Institution

DISSERTATION: RESIDENTS ATTITUDES TOWARDS RECYCLING IN DOHA

Student's Name

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Instructor

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ABSTRACT

Waste management is an imperative role and responsibility of every entity in a society so as to protect the environment and promote the health and safety of the people. Doha, the capital city of Qatar, which is the context of this study, experiences a major problem of waste management due to the high population, increasing urbanization, immigration, and rising economy. As such, the government of Qatar in collaboration with the various municipalities and other stakeholders initiated a nationwide recycling project to manage the residential wastes, which form 30% of the overall waste generation. The objective of the research was to assess the knowledge of the residents concerning the government-sponsored recycling of the residential wastes. As such, the study aimed at revealing the willingness, motivation, and understanding of the residents regarding the recyclable products and the importance of adopting and implementing the initiative. The study was conducted using as survey design and application non-random sampling via a web-based survey. The self-selection based on the criteria that ensured convenience sampling result in a sample size of 317 respondents. The data collected using an online questionnaire was analyzed by applying both qualitative and quantitative approaches. Notably, the results of the study showed that the males and younger people were then main adopters of the initiatives. Also, Doha households had an average of nine members due to the social life of the Muslims who dominate the city. Overall, the respondents understood the importance of recycling and listed various recyclable items. They were also willing to implement the project despite the various challenges such as costs, time, inadequate skills and experience, and lack of facilities.

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1.0.   INTRODUCTION

1.1.   Background Study

The major cities all over the world experience serious challenges of solid waste management, particularly because of the increasing rate of urbanization. Anderson and Fayram (2014, p. 302) noted that the global solid waste crisis has the potential of undermining the credibility of the cities; therefore, many governments in the 21st century strive to upgrade their solid waste management systems. A report by Wang et al., (2011, p. 978) stated that many countries have developed technologies, policies, governance systems, and increased funds to revamp solid waste management. However, it is important to acknowledge the strides that the developed countries have made in managing solid wastes across their cities, particularly because of adequate material, financial, and technical capacities. Additionally, as Abdelnaser et al., (2011, p. 101) noted, the residents of such cities have the right will and attitude to support the waste management through engaging in the household and communal waste recycling programs.

The trend is replicated in the rapidly developing economies of the Latin America, Africa, and Asia (Fook and Gang, 2010, p. 177). In particular, this research focuses on the residents' attitude about solid waste recycling in Doha, Qatar. Undoubtedly, Qatar is one of the world's fastest growing economies, which his accompanied by increasing populations (Appendix 1), rapid urbanization, and an inevitable acceleration of solid waste generation (Sillitoe, 2014, p. 16). The current population of the country is above 2.1 million, a 0.81% increase from the 2015 figure with up to 85% leaving in Doha (Salama and Wiedmann, 2013, p. 45). The nation has a sex ratio of 3.150, which means that for every 3,150 males there are 1000 females. Notably, the sex ratio

is higher than that of the overall world, which is 1.016 (Okan and Sadek, 2014, p. 16). Doha has been described as the city of foreign workers because of many immigrants including the majority Arabs, Indians and others such as Nepalis, Iranians, Bangladeshis, Filipinos, Pakistanis, and many more (Sillitoe, 2014, p. 18-19). The burgeoning problem of solid waste has prompted the policymakers of the country, and specifically the city to expand the waste recycling program beyond the current context, which involved only university campuses and schools. Khatib et. al. (2014, p. 231) noted that reforms on waste management are made in the city to include households and neighborhoods in recycling solid waste so as to reduce the foreseen dangers in the city.

The authorities in Doha plan to make it mandatory for all residents in the city to recycle the generated wastes on a daily basis. The program is supported by the government institutions under the oversight authority of the Ministry of Economy ad Commerce in coordination with other government agencies and ministries (Milanez et al., 2015, p. 67). Salama and Wiedmann (2013, p. 48) hinted that the objective of the project is to initiate a nationwide waste management so as to achieve more within a short span. Statistics reveals that each year Qatar generates above 2.5 million tons of solid wastes, of which 60 are organic in nature while the other 40% are recyclable (Okan and Sadek, 2014, p. 21). The country tops the world with a per capita waste generation of 1.8 kg/day comprising of a large fraction of recyclable items such as glass, metals, paper, and plastics amongst others. The UN Climate Change Conference held in Qatar in 2012 and the National Development Strategy that elapses in 2016 have spearheaded the quest for increasing the rate of waste recycling from 8% to 38% (Salama and Wiedmann, 2013, p. 53). Therefore, the issue that needs investigation is the attitude of the people towards accepting and practicing the recycling program, particularly in the capital city.

1.2. Problem Statement

Doha is the capital city of Qatar, a country that has the highest per capita generation of waste in the whole world. Rav and Unnisa (2013, p. 33) clarified that the country generates up to 7000 tons per day out of which 30% (2100 tons) are from the households. As such, the government in collaboration with many entities such as the learning institutions, recycling companies, corporate bodies, and the private sector has revamped the efforts to foster solid waste management. Such projects are pronounced in the city because of the continued urbanization and population growth that results in more generation of recyclable wastes from the residential areas (UNITED NATIONS, 2005, p. 112). Khatib et al., (2014, p. 233) also added that waste disposal poses a serious challenge to the city that dumps up to 400 tons of waste to the landfill. Therefore, to avoid wastage and overwhelming the disposal points, the residential recycling project was initiated under the umbrella of the Qatar Green Building Council (QGBC) (Agamuthu and Tanaka, 2014, p. 113).

The QGBC and other institutions including individual researchers have engaged in studies to assess the progress that the recycling project has achieved all over the country (Rav and Unnisa, 2013, p. 41). However, this research went a notch higher to fill the knowledge gap about the attitude of the residents towards the project. Even better, it focuses on the inhabitants of the Doha who represents the higher generators of solid wastes than any other parts of the country. In fact, the 2012 e-survey by the QGBC revealed that the 90% of Qatar residents support the need for efficient energy use and promotion of sustainable, which are pillars of the nation's Vision 2030 (Okan and Sadek, 2014, p. 18). It is, therefore, explicit that this study adds new knowledge and information about the attitude and willingness of the city residents towards the government supported recycling project.

1.3.   Research Questions

1. What are the different factors that influence the willingness of the Doha residents in accepting and implementing the waste recycling project?

2. What are the different types of recyclable wastes generated by the Doha residents and how important is it to them to recycle the refuse?

3. What issues encourage or motivate the residents to adopt and engage in the residential waste recycling projects?

1.4.   Research Objectives

1.4.1.   Main Objective

To assess the knowledge of the residents of Doha towards solid waste recycling and its importance

1.4.2.   Specific Objectives

1. To analyze the different factors influencing the willingness of the Doha residents in engaging in solid waste recycling

2. To examine the knowledge of the residents about the different types of recyclable solid wastes and the importance of recycling the them

3. To assess the issues that motivate the residents to recycle the solid wastes

1.5.   Research Hypothesis

H_0-There is no relationship between the awareness of the importance of solid waste recycling and positive attitude for adoption.

H_1-There is a relationship between the awareness of the importance of solid waste recycling and positive attitude for adoption.

1.6.   Significance of the Study

The research contributes vital information for the government and the other entities involved in facilitating the implementation of the residential recycling project in Qatar and particularly in Doha. In particular, the study aims are unveiling the factors that influence the willingness of the Doha residents to accept the program of recycling the wastes. Undoubtedly, by understanding the attitude of the people, it is possible to make proper interventions that will enhance acceptance of the recycling project (Feldstein, 2002, p. 2). Abdelnaser et al., (2011, p. 103) explained that attitude determines the behavior; therefore, the research can be used to provide guidelines for shaping the behaviors of the Doha residents to recognize the importance of managing the solid wastes. Such recognition will, in turn, motivate the residents to recycle more wastes, which is in line with the objectives of the National Development Strategy and the Vision 2030 (Smyth, et al., 2010, p. 1010).

According to Afroz et al., (2011, p. 712), attitude entails a complex mix of the values, personalities, and motivation of the people, which are essential for understanding them. As such, the study helps by alerting the stakeholders of the recycling project by the perception of the people concerning the objective of the venture. With that, they can make the right reforms ensure that the mission of the scheme concurs with what the residents know or understand. However, in the case of any flaws, the research still assists by revealing the kind of knowledge that the public lacks and make appropriate adjustments (Milke, 2008, p. 938). Better still, the study helps to make the residents aware of the need to engage in the waste recycling to protect the environment, reduce wastage, and foster sustainability and efficient energy use (Al-Maaded et. al., 2011, p. 186). Additionally, the study builds the background for further studies and also creates new ideas for future researchers who would like to advance in understanding waste management.

Moreover, the study serves as a mechanism for communicating with the public so as to understand their views and perceptions concerning the waste recycling. It also offers an avenue for collecting their opinions ad suggestions that can be used to revamp the waste management program (Savage, 2002, p. 691). Also, by appreciating their knowledge and attitude, it is possible to establish new systems and strategies to improve awareness of the value of recycling wastes (Afroz et al., 2011, p. 712). Ultimately, the research will help in increasing the scale of managing the household wastes, which in turn protects the environment and promotes public health. With that, the urban residents will be sensitized on the value of managing the waste, which can then be replicated in the other parts of Qatar to accelerate the achievement of a nationwide waste management. Overall, the study enhances public awareness; aims to protect the environment and public health besides informing the policymakers, researchers, institutions, and the agencies for the Qatar waste recycling project.

1.7.   Research Structure

The paper is structured into five main sections. First, the introduction provides the foundation for the study by giving the background study and states the problem so as to ensure the reader understand why it was necessary to conduct the research. Additionally, it highlights the research objectives and questions in addition to stating the hypotheses so as to guide the overall study. Moreover, the introduction reveals the rationale or purpose of the study to understand the possible contributions of the study. Secondly, the literature review provides the assessment and evaluation of the previous or related studies so as to test the consistency of this research, and most importantly to identify the research gap. Additionally, the research methods section unveils how the study was conducted by explaining the design, sampling technique, data collection, and other considerations during the study. The data analysis and result shows the presentation of the

findings and give details of how the data collected was analyzed. Moreover, the discussion expounds on the results and relates it to what other studies and theories say so as provide deeper meaning. Finally, the conclusion ad recommendations wind up the research by suggesting areas that need future studies.

2.0.   LITERATURE REVIEW

2.1.   Overview of Recycling in Qatar

The scenario of solid wastes in Qatar is very profound as the residents generate different types of solid wastes such as paper, glass, plastics, wood, clothing, metals, and a large percentage of organic wastes (Anderson and Fayram, 2014, p. 302). The refuse are collected by different municipalities, the private sectors, and other institutions with the target of disposing them off to the landfills. Overall, the country has three major landfills that include Al-Krana for dumping the sewage refuse, Umm Al-Afai for domestic and bulky wastes, and Rawda Rashed that receives those from the demolition and construction sites (Okan and Sadek, 2014, p. 18-21). Undoubtedly, as Al-Maaded et al., (2011, p. 186) supported, the use of landfill is not appropriate for a country like Qatar that has set the high target of more than quadrupling the current recycling rate. Markedly, a project called Domestic Solid Waste Management Center (DSWMC) was initiated to maximize resource and energy recoveries. The DSWMC is a state-of-the-art scheme that aims at designing the processes of separating, re-processing, composting, energy recovery, and recycling of waste (Agamuthu and Tanaka, 2014, p. 115). Okan and Sadek (2014, p. 17) noted that the mission is to treat up to 1550 tons daily and generate energy for residents besides supplying the surplus amounting to about 34.5 MW to overall grid.

Additionally, the Qatar government is committed to achieving a nationwide waste management with particular focus on the capital city. The National Development Strategy (NDS) that elapses in 2016 was established to ensure that the recycling rate of wastes from households, industries, and commercial sites surpass the rate of generation (Agamuthu and Tanaka, 2014, p. 116). The authors noted that the current recycling rate is 8%, which NDS projects to reach 25% by 2016 to reduce the need for landfills from 91% to 64%. The objective of the strategy is to protect the

environment through avoidance and recovery of wastes. The project operates based on the concepts of reducing, reusing, and most importantly, recycling the wastes besides disposal as the least desirable option (Diaz, 2010, p. 594). Notably, to implement the projects, the stakeholders (The Government, the Municipality, Non-governmental organizations, corporate bodies, and the city residents) have ventured into sponsoring demonstrations and promoting public awareness, particularly in Doha. The aim is to enlighten the residents on the importance of recycling and using recycling products so as to ensure a sustainable future. As such, the Qatar National Master Plan was developed to conduct a nationwide classifications and mapping of wastes as residential and non-residential (Anderson and Fayram, 2014, p. 305). Okan and Sadek (2014, p. 15) noted that the government has intensified the effort of encouraging the residents of Doha to accept the recycling initiatives through public demonstrations and education. However, the burning issue is whether the residents have the right attitude or know the importance of recycling.

2.2.   The Essence of Waste Recycling

According to Agamuthu (2005, p. 171), recycling is one of the best waste management strategies because it allows conversion of used and abandoned materials into useful products. The overall process involves collection, segregation and sorting, processing, and manufacturing of the recyclable wastes into new materials. Agamuthu (2005, p. 175) enlisted the recyclable products to include plastics, papers, metals, wood, batteries, computers, cloths, rubber, glass, and organic wastes amongst others. Many urban households generate recyclable wastes; unfortunately, most of them end up into the landfills, incinerators, or poorly disposed of next to the residential areas. According to Anderson and Fayram (2014, p. 306), the waste recycling could be affected by lack of policies, plans, and financial support from the relevant authorities even in the presence of the human resources. However, as Agamuthu (2005, p. 173) noted, the recycling of residential

wastes is inexpensive and simple but is seriously affected by lack of the will and the right attitude.

Markedly, Anghinolfi et al., (2013, p. 291) noted that recycling provides more benefits beyond the protection of the environment as many people perceive. The authors clarified that it ensures saving and recovery of energy as many; for example, the mission of the project is to encourage energy efficiency and recovery that can supply both to the households and the national grid. Additionally, the technology reduces the emission of the greenhouse gasses, which in turn helps to moderate the problem of global warming. As Al-Maaded et al., (2011, p. 189) explained, recycling prevents wastes from reaching the incinerators the emit carbon dioxide and other gases with the global warming potential (GWP). Also, by reducing the need for landfills, it prevents the evolution of methane gas, which has higher GWP index of 21 over 100 years than the carbon dioxide. The recycling entails a chain of processes that can employ people as collectors, sorters, and other expertise for re-processing (Chang and Davila, 2007, p. 823).

However, Anghinolfi et al., (2013, p. 293) differed with the proponents by arguing that recycling has its own challenges that overshadow the benefits. The authors mentioned about the costs, need for space, expertise, legal and institutional constraints, uncertainty of supply, and that it encourages waste production. It may also be intricate for residents to decide on what to recycle, which may further be complicated by the need for sorting (Chang and Davila, 2007, p. 824). Undoubtedly, the correct segregation of the wastes is essential for successful recycling; however, the process is time-consuming, tedious, and expensive, especially when done manually. Moreover, the residents may lack the knowledge of recycling some wastes; for example, the e-wastes and other recyclable but hazardous products (Kojima, 2005, p. 79). Therefore, it is

important to assess the willingness of the public towards adoption and diffusion of new

technologies, which in this case is recycling (Cruz et al., 2014, p. 2).

2.3.   The Theory of Adoption and Diffusion of Technology

According to Muga and Thomas (2013, p. 23), adoption is the acceptance of a new technology

that is determined by having the right attitude and knowledge. The perception and understanding

of the new idea or concept are imperative parameters the influence whether people will adopt the

technology faster, slower, or reject it. Additionally, diffusion is the process or mechanism

through which the technology spreads or is communicated to the overall social system (Zolait,

2013, p. 74). For instance, the recycling is considered as the new technology; therefore, the

adoption and diffusion of the technology is subject to many factors. Popat (2003, p. 21) outlined

that the adoption and diffusion of new ideas are influenced by four elements called (i)

innovation, (ii) communication channels, (iii) social systems, and (iv) time.

2.3.1.   The Innovation

Fissel et al., (2013, p. 299) explained that the attributes of a given innovation influences the rate

at which it becomes adopted and diffused by the target audiences. The characteristics of the

technology includes it relative advantage, compatibility, trialability, complexity, and

observability (Farquhar and Summers, 2008, p. 69). First, the relative advantage is the degree of

perception that the new innovation has more benefits than the previous ones (Kauffman and

Techatassanasoontorn, 2010, p. 158). The attributes are measured in terms economic, social, and

environmental advantages including issues of satisfaction and convenience (Muga and Thomas,

2013, p. 26). In essence, the greater the advantages the faster the technology is accepted and

diffused. For example, the residents of Doha are more likely to adopt the recycling technology if

they understand the relative advantages compared to other options such as incineration and landfill disposal amongst others (Nasri et al., 2014, p. 25).

Secondly, the compatibility is the extent of perception that the new idea or concept is consistent with the current values, needs, and experiences of the potential adopters (Beck 2008 et al., p. 421). Afroz et al. (2011, p. 717) added that technologies that are compatible with the people's norms and values are more likely to be adopted faster than the incompatible ones. Abdelnaser et al. (2011, p. 105) also noted that incompatible ideas get adopted if people have acquired new value systems that augur well with the technology; otherwise, the adoption and diffusion process becomes slow and in worse scenarios, rejected. For example, the recycling initiative can only be accepted smoothly if it is compatible with what the inhabitants of Doha value or need.

Third, the complexity is the extent to which people perceive a technology to be difficult to use, apply, or understand. As Kauffman and Techatassanasoontorn (2010, p. 159) explained, some ideas and concepts are easy to understand and use; however, others are difficult and complicated. It is undeniable that people tend to shy away from the complicated technology and are often ready to accept and implement that easy ones. Miafodzyeva et al., (2010, p. 342) stated that complex ideas require acquisition of new skills and knowledge, which could be expensive, time-consuming, and probably impossible. As such, the recycling project can only be accepted if the residents perceive it as easy to implement with limited skills and understanding (Narayana, 2009, p. 1165).

Fourth, the trialability is the extent to which the idea or technology can be tried or experimented (Beck 2008 et. al. p. 424). The innovations that are more likely to be attempted or tested are adopted faster than the indivisible ones. That is, people are often cautious about new ideas and

they seek surety and confidence through trials and experimentations (Kauffman and

Techatassanasoontorn, 2010, p. 162). As Miafodzyeva et al., (2010, p. 345) explained,

innovations can only be implemented if the adopters feel safe about it in terms of knowledge and

understanding, which are gained through trying and experimenting. Therefore, the Doha

residents will only have a positive attitude towards the recycling if they are certain about its

trialability.

Lastly, the observability measures the visibility of the technology to the overall social system

(Narayana, 2009, p. 1166). People always want to see and approve the results of a given

initiative; however, if the outcomes cannot be seen, the adopters tend to be skeptical. Chiyangwa

and Trish (2016, p. 59) supplemented that the visibility allows people to evaluate and discuss the

technology, which are essential for making further interventions or adjustments. So, if the

recycling initiative shows no results, then the residents will tend to avoid or adopt it in a slower

rate than the government expects (Song et al., 2012, p. 9).

2.3.2.   Communication Channels

Communication is the mechanism through which people create and exchange information

amongst each other. The objective of the communication is to share vital information and ensure

mutual understanding, coordination, and cooperation of the parties in a social system. Juma and

Kendi (2015, p. 771) added that the knowledge about a given innovation can only spread to other

people if the communication channel is efficient and reliable. Additionally, the interpersonal

channels are important for formation and changing of peoples' attitudes towards a given new

technology or idea. Chiyangwa and Trish (2016, p. 62) also asserted the communication is an

essential tool for influencing the adoption or rejection of innovations.

Notably, people do not often consider the adoption based on the objective findings of research; instead, they involve subjective evaluations of the information from those who adopted the idea (Popat, 2003, p. 25). There are different channels of communicating the new idea; for example, it could be through the mass media that includes prints, televisions, radio, and other electronic means such as the emails, social media, and other interactive channels (Al-Shafi, 2004, p. 81). As such, the residents can only adopt the recycling technology if the information is shared promptly through the right channels that are convenient and preferred by them.

2.3.3. Time

Time has various dimensions for measuring the rate of adoption and diffusion of a new technology. First, time is essential for innovation-decision process, which is a mental process as it relates to understanding the behavioral aspects of people (Popat, 2003, p. 24). Therefore, as Al-Shafi (2004, p. 81) clarified, including the time dimension in analysis the rate of diffusion of a technology elicits more strength. Kendi (2015, p. 773) also explained the inclusion of time allows categorization of the potential adopters into different groups. Millon and Lerner (2003, p. 32) believes that the different decision units show how people develop attitudes towards a new idea that directs its adoption or rejection. Other stages include the implementation phase and ultimately to the conformation of the prior decision. As such, people make continual decisions at the different stages so as to avoid uncertain issues about the expected consequences.

Chiyangwa and Trish (2016, p. 65) added that the time dimension makes the adoption and diffusion process to be classified in five stages called knowledge, persuasion, decision, implementation, and confirmation. At the knowledge stage, a person becomes aware of the new technology and somewhat gain some information of how the technology functions. Secondly, the persuasion phase is where a person acquires the real attitude of favouring or unfavouring the idea

before making a preliminary decision (Owusu et al., 2013, p. 123). The decision, therefore, is

made based on the gain knowledge coupled with persuasion. Then, the implementation stage is

the time when an individual decides to put the idea or concept in to action, particularly to try or

experiment with. Ultimately, after evaluating the preliminary results, he/she does an evaluation

to confirm the already made decision (Kendi, 2015, p. 773).

The other perception is to consider the innovativeness of the adopters. As Seadon (2006, p.

1335) explained, the innovativeness represents that degree adopting the technology at an earlier

stage as compared to the others in the social system. Notably, the notion also results in five

categorizations of people as innovators, early adopters, early majority, early minority, and

laggards (Kendi 2015, p. 774-776). The innovators are averagely the first 2.5% who are

obsessed by the idea of venturesomeness, which puts them out of the society circle for peer

networks to cosmopolite relationships. Second in the position are the early adopters who

constitute about 13.5% of a given social system. Whereas the innovators are seen as

cosmopolites, the early adopters are described as localities that make a large percentage of the

opinion leaders and form the source of advice or information to the subsequent adopters (Barr,

Ford, and Gilg 2003, p. 414). Each of the early majority and the late majority constitute 34%

population and adopt the technology just before and after the average members of the system.

The last portion is the laggard group that is 16% of people who do not possess any opinion

leadership. Kendi (2015, p. 778) mentioned that the laggards are the most localite; thus, they

make decisions based on previous results. They constitute the most suspicious and slowest agents

of change; hence, the poorest attitude.

2.3.4.   The Social System

The social system is the last element of diffusion of a technology. The system in this case

represents all the people in Doha having a common goal of adopting and implementing the

recycling initiative. The overall system defines the boundary within which the recycling is

expected to diffuse. Within that scope, the social structure is developed that in turn defines the

norms and behaviours the constituent members (Seadon, 2006, p. 1333). Such paradigms are

important in measuring the compatibility of the initiative, which is integral for the acceptance or

denial (Barr et al., 2003, p. 408). Therefore, the adoption of the recycling project will be high if

the social system constitutes many agents of change. Such agents are always the early adopters

who are the role-models, opinion leaders, and instrumental in making the idea reach the critical

mass to increase awareness and approval of the recycling (Kendi 2015, p. 778). Overall, the

whole theory explaining the adoption and diffusion the recycling is explained by the conceptual

model in appendix 2.

3.0.   RESEARCH METHODS

3.1.   Research Design

The research was a web-based survey of the residents of Doha to collect information about their knowledge concerning the recycling initiative. Notably, there were various considerations that were made to ensure the sample was representative and to improve the qualities of the expected results. Undoubtedly, the design was favoured due to the nature of the study which called for understanding the behavioural aspects of the residents. Also, it proved financially unfeasible and impractical to collect data using the conventional method of paper-based surveys. The geographical scope of the study also made it impossible to conduct a physical survey of all the residents of Doha. As Baker et al., (2007, p. 3) noted, the web-based survey is appropriate for collection of data from a large population because the cost per response often decrease instead of showing a significant increase as the size of the sample increases. Moreover, the method allowed a speedy distribution of the online-based questionnaire, which also led to higher response cycles (Lazar, 2001, p. 59).

The technical design of the website was done to support multiple browsers and platforms while preventing multiple submissions of the responses. The site also allowed saving of the responses and submission after completion of the survey. Notably, to avoid the complications of using detailed software, the research opted for a simple design that only provided the link to the website and the respondents were given the loggings to the site. Just after entering the user name and the password, the first display was consent information that informed the respondents of their voluntary position of choosing to participate or not. The initial page also clarified the purpose of the study, which served as an assurance for honesty besides the declaration to protect the privacy and confidentiality requisitions. As Couper (2008, p.67) contended, it is always

important to first earn the trust and build a strong rapport with the respondents, particularly when conducting the online survey, which many people perceive suspiciously and unconventionally.

Additionally, the website was designed to have a simple layout while maintaining the need for professional outlook. The simplicity allowed easy navigation and minimizing the use of colours and graphics that could have breached the credibility of the site. As Nagao et al., (2003, p. 43) supported, too complex electronic-survey sites often result in lower response rates due to the technicalities, issues of credibility, and the problem of delays when downloading. The site also provided the option for saving and submitting the responses, which was applicable to all the study subjects including those who abandoned or left some questions unanswered. The idea was to prevent the loss of the information from the completed sections. After the completion of the survey, the respondent was notified and thanked immediately for the participation.

Despite the lack of a mechanism to incent the Doha residents to participate in the study, the study response rate was remarkably high due to the pre-notifications. Prior to the actual study, the residents were informed and invited through the opinion leaders and posters to encourage them to participate. The current recycling project supported by the government also created a research-sensitive community due to the previous orientation of the residents towards such studies by the QGBC. The response was also high because of the simple questions language and a systematic arrangement from issues of demographics and to the main aspects of the recycling. Multiple response alternatives also made it easy for the respondents choose their responses from an array of many options (Lazar, 2001, p. 61).

3.2.   Study Area

Doha is the capital city of the rapidly developing Qatar. As shown in figure 1, the city is found on the coastline side of the Persian Gulf in the eastern part of the country (Wiseman, 2014, p. 56). With the increasing number of immigrants and external job-seekers from all over the world, particularly from Southern Asia, the city has been experiencing a continued growth in population. Additionally, the escalating rural-to-urban migration coupled with the rising numbers of expatriates, the city's population has grown beyond 1.6 million from the 612,707 of the 2004 census (Wiseman, 2014, p. 57). About 40% comprises of the majority Arabs with 19% Indians, 18% Pakistani, 11% Iranians, and others from different countries such as Bangladesh, Egypt, European nations, and United States amongst others (Kreith and Tchobanoglous, 2002, p. 12). The widely spoken language is Arabic with English following as the common language due to the metropolitan nature of the city. The city's population density is about 3745 people/ km2 compared with the overall Qatar's density that is 185 people per square kilometer (Pariatamby and Tanaka, 2013, p. 38). Additionally, the city's religious background reflects the nation's index where 77.5% are Muslims, 8.5% Christians and the remaining 14% comprising of a mix of different religions (Wiseman, 2014, p. 57-58).

The overall city including the suburbs sprawls to a geographical area of approximately 133 square kilometers. Notably, the Doha International Airport is an important infrastructure for the Persian Gulf Area because it is the connection of the city with major cities in Asia, Australia, Africa, India, Europe, and the United States (Pariatamby and Tanaka, 2013, p. 37). Its economy has been is has been increasing with the increase of the business activities, literacy, education, and international events amongst others (Israeli et al., p. 154). For instance, Doha has many sports stadiums and state-of –the-art infrastructure that has made it host many international

sports such as the 2005 and 2006 Asian Games, the 2011 Asian Indoor Games and AFC Asian

Cup. The Country also successfully bided the 2016 Summer Olympics and the 2022 World Cup.

Additionally, Pariatamby and Tanaka (2013, p. 40) revealed there are currently more than 18,

500 projects continuing in the city as Doha Mega Projects and the Residential Recycling is one

of them. In hindsight, the few examples show the economy is high, which has led to increased

waste generation and the need for better waste management programs. Kreith and

Tchobanoglous (2002, p. 19) explained that the growth of the economy correlates with the

increase in waste generations form the residential area and need for a cleaner environment.

Wiseman (2014, p. 56) confirmed that most Doha residents are aware of the benefits of recycling

wastes and possibly have the right attitude towards the governments' recycling project that

covers even the households.

Figure 1: the study area

Source: (Mapsofworld, 2016, p. 1)

3.3.   Sampling and Subject Selection

Due to lack of a central list of the Doha internet users or a sampling frame, it was impractical to apply the random sampling technique. The nature of the research, which wanted to understand the knowledge or behaviors of the residents towards the recycling project, also supported the use of the non-random sampling. As such, the non-random sampling was used in a way that there was a self-selection from the volunteers of the Doha residents' internet users. Notably, to entice the potential respondents, the study involved posting of invitations and pre-notices at different locations of multiple internet users. Fortunately, there a growing numbers of volunteer online respondents due to the previous studies conducted by the QGBC and other researchers. Nevertheless, it is necessary to acknowledge that it was hard to match the general population with the sample in terms of representativeness and proportionality. Baker, Reynolds, and Woods (2007, p. 13) noted that the most reliably sample is a web-based survey is the national census, which in this case was unfeasible due to the cost, time, and other complex requisitions.

Out of the accessible populations who were the Doha residents' internet users, the sampling led to sample of about 317 people out of which 61.74% were males and the rest women. The idea of the sample was to include every internet user irrespective of the gender to reach a minimum of 250 people. But it was fortunate that the sample exceeded the threshold limit that improved the reliability of the results. Couper (2008, p. 73) mentioned that the higher the number of the online respondents the greater the representation, which is why a perfect sample should be equal to the general population; undoubtedly, impractical. The city internet users and agents of change are predominated by the male gender, which was reflected in the proportions of the males and females in the sample size.

The sample was also expected to show a variation of the number of the respondents considering the ages because the Doha's internet users are mainly the younger population and the numbers reduces up the age structure (Pariatamby and Tanaka, 2013, p. 41). Additionally, the selection criteria only recommended those beyond 18 years to avoid inclusion of children in the study. The other criteria that included the internet use, awareness of the recycling technology, and residence in Doha were used based on the technique of convenience or over sampling Method. As Couper (2008, p.34) explained, the convenience sampling includes the respondents that are easy to locate or reach.

According to Gravetter and Forzano (2012, p. 151), convenience sampling is preferred when there is no sampling frame from which to choose the respondents. Couper (2008, p. 76) also added that the technique is fast, cost-effective, simple, and readily available; hence, attracts many researchers. Notably, the method allowed rapid collection of the information from the respondents given that the research based on a large geographical context. Couper (2008, p. 74) argued that researchers often use accurate but also simple sampling method so as to allow timely analysis of the data collected. Because the convenience sampling focuses on the respondents that are easy to reach, it avoids the challenges of cost and the need for resources.

3.4.   Data Collection

Apart from the secondary data from the review of the books, journals, and others, it was imperative to collect the primary data through the web-based survey. The data collected were from 14 questions with multiple responses arranged using nominal scales. Insightfully, the questions required data that could be analyzed through triangulation of both quantitative and qualitative mechanisms. The initial questions asked about the demographic information before developing to those that focused on the attitudes of the respondents towards the recycling as

shown in appendix 9. The theme of the questions showed the type of information expected, which include the age and gender of the respondents because the demographic variables influence the acquiescence of the recycling technology (Lazar, 2001, p. 92). Additionally, the data about the household characteristics was to indicate the number of types of household in Doha and to relate the results to the recycling project.

The study also collected data concerning the perception and understanding of the respondents of the recyclable items and how often or the amount they currently recycle. Moreover, the respondents were questioned about their motivation for engaging in the recycling and if they understood its importance. It was also necessary to inquire about the factors the influence their ability to recycle the items and how they dealt with the issues of electronic wastes. As Rahji and Oloruntoba (2009, p. 962) noted, communication systems influence the adoption and diffusion of an idea, a question asked about the type of channels that the residents preferred.

3.5.   Validity and Reliability

The accuracy and consistency of the data collected were improved through the use of a large sample size, which is recommended when conducting an online survey. Additionally, the questions were well-structured, unambiguous, and the language was simple to eliminate complexity and a likelihood of misunderstanding (Lazar, 2001, p. 28). The reliability was also enhanced by the use of variable responses that were answered by a single click on a specific choice to avoid multiple answers. Also, to ensure validity, all the questions used the same nominal scale so as to eliminate the challenge of mixing the scales.

Most of the questions were closed-ended that made it easier for the respondents to exactly choose from one of the alternative responses, which increased the reliability and validity. The

questions' contextual design and wording were straightforward, which increased the accuracy of responding. Also, the logical organization allowed better understanding and consistent responses. In addition, there was a pilot survey of the responses before the analysis so as check the knowlegdeability, completeness, efficiency, and relevance of the responses. Nevertheless, the problem of controlling the unsolicited respondents, incomplete responses, and the inadequacy of the sample representativeness could affect the generalizability of the findings.

3.6.   Ethical Considerations

The study was conducted by adhering to the ethical and professional principles. As (Lazar 2001, p. 53) explained, the web-based surveys are often affected by the issues of privacy, trust, and confidentiality. However, proper considerations were made to ensure compliance with such requisitions. First, the pre-notification and invitations post ensure informed consents added to the statements explaining the purpose and the allowance of voluntary participation on the first page often of the survey website. The respondents were assured that the data collected was confidential and only meant for research. Additionally, all the reviewed literature and borrowed word, phrases, or concepts are cited so as to avoid the academic offense of not acknowledging the works of others known as plagiarism.

3.7.   Research Assumptions

The research used the assumption that all the internet users in Doha were potential respondents. Another supposition was that the identity of the subjects was not required to protect their privacy and other suspicions. Due to the inadequate funds to incentivize the participants, it was assumed that the Doha residents would respond well to the invitations and pre-notices to ensure repetitiveness of the sample. Moreover, it was supposed that the use of few and simple-structured questions who would result in a higher response rate. Most importantly, the study was pegged on

the assumption that the sample size was representative of the overall residents of Doha, which would allow generalization of the results to the entire population (Spitz, Niles, and Adler, 2006, p. 102).

3.8.   Limitations and Delimitations

Despite the measures undertaken to improve the quality of the study, it was affected by limitations such as the inadequate incentives for participation. However, as Baker, Reynolds, and Woods (2007, p. 28) explained, incentives do not necessarily have much influence on the response rate. Technical challenges of designing the website and the online questionnaires also posed some hurdles; nevertheless, the nature of research encouraged the use of simple models. There was also the problem of unsolicited respondents; for example, those below 18 years old. As such, the consent not was use to specify the criterion of including the 18 and above only. Closing the survey at a given date also eliminated the case of extra responses. Limited use of open-ended questions also avoided the challenge of self-disclosing and lengthier responses that could raise suspicion and low response rates.

4.0.   RESULTS AND DISCUSSION

4.1.   Demographic Information
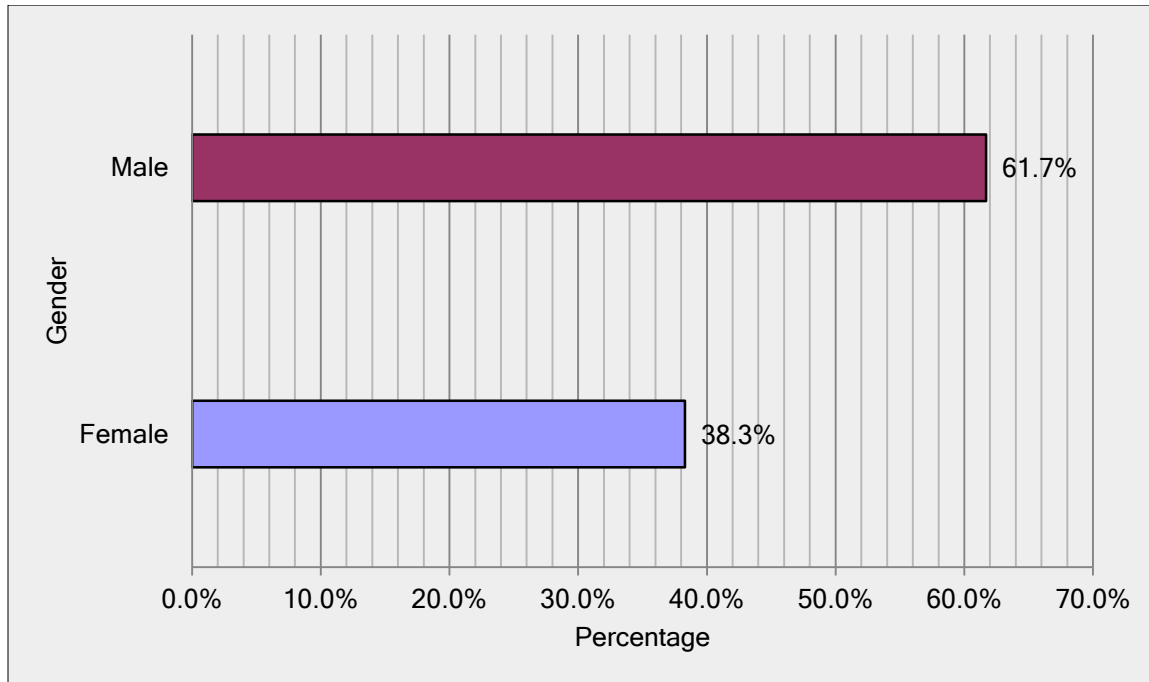
4.1.1. Gender

Figure 2: The sex ratio of respondents

The sample size included 317 participants, but the post-piloting process eliminated 6 of them who did not fulfill the requirements of the research. Out of the number, 61.74% were males and only 38.26% were females. The data revealed how the internet users of Doha are dominated by males. As Rahardyan et al., (2004, p. 444) supported, Qatar is a Muslim-dominated country and the culture is male-dominated. Most of the educated and agents of change are men, while most women are either housewives or marginalized. However, as Pariatamby and Tanaka (2013, p. 37) the elite women were so influential and constituted the major part of reformists and early adopters of the recycling project. The education statistics of the country shows that women are

more educated than the men; however, it is also true that the men are highly involved in vocational trainings, which mostly require computer literacy (United Nations Human Settlements Programme, 2010, p. 156). Nevertheless, the number of men (> 70%) far much outnumbers that of the women both in the country and within the city, which was also reflected in the sample's sex ratio (Jayasinghe et. al., 2013, p. 66).
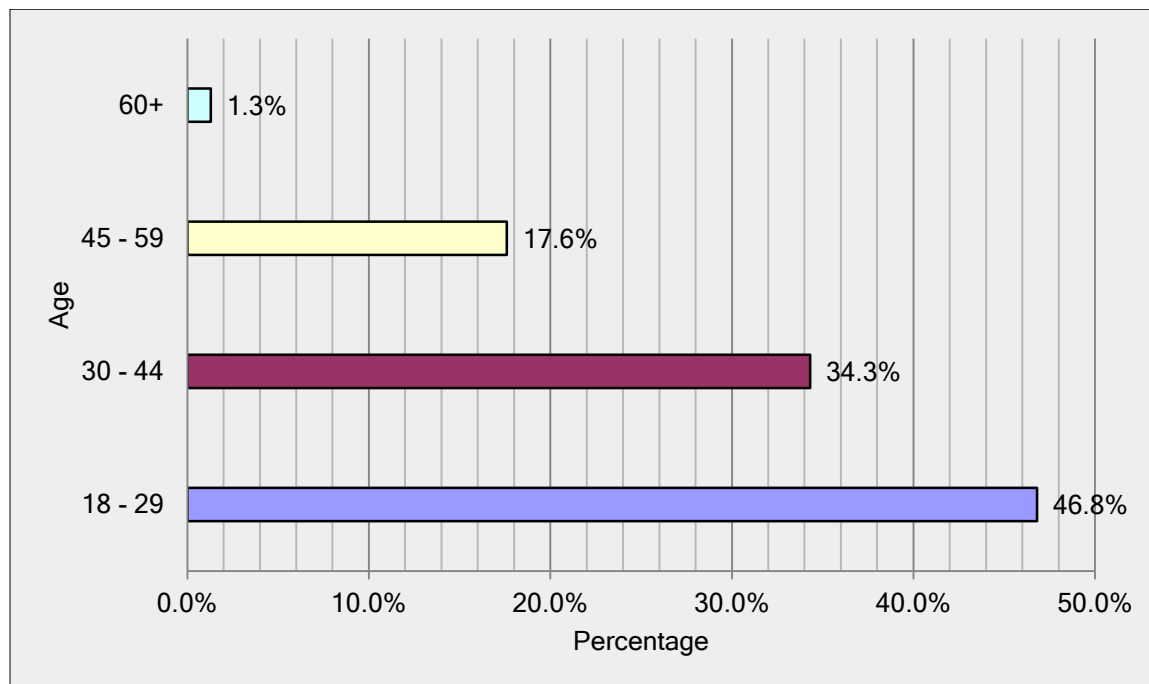
4.1.2. Age

Figure 3: Respondents' age structure

The sample was divided into four age groups and the results show that the youngest group between below 29 years formed the largest proportion of the internet users in Doha. Out of the 312 respondents, 146 were below 29 years, 107 between 30 and 44 years, 55 between 45 and 59 and only 4 were above 60 years. According to Babaei et al., (2015, p. 95), age is an important variable in explaining the variation of knowledge towards a particular technology. It is apparent that the contemporary world is dominated by young elites with better incomes and high interest

for improving their knowledge. First, the population below 30 years forms the majority of internet users, which was reflected in the sample. Urban Management Program and Preston (2002, p. 4-6) also added that the young often have positive attitudes towards developments; hence, they are more likely to understand the importance of recycling and be in the forefront of implementing the project. However, the old, particular above 45 years also play an important role in informing the residents about their experiences, values, and norms that might influence the project. The very old are often very skeptical or unaware of the new developments in a society; hence need to be persuaded by the early adopters before making positive considerations (Farquhar and Summers, 2008, p. 72; Fourie, 2006, p. 802).

4.1.3.   The Number of People in Doha Households
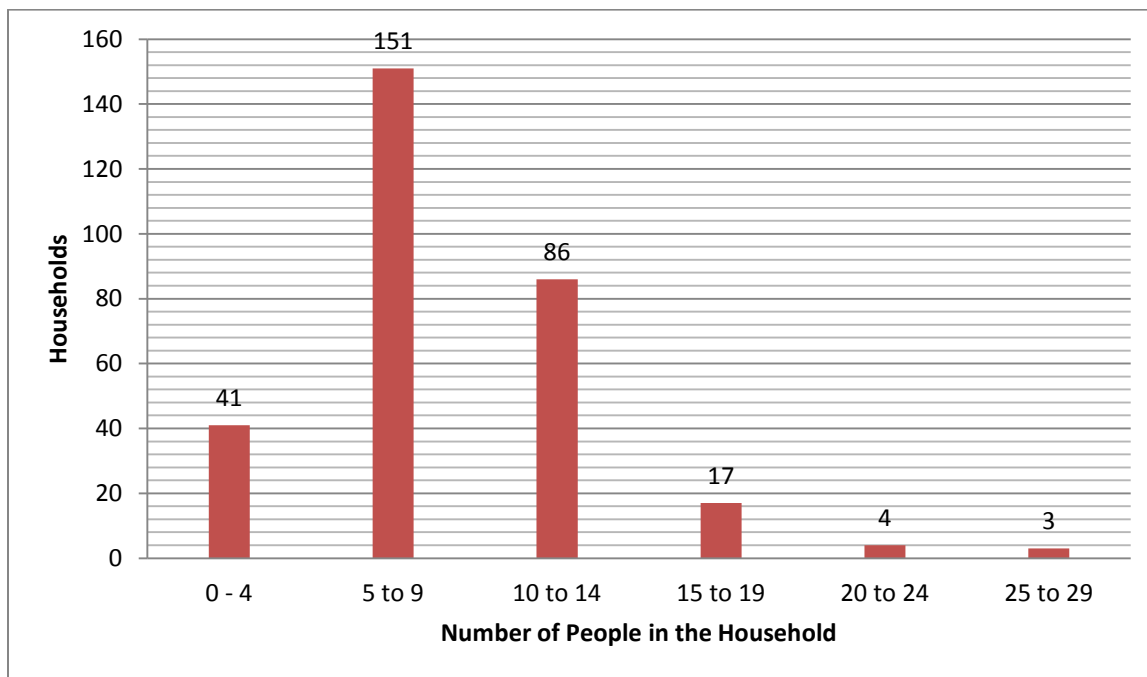

Figure 4: Number of People in the Doha Households

The number of people in the household ranged from 1 to 27, and out of the 302 respondents, the total number of people from all the households was 2579. The mean average of a household was

8.539, which is approximately 9 people in every household. There was a standard deviation of

4.181, which showed a high disparity amongst the different households. The information may

differ with the total fertility rate of the country which about 1.95 children born per woman. The

Muslims Qataris have a unique social life where extended families and sometimes including the

friends live in the same household. Additionally, the foreign workers tend to share houses due to

the high cost of renting and living in the city residents. The results reveal how the city is

populated with households containing averagely 9 people. In hindsight, the higher the number of

people in the households, the higher the volume of the residential solid waste generation

(Challcharoenwattan aand Pharino, 2015, p. 7419). The situation confirms the high tonnage of

wastes generated per day and the urgent need to adopt the recycling project.
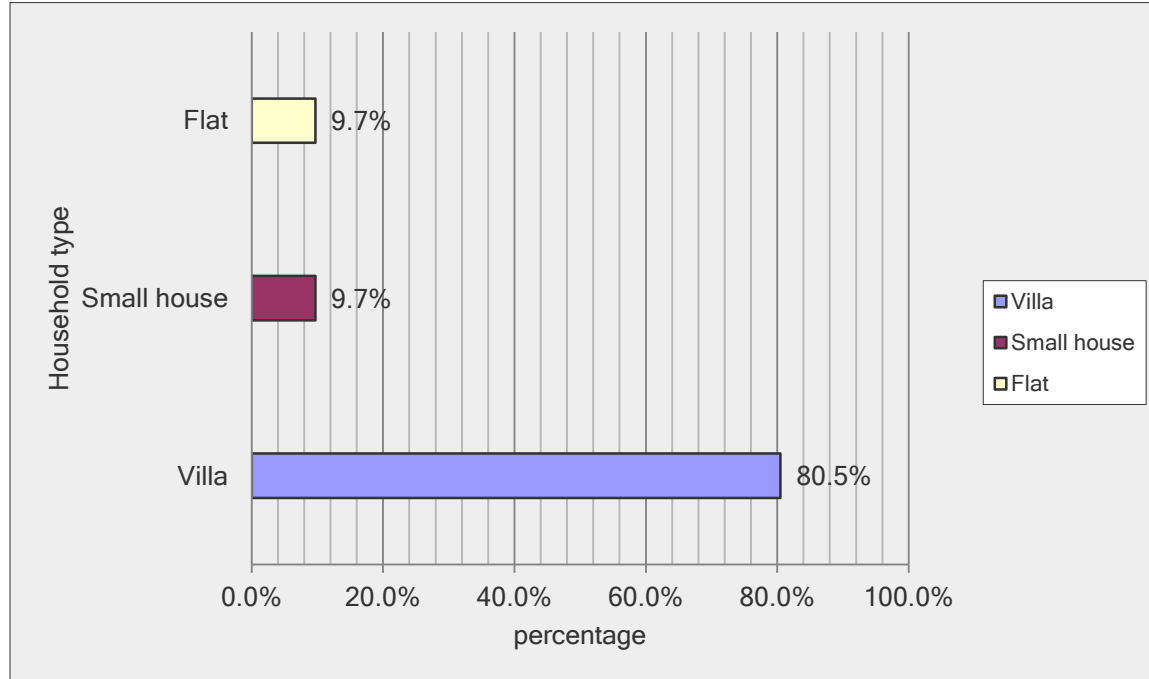
4.1.4.   Type of Households

Figure 5: Type of the households

The figure 4 also shows there were three main types of the households that included small

houses, flats, and villas. The variation of was mainly determined by the different social classes

with the richest occupying the villas and the poorest residing in the small houses (Kikuchi, 2001,

P. 142). The results showed that out of the 308 responses, the majority (248 respondents) live in

the villas while only 30 people live in the small houses just like in the flats. It is, therefore,

evident that a large proportion of the Doha residents are affluent, supportive of clean

environment and sensitive to public health issues. As Babaei et al., (2015, p. 97) explained,

people with good economic status demand clean, safe, and healthy surrounding since they

understand the importance; hence, they tend to support waste management initiatives like the

recycling scheme.

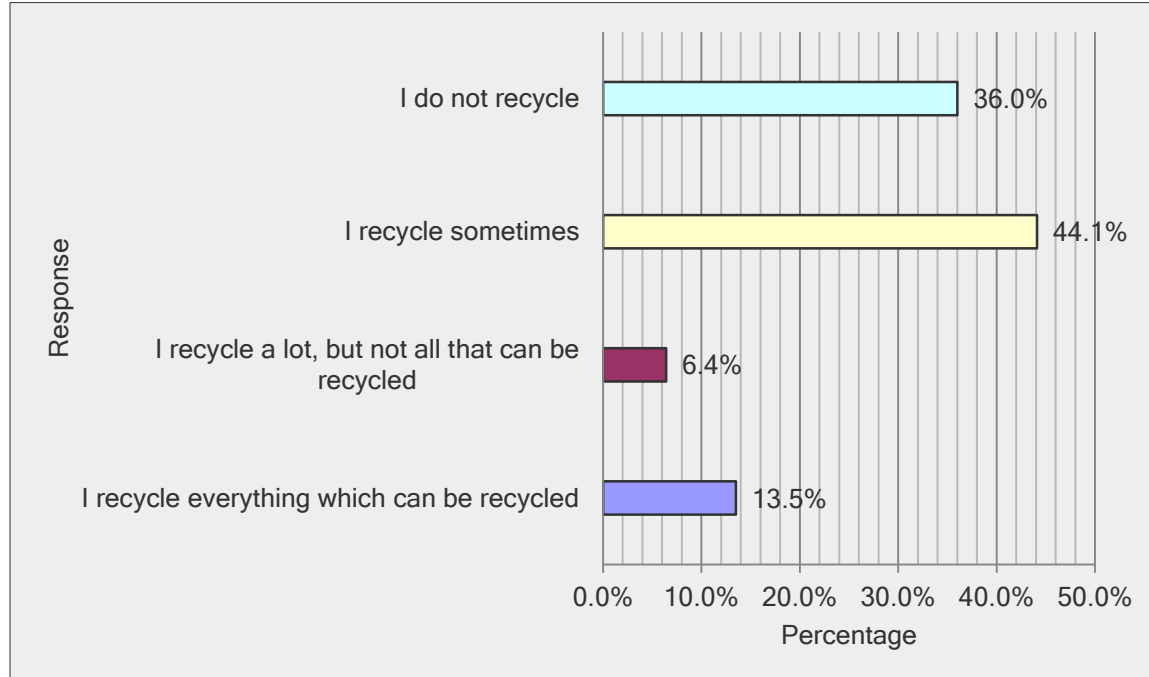### 4.2.   How much the Residents Recycle

Figure 6: The much the Residents Recycle

The findings show that the residents have not implemented the project as the government expected. Majority of the population do not recycle or only do it occasionally and just 19.9 % recycle everything or a substantial part of the wastes. Out of the 311 responses, 122 admitted that they do not recycle at all and 137 recycle sometimes; hence, the 80.1% of the population either do not understand the benefits of the practice. Kanat (2010, p. 1738) noted that the lower cases of adoption could be attributed to lack of knowledge, motivation, or facilities, which could explain the state of the Doha residents. Nonetheless, 6.4% and 13.5% of the respondents said that they recycle a lot and everything respectively. The low rate of adoption could also be attributed to the timeframe, as the project is still on its inception periods of knowledge and persuasion as explained by the adoption and diffusion theory (Saphores et. al., 2006, p. 183).

The less than 20% adopters constitute the innovators and early adopters; therefore, as the time goes by, many people are expected to get convinced and make decision favoring the project.
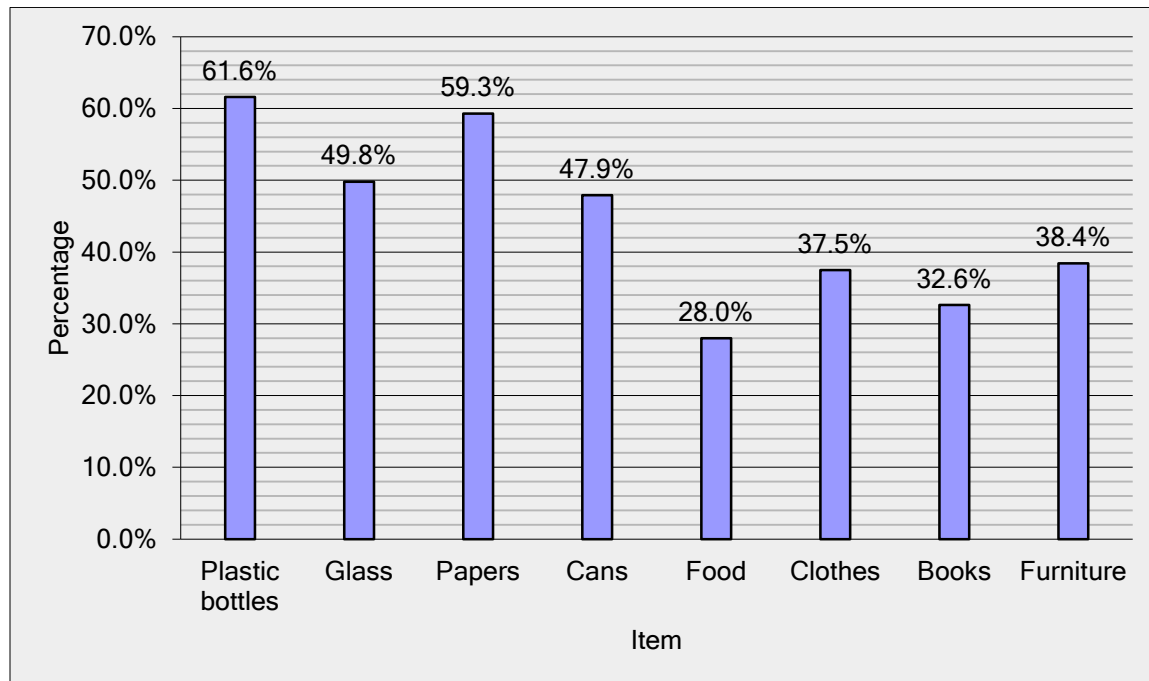
4.3.   The Willingness to Recycle

Figure 7: Willingness to recycle items

Notably, the majority was willing to recycle plastic bottles and papers, followed by cans, cloths, and glasses while few mentioned furniture, books, and food. Out of the 309 responses, 65.5% and 50.2% admitted that they could recycle plastic bottles and papers respectively. The higher percentages augurs with the argument of Babaei's et al., (2015, p. 95) that people are often willing to recycle what they always use or generate. Additionally, 40.8% and 40.5% were willing to recycle clothes and cans respectively, because they believe they are recyclable and have seen or used some of the re-processed product. However, only 38.8% agreed on recycling glass as they perceive that the process is risky, expensive, and complex. The similar perception was with the 27.2% who accepted to recycle furniture. Just 24.9% were willing to recycle food and books

since the others thought the process is impractical and required more time and skills if not to mention their social values and norms against the process.

When asked about the potential items to recycle, the respondent gave similar responses as those concerning their willingness. They mentioned the recyclable items to include the plastic bottles, glass, papers, cans, food, clothes, books, and furniture; however, the percentages varied. Out of 307 responses, 189 mentioned the plastics, which recorded the highest percentage and 86 chose foods. The details about the responses are illustrated in appendix 3. The variation of the percentage of responses of the other items was minimal. Markedly, most of the Doha residents understand the recyclable waste products with limited information about the organic components.

As Narayana (2009, p. 1166) clarified, even the organic waste products such as foods and other biomass can be recycled. The residents' knowledge about the recyclable items is possibly because of theri satisfaction with the advantages, the triability, visibility, complexity, and compatibility of the recycling process (Ljunggren, 2000, p. 526). However, most of the respondents seemed not to specify other household wastes that are recyclable such as old televisions, computers, the rechargeable batteries, fluorescent bulbs, DVD and CD cases, electronic items and other e-wastes (Saphores, 2006, p. 189). As shown in the appendix 6, out of the 310 respondents, 37.1% would dispose of the electronic wastes, 37.1 % would donate, and 12.6 % would sell. Even those who specified other options did not mention the idea of recycling. Insightfully, the residents were worrying about the technicalities, expenses, and the safety of the recycling of e-wastes, which they perceive as hazardous (Ljunggren, 2000, p. 529).
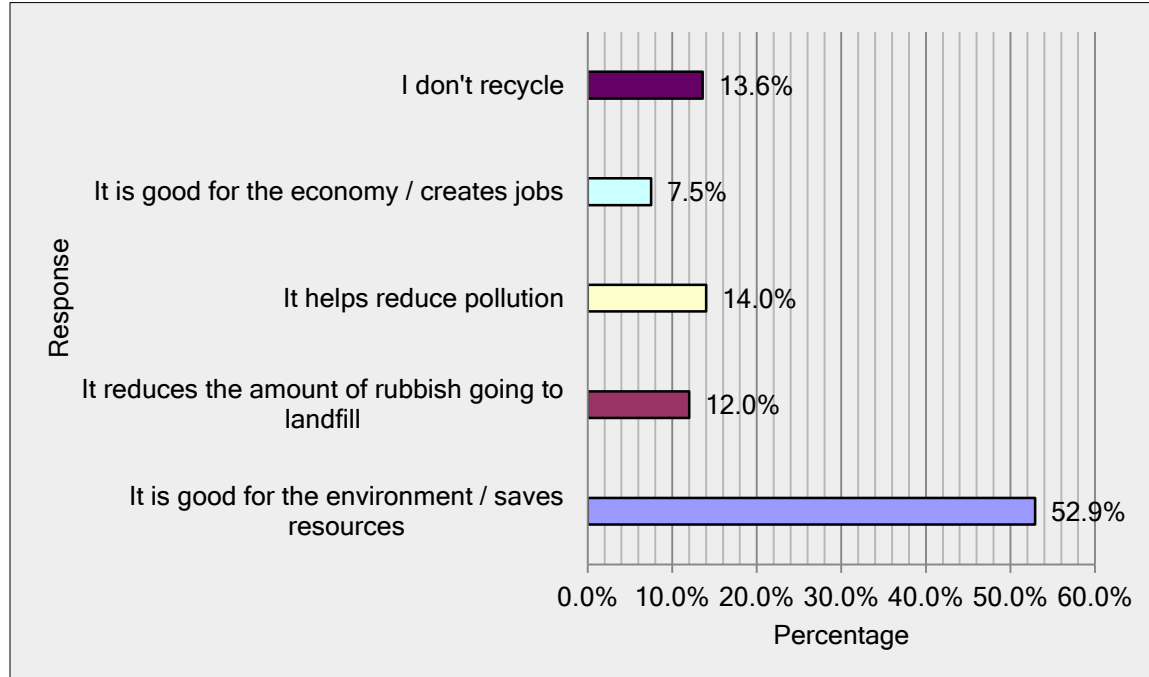
4.4.   Motivation for Recycling

Figure 8: Motivation for Recycling

According to Abdelnaser et al. (2011, p. 105), motivation is the self or outside incentive that drives a person to make a decision or take an action. The respondents were asked about what drive them to recycle their wastes and 52.9% of the 308 responses wanted to protect the environments and recovery resources. Just like Carvalho and Marques (2014, p. 13) noted, recycling is essential for protection of environmental damage due to the solid wastes that have an overall negative impact to the land , waste, air, and human health. Additionally, 12% wanted to reduces the amount of wastes heading to the landfills. Hazra et al., (2013, p. 404) asserted that waste disposal to the landfills is an alternative but not the best waste management strategy. Therefore, the recycling recovers the wastes that would otherwise reach the landfills. Another 14 % of the research subjects had the aim of reducing pollution of the environment, which is a key driver for adoption of recycling.

Abdelnaser et al. (2011, p. 106) added that the benefits of recycling are the motivators for the adopters. For example, it creates jobs that generate incomes to people who sell the products. Notably, only 7.5% of the respondents cited the advantage of earning income. Most of the Doha residents have the attitude of engaging in the recycling as a moral initiative to protect their surrounding and promotes the health of the public. However, 13.6% could not show their motivation because they have not engaged in recycling. It is, therefore, important for the stakeholders of the recycling project to continue with the awareness creation to enlighten the public about the appropriateness and imperativeness of implementing the initiative (Igbinomwanhia and Ohwovoriole, 2012, p. 102).

The respondents noted several issues that would encourage them to start or continue with the recycling. For example, of the 309 answers, 31.4% mentioned the need for time. Time is a crucial determinant of the adoption and implementation of an idea. People are always busy with their daily undertakings and the Doha residents are not exempted (Hazra et al., 2013, p. 406). However, the major problem was the lack of bins as 37.9% called for bins to ease collection and sorting. Additionally, 22.7% opted for financial gains while the other 8.1% specified issues such as skills, proper information, experiences, training, and collaborations. The research subjects revealed that their ability to recycle their wastes is also affected by lack of interest and facilities amongst others. Appendix 7 reveals that 57.3% of that could be incapable due to lack of the collecting bins while 21% did not understand the technology of recycling. Despite 14.6% lacking the interest, others called for training and inductions to enable them get involved. The results in appendix 8 also shows that the 51.9% of the residents would recycle is they receive the incentive and support from the government. Others repeated the requisition for expertise and sorting skills (Igbinomwanhia and Ohwovoriole, 2012, p. 105). Intrinsically, 15.55 wanted a detailed

understanding of the specific type of plastics to recycle. Undeniably, different waste products have definite components that make them recyclable or not.

As illustrated in the appendix 5, of the 310 replies, 7.6% strongly agreed that recycling protects the environment, 26.1% agreed while 1.6 % disagreed including the 0.6% who strongly disagreed. Overall, the recovery of resources limits or diverts the wastes that would pollute the environment. For example, many wastes such as polythene, papers, cans, organic and the e-wastes cause detrimental impacts to the various components of the environments. Lavee and Khatib (2010, p. 2205) explained that the wastes cause air pollution and its subsequent consequences when burnt or incinerated. The solid wastes and their leachates also pollute the soil, which reduces the quality, usefulness, and aethestic values including the consequences on the living organism (Uke and Stentiford, 2013, p. 1424). Similar or severe costs are also felt when the pollute water bodies and other parts.
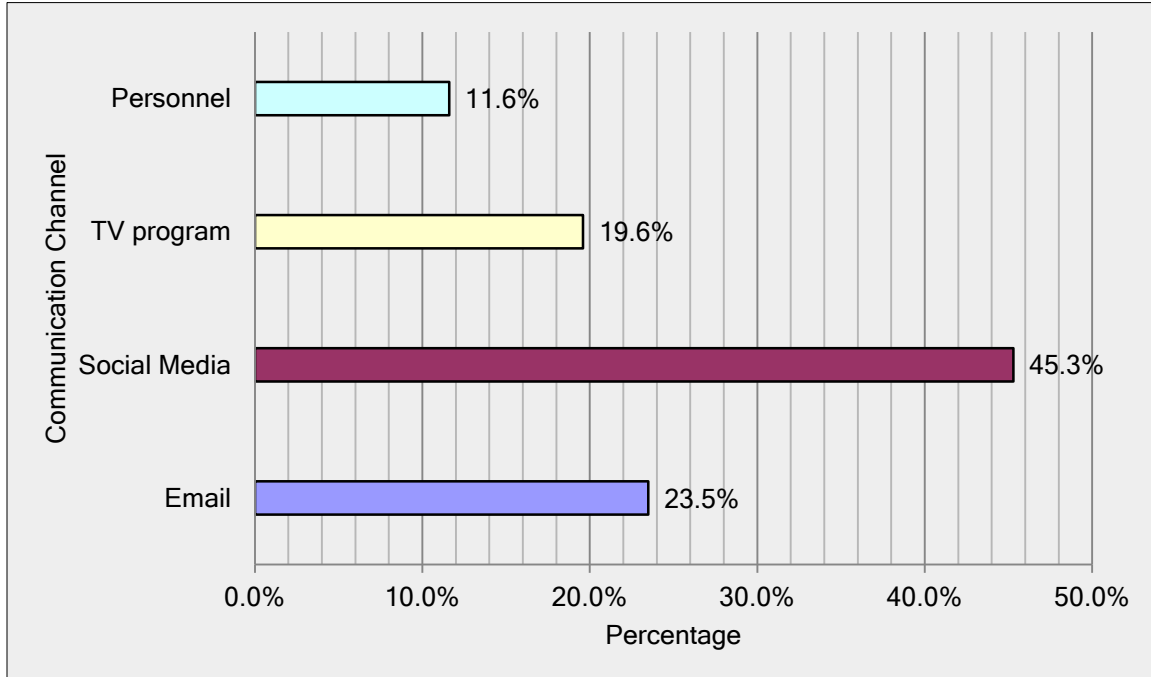
4.5.   Communication

Figure 9: Communication Channels

Saphores et al., (2006, p. 185) contended that communication enhances the spread and diffusion of an idea or concepts to other people. It is undeniable that sharing of information allows passage of the knowledge and persuasion of the non-adopters to facilitate informed decisions about acquiescence or rejection. Juma and Kendi (2015, p. 771) highlighted the different communication channels, particularly the mass media that includes print TV, radios, telephone, emails, social media, and other interactive mechanisms. Personal representatives can also give the information through demonstrations, displays, experimentation, forums, and discussions amongst others. The figure 8 above reveals that 45.3% of the Doha residents would prefer the social media because of its convenience, wide coverage, ease of use, and proliferation of affordable computers and internet. The least preferred was the personal representatives mainly because of the limitation of time, resources, and other inconveniences.

5.0.   CONCLUSION

The purpose of the research was to assess the knowledge of the Doha residents concerning the recycling of the household wastes. Notably, the city is under pressure of solid wastes that overwhelm the alternative management options such as disposal to the landfills or incineration. The burgeoning problem has been exacerbated by the increase of population, urbanization, and the economic status of the residents. As such, the study helped in understanding the attitude of the residents towards the government-sponsored project of recovering the residential wastes. Objectively, the study aimed at revealing the willingness of the residents, identify their knowledge about the recyclable wastes, and assess the factors that influence their acceptance, motivation, and ability to engage in the project. The presumption was to prove if there is a relationship between the knowledge and positive attitude.

The findings revealed that the respondents understood the objectives of the project, which included protection of the environment, public health, and resource recovery. Others also mentioned issues of income generation, energy recovery, and moral obligations. However, the majority complained about the challenges of skills, time limitations, and facilities while a small proportion had no interest for the recycling. Results also shows the male and the young dominated the adoption. Additionally, the Doha households had an average of 9 members leading to more waste generation. Overall, the residents have the right knowledge and attitude towards the project despite some challenges. The analysis of the results accepts the alternative hypothesis that there is a relationship between knowledge about the recycling and having a positive attitude. Nevertheless, the research recommends future studies to focus on how to conduct a market and non-market valuation of the willingness of the residents to adopt the waste recycling.

References List

Abdelnaser, O., Mahmood, A. and Read, A. (2011). A Study of The Motivation and De-
Motivation Factors Influencing the Participation Of People of Pulau Pinang in Recycling
Of Solid Wastes. *Solid Waste Technology Managemnt*. **37**(2), pp.91-101.

Afroz, R., Tudin, R., Hanaki, K. and Masud, M. (2011). Selected socio-economic factors
affecting the willingness to minimise solid waste in Dhaka city, Bangladesh. *Journal of
Environmental Planning and Management*. **54**(6), pp.711-731.

Agamuthu, P. (2005). Book Review: Waste Management Series 4. Solid waste: Assessment,
Monitoring and Remediation. *Waste Management & Research*. **23**(2), pp.171-176.

Agamuthu, P., and Tanaka, M. (2014). *Municipal solid waste management in Asia and the
Pacific Islands: challenges and strategic solutions*. Singapore: World Scientific.

Al-Khatib, I., Ajlouny, H., Al-Sari', M. and Kontogianni, S. (2014). Residents' concerns and
attitudes toward solid waste management facilities in Palestine: A case study of Hebron
district. *Waste Management & Research*. **32**(3), pp.228-236.

Al-Maaded, M., Madi, N., Kahraman, R., Hodzic, A. and Ozerkan, N. (2011). An Overview of
Solid Waste Management and Plastic Recycling in Qatar. *Journal of Polymers and the
Environment*. **20**(1), pp.186-194.

AL-Shafi, S. M. (2004). *Domestic solid waste management in Qatar*. Coventry: Coventry
University.

Anderson, C. and Fayram, T. (2014). Recycle of Precious Metals Utilizing Copper Based
Industrial Pyrometallurgyand Electrorefining. *J Solid Waste Technol Mngmnt*. **40**(4),

pp.300-310.

Anghinolfi, D., Paolucci, M., Robba, M. and Taramasso, A. (2013). A dynamic optimization
    model for solid waste recycling. *Waste Management*. **33**(2), pp.287-296.

Babaei, A., Alavi, N., Goudarzi, G., Teymouri, P., Ahmadi, K. and Rafiee, M. (2015).
    Household recycling knowledge, attitudes and practices towards solid waste
    management. *Resources, Conservation and Recycling*. **102**(5), pp.94-100.

Baker, J. D., Reynolds, R. A., and Woods, R. (2007). *Handbook of research on electronic
    surveys and measurements*. Hershey: Idea Group Reference.

Barr, S., Ford, N. and Gilg, A. (2003). Attitudes towards Recycling Household Waste in Exeter,
    Devon: Quantitative and qualitative approaches. *Local Environment*. **8**(4), pp.407-421.

Beck, R., Beimborn, D., Weitzel, T. and König, W. (2008). Network effects as drivers of
    individual technology adoption: Analyzing adoption and diffusion of mobile
    communication services. *Information Systems Frontiers*. **10**(4), pp.415-429.

Carvalho, P. and Marques, R. (2014). Economies of size and density in municipal solid waste
    recycling in Portugal. *Waste Management*. **34**(1), pp.12-20.

Challcharoenwattana, A. and Pharino, C. (2015). Co-Benefits of Household Waste Recycling for
    Local Community: Sustainable Waste Management in Thailand. *Sustainability*. **7**(6),
    pp.7417-7437.

Chang, N. and Davila, E. (2007). Minimax regret optimization analysis for a regional solid waste
    management system. *Waste Management*. **27**(6), pp.820-832.

Chiyangwa, T. and (Trish) Alexander, P. (2016). Rapidly co-evolving technology adoption and diffusion models. *Telematics and Informatics*. **33**(1), pp.56-76.

Couper, M. (2008). *Designing effective Web surveys*. Cambridge: Cambridge University Press.

Cruz, N., Simµes, P. and Marques, R. (2014). Costs and benefits of packaging waste recycling systems. *Resources, Conservation and Recycling*. **85**(2), pp.1-4.

Diaz, L. (2007). Ethics in solid waste management. *Waste Management*. **27**(5), pp.593-594.

Farquhar, I., and Summers, K. H. (2008). *The value of innovation: impact on health, life quality, safety, and regulatory research*. Bingley: JAI Press/Emerald.

Feldstein, M. (2002). How to design recyclable learning objects. *eLearn*. **2002**(7), p.2.

Fissel, B., Gilbert, B. and LaRiviere, J. (2013). Technology adoption and diffusion with uncertainty in a commons. *Economics Letters*. **120**(2), pp.297-301.

Fook, L. L., and Gang, C. (2010). *Towards a Liveable and Sustainable Urban Environment Eco-Cities in East Asia*. Singapore: World Scientific.

Fourie, A. (2006). Municipal solid waste management as a luxury item. *Waste Management*. **26**(8), pp.801-802.

Gravetter, F. J., and Forzano, L.-A. B. (2012). *Research methods for the behavioral sciences*. Belmont, CA, Wadsworth Cengage Learning.

Hazra, T., Goel, S. and Maitra, B. (2013). Willingness-to-pay for solid waste management service attributes: Kolkata Municipal Corporation area, India, as a case study. *International Journal of Environment and Waste Management*. **12**(4), p.406.

Igbinomwanhia, D. I., and Ohwovoriole, E. N. (2012). Study of the constraints to residential solid waste management in Benin metropolis, Nigeria. *Journal of Emerging Trends in Engineering and Applied Sciences.* **3**(1), 103-107.

Israeli, A., Uriely, N. and Reichel, A. (2002). Attitudes of Local Residents vs. Residents of Surrounding Areas Towards Tourism Development. *Anatolia.* **13**(2), pp.145-157.

Jayasinghe, R., Mushtaq, U., Smythe, T. A., and Baillie, C. (2013). *The garbage crisis: a global challenge for engineers*. New York: McGraw-Hill.

Juma, E. and Kendi, E. (2015). Access to information about solid waste management: Implications on residents' attitudes in Eldoret Municipality, Kenya. *Ethiop. J. Env Stud & Management.* **8**(1), p.771.

Kanat, G. (2010). Municipal solid-waste management in Istanbul. *Waste Management.* **30**(8-9), pp.1737-1745.

Kauffman, R. and Techatassanasoontorn, A. (2010). New theoretical perspectives on technology adoption. *Information Technology and Management.* **11**(4), pp.157-160.

Kikuchi, R. (2001). Recycling of municipal solid waste for cement production: pilot-scale test for transforming incineration ash of solid waste into cement clinker. *Resources, Conservation and Recycling.* **31**(2), pp.137-147.

Kojima, M. (2005). *International trade of recyclable resources in Asia*. Chiba: IDE-JETRO.

Kreith, F., and Tchobanoglous, G. (2002). *Handbook of solid waste management*. New York: McGraw-Hill.

Lavee, D. and Khatib, M. (2010). Benchmarking in municipal solid waste recycling. *Waste Management*. **30**(11), pp.2204-2208.

Lazar, J. (2001). *User-centered Web development*. Boston: Jones and Bartlett Publishers.

Ljunggren, M. (2000). Modelling national solid waste management. *Waste Management & Research. Research*. **18**(6), pp.525-537.

Mapsofworld, (2016). *World Map*. [online] Mapsofworld.com. Available at: http://www.mapsofworld.com/ [Accessed 12 Jan. 2016].

Miafodzyeva, S., Brandt, N. and Olsson, M. (2010). Motivation recycling: pre-recycling case study in Minsk, Belarus. *Waste Management & Research*. **28**(4), pp.340-346.

Milanez, B., Hargrave, J. and Luedemann, G. (2015). Urban environmental services: valuing the environmental benefits of solid waste recycling in Brazil. *International Journal of Environment and Waste Management*. **15**(1), p.67.

Milke, M. (2008). The world's great solid waste management libraries. *Waste Management*. **28**(6), pp.937-938.

Millon, T., and Lerner, M. J. (2003). *Handbook of psychology. 5, 5*. New York, Wiley.

Muga, H. E., & Thomas, K. D. (2013). *Cases on the diffusion and adoption of sustainable development practices*. Hershey PA: Information Science Reference.

Nagao, N., Matsuyama, T., Yamamoto, H. and Toda, T. (2003). A novel hybrid system of solid state and submerged fermentation with recycle for organic solid waste treatment. *Process Biochemistry*. **39**(1), pp.37-43.

Narayana, T. (2009). Municipal solid waste management in India: From waste disposal to

    recovery of resources?. *Waste Management*. **29**(3), pp.1163-1166.

Nasri, N., Mohd. Zain, H., Mohammed, J., Hamza, U. and Ahmed, M. (2014). Sustainable

    Recycle Solid Waste to Synthetic Renewable Solid Energy. *AMM*. **705**(3), pp.24-28.

Okan Sirin, R. and Sadek, H. (2014). Recycling of Local Qatar?s Steel Slag and Gravel Deposits

    in Road Construction. *International Journal of Waste Resources*. **4**(4), pp.15-23

Owusu, V., Adjei-Addo, E. and Sundberg, C. (2013). Do economic incentives affect attitudes to

    solid waste source separation? Evidence from Ghana. *Resources, Conservation and*

    Recycling. **78**(5), pp.115-123.

Pariatamby, A., and Tanaka, M. (2013). *Municipal solid waste management in Asia and the*

    Pacific Islands: challenges and strategic solutions. New York: McGraw-Hill.

Popat, A. (2003). *People's knowledge, attitudes and behaviour towards waste recycling: an*

    exploratory study. Hershey, PA: Information Science Reference.

Rahardyan, B., Matsuto, T., Kakuta, Y. and Tanaka, N. (2004). Resident's concerns and attitudes

    towards Solid Waste Management facilities. *Waste Management*. **24**(5), pp.437-451.

Rahji, M. and Oloruntoba, E. (2009). Determinants of households' willingness-to-pay for private

    solid waste management services in Ibadan, Nigeria. *Waste Management & Research*.

    27(10), pp.961-965.

Rav, S. and Unnisa, S. (2013). *Sustainable solid waste management*. Toronto: Apple Academic

    Press.

Salama, A. M. A., and Wiedmann, F. (2013). *Demystifying Doha on architecture and urbanism in an emerging city*. Farnham: Ashgate.

Saphores, J. (2006). Household Willingness to Recycle Electronic Waste: An Application to California. *Environment and Behavior*. **38**(2), pp.183-208.

Saphores, J.-D., Nixon, H., Ogunseitan, O., and Shapiro, A. (2006). Household Willingness to Recycle Electronic Waste. *Environment and Behavior.* **38**(2),pp.181-211.

Savage, G. (2002). Integrated Solid Waste Management: A Life Cycle Inventory. *Waste Management*. **22**(6), pp.691.

Seadon, J. (2006). Integrated waste management: Looking beyond the solid waste horizon. *Waste Management*. **26**(12), pp.1327-1336.

Sillitoe, P. (2014). *Sustainable development: an appraisal from the Gulf Region*. Hershey, PA: Information Science Reference.

Smyth, D., Fredeen, A. and Booth, A. (2010). Reducing solid waste in higher education: The first step towards a green university campus. *Resources, Conservation and Recycling*. **54**(11), pp.1007-1016.

Song, Q., Wang, Z. and Li, J. (2012). Residents' behaviors, attitudes, and willingness to pay for recycling e-waste in Macau. *Journal of Environmental Management*. **106**(9), pp.8-16.

Spitz, G., Niles, F. L., and Adler, T. J. (2006). *Web-based survey techniques*. Washington, D.C: Transportation Research Board.

Uke, M. and Stentiford, E. (2013). Enhancement of the anaerobic hydrolysis and fermentation of

municipal solid waste in leachbed reactors by varying flow direction during water addition and leachate recycle. *Waste Management*. **33**(6), pp.1425-1433.

United Nations Human Settlements Programme. (2010). *Solid waste management in the world's cities: water and sanitation in the world's cities 2010*. London: UN-HABITAT/Earthscan.

United Nations. (2005). *Urban environmental governance for sustainable development in Asia and the Pacific a regional overview*. Bangkok: United Nations, Economic and Social Commission for Asia and the Pacific.

Urban Management Program, and Preston, M. (2002). *Urban Management Programme, 1997-2001*. Nairobi: United Nations Human Settlements Programme.
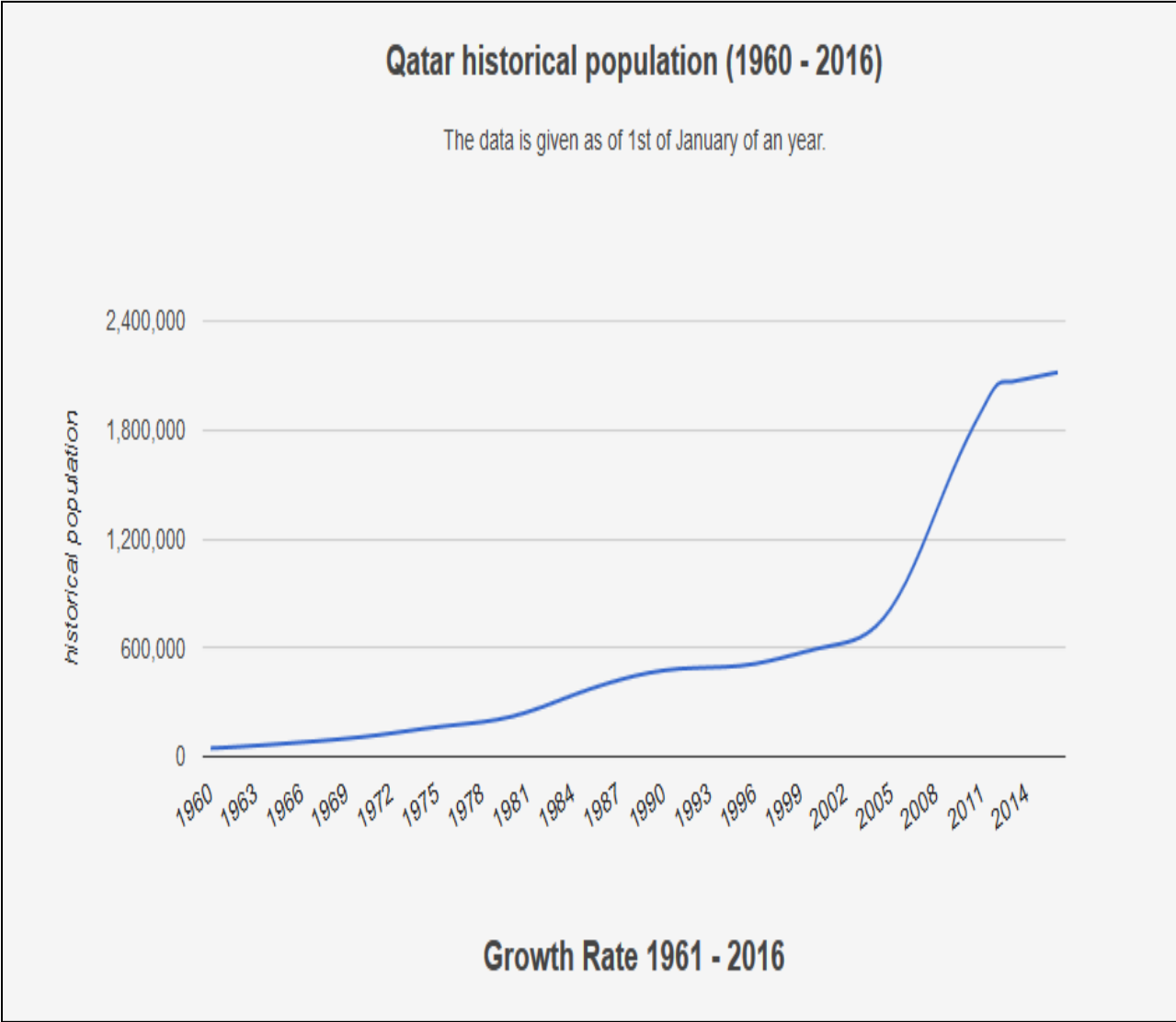
Wang, Z., Yin, J. and Zhang, X. (2011). Willingness and behavior towards e-waste recycling for residents in Beijing city, China. *Journal of Cleaner Production*. **19**(10), pp.977-984.

Wiseman, A. W. (2014). *Education for a knowledge society in Arabian Gulf Countries*. Emerald: Group Publishing Limited.

Zolait, A. H. S. (2013). *Technology diffusion and adoption: global complexity, global innovation*. Hershey, PA: Information Science Reference.
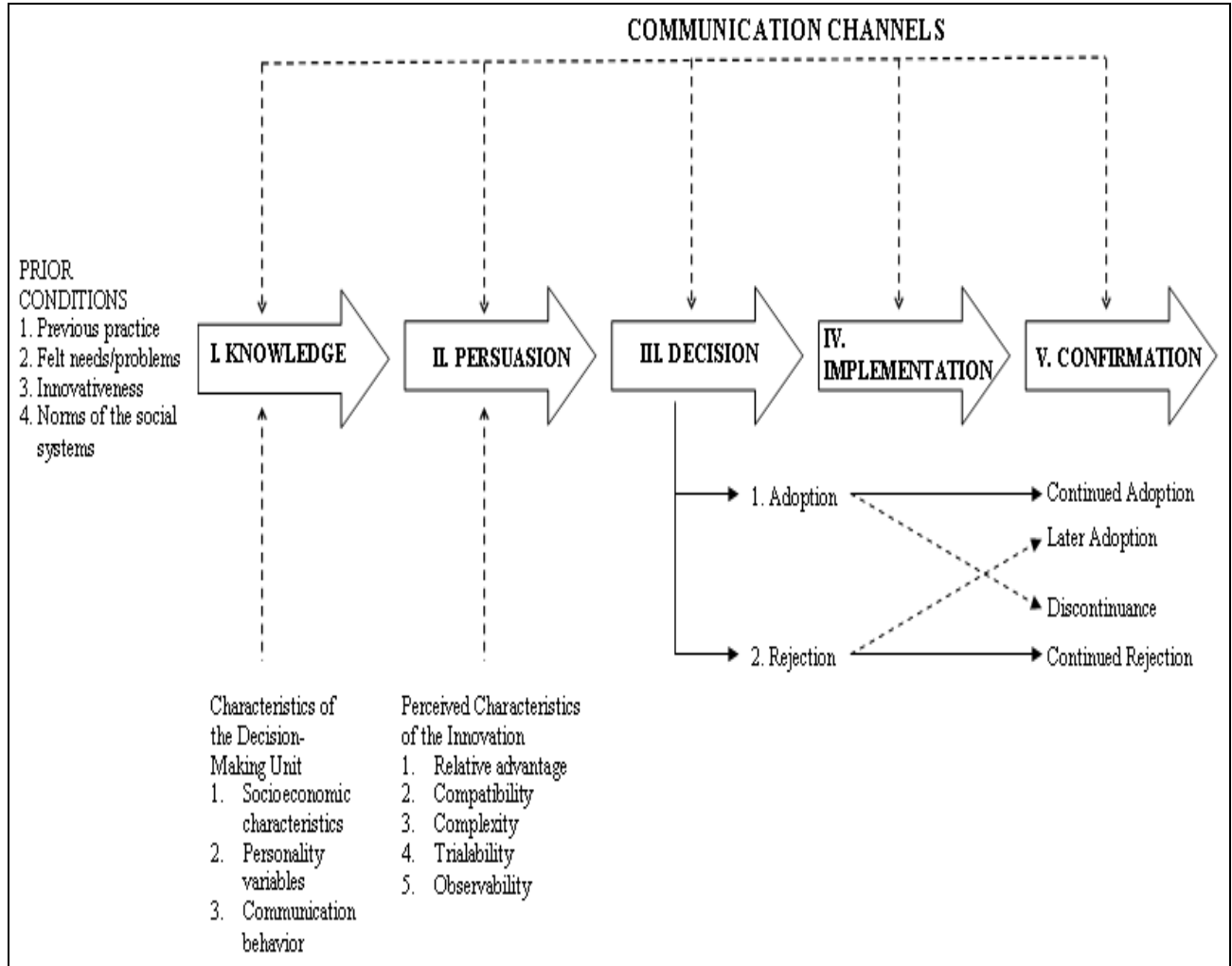
APPENDICES
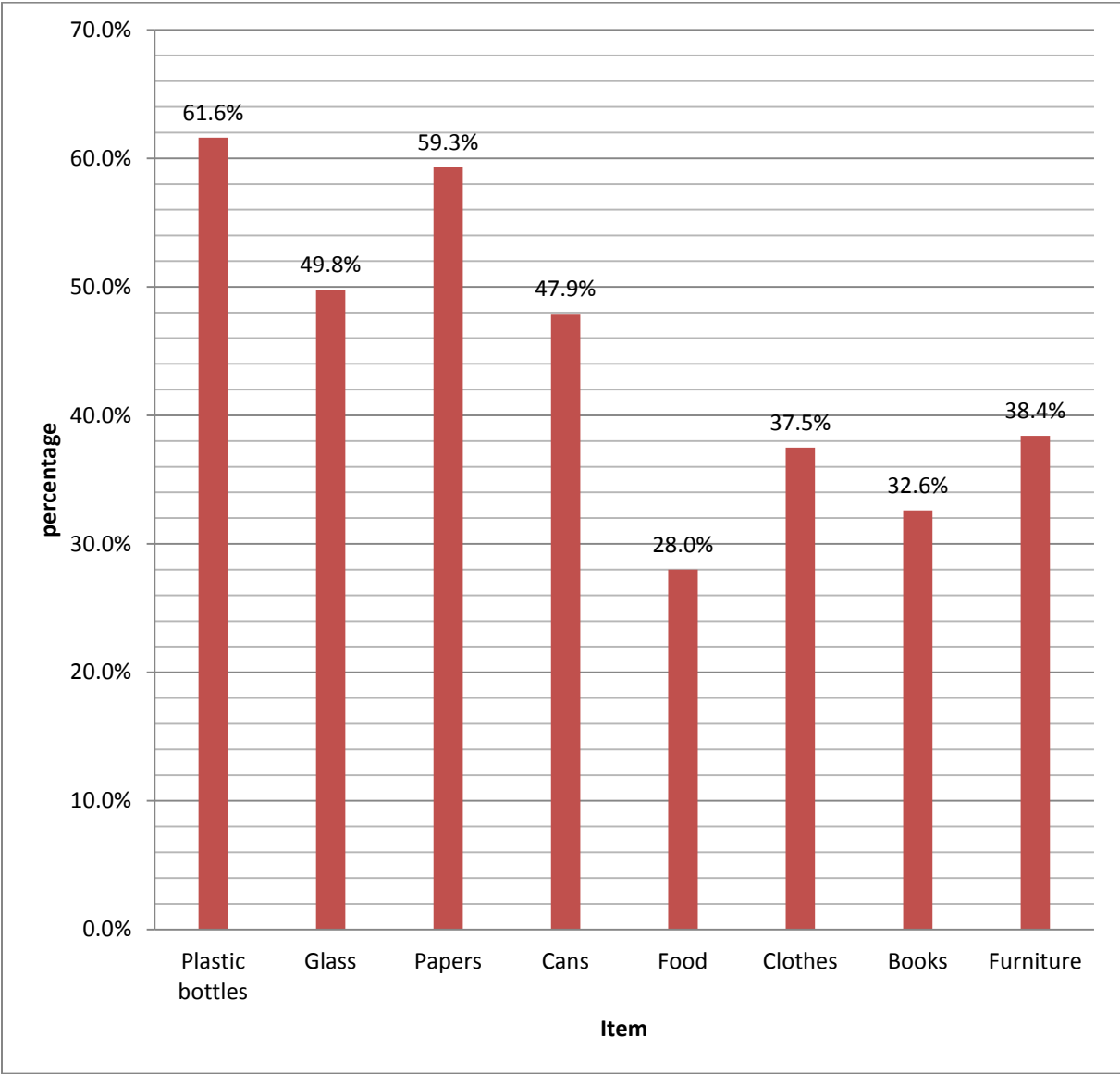
Appendix 1: The Population Growth in Qatar.

Source: (Mapsofworld, 2016, p. 1)

Appendix 2: The Model of the Adoption and Diffusion Theory
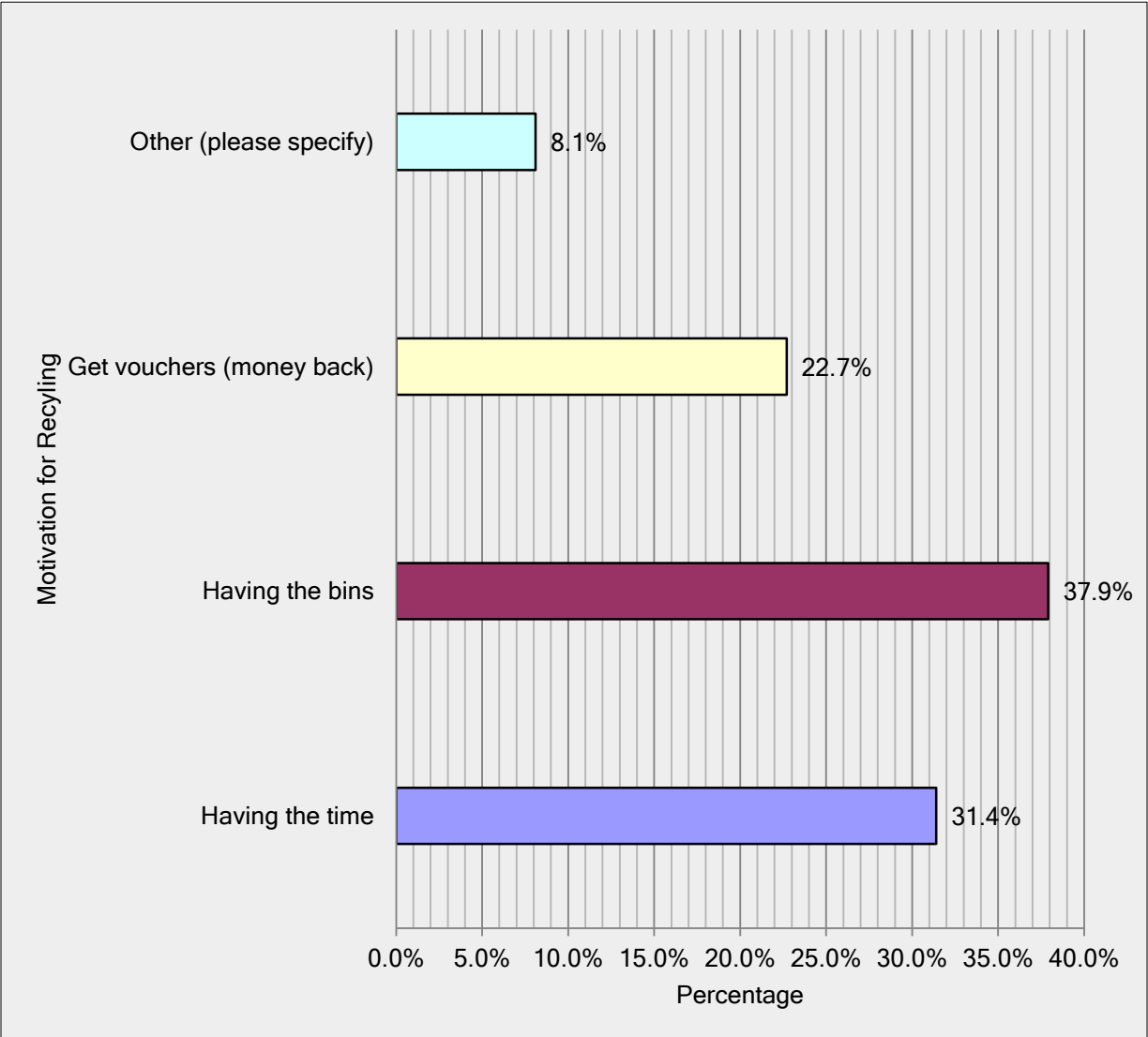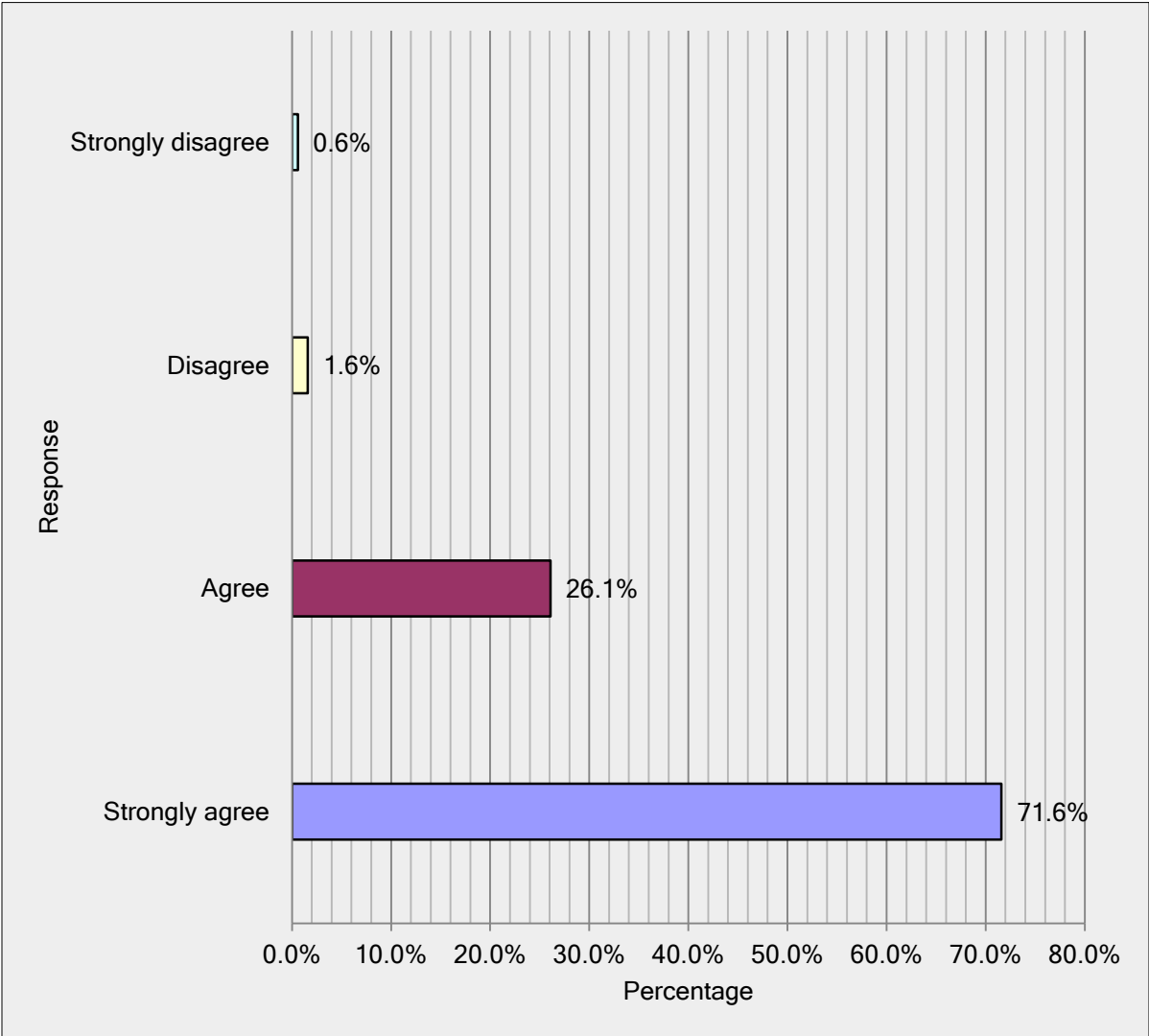

Source: (Zolait, 2013, p. 70).
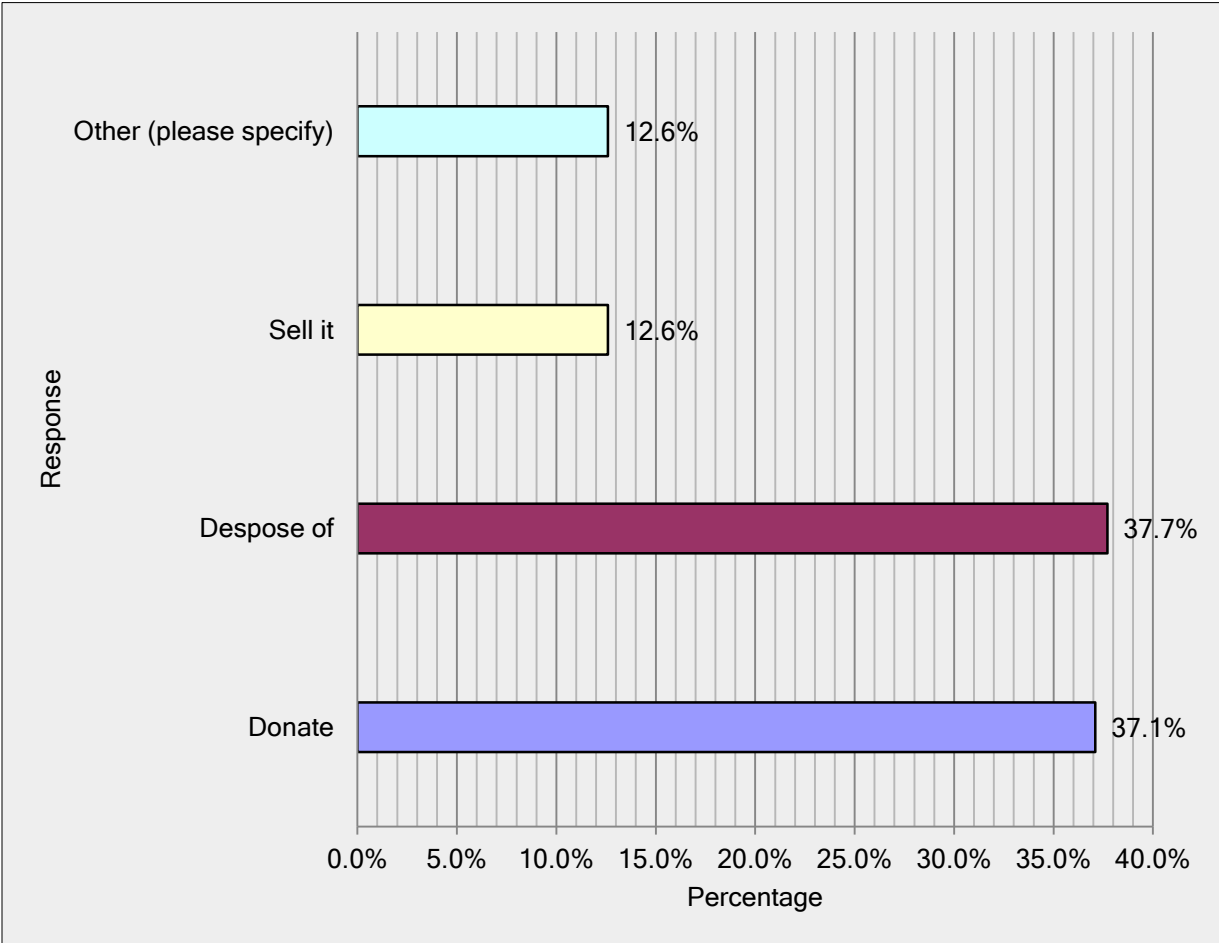
Appendix 3: The Responses on Recyclable Items

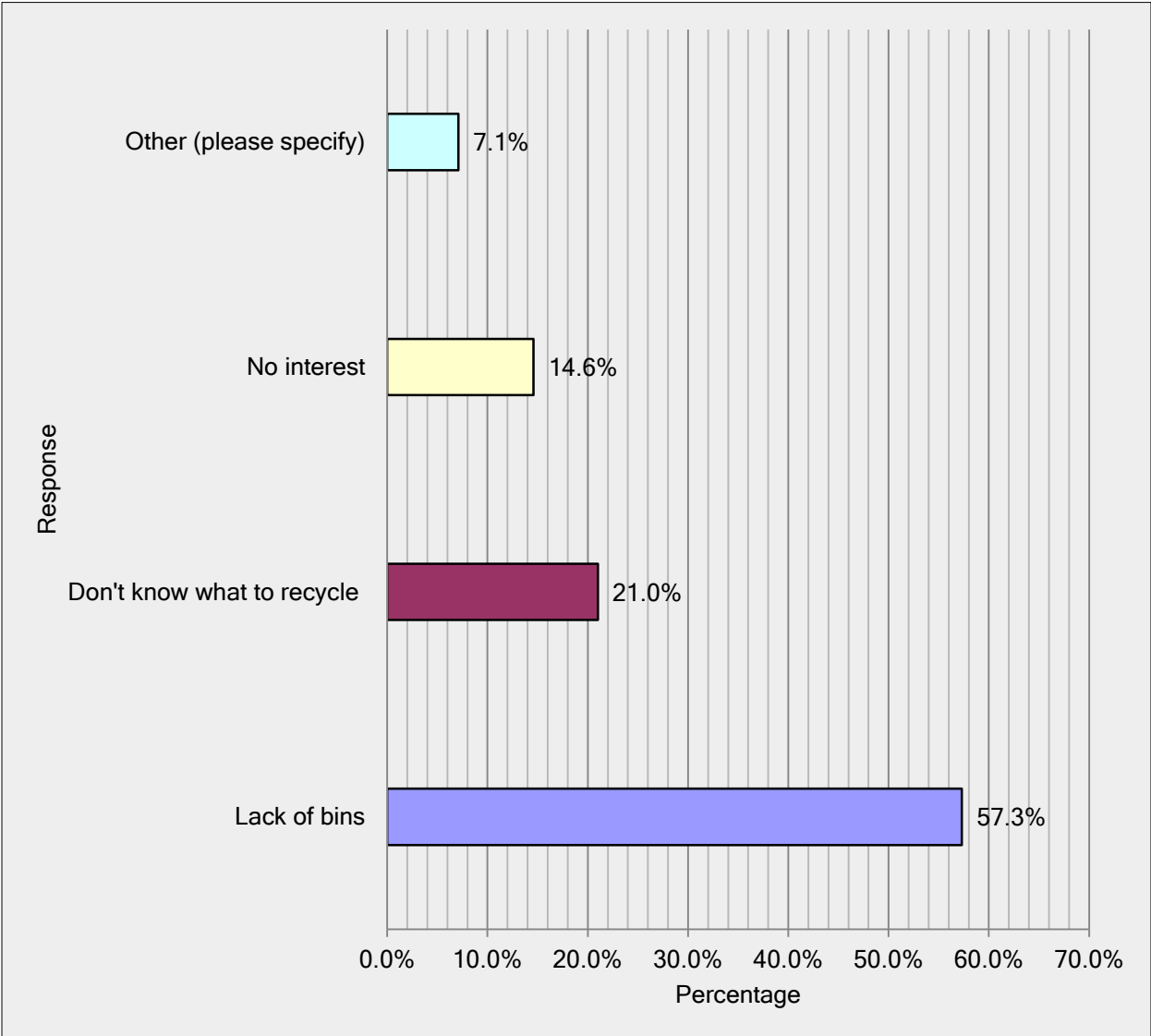**Appendix 4: The Responses on Motivation to Recycle**

Appendix 5: The Responses on how Recycling Protects the Environment

Appendix 6: Responses on electronic wastes

Appendix 7: Factors affecting ability to recycle

Appendix 8: Responses on Conditions to Recycle

Chart showing Percentage vs Motivation for Recycling:
- If I knew the government recycled all our waste: 51.9%
- If I Knew What to recycle.: 30.0%
- If I knew what plastics I could recycle: 15.5%
- If we had a way of getting our recycling to a sorting site: 24.5%
- If we have recycling bins: 31.0%

Appendix 9: The Online Questionnaire

1. What is your gender?

○ Female

○ Male

2. What is your age range?

○ 18 - 29

○ 30 - 44

○ 45 - 59

○ 60+

3. How many people currently live in your household?

☐

4. Type of your household:

○ Villa

○ Small house

○ Flat

5. Which of the following statements best describes how much you recycling

○ I recycle everything which can be recycled

○ I recycle a lot, but not all that can be recycled

○ I recycle sometimes

○ I do not recycle

6. Which of the items would you be most willing to recycle?

☐ Plastic bottles

☐ Glass

☐ Papers

☐ Cans

☐ Food

☐ Clothes

☐ Books

☐ Furniture

7. Which of the following items could potentially be recycled?

☐ Plastic bottles

☐ Glass

☐ Papers

☐ Cans

☐ Food

☐ Clothes

☐ Books

☐ Furniture

8. If you do recycle, what motivates you most?

○ It is good for the environment / saves resources

○ It reduces the amount of rubbish going to landfill

○ It helps reduce pollution

○ It is good for the economy / creates jobs

○ I don't recycle

9. Which of the following would most encourage you to recycle more?

○ Having the time

○ Having the bins

○ Get vouchers (money back)

○ Other (please specify)

[   ]

10. Recycling is good for environment

◉ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

11. Which of the following most affects your ability to recycle?

○ Lack of bins

○ Don't know what to recycle

○ No interest

○ Other (please specify)

[   ]

12. I would recycle more

☐ If I knew the government recycled all our waste

☐ If I knew what to recycle

☐ If I knew what plastics I could recycle

☐ If we had a way of getting our recycling to a sorting site

☐ If we have recycling bins

13. What do you usually do with your old electronic devices?

○ Donate

○ Dispose of

○ Sell it

○ Other (please specify)

[   ]

14. What is your preferred method of communication for receiving information about recycling?

○ Email

○ Social Media

○ TV program

○ In person information from representatives from the government