should be taken into account when it comes to environmental behavioral commitment. Thus, when it comes to

environmental issues and sustainability, behavioral approaches, such as the ABC model, are often adopted even in policy-making. However, as Blake (1999) mentions, because such approaches solely focus on attitude and behavior, other external factors are highly likely to be neglected. Thus, in this thesis, the study will focus on applying the Theory of Planned Behavior for investigating attitude towards the waste management practices.

The Theory of Planned Behavior (TPB), which was developed by Ajzen from the Theory of Reasoned Action (TRA), focuses on how much intention the individual has to engage in a specific behavior (Ajzen, 1991, p. 181). The intention is basically a motivation and considered as the main concept. The stronger the intention, the more likely one is determined to act on it. The intention can be determined by three factors (Ibid, p. 188). The first determinant is the attitude which refers to the personal opinion and evaluation on whether the specific behavior is favorable or not. The second one is subjective norm or the individual's perception of social pressure influencing in their behavior. Moreover, Ajzen (1991) also found that moral obligations and norms had influence on performing a certain behavior. Because studies found that subjective norms were the weakest determinant of behavioral intention (Pakpour et al, 2014), the thesis will focus on the moral norms and obligations part rather than the subjective norms

The main difference between TPB and TRA is that the third determinant was introduced which is perceived behavioral control. This refers to people's perceptions or beliefs of their own ability to control certain behavior (Tonglet et al, 2004, p. 197). Hence, the TPB further investigates how their behavioral control affects their behavior. Moreover, the theory also includes additional factors since the presence or absence of opportunities, resources and skills are at play as well. According to the theory, the more opportunities and resources the individuals think they have, the greater their attitude and control will be over their behavior.

There have been numerous studies (Tonglet et al, 2004; Pakpour et al, 2014; Davis and Morgan, 2008) that applied this theory to investigate people's recycling behaviors or waste minimization practices based on their attitudes and perceptions as well as other potential factors. The inclusion of the other additional and situational factors such as demographic variables, opportunities and resources in the theory would enable to explore both the attitude and those additional and situational factors in waste management practices.

Therefore, together with the value-action gap, it will add to the theoretical framework to be applied for shedding light on the results of the data analysis.

5. Research Methodology

5.1. Research strategy

Quantitative approach examines the “reality in terms of variables and relationships between them” (Punch, 2005, p. 237) through numerical measurement whereas qualitative methods tend to look at “holistic and in-depth understanding of social life” (Ibid, p. 238) and thus, deal with “words” rather than numerical measures. Instead of choosing either qualitative or quantitative methods, a mixed approach was undertaken in this thesis. Mixed method research integrates qualitative and quantitative research in one study so that it provides better understanding of the phenomena as the two approaches complement each other (Bryman 2012, p. 628).

Combining the two methods would enable me to get a wider picture of the subject of study but it is also important to point out that the thesis puts more emphasis on the quantitative methods and the qualitative methods play a subsidiary role. On the one hand, the quantitative methods were applied in order to examine people’s perspectives and attitudes towards waste management in relation to their management practices and to investigate how demographic differences influence people’s practices. On the other hand, the qualitative methods were necessary firstly, to understand the importance of solid waste management and how people think of it in their cultural context, secondly, to review and analyze the importance of quality of services in waste management based on the patterns that quantitative analysis provide.

A single case study design was adopted in order to get a deeper understanding on the role of accessibility to solid waste management and attitudes of urban citizens’ towards solid waste management in Ulaanbaatar. A case study is a design that intends to have a holistic understanding and do intensive analysis on the case (De Vaus, 2001, p. 220). The fact that there were no previous studies specifically focused on the public’s attitude and perception to solid waste management in Ulaanbaatar gave a push to conduct a case study. Even though qualitative methods are frequently used for case studies, De Vaus (2001) stated that case study design is flexible that any methods and techniques including data collection through surveys and statistical analysis can be employed. Moreover, Bryman (2012)

argued that case study design can not only be employed in two different research approaches separately, but also it can be used in mixed methods. Therefore, using a case study design would help in getting deeper understanding on the case of Ulaanbaatar's solid waste management through both qualitative and quantitative methods.

The research will not seek to make a generalization for the whole population. Instead, it will look at a case of Ulaanbaatar city, attempt to capture the attitude and perception among the small size of sampling population and how it accounts for their practices. Further, the thesis will look at whether people in different age groups and other social groups differ when it comes to attitude towards waste management.

5.2. Data collection and sampling methods

In order to conduct the research, both primary and secondary data were used to answer the research questions. The primary data, central for all the research questions, was quantitative and gathered using a structured survey. The data was collected in two different ways. Firstly, it was directly collected through an online social survey due to the limitations of time and distance. The web survey was sent out to the correspondents mainly through Facebook and some were sent by email. One of the issues when conducting online survey is that internet users can be a biased sample of population because the respondents tend to be in middle or upper middle class, younger or better educated (Couper, 2000 cited in Bryman, 2012). Thus, in order to mitigate this bias and get a wider sampling of the population, an offline survey was conducted, which was handed out to people in Ulaanbaatar city in paper by my assistant in Mongolia.

I am fully aware that 'research assistant' is a formal term when a researcher is employed and paid for the purpose of assisting and collaborating in academic papers and researches. However, in this case the research assistant is my relative, who is a newly graduate in Social Sciences major from the National University of Mongolia, had a role only in distributing the survey in paper and collecting the respondents' responses. During the survey collection period, she was constantly in contact with me and reported the collection process throughout. Because she had a clear understanding of the research questions and the aims, the communication went smoothly and it was reliable to have her assist with the data collection process. Moreover, as the survey questions were formulated to be as simple as possible for the respondents just as Scheyvens (2014) recommended, there was not a case where the respondents asked additional questions from the assistant regarding the

survey questions. After distributing and collecting the paper surveys, she then sent those through an e-mail along with the photos and videos of the respondents filling the survey as evidence.

In both online and offline/paper-based surveys, people aged between 18 and 65 were involved and in total, the total sampled population was 206 people. A snowball sampling was applied. It is an approach in which the researchers establish a contact with other people through their initial participants that are relevant to their research (Ibid, p. 202). This method is found to be fit for this thesis firstly, because of the fact that I was not able to go to Mongolia in person to conduct other methods. Secondly, the method was employed due to the time limitation. As the survey was conducted by snowball sampling method, the initial respondents for online survey were found through Facebook. As for the paper survey, people from Christian church I am involved in were the initial respondents.

It is important to make the questionnaire short and get the essential information from it (Scheyvens, 2014, p. 43). Hence, the questionnaire contained 23 closed-ended questions. The questionnaire included various types of questions, namely single and multiple choice and scaled questions covering the following topics:

- Demographic information (age, gender and education level)
- Area and types of residency they live in
- People's knowledge on sorting out the solid waste products
- Personal waste disposal practices
- Personal opinion and information on accessibility to waste services: collection, disposal, recycling (time and distance to waste disposal stations and recycling centers)

Most importantly, the questionnaire included questions about perceptions and attitudes associated with household solid waste and waste management. Some of the questions that are included in the survey were based on the 'ingredients' of attitude which was covered in the literature review (Wang and Yu, 2018; Brady, 2006; Permana et al, 2015; Sheau-Ting et al, 2016). Therefore, the survey also covered what incentives trigger people's attitudes.

Further, as mentioned above, the sampling involved people from diverse backgrounds and social classes in the paper survey. But as the internet usage has considerably increased in Mongolia in recent times (Mongolian Statistical Information Service, 2017) it is not

possible to assume that people involved in the paper survey do not have access to internet. Hence, in order to avoid having errors, questions about internet access and usage were also added in both online and offline surveys. This will be analyzed by correlating with people's attitude and waste disposal practices.

All the answers were then coded so that it would make it easier to run the statistical tests and analysis. Most of the people in Mongolia do not speak English well. Thus, both surveys were conducted in Mongolian and then translated into English by me afterwards. The survey questions can be found in Appendix A. In addition, the secondary data and statistics were collected from various different sources like the Environmental Information Center (EIC), National Statistics Office of Mongolia and from the previously published studies, or official reports and documents as well.

On the other hand, secondary literature was reviewed for the qualitative methods. Documents such as an official strategy paper to improve the waste management of Ulaanbaatar and previous studies were analyzed to understand the context of the research. It will assist in analyzing the quantitative data and get a holistic view on solid waste management in Ulaanbaatar. Limitations related to the data collection process will be further discussed in section 5.4.

5.3. *Data analysis methods*

Once the data collection through the survey was completed, different types of statistical analysis such as descriptive analysis, bivariate analysis and multiple regression analysis were conducted with the help of SPSS Statistics program. After the patterns and correlations which the quantitative analysis gave on the subject, more in depth qualitative analysis was made by comparing to existing literature.

The main thing to explore is how much personal perception and attitudes affect people's practices of solid waste. Therefore, multiple regression analysis was conducted on the two dependent variables: 'Waste reduction at source through careful attention to consumption' and 'Waste separating practice'. Multiple regression analysis enables to examine the link between dependent variable and several different independent variables and how much each independent variable contributes to the dependent variable (Pallant, 2016, p.149). Those two regression models will be analyzed in section 6.3.

In order to analyze whether demographic factors and service accessibility have an impact on waste management, a suit of tests was carried out using the SPSS Statistics program as well. For instance, the independent samples t-test was used to determine if there is a difference between two groups (male and female) on the dependent variables as it compares the means of two independent variables (Ibid, p. 244). In addition, the survey categorized respondents into different groups based independently on their age and highest attained education level. The relationship between these independent variables (i.e. age and 'highest education level' respectively), and the dependent variables (waste separation practice and waste reduction by paying attention to consumption) was analyzed with corresponding one-way ANOVA tests. This kind of test is the most suitable for this situation as it compares the means of two or more groups (Ibid, p. 256).

5.4. *Limitations*

Identifying and acknowledging the constraints and biases will increase the accuracy of the collected data. This section discusses the possible limitations of this work and the measures taken to overcome them.

It is important to avoid sampling bias when doing analysis (Bryman, 2012, p. 173). If only an online survey had been conducted, there would be a high probability that most people involved in the online survey might be middle or upper middle class people. In other words, the sampling would be biased since people who do not have internet access could not participate. Therefore, in order get a wider sampling, both online and offline surveys were conducted. Limiting the survey to only people with access to the internet could represent a bias towards younger, wealthier and more educated people. The inclusion of two types of survey would help reduce the demographic selection bias. As discussed in section 5.2 it's impossible to guarantee that the respondents of the paper-based survey did not have access to the internet. Consequently, a question on the level of internet access was added to the survey and was analyzed accordingly.

The paper survey was conducted through my assistant in Ulaanbaatar city. However, the reliability of the data could be questioned since it was assisted with other person than me. Due to distance and time limitations, I had to resort to an assistant to distribute the paper survey and collect the responses. But in order to validate the data collection process, the assistant took photos and videos of the respondents when filling their survey. This was done with the consent of the respondents. However, in some cases, they refused to be

filmed or have their photos taken. As discussed in section 5.2, the survey questions were written in a simple and self-explanatory manner, so that no questions needed to be asked from the assistant. Another constraint was to have all the respondents answer every question in the paper survey. Because it was a self-completion survey, some of the questions were left unanswered.

In line with previous studies on perception and attitude of the public towards waste management (Barloa et al, 2016; Douli et al, 2017; Babaei et al, 2015) the work carried out in this thesis involved conducting a structured survey and analyzing the responses of the participants. One limitation of this approach is that it lacks the qualitative and more in-depth understanding that semi-structured or unstructured interviews could provide to understand people's perspectives. Unfortunately, due to the geographical separation and time constraints it was not possible to complement the current study with this kind of interviews. Even though phone interviews were attempted, not enough volunteers were willing to participate in phone interviews. Therefore, the secondary literature review will help mitigate this shortcoming.

Another limitation was that perspective of the officials and authorities was not examined regarding solid waste management and access to services. The responses from authorities could help contextualize the finding of this thesis. An interview was with the officials at Department of urban planning and waste management in Governor's Office of Ulaanbaatar was requested, regrettably no response was received. Therefore, further research could add to the findings of this thesis by conducting a more qualitative study.

6. Results and analysis

6.1. Descriptive analysis of the sample

In this section, the characteristics and descriptive statistics of the sample will be described. Firstly, the demographic information, namely age, gender and education level of the sample will be examined which will be used for the regression analysis. Secondly, the location and types of dwelling of the respondents will be reported as well.

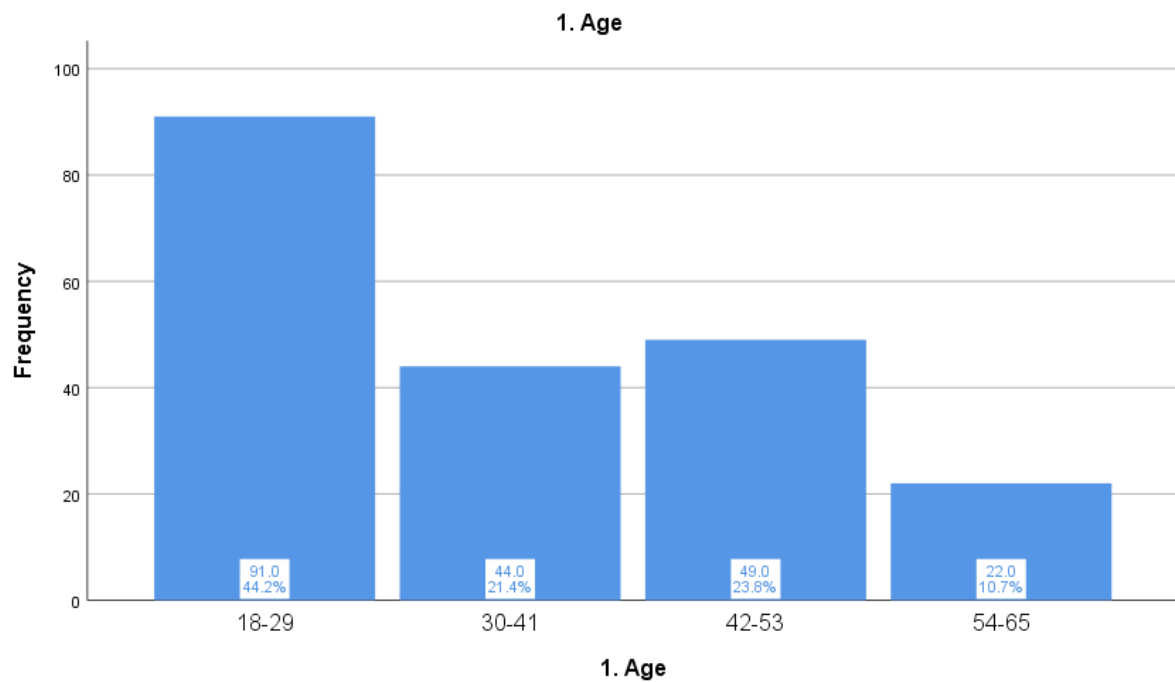


Figure 6.1.1. Age of respondents

In the survey, the total sampling population was 206 participants. The respondents were categorized into four distinct age groups. Of the total respondents, 44.2% was in the first age group between 18 and 29. In contrast, only 10.7% of the sampling population was aged between 54 and 65 who had the lowest participation in the survey. This was about four times lower than the first age group. The share of second and third age groups (age of 30-41 and age of 42-53) was comparable at 21.4% and 23.8% respectively.

Table 6.1.1. Gender of the respondents

	Frequency	Percent
Female	123	59.7%
Male	80	38.8%
Missing data	3	1.5%
Total	206	100%

Regarding the gender of the sample, data for three of the respondents were missing. But the table 6.1.2 shows that 123 respondents (59.7%) out of 206 were female whereas 80 respondents (38.8%) were male.

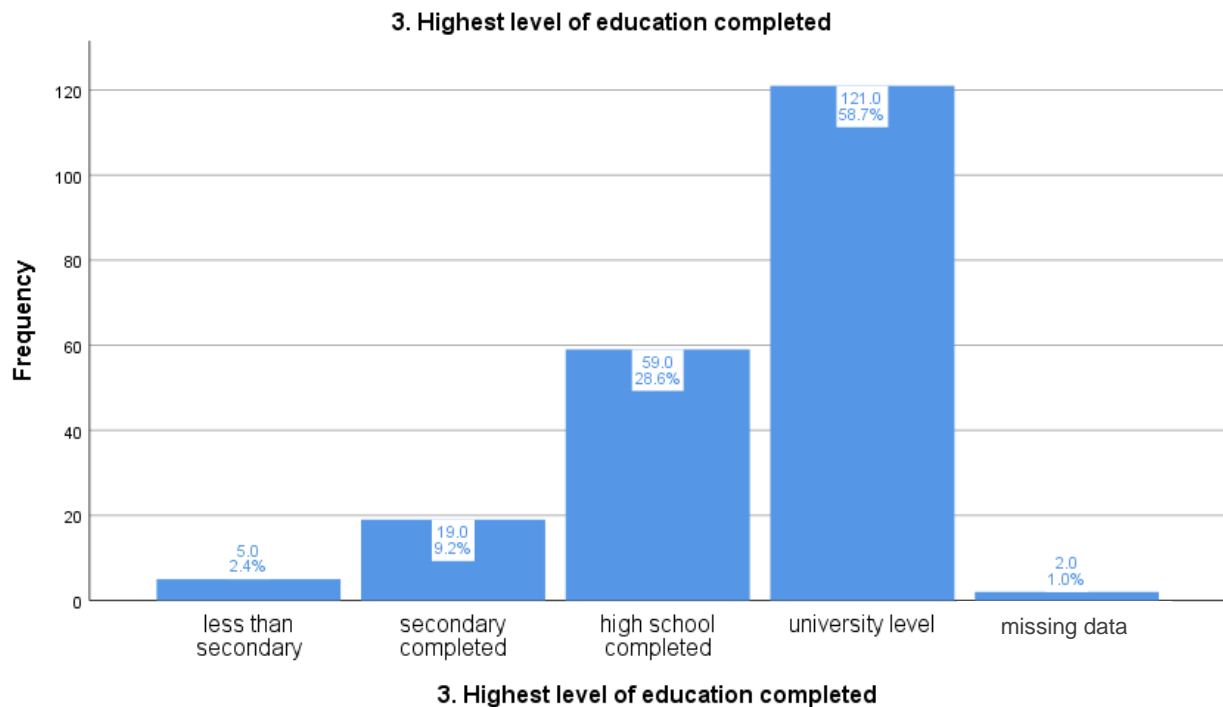


Figure 6.1.2. Education level of the respondents

Regarding the education level, respondents had to choose the highest level of education that they had completed. Figure 6.1.2 shows the education level of the respondents. From the above figure, it can be seen that 1% of the respondents did not specify their education level. The majority of the sampling population, 58.7%, has university level education. This result might seem high for a developing country and not representative of the general Mongolian population. However, it is worth noting that the literacy rate of adults rose to 98.4% in 2015 in Mongolia which is quite high. Further, it was also estimated that the gross graduation rates in first degree programs reached to 60% in 2017 (UIS, 2019). This means that 60% of all adults who are at their graduation age graduated their first degrees in 2017. On the other hand, people who have less than secondary level education and secondary level completed were very few (less than secondary was 2.4% whereas secondary completed was 9.2%). In addition, 28.6% of all the respondents have completed their high school education.

The city consists of nine districts but the respondents were all from seven of them. This could be due in part to using the snowball sampling method, whereby the first survey participants must have referred to other people who live in the same neighborhood. In addition, the two other districts are quite far away from the seven districts. Hence, the survey shows that Bayanzurkh district and Khan-Uul district were the districts with the

highest number of respondents (29.1% and 23.8% respectively) On the other hand, only one respondent was from Nalaikh district. One more interesting thing was that, one person from Khuwsgul province which is 545 km far from Ulaanbaatar city participated in the paper survey. But since the focus of the thesis is on urban citizens of Ulaanbaatar, the data of the respondent from Khuwsgul province is removed in order to avoid errors. This means that, in the latter analysis, that data will not be considered. Unfortunately, data for 4.4% of the respondents is missing.

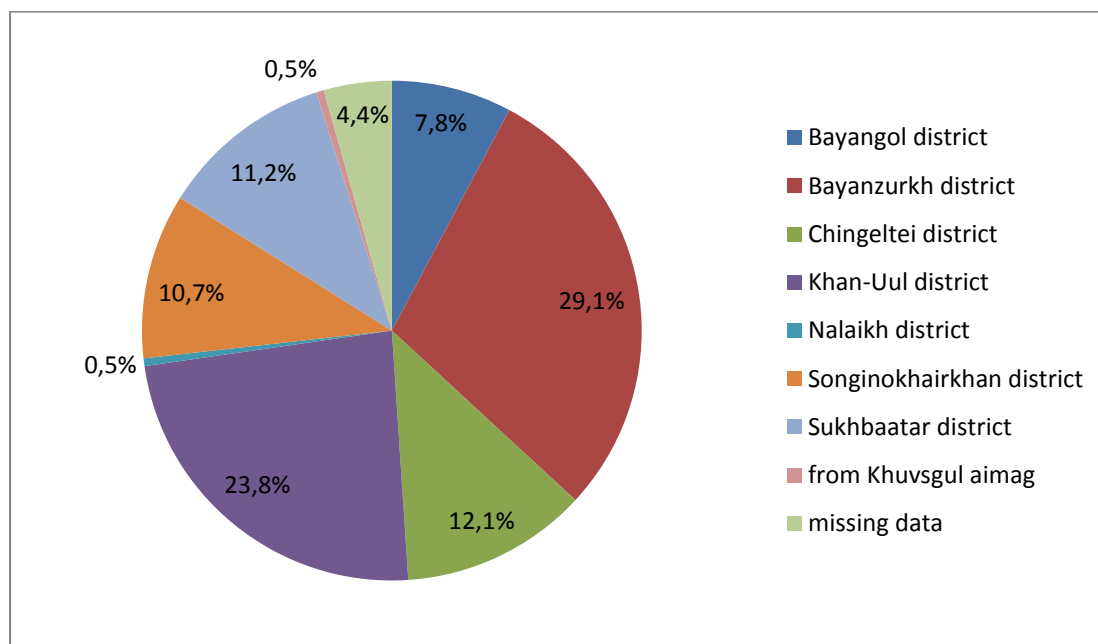


Figure 6.1.3. Districts where respondent reside

Table 6.1.2 Residency types

		Frequency	Percent
Valid	Apartment area	116	56.6
	Ger district	48	23.4
	Other	41	20.0
	Total	205	100.0

Since the Ger districts and other types of residency such as private houses exist along with the apartment areas in the Ulaanbaatar city, the survey also looked into what type of places respondents lived

in. According to the survey results, the majority of the people (56.6%) involved in the survey lived in apartment areas. On the other hand, the number of respondents lived in Ger district and other housing types were of comparable magnitude. While 23.4% of the people lived in Ger district, the rest of the respondents (20%) resided in other types of housing areas.

6.2. *Information and knowledge on solid waste management*

This section deals with the survey questions 6 to 11 which focused on people's knowledge on their household solid waste management and the sources from where they get information regarding the issue.

The results showed that one data point out of all 205 respondents is missing when asked how much they know about solid waste and its impact on the environment. 29.8% of the respondents answered that they know the subject very well whereas around half of the people (50.7%) stated that they have fair amount of knowledge on the issue. The share of the people who do not know that much about the topic was 16.1%. On the other hand, only 2.9% of the people claimed that they do not know anything at all. From here, it can be seen that a considerable amount of people somewhat know about solid waste issues in the city.

Moreover, more men claimed that they know very well about solid waste and its impact compared to women, with 31.6% and 28.5% respectively. However, the Chi-square test showed that it is not statistically significant when exploring the relationship between gender and the knowledge on solid waste and its impact as the significance value was above 0.05. In other words, there is not much significant difference between male and female when it comes to their knowledge on solid waste and its impact.

On the other hand, the test demonstrated that there is a statistically significant correlation between the two variables: highest education level and the knowledge on solid waste and its impact. This means that there are differences between the four different levels of education. According to the crosstab results, the percentages of the people who have university level education that knew fairly or very well on the topic (88.4% out of 100%) were higher compared to the proportions of those who had lower levels of education. However, this is not enough to fully conclude that they have higher awareness on solid waste issues. It simply implies that education level matters for how much people know about the impact of solid waste on the environment.

The Chi-square table presented statistically significant value for residency types and the amount of information and knowledge people have. In other words, there is a significant difference among the different types of residency when it comes to how much information and knowledge they have. According to the crosstab, 39.7% out of all respondents who

live in apartment claimed that they know the topic very well. This was about two times higher than the results of those from Ger district and other types of residency (14.6% and 19.5% respectively). Therefore, it can be argued that dwelling type or, more likely, socio-economic status, might play role in people's knowledge.

The results suggest that people from Ger districts have less information and knowledge on solid waste and its impact on the environment compared to those from apartment areas. The survey even suggested that 36.5% of the people living in apartment areas are most concerned with their waste generation while the proportion of respondents from Ger district and other residence types were 27.2%. This might imply that people from apartment areas pay much more attention on the issue. And that might have led them get more information on the issue due to their concerns.

Table 6.2.1. Percentages of people with university level education

	University level education
Apartment areas	75% out of 100%
Ger district	29.2% out of 100%
Other	48.8% out of 100%

Also this might be explained by the education level. It can be seen from the table 6.2.1 that three quarters out of all the respondents living in apartment areas have university level education whereas only 29.2% of the respondents

in Ger district pursued university level education. And as previous analysis suggested, there was a clear difference among different education levels and that, education level matters for how much people know about the topic. This difference of education level between people from Ger districts and apartment areas might be occurring because of the affordability of higher education. As stated in the context part, Ger districts are settlements with lack of basic infrastructure where waste generation is higher compared to apartment areas (Byamba, 2012). And mostly people from low-income families live in those areas (Ibid, p. 12).

Thirdly, it might also depend on what type of sources people use to obtain information on the issue and how often they use. Thus when it comes to what sources people get information from, 43.1% of the participant answered that they get information from the internet and social media (table 6.2.2). This is followed by those who use television news as a source. However, it can be seen that only 1.1% claimed that they get information from school. The table suggests that the majority of the respondents obtained information on

solid waste issues through the internet and social media. Further, this might be implying that sources other than the internet or social media present limited information on waste issues, waste management and the environment.

However, there were great differences between the residence types on how often and how much information they get from the internet on the waste issues which would potentially affect their awareness and knowledge on the issue. The survey showed that 81% of respondents residing in apartments use the internet every day and 66.4% of the respondents residing in apartments stated that they get a fair or large amount of information on household solid waste management. On the other hand, only 12.5% who lived in Ger districts and 41.5% of respondents living in other types of residency claimed that they use it every day. Further, only 12.5% and 34.2% of people from Ger district and other types of residency gained fair or large amount of information on household solid waste management. Hence, this might also explain why people from Ger districts have less information and knowledge on solid waste and its impact on the environment compared to those from apartment areas.

Table 6.2.2. Various sources of information

	Total respondents	Share of all respondents from Apartment areas	Share of all respondents from Ger districts
Internet and social media	43.1%	56.4% out of 100%	12.7% out of 100%
Television news	37.6%	25.8%	65.5%
From friends and acquaintances	9.3%	7.4%	10.9%
Newspapers and magazines	7.1%	8.6%	7.3%
From school	1.1%	1.2%	0%
Other	0.7%	0%	1.8%
I don't get information on this topic	0.4%	0.6%	0%
No answer	0.7%	0%	1.8%

Furthermore, it seems that the rate of sources other than the internet and social media is quite low. This was similar to the results of previous research conducted on Turkey where

the rates of other sources for environmental education were quite low while the usage of the internet was increasing (Ors, 2012). From here, it can be assumed that internet and social media could be used as an alternative source for education on appropriate solid waste management to capture the attention of young population since the majority of the users in Mongolia are teenagers and youth (Oidov, 2018). However, in that case, people who have less opportunities to access internet and not to mention, the elder people might be at a disadvantage. People who have access to internet tend to be wealthier or more educated compared to those who do not (Couper, 2000 cited in Bryman, 2012). Thus, this illustrates that educational programs need to be carried out more through other types of media and telecommunication.

Interestingly, one of the survey respondents stated his own personal experience in the survey. He claimed that he gets information from the internet and social media but more importantly, he got to know even more after living in Taiwan. Babaei et al (2015) argued that knowledge and attitude are core factors that determine people's actions and knowledge is best acquired through personal experience or education. According to the respondent, education on waste separation and recycling, for instance, are taught starting from elementary school in Taiwan which is quite the opposite to the case of Mongolia. But only 1.1% of the surveyed respondents chose school as their source for waste and environmental education. Therefore, this suggests that educational programs and activities should be spread through not only informal ways like media but also through formal education in schools as well.

Table 6.2.3. Satisfaction with the information on solid waste management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	fully satisfied	3	1.5	1.5	41.0
	fairly	81	39.5	39.5	39.5
	not satisfied	104	50.7	50.7	100.0
	I don't know	17	8.3	8.3	49.3
	Total	205	100.0	100.0	

Only 1.5% was fully satisfied with the available information and knowledge on solid waste management while 8.3% answered that they do not know. On the contrary, approximately half of the respondents (50.7%) claimed that they are not satisfied with the information and knowledge they get even though more than 80% of the respondents

claimed they know the issue fairly well. But even though it is a high number, about half of those people do not separate their waste, for instance. This clearly showed that a high degree of knowledge and awareness do not necessarily guarantee high level of action which was also the case for Philippines. Barloa et al (2016) found that the knowledge and attitude of the undergraduate students in the Philippines do have positive influence on their practices. Nevertheless, their recycling or waste reduction practices were relatively low despite their high degree of knowledge and attitude.

6.3. Role of accessibility to waste services, personal perceptions and attitudes on solid waste management

In the first part of this section, the two regression models will be analyzed. Table 6.3.1 illustrates the variables included in the multiple regressions. Furthermore, the extent to which public perception and attitude account for people’s practices will be investigated. Also, as the survey covered main incentives for public attitude towards solid waste management, the results will be analyzed and discussed based on the literature review in the second part.

Table 6.3.1. Variables

Dependent variables	Independent variables
<ul style="list-style-type: none"> - Waste reduction at source through careful attention to consumption and purchase [Question 14] - Waste separating practice [Question 17] 	<ul style="list-style-type: none"> - Waste issue concerns: concern on household waste generation and concern on increasing waste in the city [Question 12, 13] - Personal responsibility to reduce the amount of waste [Question 15] - Most worried issue [Question 16] - Demographics (age, gender and education level) - Residence type - How much people know about the subject - Satisfaction with the available waste services [Question 23]

- Part 1

The first regression model examined waste reduction at source through careful attention to consumption in relation to the independent variables that include personal responsibility, waste issue concerns, age, gender, education level, type of residence and satisfaction with available waste services as well as the amount of knowledge people have. The regression test showed R square value of 0.279. This means the model (including all the independent variables) explains 27.9% of the variance in waste reduction at source through careful attention to consumption. However, Pallant (2016) stated that if the sample size is small, the results of the R square tend to be overestimated and thus, the Adjusted R square value corrects the value. For this matter, 24.4% of the variance in waste separating practice is explained by the independent variables and the ANOVA table indicates that the model is significant.

Table 6.3.2 Evaluation of model no. 1

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.528 ^a	.279	.244	.836

Overall, most of the independent variables had marginal correlation but three variables, namely personal responsibility, concern on household waste generation and the amount of knowledge people have, showed positive and medium correlation strength to the dependent variable. This means that the more people know about solid waste issues, show concerns on their household waste generation and become more responsible, the better they pay attention to their consumption so that it is possible to reduce waste at source. Furthermore, these are the variables that showed the strongest contribution to explain the dependent variable. The case of Ghana demonstrated that public awareness and knowledge on the issue correlates with an increase in the public participation, people's practices on solid waste management and improves the existing solid waste management system (Douti et al, 2017). Hence, the findings from this survey are in line with the results of the paper and it can also be an indication that the more people know about the issue, the better management they have on solid waste.

People's level of concern on their household waste had the biggest contribution with the value of .285. This indicates that people's behavior on consumption to reduce waste at

source is more dependent on their attitude than any other factors. And that basically supports the theory of planned behavior in which Ajzen (1991) argued that the stronger their attitude, the more they would attempt to act. Most of the participants (53.7%) chose 3 and 4 on a scale of 4 when asked how much they pay attention to their consumption in order to reduce their waste at source. Hence, this means that more people tend to pay attention driven by the factors included in the model, but mostly triggered by the household waste generation concern. Hence it is not completely sufficient to conclude that there is a gap between their values and actions from the results. Unfortunately, the demographics and residence types showed not only small correlations but also weak contributions as well. Here, age variable correlated negatively with the dependent variable, meaning that older people pay less attention to their consumption.

The second model focused on exploring the relationship between waste separating practice and the same independent variables. With the Adjusted R square value of 0.210, the regression analysis showed that the model (including all the independent variables) explains 21% of the variance in waste separating practice. This is rather a small value even though the test was statistically significant. Therefore, it can be concluded that other factors that are not investigated in the model are at play in explaining the variances of the dependent variables.

Table 6.3.3 Evaluation of the model no. 2

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.497 ^a	.247	.210	.78970

However, the independent variables including concern on household waste generation, personal responsibility to reduce waste and satisfaction with the available waste services were statistically significant meaning that they still have an effect on waste separating practice. Satisfaction with the available waste services and personal responsibility to reduce waste positively correlated with waste separating practice, showing medium relationship. Only 1.5% of the participants claimed that personal responsibility is not at all important when it comes to waste issues. Furthermore, there were participants who believed that the authorities are responsible for waste issues but not the citizens. This result was similar to the case of Ghana where the role of authorities is more important than

public participation and they were thought to be responsible for solid waste management (Douti et al, 2017). However, in this case, only 1.5% of the participants thought that way whereas about 94.1% of the surveyed population showed moderate or high degree of personal responsibility to reduce the amount of waste whereas.

Nevertheless, more than half of the surveyed population (54.6%) claimed that they do not separate their waste and 93.8% of those who do not separate their waste viewed that personal responsibility is very important or somewhat important to reduce waste. Thus, it indicates that there is a 'value-action gap' since the respondents showed low level of action despite the fact that they show high degree of personal responsibility. Then, one could theorize that other situational and additional factors are at play apart from the individual's intention and attitude. Even though attitude plays crucial role in engaging in behavior, just as the theory of planned behavior and the value-action gap suggests, other factors need to be taken into account. Available waste services, for example, can be one of the situational factors. In fact, among all the independent variables, satisfaction with the available waste services showed the most significant contribution to waste separating practice. McAllister (2015) mentioned accessible and convenient waste services would encourage both perception and practices of an individual. Therefore, the findings show support for the results of the prior paper that the quality or the availability of waste services affect people's waste separating practices much more than personal attitude and perception.

Other factors such as the demographics did not contribute as much as the attitude and perceptions. Also, the correlations table suggests that apart from the discussed independent variables, others had small relations with the dependent variable. Even though it was statistically insignificant, there was a small, negative correlation between age and waste separating practice. It means that the higher the age, the lower their level of waste separating practice is. Waste separation and recycling are linked in such a way that through improved waste separation, recycling can be encouraged and conversely, recycling facilitates the waste separation practice (Agamuthu et al, 2007). But the low level of separation in older age generally implies that elder people would recycle less. This differs from the previous study done by Fiorilla (2013) where the recycling rates rose the more people age in Italy. The findings of the survey might due to the low level of information on waste separation. As mentioned in the context part, waste separation is a

rather new concept in Mongolia and that a new system on waste separation is to be introduced. While the youth could get information on that through the internet, the elders might be at a disadvantage since proper waste management is not promoted much through other media sources.

Overall, the regression analysis on both models showed not much high results. Both models only explained around 20% of the variance in people's solid waste management. But even so, through the regression analysis, it can still be seen that attitude and perception do have an influence in people's waste management practices. And more importantly, it definitely had more correlation in terms of strength and contribution compared to other aspects included in the models. This would also prove that one of the three main determinants, personal attitude, in theory of planned behavior somewhat explains the case of Mongolia.

However, the contribution and impacts of the independent variables, including the attitude and perception, were marginal. It can be assumed that other aspects which were not considered and examined in this thesis have a bigger role and contribution in the solid waste management. Besides, the sampling population needs to be larger in order to show statistically significant results. But even with a small sampling size, the analysis supported and demonstrated that attitude and perception do play a role when it comes to solid waste management performances. It showed that there is, to certain extent, a gap between people's values or beliefs and actions among the urban citizens in Ulaanbaatar, Mongolia since the findings presented that people did not act accordingly to their attitudes and values.

- Part 2-Qualitative study

As the prior studies mentioned in section 2.2 showed, there are various different incentives and motivations behind people's attitudes and behaviors they perform. The regression analysis showed a positive effect and contribution of the attitudes and perceptions on practices of solid waste. Therefore, following from the quantitative results above, this section will examine in greater detail the motivations of the respondents for separating or not separating their household waste. This will be accompanied by a qualitative discussion of the results in conjunction with a comparison to prior findings in the literature. Moreover, accessibility to waste services which is considered as an additional factor from the

perspective of the theory of planned behavior will be analyzed and discussed in this section as well.

As mentioned above, around half of the participants stated that they do not separate their household solid waste whereas only 6.3% of the surveyed population regularly classified their waste at source. The rest of the sampled population claimed that they sometimes or quite often separate their waste. Among the people who do separate their waste (independently of the frequency with which they perform the practice), there were some that do the practice encouraged by the economic incentives although these people amounted to only 14.7%. This means that for those people, monetary incentives increase their solid waste separating practices and recycling activities. As stated in the prior studies (Permana et al, 2015; Sheau-Ting et al, 2016), economic incentive can be a big push and a core motivation for having a positive attitude which would eventually lead to habitually performing the appropriate solid waste management practices. Furthermore, there are some citizens who are solely dependent on picking up recyclable waste for their living. This situation can be seen quite often in Mongolia where waste pickers even live in disposal sites to collect recyclable waste for a living (Byamba and Ishikawa, 2017, p. 9). However, compared to other incentives, financial motives had the lowest proportion. This might be the case because of the low payment in return of the recyclables. For instance, in 2018, recycling centers paid 200 Tugrug (around 0.73 Swedish Krona) for one kilo of plastic bottles (News, 2018). This amount is not high enough to be financially motivating. Besides, the recycling centers are not only few but they are also not quite user-friendly as Figure 3.2.1 illustrated. 21.5% of the people were concerned with lack of facilities if and when they see a great amount of waste in their neighborhood. Moreover, about 45% of the participants were not at all satisfied with the recycling centers and also waste collection and disposal services. That might be why there were barely any respondents (about 5.5%) that claimed waste services are the incentives to separate their waste.

Previous studies (Wang and Yu, 2018; Brady, 2006) showed a link between aesthetics and moral views and concluded that moral obligations motivate people to engage in actions to protect the environment and aesthetics experiences can shape their moral views more. Around 11% of the surveyed population did find that aesthetics and cleanliness of the environment is the issue that worries them the most. However, respondents did not show any linkage between aesthetic aspects and moral views. But they stated that they separate

their waste because it is the right thing to do. Ajzen (1991) theorized that people's moral obligation was also one of the greatest determinants in showing certain behaviors and hence, concluded that it should be considered in the planned behavior theory. Even though the proportion of the respondents who separate their waste because of moral obligations was not that high (20.2%), the results show that it is still in line with the previous studies and hence, support that this part of the theory of planned behavior is appropriate for the case of Ulaanbaatar. One could make a link between this sense of morality and other factors. For instance, as previously discussed, the most educated people have the better waste management practices. This people had higher chances to educate themselves or be educated about the value and history of their land through its nomadic tradition. In turn this could have led to a greater sense of moral obligation towards the environment. On the other hand, people with lower education levels, who tend to have a lower income, probably did not have the luxury of being informed about these issues. Even though, low-educated people are more likely to live in a Ger district, and thus have moved away from nomadism more recently than apartment residents, their economic situations makes them also more likely to be more preoccupied of making ends meet than taking care of their surroundings.

The results indicated that people do have certain awareness on waste issues firstly, because most people (29.4%) separate their waste in order to reduce the amount of waste at source. As mentioned above, separating the waste at source is crucial because when it is not sorted out properly, the mixed waste would end up transported directly to landfills. That prevents people from recycling and as a result, the amount of waste to landfill would grow. This is both environmentally and financially harmful. Furthermore, people separate their waste because they claimed that recyclable waste can be used for producing other products instead of using new and raw materials. As Owusu et al (2013) argued, it is possible to produce higher-quality materials if waste is separated properly. Hence, the findings illustrate that the driving forces behind them separating their waste are out of concern for the environment and also for sustainable use of resources. In addition, when asked the very first thing people would worry about if they see too much waste and rubbish in their neighborhood, 27.8% of the people would be concerned with the negative impact on the environment. This was the answer with the second highest proportion. Because there was hardly any academic paper that explored the public attitudes or public awareness on the case of Mongolia, it can now be assumed based on the findings and

results of this survey that there is awareness and concerns among the citizens and that, they know what practices lead to what. But one surprising finding was that, most people (32.2%) would be concerned with how ignorant other citizens are, instead of the environmental harm, if they see a lot of waste in their neighborhood. This perception somewhat links with people's responsibility. In other words, like mentioned before, more than 90% of the surveyed population thinks personal responsibility is important in reducing waste. And if there is much waste found in a neighborhood, the findings imply that they would focus more on people's responsibility and how they are ignorant than its negative impact on the environment.

But it is not right to fully conclude that people who do not separate their waste are not aware or not concerned about the environment. It is possible that people did not show satisfying results on their practices due to lack of accessibility even though they are concerned about the impacts on the environment. As mentioned above, recycling, for instance is not convenient enough for citizens. In fact, 15.6% of the participants do not separate their waste mainly because of that reason. In addition, most recycling centers seem to be quite dispersed that 64.4% of all respondents stated that it takes more than 20 minute for them to get to recycling centers. Regarding the waste disposal stations, they were only 5 to 10 minutes walking distance from their homes in most cases. However, more than half of the participants could not sort out their waste because there are hardly any waste separation stations.

The theory of planned behavior argues that additional factors like presence or absence of resources and opportunities are important factors that influence people to perform certain action apart from their attitudes and perceptions. In this case, the resources and opportunities would include the accessibility to waste services people currently have. And the fact that the recycling centers are far and there are hardly any waste stations which are for waste separating demonstrates there is a lack of resources, lack of proper facilities and lack of access to waste services. And that has resulted in over hundred people not separating their waste at all. This clearly supports the arguments from the previous studies mentioned earlier (Zurbrugg, 2003; McAllister, 2015) where inadequate service coverage and inefficiencies of service limit people's recycling practices and further, greatly affect people's attitude and perception. Moreover, whether the recycling centers or waste stations are near to their homes or accessible and user-friendly were the aspects that people think

the most important for them to recycle or separate their waste. It is also worth noting that 45.4% of the sampling population was not at all satisfied with the recycling, waste collection and disposal services.

Furthermore, apart from proper facilities, lack of information also leads to a gap between values and actions (Blake, 1999, p. 268). 17.8% of participants who do not separate their waste argued the lack of knowledge on waste separation as a main reason to their performance. As detailed in the previous section, 80.5% of the surveyed population claimed that they have fair or high amount of knowledge on waste issues. However, it seems that they do not know about the appropriate way to handle household solid waste. The case of Ghana (Douti et al, 2017) has already illustrated that lack of public role in solid waste management and negative attitude was driven by lack of knowledge and access. Therefore, like mentioned above, more educational programs and advertisement on proper household solid waste management needs to be carried out in order to change people's attitudes and improve people's practices.

Anecdotally, while there were some people who did not maintain proper management on solid waste because of their laziness, one respondent who filled the paper survey wrote that she was embarrassed to go to recycling centers and that resulted in not separating the waste and recycle at all. Blake (1999) implied that while individual's attitude and responsibility are the main determinants for behaving environmentally friendly, those can also be the main barriers which hinder them to prioritize the environment. Even though this response only constitutes anecdotal evidence, it clearly shows that the attitude of this person greatly affected her waste separating practices. Secondly, her response and actions showed there is a gap between her values and action because she showed high degree of concern on waste issues and her household waste generation. Yet, she showed no appropriate action towards it despite the great amount of concerns.

Overall, the various different incentives behind people's attitudes and values illustrates that they clearly are in line with prior studies on different contexts. There were attitudes driven by monetary or moral obligations, but more were triggered by the consideration of the environment and sustainable use of resources which implied that urban people in Mongolia have environmental awareness. However, just as the regression analysis demonstrated there is an inconsistency between people's values and actions, proving that individual's concerns, positive attitudes and perceptions do not guarantee positive

behaviors and performances. The results showed that the value-action gap is happening mostly because of insufficient and inefficient waste services. The distance and the convenience of the waste services affected the waste separation and recycling practices. Therefore, it can be implied that the urban citizens would be willing to manage their household solid waste appropriately, if the waste services were more accessible and more convenient.

6.4. Relationship between solid waste management practices and demographic differences

This section will focus on the independent variables, demographic characters of the sampling. In previous section, demographic variables were already included in the multiple regression analysis and as a result, the correlation and contribution were briefly explained. Because the demographic characteristics did not show any significant contribution and effects in the multiple regression analysis, more focused analysis on different groups was made in this section. They were be examined by correlating them to the two dependent variables.

- Age groups

Firstly, different age groups and waste separating practice, the dependent variable, were analyzed by conducting one-way ANOVA test. The test found no statistically significant difference between different age groups for separating waste products at source, with significant level of 0.107. Likewise, for waste reduction by paying attention to their consumption, the test showed no statistically significant difference between the age groups, with the significance level of 0.143.

The results on age groups showed that there was no statistically significant difference for solid waste management practices. As discussed in the literature review, prior studies showed that demographics usually play a role in personal waste management (Babaei et al, 2015; Fiorillo, 2013). The fact that the results of this thesis did not find a statistically significant effect does not necessarily imply that such effect does not exist. Rather, it means that it cannot be determined from the sampled population. Bryman (2012) postulated that the size of the sample affects the statistical significance. The larger the sample size, the more likely a correlation will be found statistically significant (Ibid, p. 350). In our survey, the sample size might not be large enough to display any significant

effect. Furthermore, the sampled population was skewed towards younger participants, having only 22 respondents in the oldest subgroup. On the other hand, various other factors should be taken into account. As the theory of Planned Behavior suggests, both the main determinants and additional factors including demographic characteristics have effects on people's certain behaviors (Ajzen, 1991).

- Gender

An independent samples t-test found no statistically significant difference between genders when it comes to separating waste at source. However, a significant difference was found when it comes to reducing waste by paying attention to consumption. The survey showed that 58.7% of women chose 3 and 4 (on a scale of 4) when asked how much attention they pay to their consumption in order to reduce the amount of waste, in contrast to a 47.5% of men. This suggests that women are more concerned with their household waste generation and thus, attempt to take action on reducing their consumption compared to men. When discussing solid waste management in Ghana, Doui et al (2017) stated that in developing countries more women were concerned with household waste because women tend to be in charge of household related tasks. Similarly, Fiorillo (2013) also found that women's performance on recycling was higher than men's. Therefore, the result of the survey might be implying that more women are concerned with their consumption and household waste generation because of their responsibility towards household work.

- Highest education level

An ANOVA test found that there is a statistically significant difference between the four levels of "highest attained education" in relation to separating waste products at source, with a significance value of 0.018. A positive, albeit weak correlation was found, meaning that the more educated the individual the better their waste separating practices are. This result is clearly in line with the previous studies (Barloa et al, 2016; Babaei et al, 2015) in which education level had the positive effect on people's behavior of waste separating and recycling.

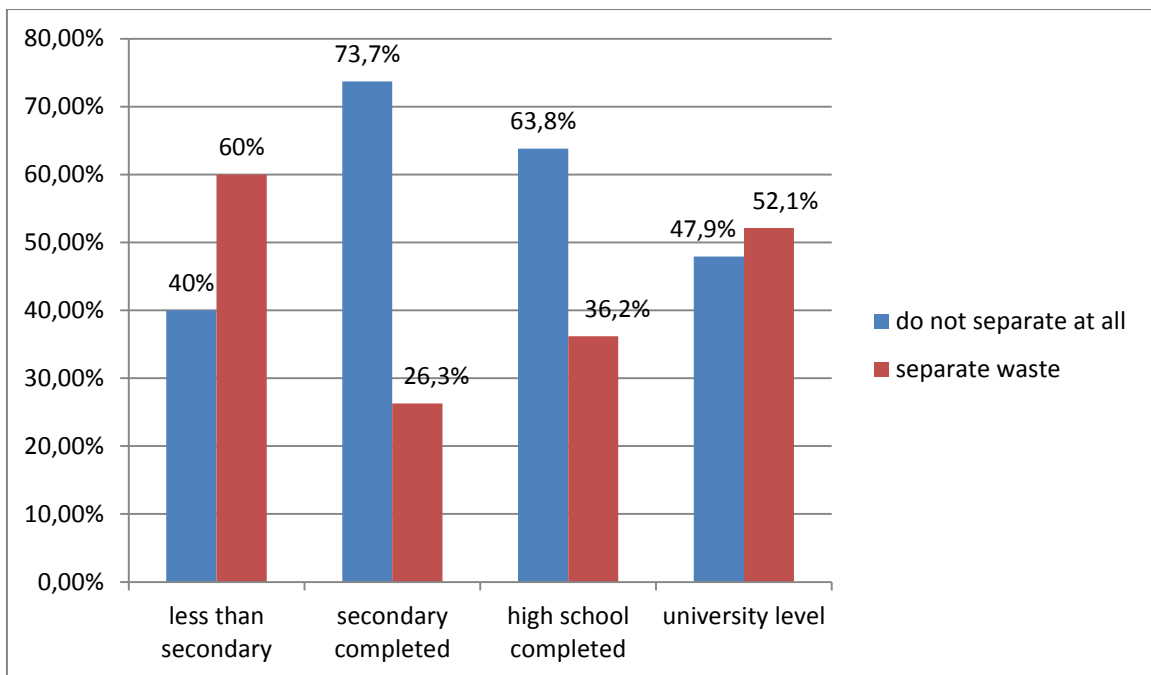


Figure 6.4.1. Waste separation practice by different education level

As can be seen from figure 6.4.1, the chart showed rather high results for the group ‘less than secondary’. This is because only 5 people were in the group and 3 out of 5 people claimed they separate their waste. Otherwise, the proportion of people who separate their waste increased with the education level. More than half of the people with university level education separated their waste although the difference was not much big than those who have the same level education but do not practice waste separation.

In contrast with the above, no statistical significance between levels of educations was found when it comes to paying attention to consumption in order to reduce waste at source

7. Conclusion

This thesis aimed at understanding how specific factors, from demographic and accessibility factors, to amount and sources of information on the issue, and attitudes and perceptions of the population influence household solid waste management in Ulaanbaatar, Mongolia. Despite the fact that several studies have been conducted on the topic of solid waste management in Mongolia as a whole, this work is the first to specifically focus on urban people’s attitudes, perceptions and knowledge of waste management.

A mixed approach was pursued, whereby data was originally gathered by means of a structured survey and analyzed quantitatively, followed by a more qualitative analysis comparing the results with the existing literature.

Regarding the amount of information and knowledge about waste management and its impacted, the analysis did not find any significant difference between genders or age groups. However, both residence type and highest attained education level predicted the amount of information and knowledge people have. People living in Ger districts or having lower education levels were less likely to know the topic very well, in contrast with residents of apartment areas or higher educated people. These two variables correlate with socio-economic status, showing that better off citizens were more likely to know about recycling and other waste management issues. Ger, the traditional housing in Mongolia which is home to almost half of the population of Ulaanbaatar, also exist along with the apartment areas in the city. Hence, further research could be done to map out which districts and areas are more vulnerable and more likely to be unaware on the issue and investigate what could potentially be done to raise awareness.

Internet and social media (43.1%) was the largest source of information on waste management issues, followed by television news (37.6%). Since the majority of the internet users in Mongolia are teenagers and youth (Oidov, 2018), internet and social media could be used as an alternative source of education on waste management in order to capture the attention of the young population. There was a small, negative correlation (although not statistically significant) between age and waste separating practice. This could mean that the elderly might be at a disadvantage since proper waste management is not promoted much through traditional media types. Further research is needed to investigate this issue.

The survey findings show that the public attitude and perception play a crucial role when engaging in solid waste management practices. This factor has a more significant contribution than any other factors, such as the demographic characteristics discussed above. In other words, the more people know about solid waste issues, show concerns on their household waste generation and be more responsible, the better they pay attention to their consumption and manage the solid waste they produce. This is in agreement with the theory of planned behavior, which postulates that attitude is the key variable in performing a certain behavior (Ajzen, 1991).

The findings also suggest that there is, to certain extent, a gap between people's concerns and their actions. Even though the respondents showed a high degree of responsibility, great concern on waste generation and negative impact of waste on the environment, their practices and performances did not always align with their attitudes and beliefs. According to Blake (1999), the inconsistency happens due to other situational and external factors. Based on the empirical data and literature review, the value-action gap occurred mainly because of the lack of accessible waste facilities and services. The literature demonstrated that lack of access to services and lack of service coverage limit people's practices of solid waste management. Therefore, the findings suggest that accessible and convenient waste services would encourage people to have sustainable solid waste management. However, in the case of Ulaanbaatar, there are only a few waste separation stations, and the facilities are unfriendly to users. Hence, it is important for the authorities to carry out the purposed goals and activities proposed in the *Strategy to improve the waste management in Ulaanbaatar* (2017), such as introducing the waste separating system along with the incentive-based automatic recycling machines and waste stations in order to promote public's solid waste management practices.

The main limitation of this study is the size of a sample, of 205 respondents, which might not be considered a representative of the entire population of Ulaanbaatar and might suffer from biases in its demographics. This could have led to some existing effects not been able to be detected with sufficient statistical significance, and to some correlations appearing weaker than they actually are. Further work would require a greater sampled population in order to overcome this shortcoming.

Additionally, even though the case study aimed at understanding the case as a whole, other aspects remained unexplored in this paper. For instance, the role of institutions and authorities responsible for solid waste management was only tangentially considered. It was found that scarcely any information on waste management reached the population from schools or formal education. Furthermore, the lacking accessibility to recycling facilities seemed to be a great detrimental factor deterring good waste management practices. Future research should study in greater depth, the role and impact of public institutions on the attitudes and behaviors of Ulaanbaatar's residents.

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Appendix A. Survey of the study

1. **Age:**
 - a. 18-29
 - b. 30-41
 - c. 42-53
 - d. 54-65
2. **Gender:**
 - a. Male
 - b. Female
3. **Highest level of education completed:**
 - a. Less than secondary
 - b. Secondary completed
 - c. High school completed
 - d. University level
4. **District you live in:** _____
5. **Types of residency:**
 - a. Apartment area
 - b. Ger district
 - c. Other
6. **How much do you know about solid waste and its impact on the environment?**
 - a. Don't know at all
 - b. Not that much
 - c. Fair
 - d. Very well
7. **How satisfied/happy are you with the level of information on household solid waste and its right way to handle?**
 - a. I don't know
 - b. Not satisfied
 - c. Fairly
 - d. Fully satisfied
8. **Where do you get information related to household solid waste and its impact? (choose more than 1)**
 - a. TV news
 - b. Internet and social media
 - c. Newspapers, magazines
 - d. From friends and acquaintances
 - e. I don't get information on this topic
9. **How often do you use the internet?**
 - a. I don't use the internet
 - b. Once a month
 - c. Few times per month

- d. Once a week
 - e. More than 3 days per week
 - f. Everyday
- 10. On the day you use internet, how many hours do you spend on using the internet?**
- a. I don't use the internet
 - b. 0-1 hour
 - c. 1-3 hours
 - d. 3-5 hours
 - e. More than 5 hours
- 11. How much information on household solid waste and waste management do you think you get from the internet?**
- a. I don't get information from the internet
 - b. Very little
 - c. Fair
 - d. Very much
- 12. How concerned are you about the increasing waste issue in the city? Choose from scale of 1-4 (1=not at all concerned 4=very worried)**
- 13. How concerned are you about the amount of waste you generate in your household? Choose from scale of 1-4 (1=not at all concerned 4=very worried)**
- 14. In order to reduce the amount of household solid waste, how much do you pay attention to your purchase and consumption? Choose from scale of 1-4 (1=very little, 4=very much)**
- 15. How important do you think a personal responsibility is to reduce the amount of waste?**
- a. Not at all important
 - b. Not that important
 - c. Somewhat important
 - d. Very important
 - e. The authorities should be responsible, not the citizens
- 16. If/when you see too much waste and garbage in the neighborhood you live, what will be the very first thing you will be most worried about?**
- a. The negative impact on the environment
 - b. The aesthetics and cleanliness of the neighborhood
 - c. The lack of waste facilities (trash bins, disposal stations, recycling centers)
 - d. The ignorance and incivility of the citizens
 - e. That the law enforcement and strategy implementations are weak
 - f. Not at all worried about anything
- 17. Do you sort out the household waste products at source?**
- a. Not at all
 - b. Sometimes
 - c. Often
 - d. Always

18. Please state the reason of not sorting out

- a. Don't have any knowledge on sorting out the waste
- b. Because there are hardly any waste disposal stations for sorting out
- c. Recycling is not very convenient for citizens
- d. Don't think it is necessary to sort out
- e. Feel lazy at times
- f. I sort out the waste products

19. Please state the reason why you sort out

- a. In order to reduce the amount of the waste at source
- b. Because of the economic incentive of recycling
- c. Because it is possible to create and build things using the recyclable waste products
- d. Because it is the right thing to do (morally right)
- e. Because the waste disposal stations and recycling centers are near and convenient for citizens
- f. I never sort out waste

20. How long does it take to get to the nearest waste disposal stations from your home by walk?

- a. 5-10 min
- b. 10-20 min
- c. More than 20 min

21. How long does it take to get to the nearest recycling center from your home by walk?

- a. 5-10 min
- b. 10-20 min
- c. More than 20 min

22. What influences you the most to go to recycling centers and waste disposal stations?

- a. Whether it's near to where I live (the distance)
- b. Whether it's convenient to recycle and sort out the solid waste products
- c. The cleanliness
- d. Nothing

23. On a scale of 1-4 (1=the least satisfied, 4=the most satisfied), how satisfied are you with the waste collection, disposal and recycling services the municipality offer?