RESIDENTS' RECYCLING INTENTIONS AND BEHAVIORS IN DEVELOPING COUNTRIES: ACASE STUDY OF LEBANON

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Table of Contents

Abstract

Purpose: This research aims to shed light on key potential variables affecting the Lebanese recycling intentions and behaviors. It tries to reveal the mediation role that intention plays between these variables and the recycling behavior. It also studies the moderating role that the government and the presence of appropriate infrastructure might play in encouraging eco-friendly Behaviors.

Design/methodology/approach: Quantitative data was collected from 317 participants through a questionnaire shared with participants on different social media platforms. The relationship between Attitude, Social Norms, Perceived Behavioral Controls and Awareness, with Intentions and Behaviors is tested using a Structural Equation Modelling system by the means of IBM SPSS.

Findings: Findings reveal that Attitude, Social Norms and Awareness affect directly recycling Intentions leading to active recycling Behaviors. Whereas Perceived Behavioral Controls (PBC) is found to be directly affecting recycling Behaviors without creating corresponding recycling Intentions. Intention is shown to be a partial mediator in the relationship between Attitude and Behavior as well as between Awareness and Behavior. A full mediation effect is found in the relationship between Social Norms and Behaviors, whereas no mediation is revealed in the relationship between PBC and Behavior. The proposed moderators Role of Government and Infrastructure were both found neutral when it comes to shaping the relationship between recycling Intentions and Behaviors.

Research limitations: Participants from the older generations were not numerous, given that the questionnaire was shared with participants through social media platforms. The sample included participants from the Mount Lebanon Kaza mainly. Thus, a wide coverage of the different Lebanese regions was not safeguarded.

Theoretical implications: This study followed the scheme of the Theory of Planned Behavior with the addition of awareness as independent variable and the role of government and the presence of infrastructure as moderators and interesting results came out in a context of a developing country where its government is financially collapsed.

Practical implications: The findings of this research will assist several environmentalists and social entrepreneurs in adopting the right strategy and techniques for higher environmental engagement rates. At the political level, the waste management market should be liberalized, as trust in such corrupted government is lost.

Originality/value: There is a scarcity of research in the environmental field in Lebanon. Thus, such study would have an added value for the community in order to better understand the citizens' attitudes, intentions and behaviors, and consequently formulate and implement efficient and effective strategies.

Keywords: Waste Management, Theory of Planned Behavior, Recycling Intentions, Recycling Behaviors, Perceived Behavioral Control, Social Norms.

Acronyms

Municipal Solid Waste MSW

United Nations UN

Methane CH_4

Household Solid Waste HSW

Solid Waste Management SWM

Theory of Planned Behavior TPB

Ministry of Environment MoE

Perceived Behavioral Control PBC

Simple random sampling SRS

Exploratory Factor Analysis EFA

Factor Analysis FA

Kaiser-Meyer-Olkin KMO

Structural Equation Modelling SEM

Ordinary Least Squares OLS

Exploratory Factor Analysis EFA

Confirmatory Factor Analysis CFA

Average Variance Extracted AVE

Modification Indices MI

Maximum Shared Variance MSV

Composite Reliability CR

Adjusted Goodness of Fit Index AGFI

Comparative Fit Index CFI

Tucker-Lewis Index TLI

Normed Fit Index NFI

Introduction

1. General Background

Urbanization along with consumption and population growth amplified the waste production rate worldwide. The annual generation of waste is estimated to increase at an increment of 70% and to reach approximately 3.4 billion tons in 2050 (Kaza et al., 2018). The lack of sustainable waste management severely affects low-income countries where the majority of garbage is disposed of in unregulated landfills or is openly burned (Fernández-González et al., 2020). These malpractices are actually a breeding ground for viruses and lead to crucial environmental disasters. The landfilling contamination affects air quality, water sources, ecosystems and human health. Therefore, engineered waste solutions became vital in order to separate, treat and safely dispose of all types of waste.

Municipal Solid Waste (MSW), that corresponds to household type of waste, is a burden for societies with poor financial resources and weak planning systems. Such solid wastes include organic waste, paper/cardboard, metal, plastics, glass and some minor refusals. However, in developing countries the dominant portion is organic waste. It makes up around 68 to 70 percent of the total amount generated (Fernández-González et al., 2020). Since the weight of organic waste generated will increase in the same way as the total amount of waste, it became imperative for different countries to consider appropriate solutions for solid waste management. As a result, the World Bank and the United Nations (UN) put on high priority the need to guarantee safe disposal and public health while managing MSW (Azzi, 2017).

The world is converging towards a zero-waste management system. MSW management is basically the control of waste from source to disposal while implementing the optimal principles

of public welfare in terms of economics, conservation, health, aesthetics and environmental concerns (Sukolthaman et al., 2015). And here lies the importance of recycling. Bendak and Attili (2016) argue that recycling consists of using discarded materials in an industrial productive process in order to preserve non-renewable sources of energy and minimize landfilling rates. This technique reduces the exploitation of raw materials, minimizes pollution rates and diminishes waste generation. Indeed, natural resources are very scarce and reusing them is vital for future generations (Ugulu, 2015). A necessary step for implementing recycling is the separation of the household solid waste, HSW, at source. Zhang et al. (2015) believe that the adoption of a separation at source strategy, for the recycling process, requires high levels of governmental regulations and involvement to trigger and boost effective public participation. In the long-run, it is anticipated that such processes will reduce the amount of solid waste generated and sent to landfills. Thus, pollution rates will decrease and a cleaner and sustainable environment will be secured. In fact, environmental problems are mainly caused by the behavior of human beings, and can be mitigated by a simple change in such behaviors. Hence, before designing any solid waste management (SWM) system, social assessment of citizens' behaviors is required. Educating people deems necessary to overcome any future barrier to recycling, and to implement an effective strategy. Citizens' behaviors are affected by multiple parameters. The most frequent variables revealed by scholars, tackling recycling intentions and behaviors, are attitude, social or subjective norms and perceived behavioral control. These variables are mainly used in the fundamentals of the theory of planned behavior that will be further elaborated in this study. In addition, and in order to conduct more reliable and comprehensive studies, some influencing factors such as environmental awareness, habit, governmental role and situational factors are added to further

back up suggested hypotheses (Jigani et al., 2020; Aboelmaged, 2020; Al Mamun et al., 2018; Delcea et al., 2020).

2. Context of the study

In Lebanon, the waste management sector is strictly linked to politics. This has caused an amplified pollution rate and a disastrous environmental situation, although the solutions proposed by different NGOs and entrepreneurs to solve this crisis are doable and modern. Decentralization is the basis of all procedures along with the crucial role of municipalities to adopt an integrated waste management plan and monitor its proper implementation. Appropriate waste management systems rely on a well-established governance along with strict plans of an independent regulatory body that does not seek any profit or interest. Waste has turned into a permanent disaster with all the delays in the suggested solutions' implementations. This crisis erupted in 2015 with the worsening of the political situation and the absence of a clear approach to manage this sector by the government. Indeed, Lebanon spends around 155$ to treat every ton of solid waste compared to a sum of 7.2$ per ton in Algeria and 22.8$ per ton in Jordan (Thalis et al., 2013). Moreover, the cost of environmental degradation from poor waste management in Lebanon amounted to 66 million dollars annually (Arif & Doumani, 2014). According to Abbas et al. (2019), 77% of solid waste is dumped in landfills. Based on the numbers of the Ministry of Environment, there are 941 open dumps from which 617 are household solid waste landfills and 150 land burn waste weekly. In the article entitled Lebanon: Huge Cost of Inaction in Trash Crisis, the Human Rights Watch highlighted the following, being the causes of the waste problem in Lebanon:

- Poor government management and planning,
- Lack of support and oversight for areas outside Beirut and Mount Lebanon,
- Excessive use of open-air landfills,

- Reliance on outsourcing to the private sector and international donors,
- Lack of transparency.

Waste management in Lebanon has never relied on the best environmental and public health practices. All decisions have been always taken the last minute. Since the end of the Lebanese war in 1990, the central government has focused its efforts on waste management in Beirut and Mount Lebanon, leaving municipalities in other regions largely self-reliant (Azzi, 2017). When interviewed by Ghada Eid (2021) in a talk show on MTV Lebanon channel, Josiane Yazbeck, an environmental and legal expert, argued that the main problem of the waste crisis in Lebanon is the lack of a political will to solve this issue and the greed of some to make money from waste collection services. With the aggravation of the crisis, some municipalities arranged the transfer of its waste to other regions for treatment, which led to an increase in transportation cost. Other self-depending municipalities took the initiative to treat its garbage by adopting small scale treatment plants such as Bekfaya, Bet Merry and Rouweysit-Al-Balout. For example, in Beit Mery and in 2015 specifically, the Lamartine Valley became the accommodation of waste of all Matn areas. They built a zero waste recycling plant that includes sorting, composting and processing of recyclables. They adopted a two different colored bags system for sorting at source, however, only 30% of citizens complied, given the lack of laws to enforce it (Abi Chaker, 2021). Indeed, this environmental disaster should unite Lebanese people against their state since their health was in danger.

3. Need of the Study

Many recent studies have tackled the main barriers hindering the implementation of environmental projects in specific communities and during exceptional situations. Nevertheless, none has

discussed the obstacles that recycling initiatives are facing in the Lebanese community. Indeed, Lebanon has been experiencing recently an extremely critical situation, combining both the Covid-19 pandemic and the financial collapse of the government and its banking sector. From here the importance of such a study, in such crucial circumstances, shedding light on the different factors affecting positively the Lebanese intention to recycle and consequently to be physically engaged in such activity.

The success of any project is basically linked to different critical factors: commitment, involvement, objectives, expertise and many more. Identifying key influencers of individuals' recycling behaviors will help governments and responsible entities adopt the most effective techniques and strategies. It will spot light on the main parameters that would effectively modify recycling behaviors and create responsible residents taking care of their environment.

Moreover, Lebanon suffers from a scarcity of research in general and in environmental topics particularly. Thus, any conducted research would have an added value for the community, as it helps better understand the issue at hand.

4. Objectives of the Study

This research aims to shed light on key potential variables affecting the Lebanese recycling intentions and behaviors. It tries to reveal the mediation role that intention plays between these variables and the recycling behavior. In addition, it aims to identify all barriers preventing Lebanese people from separating their waste at source. Moreover, this study aims to reveal the moderating role that the government and the presence of appropriate infrastructure might play in encouraging eco-friendly behaviors. Results will be hopefully used to advance fruitful recommendations, assisting Lebanon in such a crisis, at least on the environmental level.

5. Brief Overview of all Chapters

After introducing in the first part, this study's background, need and objective, Chapter One will review the literature discussing human intention and behavior, by highlighting the Theory of Planned Behavior (TPB). This theory focuses on attitude, social norms and perceived behavioral controls being the main parameters affecting intention and shaping human behaviors. For the purpose of this study, additional parameters such as awareness, the role of government and the collection infrastructure were added to the model.

In Chapter Two, a detailed description of the methodology is presented including the framework, research questions, hypotheses, epistemology, reasoning type and design, research method and research sample. Also, the design of the research instrument is presented in all its steps and details including the statements and the subsections of the questionnaire. IBM SPSS 26 is the software used to develop the Exploratory Factor Analysis (EFA) and IBM SPSS AMOS 22 is used for the Confirmatory Factor Analysis (CFA).

Chapter Three will present the findings and the results obtained from the simulation of SPSS and SPSS AMOS of the quantitative data collected. It provides descriptive tables and hypotheses testing in order to answer the main research questions set. In addition, a regression analysis is conducted on the demographical data of the sample of study. It also includes a meticulous discussion of the findings and the main reasons behind every accepted/rejected hypothesis. It debates the role of intention as a mediator, and the role of government and infrastructure as moderators in boosting or lessening the relationship between recycling intention and behavior.

Lastly, the conclusion, the limitations that the researcher has faced, and few practical and theoretical implications were presented along with specific recommendations for future potential research.

Chapter One: Literature Review

1. Global Waste Crisis

Waste management systems, environmental protection and sustainability are worldwide issues. Adopting a specific treating technique is directly dependent on the composition and the amount of waste, which will directly influence the treating plant type and size. Landfills, incineration, anaerobic digestion and aerobic digestion are all possible waste treating techniques. Introduced in England, the sanitary landfill consists of burying MSW in a hole. It is actually a wasteful process for the only reason that recyclables are being spoiled with no valuable income. Indeed, it can contaminate ground water and increase the emission of greenhouse gases (mainly methane CH_4). When it comes to incineration, it is a trash-burning unit that transforms MSW into ash, fumes and air pollutants. It requires the presence of environmental laboratories and specialized filters in order to avoid air contamination. It does not eliminate the need for landfilling, however, it decreases the amount sent by 90 to 95% (Levaggi et al., 2020). Incineration comes advantageous in specific areas especially for medical, hospital and life-threatening waste, where toxins are destroyed at high temperatures. The adoption of incineration is closely correlated with the organic ratio available. Whenever a high ratio of organics is available, incinerators are discarded. On another hand, aerobic digestion is a low-cost treating technique. It is the fermentation of organics in the presence of oxygen and specific bacteria. It can be controlled easily (hazards free) and has a fast rate of compost production. Nevertheless, it is efficient only on a small scale and is temperature sensitive. Finally, for large weight of organics, anaerobic digestion can be the right solution. The idea of anaerobic degradation saw the light first in India and has the capacity of treating MSW, farm waste and green waste. The degradation process takes place in an enclosed reactor, in the absence of oxygen, and produces a form of compost and biogas that can be used for energy production. In

fact, the majority of the previously mentioned techniques require a pre-sorting step to boost their effectiveness and avoid any spoilage of reusable materials. Therefore, spreading awareness for residents about the importance of recycling and its possible outcomes might be the key for better sorting efficiencies. This participation could be very challenging in terms of available infrastructure and people's past behaviors; however, the majority of environmental projects takes into consideration these obstacles to boost the engagement rate of individuals. This chapter will discuss all potential variables that could help create environmental intentions and behaviors.

2. Theoretical background

Government is the main provider of environmental awareness and adequate infrastructure. Therefore, it is crucial to understand the link between the measures to be taken and the public's response. The Theory of Planned Behavior (TPB) provides a strong basis for a model of recycling decisions. It offers a theoretical context for the identification of influencing factors on waste separation (Ajzen, 1991). It reveals that ability and motivation are the basic predictors of behaviors in various situations. Since source separation is the first step towards a successful SWM, the discussion of TPB deems required for a better understanding of separation behaviors. Wan and Shen (2013) argue that TPB is considered a robust model for describing environmentally friendly behaviors.

Ajzen (1991) believes that the three major factors that directly affect behavioral intentions are:

- Attitude, the individual's subjective perception of the performance of a certain behavior.
- Social norms, the individual's motivation to engage in a certain behavior under the influence of social pressure.
- Perceived behavioral control, the individual's perception of his/her ability to accomplish a specific behavior and all external circumstances affecting the adoption of the behavior.

Attitude and social norms are motivational factors for a person's intention to achieve a certain behavior. Afterwards, the person's behavior will be predicted by his/her own intention to perform it. When it comes to perceived behavioral control, it should be noted that this parameter could actually affect the execution of an intended behavior. Therefore, perceived behavioral control acts as a motivator for the person's intention, and together with the intention, directly influence behavior (Stoeva & Alriksson, 2017). Ajzen (1991) confirms that the power of predicting the control of perceived behavior on behavior actually increases with the realistic perception one has over a situation. Also, intention is tightly linked with people's motivation to achieve what is expected from them. Thus, the following model, advanced by Ajzen (1991) includes independent variables (Attitude, Social Norms and Perceived Behavioral Control) a mediator (Intention) and a dependent variable (Behavior).

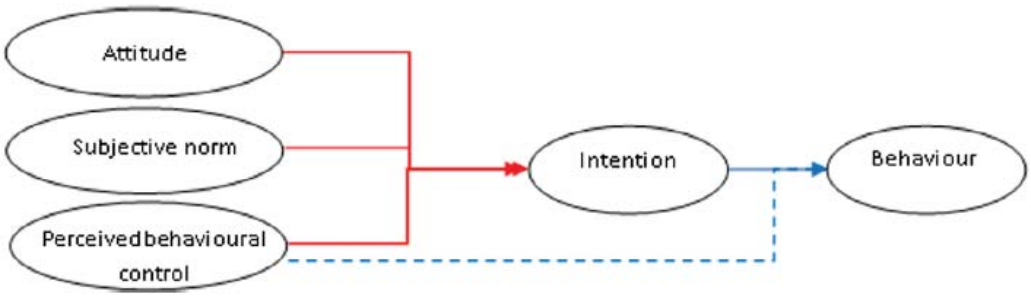

Figure 1: The model of the Theory of Planned Behavior

This theory had been extensively adopted in attitude-behavior studies including public transportation, smoking, technology reception and others. It has been similarly applied for recycling behaviors. Ajzen (1991) confirmed that TPB is extensively flexible and tolerates extra variables for further clarifications and better validity. Researchers complement the classical model of TPB with multiple variables to better predict citizens' behaviors. A larger emphasis should be

accorded to identify the factors that influence separation and recycling behaviors. For instance, in Australia, conscientiousness and self-identity affected indirectly all the citizens' recycling behaviors and were included as a subsection in the attitude parameter discussion (White & Hyde, 2012). Zhang et al. (2015) confirmed that the activities of neighbors strongly modified recycling behaviors in households and constituted a sort of social pressure on these individuals. They revealed that attitudes, perceived behavioral control, situational factors, social norms and intentions significantly forecasted solid waste separation behaviors in China. In Sweden, research revealed that perceived behavioral control, satisfaction with local facilities, social norms and attitude have an impact on the intention and behavior of people in that country (Stoeva & Alriksson, 2017). Environmental knowledge has been added to a study in Padang, Indonesia and was found to have a major influence on separation intentions (Ulhasanah & Goto, 2018). They found that citizens tend to recycle more effectively if they have some basic environmental concerns and knowledge. Within the same context, Oztekin et al. (2017) studied the impact of gender differences on recycling and separation behaviors. They found that female recycling intentions are modeled by perceived behavioral control and innate recycling attitudes, whereas men recycling intentions are modeled by their past behaviors (habit). Furthermore, Ulhasanah and Goto (2018) showed how habit and government involvement affected positively daily recycling behaviors of households in Indonesia. In Kavala, Greece, spatial planning of recycling bins had been added to the model; however, results did not confirm its impact on citizens' recycling behaviors (Kechagias & Dimitriadis, 2020).

To our knowledge, no study has explored MSW separation behaviors in Lebanon while adopting the TPB perspective. Thus, the findings would help understand what interventions could be the most efficient in influencing positively the behavioral changes among Lebanese.

3. Research Variables

As mentioned in the previous section, the TPB is a starting point for tackling intentions and behaviors in a specific field. Therefore, this study will discuss the relationship between attitude, social norms and perceived behavioral controls of Lebanese citizens and their intention to recycle. In addition, it will describe the effect of environmental awareness, the presence of a strong governance and appropriate situational factors in shaping ecofriendly behaviors.

a. Attitude

Attitude refers to the beliefs of an individual and his/her subjective assessment of a specific Behavior (Wan and Shen, 2013). It highly depends on the consequences desired (Yahya et al., 2016). Residents' attitudes are the key parameter for the success of recycling programs (Bendak & Attili, 2016). Thus, assessing attitudes can provide further insights about possible recycling behaviors. In order to secure higher participation rates, Bendak and Attili (2016) believe that it is necessary and crucial to better recognize those who recycle, to understand the reasons behind their engagement in such activity, and to assess the way they perform this process.

In fact, the 'conservation psychology' focuses on recognizing why individuals do or do not behave in a specific manner and what are the ways to encourage this specific behavior (Soutter & Mottus, 2020). Wallen & Landon (2020) define the conservation psychology as the study of relationships between human beings and nature. It is tightly oriented towards conserving natural resources and preserving the quality of life. Selinske et al. (2018) mentioned that conservation psychology is derived from environmental psychology. The latter did not tackle conservation and preservation of natural resources. However, in 2003, biodiversity preservation became a crucial matter to highlight distinctively. Therefore, the term 'conservation psychology' has been adopted and distinguished from environmental psychology (Selinske et al. 2018)

The conservation psychology, applied to the waste management research, has two main parameters of interest: environmental attitudes and behaviors (Soutter & Mottus, 2020). Hawcroft and Milfont (2010) define environmental attitudes as a person's tendency to achieve a favor towards the nature and the environment. The exploration of personality traits has been increasingly incorporated in the conservation psychology research (Soutter et al., 2020; Klein et al., 2019). Kvasova (2015) observed that specific personality traits influenced positively people's attitude and motivation to consider environmental friendly behaviors. Researchers usually designate personality traits as The Big Five (Barrick & Mount, 1991). The Big Five include agreeableness, neuroticism, conscientiousness, extraversion and openness; and each of these traits would shape the person's sense of responsibility for preserving the environment (Ying et al., 2018).

McCrae and John (1992) define 'agreeableness' as the tendency to generosity and cooperation. Usually, agreeable personalities are more likely to adopt environmental measures in order to be considered good citizens (Markowitz et al. 2012). Markowitz et al. (2012) found a positive relationship between attitudes and agreeableness, translated into high intentions to recycle. They showed that altruism is the main driver triggering agreeable persons' ecofriendly attitudes and behaviors. Within the same context, Carlo et al. (2005) revealed that people rated high on agreeableness are more inclined to consume green products.

People rated high on 'neuroticism' are subject to anger, aggression, depression and anxiety (Hirsh and Dolderman, 2007; Fraj and Martinez, 2006). These scholars revealed that such trait is not related to environmental friendly behaviors. Moreover, Soutter et al. (2020) found that neuroticism has no significant impact on ecofriendly behaviors and attitudes.

'Conscientiousness' is the predisposition of individuals towards responsibility, self-discipline and achievement (McCrae & Costa, 1985). Highly conscientious people recognize the seriousness of

environmental problems as well as their impact on the quality of life. Ying et al. (2018) confirmed that conscientious people tend to adopt strict measures to protect their environment. Milfont and Sibley (2012) revealed that conscientiousness and attitudes are positively correlated, and affected crucially recycling behaviors. Within the same context, Klein (2015) argued that perseverance and self-discipline are positively associated with environmental friendly attitudes and behaviors.

McCrae and Costa (1985) noted that people rated higher on 'extraversion' are more likely to engage and help others in their community. Ying et al. (2018) observed that an extrovert individual would adopt ecofriendly behaviors since he/she is more sociable and active. Brick and Lewis (2016) found that extraversion affects environmental behaviors positively. Moreover, Soutter and Mottus (2020) observed that extraversion influences attitudes and behaviors whenever the latter have a social recompensing aspect. Markowitz et al. (2012) determined that extrovert individuals tend to demonstrate more green attitudes and behaviors, such as green tourism, specifically.

Moreover, McCrae and Costa (1985) described 'openness' as a trait related to the degree of appreciation of new experiences. It represents the eagerness and curiosity to learn new practices (Markowitz et al. 2012). Ying et al. (2018) argued that this personality trait would push people to have the intention required to engage in recycling behaviors. Soutter et al. (2020) revealed a positive relationship between environmental attitudes and openness. Within the same context, Markowitz et al. (2012) and Hirsh and Dolderman (2007) found that high openness would lead to more involvement in environmental practices. Furthermore, different scholars highlighted the appreciation of aesthetics being the most significant impact on recycling attitudes and behaviors (Brick and Lewis, 2016; Puech et al., 2019). Thus, it is probable that sophisticated aesthetic appreciation of nature would create a desire to preserve it.

Several studies have explored the link between attitudes and intentions. As discussed earlier, attitude is a positive or a negative feeling that rises whenever an individual adopts a new behavior (Delcea et al., 2019). Zhang et al. (2015) identified two factors shaping Chinese attitudes; they are environmental knowledge and moral obligations. They suggested that environmentally knowledgeable individuals tend to have a positive attitude towards recycling, thus creating significant intentions to participate in such process. Besides, they added that having strict moral obligations modifies people's behaviors in their daily life and let them form strong environmental attitudes. Attitudes are found to have a strong correlation with separation intentions (Karim et al., 2013; Nigbur et al., 2010). Therefore, a positive attitude will intensify recycling intentions and create environmental behaviors.

Halder and Singh (2018) concluded that attitude is the second most influencing parameter on young people's intentions to recycle. In Macau-China, Song et al. (2016) revealed that citizens have positive attitudes toward household separation of waste. They found that 54.4% of the residents mentioned being often involved in environmental activities. Delcea et al. (2019) also found a positive relationship between attitude and recycling intentions. Jigani et al. (2020) reported that 77.55% of Romanian enjoyed being part of the selective waste collection system and more than 50% of them intended to sort at their households. Zhang et al. (2015) demonstrated the positive impact of attitudes on recycling intentions. In fact, attitudes pushed people to engage and boosted their intention to participate in waste separation practices. On the other hand, few studies revealed that attitude does not have any significant influence on recycling intentions, but even affects it negatively (Nguyen et al., 2017; Ng, S.L., 2019). In some cases, this negative relationship is due to impediments including far recycling bins and the shortage in their number (Bendak & Attili, 2016). The results of Bendak and Attili (2016) confirm that there are some inconsistencies

between the attitude of UAE's residents and their recycling behaviors. They actually found that residents there have a positive attitude towards environmental practices; however, the majority does not recycle. Many respondents affirmed that they have the will to engage as long as they have accessibility to proper recycling Infrastructure.

To conclude, Soutter et al. (2020) argued that attitudes changes towards environmental matters do not come overnight. Thus, adopting environmental practices require a thorough understanding, for the future generations to fully encompass such behaviors and to make them among their daily routines.

b. Social Norms

The drastic change in social norms created some major alterations in societies. In fact, the introduction of innovative concepts pushed people to increase their purchase of goods that are actually not considered a real necessity for them (Jigani et al., 2020). This situation increased all types of waste production. Thus, considering social norms when studying recycling behaviors of a specific community deems necessary.

Social norms are the way individuals perceive what others, in the same society, would expect them to do. They encompass and determine the types of accepted behaviors or the encouraged ones. They include social pressure concepts as well, and alter the people's willingness to engage in different activities (Zhang et al., 2015). Social pressures emanate from neighbors, family, friends or the community as a whole, and impact others significantly. Moreover, 'personal norms', a parameter that may complement the concept of social norms, define how people should behave in order to be in harmony with all the societal rules. Adopting a specific set of social norms will lead to their transformation to personal norms shaped by each individual (Bortoleto, 2015).

Moreover, complying with rules and personal norms boosts people's satisfaction, whereas their violation creates some feelings of guilt (Jigani et al., 2020). In fact, groups of people sharing the same physical borders, although not intimately related, create social norms (Janmaimool, 2017). Bortoleto (2015) argues that the adoption of a specific set of social norms in the daily activities leads to their transformation to personal norms that shape human behavior differently. He also commented that personal norms have a significant impact on behaviors, as individuals are inclined to escape the guilt feeling that rises after a specific incorrect behavior. Social norms are active influencers on environmental behaviors (Abrahamse & Steg, 2013). Silberer et al. (2020) determined that the effectiveness of personal norms highly rely on the degree of residents' involvement. They defined social norms as a personal perception of the frequency of occurrence of a certain behavior that residents will be involved in. They focused on the fact that social norms have a more influencing effect on individuals that have low participation in the sustainability sector than on people that are tightly engaged.

Studies tackling human behaviors highlighted social norms, being one of the most crucial variables. Amini et al. (2014) found that social norms have a noteworthy impact on recycling intentions among Malaysians, even though this impact was less than that of attitude. In Malaysia too, Mahmud and Osman (2010) revealed that social norms have a significant effect on recycling behaviors among students. Indeed, young people are the most susceptible for change. Similarly, Halder and Singh (2018) argued that social norms have the most influencing impact on the Indian students' intention to recycle. In Lithuania, Miliute-Plepiene et al. (2016) found that social norms and people's behavior are positively correlated. In China, Yuan et al. (2016) validated the existence of positive relationships between social norms and attitude from one side and, social norms and behavior from another side. On the contrary, in order to boost environmental awareness in Padang-

Indonesia, Ulhasanah and Goto, (2018) noted that the most influential factor of recycling behaviors is law enforcement, while the least influential one is social norms. Nguyen et al. (2015) reported that social norms, mainly social pressure, are not found to be a crucial factor affecting people's intention to separate waste.

c. Perceived Behavioral Control

Zhang et al. (2015) defines perceived behavioral control (PBC) as a reflection on past experiences and an expectation of potential obstacles. Delcea et al. (2020) suggest that perceived behavioral controls include the individual's beliefs towards the difficulty of achieving a specific behavior. Indeed, a behavior with more opportunities and fewer projected obstacles, boosts PBC, which will consequently enhance its chances for occurrence (Zhang et al., 2015). D'Adamo (2019) argued that PBC redirects two different dimensions. The first includes the external circumstances of an individual that can modify the ability to perform a specific behavior and the second encompasses the projected ability to execute or implement this same behavior. The external circumstances include the appropriate awareness, the adequate attitude and the surrounding social pressure. The projected ability is described by the availability of proper situational factors and the easiness to reach labelled recycling bins.

Zhou et al. (2017) demonstrated that social exclusion could decrease PBC. They define social exclusion as an emotional situation in which individual's sense of belonging is vulnerable. People would feel excluded from their society. People living independently from their society find it more challenging to control all the external factors affecting their daily life, thus, the negative effect of social exclusion on PBC.

On another note, Lin et al. (2021) referred to 'self-efficacy' as the ability of performing a specific behavior or task. They noted that self-efficacy directs people towards deciding on the amount of effort they will dedicate for a certain task or practice and the amount of time they will persist when encountering complications. This study suggests that holding slight control over a behavior would directly lower the intention to perform it. Ajzen and Madden (1986) confirmed that PBC influences intentions independently of social norms and attitudes. In the studies of Mahmud and Osman (2010) and Bortoleto et al. (2012), PBC is found to be one of the most influencing factors on recycling intentions, leading to more effective recycling behaviors. A positive relationship between PBC and waste separation behaviors is found too; however, awareness campaigns should be held more frequently in order to increase the effect of PBC on recycling intentions (Zhang et al., 2015). Similarly, Strydom (2018) reported a significant effect of PBC on behaviors and a minor effect on recycling intentions. He argued that PBC better shapes intentions whenever factors such as motivation and proper infrastructure are available. In Romania, around 60% of the respondents considered waste separation an easy task to perform (Delcea et al., 2020). Thus, the Romanian residents considered few difficulties to achieve recycling activities and demonstrated high PBC. Thogersen and Crompton (2009) affirmed that adopting an easy behavior could be the path to adopt further challenging behaviors. This approach is called the foot in the door effect and states that complying with a 'small demand' encourages complying with a 'bigger demand' according to Arnold and Kaiser (2018). Multiple studies embraced this approach. For instance, Thogersen and Noblet (2012) determined that daily ecofriendly behaviors boost the acceptance of environmental policies like wind power generation. Further, Laurent et al. (2016) investigated how engaging in so-called easy behaviors could affect intentions and willingness to engage in complex behaviors. They studied how preserving water resources on a small scale can push individuals to be active

participants in more challenging water conservation activities and projects. Therefore, a gradual increase in the difficulty of engagements would foster the implementation of difficult behaviors or actions (Arias & Trujillo, 2020). It is important to highlight that waste recycling involves a series of routine behaviors or patterned behaviors including washing, collecting, sorting, separating, incinerating, returning, disposing and reusing. Knussen and Yule (2008) designate this set of actions as repetitive-habitual patterns. Individuals will have the tendency to do them without a lot of analysis or conscious reasoning. Habit and past behaviors are a fundamental part of perceived behavioral controls. Colesca et al. (2014) claimed that habit has a significant role in environmentally oriented behaviors. Since waste disposal behaviors happen frequently in the same settings (at households), and take little amounts of time and thinking, Comber and Thieme (2012) expect it to become a daily life habit.

d. Environmental Awareness

Mosler et al. (2008) argue that an individual's knowledge and awareness predict his/her behavior. Thus, examining them in a study of recycling behaviors seems crucial. Environmental awareness is the rise of a sustainable public concern towards the waste's impact on the environment (Yahya et al., 2016). As for the environmental knowledge, Zsoka et al. (2013) define it as the sum of knowledge and awareness concerning environmental concerns and key solutions. Kwatra et al. (2014) and Sinha et al. (2007) affirm that awareness and knowledge concepts could be mentioned interchangeably, especially when tackling environmental topics.

When a personal tactic, such as recycling, is under the microscope, research attempts to recognize the individuals who recycle as well as their main characteristics (Schultz, 1995). In the investigation process, four parameters are to be tackled: knowledge about recycling, attitudes, personality variables, as well as demographic ones (Schultz, 1995). While assessing the Chinese

community, Meng et al. (2019) found that awareness had the strongest influence, among all the variables, on the separation behaviors. In the majority of papers that considered TPB to understand recycling behaviors, the role of environmental awareness and knowledge were tightly linked to people's intention to get involved, considered as a mediator, which affected their behaviors at a later stage. As discussed earlier, the state of an individual's knowledge affects his/her decision-making process. Indeed, people are inclined to avoid circumstances for which they have little knowledge, as guidance seems missing. Amyx et al. (1994) reported that with an adequate amount of knowledge concerning environmental issues, people are found to be keen to invest in environmental projects. Within the same context, Chan (2011) revealed that the lack of awareness and ecofriendly knowledge could hinder the implementation of environmental projects. Kollmus and Agyeman (2002) investigated environmental awareness issues and determined two main constraints: emotional limitations and cognitive limitations. Emotional limitations encompass emotional responses and emotional non-engagement. Emotional non-engagement is defined as the lack of ability to have emotional responses when dealing with environmental issues. Thus, the emotional limitation is the extent to which a person gets involved or not during environmental problems. The cognitive limitations include the complexity of environmental issues and the on-going destruction of the fauna and flora that can highly modify people's willingness to engage and save the environment. In other terms, the cognitive limitations include three main factors. The first is the non-immediacy of the effects of environmental problems: they involve a time lag for when humans perceive the impact of their damages. The second is the slow pace of environmental destruction and modifications. The third is the high complexity of ecological treatments and the possible solutions to adopt.

Chana et al. (2014) believe that having high levels of environmental knowledge could shape residents' environmental behaviors. In fact, residents, with high level of knowledge about solid waste separation at source, are more likely to recycle properly (Tudor et al., 2008). Moreover, Al-Shemmeri and Naylor (2017) found that those who got involved in environmental behavioral changes, were backed up with significant environmental knowledge.

Ulhasanah and Goto (2018) found that Indonesians' remarkable environmental knowledge and awareness led to a noticeable recycling intention as well as an involvement in environmental friendly activities. In Hong Kong too, Wan et al. (2014) revealed a positive connection between Awareness and Behaviors in general; however, the influence of awareness on recycling behaviors specifically was not considerable. Moreover, Meng et al. (2019) included awareness under attitudes, and found a high impact on disposal behaviors. An Australian study highlighted that awareness affects recycling behaviors by influencing other variables like intention, social norms and attitude (Kite et al., 2018). Yahya et al. (2016) concluded that awareness is the variable that had the most positive effect on, and closest association with recycling behaviors. Meng et al. (2019) reported that environmental knowledge has a noteworthy impact on the Chinese's recycling behaviors. Similarly, studies conducted by Klochner and Oppendal (2011) and Bezzina and Dimech (2011) showed that awareness has a high impact on recycling behaviors along with habit and responsibility attribution.

e. Role of Government

The government has a fundamental role in saving the environment and preserving it. A set of regulations, decrees and laws aiming for environmental protection and targeting waste reduction represents the sum of governmental procedures (Yahya et al., 2016). Bendak and Attili (2016) argue that, in order to induce and boost the sustainability concepts and recycling practices in any

society, governmental institutions are to consider three components: publicity, education and promotion. They can all be replaced or joined by proper awareness campaigns targeting the right individuals and using the appropriate learning tools. In Palestine, the lack of motivation and regulations imposed by local authorities discourages the adoption of recycling procedures (Al-Khateeb et al., 2017). The researchers emphasized the role of strict rules that deem necessary to endorse source separation and facilitate waste treatments, regardless of their types. In Macau-China, 95.7% of the respondents showed willingness to sort at source if the government had made the practice mandatory (Song et al., 2016). Within the same context, Delcea et al. (2020) found that strict governmental measures and recycling behavior are positively correlated. In UAE, 83% of the surveyed people even went further by revealing their strong attitude towards the need for the government to set regulations forcing industries to use recyclables in their packages (Bendak & Attili, 2016). Implementing any relevant environmental policy should be based on citizen's behaviors and willingness to engage to recycle their household waste. Therefore, an urgent need to survey the behaviors, attitudes and other parameters of citizens before adopting any recycling technique is obligatory.

On another note, spreading awareness and environmental education should be put on high priority. Improving the individuals' understanding of environmental practices and their benefits is a major pillar for project success (Ulhasanah & Goto, 2018). Bendak and Attili (2016) pointed out that the majority of UAE's society suffered from the lack of environmental awareness. They mentioned that in order to increase the efficiency of household recycling practices, public awareness campaigns should be held intensively by high authorities. Public participation is highly encouraged by local regulations and awareness. Zhang et al. (2015) reported that campaigns could stimulate public participation by stressing on the 'moral obligation' of individuals to separate their waste at

households. Moreover, they affirmed that the government is the main responsible entity for organizing environmental activities and scheduling awareness campaigns in schools and municipalities. Incentives would be then developed to boost active public engagement. In China, 98.8% of the respondents showed their willingness to undertake the effort required in order to protect their environment (Song et al., 2016). Furthermore, Jigani et al. (2020) focused on the importance of promotion to stimulate individual's responsibility and create a positive influence on their behaviors. Saladie and Santos-Lacueva (2016) identified a moderate influence on separation rates with proper awareness campaigns. Since the government is the first responsible unit for recycling procedures, it should gain public trust. Jigani et al. (2020) stated that trust is a combination of specific behaviors that demonstrate the expectations of residents towards multiple entities, mainly high authorities, and focuses on all the strategies adopted by the later to encounter waste management situations. Trust in government had the greatest impact on recycling intentions in Hanoi-Vietnam (Nguyen et al., 2015). Within the same context, Rompf et al. (2017) argue that trusting governmental authorities would trigger a direct positive attitude toward recycling, even without the offer of any kind of incentives to residents. When trust is boosted, allocating benefits turns out to be irrelevant. On another note, Sonderskov (2011) reported a consistent and significant effect of social trust on recycling behaviors. He argued that social trust endorses the positive expectations of individuals towards the cooperation and trustworthiness of governmental institutions. Scafuto et al. (2018) mentioned that high levels of trust could boost the residents' willingness to engage. They added that people with a lack of trust in politicians, tend to take personal initiatives and start applying ecofriendly practices in their own residents.

f. Collection Infrastructure and Situational Factor

Collection Infrastructure refers to the accessibility of citizens to waste collection stations (Meng et al., 2019). It encompasses the capacity of the facilities' storage, the number of stations and the bins indications. Such infrastructure makes it convenient for people to commit to sorting while teaching them the proper practices and encouraging them all the way through. In fact, Meng et al. (2019) confirmed that these infrastructures have a major impact on shaping recycling behaviors. Zhang et al. (2016) declared that the lack of effective infrastructure highly limits recycling intentions and eliminates its realization. Timlett and Williams (2011) highlighted the positive influence of the infrastructure's convenience and availability on the efficiency of waste separation rates. Thus, considering contextual and situational factors is as crucial as personal factors like attitudes, habits and norms. In Romania, 93.38% of the respondents agreed that the large number of collection points, when wisely managed, increases the recycling effectiveness (Jigani et al., 2020). In addition, Jigani et al. (2020) revealed that 80.29% of Romanians would have the intention to separate their household waste whenever the government provides adequate and accessible assemblage infrastructure. Zhang et al. (2015) considered situational factors as a main parameter affecting recycling behaviors directly. This variable was measured in terms of its possible barriers including space, inconvenience and time. The waste separation's rate and the residents' level of engagement would be highly affected by the lack or the availability of time and space required to accomplish proper recycling practices. Metcalfe et al. (2013) suggested that, rather than modifying people's attitude or creating recycling intentions; governments should focus on implementing proper infrastructure for household waste collection. They affirmed that adopting such strategy could minimize barriers for recycling behaviors. Furthermore, accessibility to waste collection infrastructure influences majorly behaviors in all its aspects (Zhang et al., 2016). It describes the

ease to access recycling centers as well as its abundance in multiple spots. Drop-off services or collection programs may facilitate recycling practices and make it an easy to go option. In addition, 'proximity', the distance from households to recycling locations, is a crucial factor that needs to be highlighted. The closer the recycling bins are, the easier the recycling process is, and the more likely that people's intention to recycle is boosted. Jigani et al. (2020) revealed that 77.84% of people highlighted the importance of the recycling collection bins to be close to their household. Within the same context, Du Toit et al., (2017) shed light on the challenges faced in South African townhouses where the backyards or kitchens' small spatial areas are not suitable for multiple recycling bins. Indeed, residents having positive attitude towards recycling, will not be inclined to recycle properly if the process ends up to be inconvenient (Chen & Tung, 2010). Consequently, attitudes will have a less significant impact on recycling intentions. Zen and Siwar (2015) affirmed that the recycling collection center in Kuala Lumpur-Malaysia had the most significant influence on the residents' recycling intention. To conclude, although developing infrastructure has multiple obstacles linked to administration, funds and misusages (Musella et al., 2019), its crucial positive impact on recycling behaviors is not debatable.

g. Intention

Intention is a measure of people's desire to adopt a specific behavior; it theoretically determines the type of the behavior (Jigani et al., 2020). Pakpour et al. (2014) noted a strong relationship between intention and recycling behaviors. Therefore, intention could be a mediating variable between the independent parameters highlighted in the sections above and the recycling behaviors, being the dependent variable.

Attitude, perceived behavioral control and social norms are, according to the TPB, the major parameters making up intentions (Zhang et al., 2015). It has been recognized that a positive

attitude, a strong social norm and a high behavioral control lead to stronger intentions, thus, to higher achievement rates of a given behavior. Further, the more influencing the intentions are, the more likely individuals will behave in compliance with these intentions. In their study, Huang and Tseng (2020) used behavioral intentions as a mediating variable that affects recycling behaviors. They confirmed that the consumer's behaviors are highly influenced by their intention to accomplish a specific set of tasks. They added that the origin of the food waste crisis in developed and rich nations is mainly consumer's behaviors and their attitudes towards recycling. Multiple studies determined what could shape individuals' recycling intentions. Silberer et al. (2020) found that social norms are the most important factor to study in order to understand people's intention to recycle and to be engaged in. In Sweden, Stoeva and Alriksson (2017) revealed that attitude, perceived behavioral control, social norms and satisfaction with governmental procedures affect intention and project more efficient recycling behaviors. In Padang-Indonesia, the most influencing factor on citizen's separation intentions is found to be governmental role and awareness (Ulhasanah & Goto, 2018). In fact, the severity of intention in this latter study was determined by multiple factors including environmental awareness, role of government, social norms, habits, environmental knowledge and law enforcement. Delcea et al. (2020) and Strydom (2018) found a noteworthy impact of intention on waste separation behaviors. Jigani et al. (2020) assessed the intentions of Romanians and noted that around 75% of the citizens have the intention to be engaged in environmental activities and 44% have the intention to buy recycled packaging products. Therefore, they noted that intention, along with high levels of awareness, affected positively household separation behaviors. In addition, Jigani et al. (2020) revealed that the most influencing variables on intention are responsibility, proper infrastructure and perceived behavioral control. Nduneseokwu et al. (2017) proved that proper waste collection infrastructure

affected positively recycling intentions and behaviors. Many scholars revealed that intention is mostly influenced by perceived behavioral control (Yuan et al., 2016; Wang et al., 2019; Halder and Singh, 2018). Passafaro et al. (2019) argued that neighbors and family members' behaviors have a considerable impact on modifying people's intentions to recycle. Pikturniene and Baumle (2016) determined that attitude is the primary parameter to track in order to better predict recycling intentions. Based on the society and its cultural aspects, the parameters influencing recycling intentions vary from a country to another as presented before.

4. Conclusion

The literature review presented above discusses all possible variables that could be used to study recycling intentions and behaviors of citizens. It showed the importance of the theory of planned behavior in proposing major predictors of intentions (Attitude, Perceived Behavioral Controls and Social Norms). Moreover, it highlighted a few variables that were found, through previous studies, influential on intentions and behaviors. This review helped in the development of research questions, hypothesis and the construction of the research model. The effect of each variable will be analyzed independently to check which has an impact on recycling intentions and/or behaviors and to determine the most influential parameters to focus on. Also, it will help future green entrepreneurs and responsible entities focus on the most impactful parameters to make their environmental initiatives successful in Lebanon.

The below figure shows the hypothetical model for MSW separation behaviors that will be adopted in the study. It includes the main variables presented by the TPB along with some additional parameters that are found, through the literature review, to be reliable in predicting the recycling intentions and behaviors in a given community. Each one of these variables will have a different impact on intention of people to recycle. The relationship between a parameter and

another is affected by some moderating variables that could modify the strength and direction of the relation between dependent (Behaviors) and independent variables (Environmental Knowledge and Awareness, Attitude, Social Norms, Perceived Behavioral Controls). Intention comes as the mediating variable between dependent and independent variables. It actually surfaces between the time independent variables start being operational to affect the dependent variable and the time where its influence is perceived. This model will be the basis for hypothesis development presented in the following chapter.

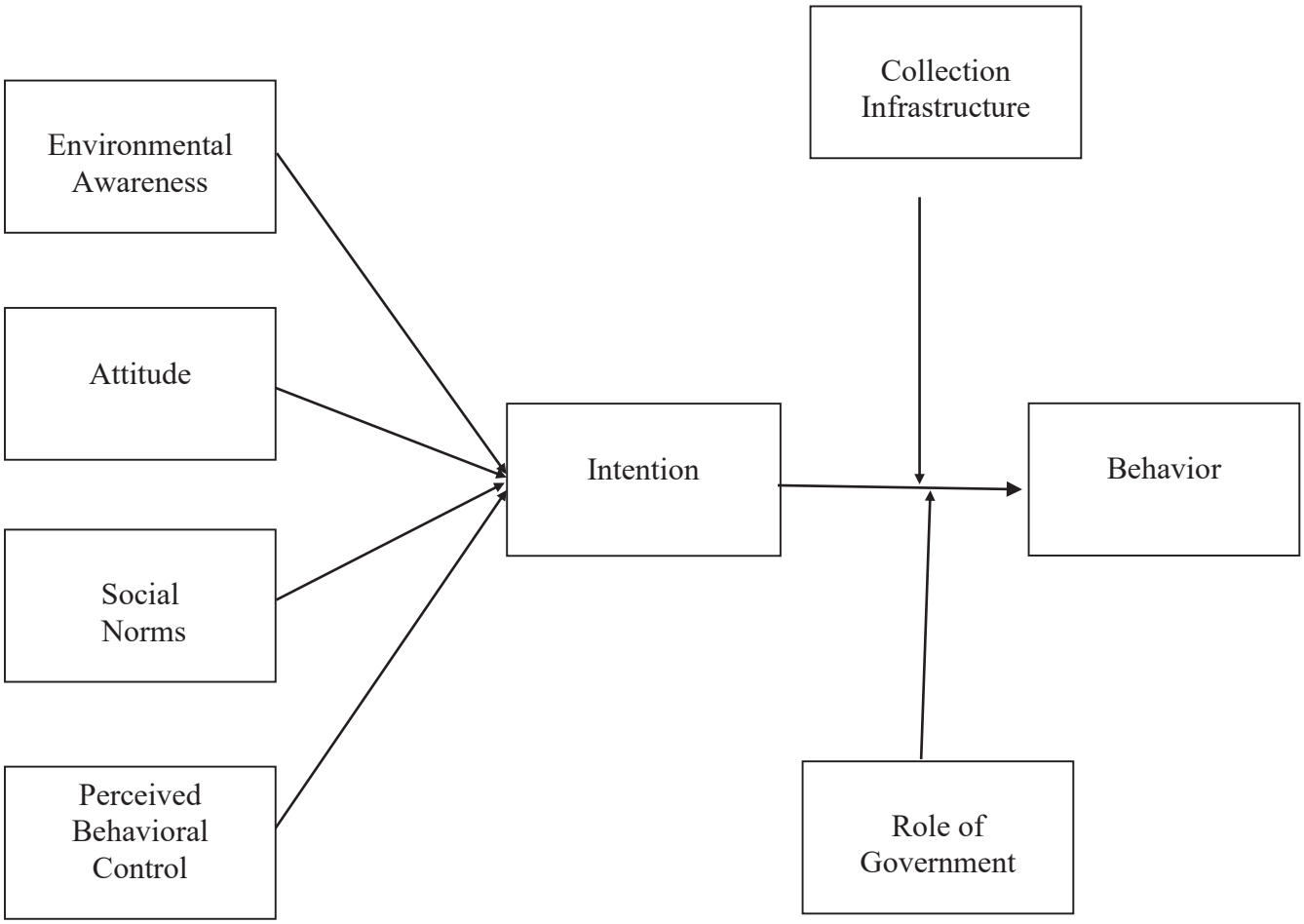

Figure 2: Research Framework

5. Research Questions

Following the lack of information and data concerning the waste collection Behaviors in Lebanon, three research questions were formulated and presented below.

- What are the different variables that could shape the citizens' Intentions to sort/recycle their waste?
- To which extent can the citizens' Intention to engage in recycling initiatives modify their actual sorting/recycling Behaviors?
- To which extent can the government and the availability of adequate Infrastructure encourage people to sort/recycle, by boosting the relationship between Intention and Behavior?

Chapter Two: Methodology

1. Introduction

As discussed in Chapter One, multiple factors shape people's intention to undertake recycling behavior, and intention in turn, might predict the citizens' actual behavior. This study focuses on identifying whether a relationship exists between citizens' attitude, social norms, perceived behavioral controls, awareness and their intention to recycle or engage in sorting activities. Also, it recognizes the link between intention and waste recycling behaviors. Moreover, it identifies the role of the government and the availability of a proper infrastructure in intensifying the relationship between recycling intentions and behaviors. Furthermore, this study aims to spot the light on the most influencing parameters that could push the Lebanese to learn and implement sorting of waste at source. This would help future green initiatives to adopt the right strategies in order to make their environmental project successful while minimizing and overcoming obstacles. Finally, it is worth noting the added value of this study where the development of a valid and reliable instrument took place, an instrument that could be used by other scholars aiming to assess people's environmental behaviors in other similar or dissimilar cultures, and consequently further boosting its validity. Accordingly, hypotheses were developed.

2. Hypotheses and Variables

Chapter one described in details the prominent variables that could help explain people's recycling intentions and behaviors. It has been highlighted that the TPB including the attitude, social norms and PBC affect directly people's intention to recycle. Environmental awareness is added to the model for a better assessment of people's willingness to engage, as an adequate background information about ecofriendly and recycling practices could boost people's intention to participate.

Moreover, the governmental role and the efficiency of the waste collection infrastructure are shown in the literature to have a moderating role in shaping people's positive intentions into active behaviors. Each variable has been tested in an independent hypothesis for the main purpose of assessing the influence of each variable independently on intentions and behaviors. Moreover, several hypotheses were developed to test whether all these suggested parameters do shape recycling Intentions/Behaviors equally in the Lebanese context undergoing a financial collapse and a global pandemic. They were previously tested individually in several studies as described in the literature review, however, they were not assessed at the same time in a society going through all these economic, political and sanitary obstacles. Some of the hypotheses were divided into two independent statements in order to detect whether the suggested independent variable acts directly on behaviors or creates intentions and then corresponding behaviors.

Thus, after reviewing the literature and tackling the different arguments highlighted in recent studies conducted in different countries and cultures, the following hypotheses are formulated to answer the research questions set:

H1: A positive Attitude toward recycling affects positively the Lebanese's Intention to recycle their household waste.

H1': A positive Attitude toward recycling affects positively the Lebanese's Behaviors to recycle their household waste.

H2: Social Norms affect positively the Lebanese's Intentions to recycle their household waste.

H2': Social Norms affect positively the Lebanese's Behaviors to recycle their household waste

H3: Perceived Behavioral Control affects positively the Lebanese's Intentions to recycle their household waste.

H3': Perceived Behavioral Control affects positively the Lebanese's Behaviors to recycle their household waste.

H4: Environmental Awareness affect positively the Lebanese's Intentions to recycle their household waste.

H4': Environmental Awareness affect positively the Lebanese's Behaviors to recycle their household waste.

H5: The positive relationship between the Lebanese Attitude, Perceived Behavioral Control, Social Norms as well as their environmental Awareness on one hand, and their recycling Behaviors on the other hand, is mediated by their positive Intention to recycle.

H6: The positive relationship between the Lebanese recycling Intentions and their recycling Behaviors is moderated by the role that the government/municipality plays in this respect.

H7: The positive relationship between the Lebanese recycling Intentions and their recycling Behaviors is moderated by the presence of adequate Infrastructure.

3. Methodology of Work and Research Strategy

Conducting a strong research necessitates a well-chosen research philosophy, reasoning type, research methods and sampling strategy. It is developed in a way that the research philosophy chosen will imply the research design. The latter would lead to the suitable choice of research methods and sampling strategy.

a. Epistemology

The approach used to gather, evaluate and present the data in a specific study is named the research philosophy (Chetty, 2016). It is a way to develop knowledge about the topic discussed (Mackenzie

& Knipe, 2006). Saunders et al. (2019) confirm that this knowledge development is based on specific assumptions linked to the researcher's perspective of the world and the practical concerns of the topic itself. The scholar might not be consciously mindful of them but he/she will certainly make a few assumptions to proceed in his/her work (Burrell & Morgan, 1979). A well-planned and reliable set of assumptions will create a credible research philosophy, which will underpin the methodological choice, research strategy, data collection techniques and analysis procedures (Saunders et al., 2009). The latter will allow all research elements to fit together and will result in a coherent research project. For instance, researchers might focus, while developing their studies, on their feelings rather than on concrete facts. The research approach that focuses on what is believed to be true (feelings) is called doxology and the approach linked to what is known to be true is known as epistemology (Saunders et al., 2019). Science has a role of transforming a doxology subject into an epistemology topic. Thus, the methods and strategies adopted in the development of the work will be various since the assumptions taken will unavoidably shape the understanding of research questions. It also depends on the aim and desired outcome of the study. Choosing the appropriate approach to tackle the subject of interest is linked to the selection of an appropriate philosophical angle. Hence, the following section will describe in detail the possible philosophies to adopt.

In research, the most commonly adopted philosophies are: Constructivism and Positivism. A constructivist interprets reality as a subjective matter. In fact, Saunders et al. (2009) confirm that analyzing an intervention can only be achieved through a detailed subjective breakdown. Constructivism's approach consists of understanding the world from the perspective of a human being (Cohen & Manion, 1994) and suggests the fact that reality is a socially constructed principle (Mertens, 2005). Hall et al. (2013) consider knowledge as an accumulation of historical, political,

social and cultural influencers. When assuming this approach, the researcher accepts reality as a construct of intelligence and human mind. It consists of studying a phenomenon in its natural setting while taking into consideration the emphasis this environment has on the studied subject (Saunders et al., 2009). The constructivists do not start from a theoretical background. They develop their own pattern or theory based on their treated topic (Mackenzie & Knipe, 2006). This paradigm came from Edmund Husserl's philosophy of Phenomenology and Wilhelm Dilthey's and other German theorists' study of Hermeneutics (interpretive understanding) (Mertens, 2005). These viewpoints imply that individuals do not learn knowledge, they construct it (Lincoln & Guba, 2005). Mackenzie and Knipe (2006) mention that constructivism relies on qualitative methods for data collection and analysis. It could also refer to some quantitative methods to back up effectively the qualitative data found (mixed approaches).

Positivists consider that reality is constant, stable and can be perceived from an objective perspective (Saunders et al., 2009). It is sometimes denoted as the scientific research or the scientific method. Mackenzie and Knipe (2006) declare that positivism is the rational philosophy that started originally with Aristotle, August Comte, and Emmanuel Kant. It is a philosophy in which causes would most probably determine outcomes (Creswell, 2003). Positivists argue that a studied phenomenon should be dealt with regardless of all environmental influencers or manipulators (Saunders et al., 2009). It often deals with some variations in reality; it considers altering an independent variable from the model to detect regularities and form relationships between the social world elements. Positivists aim to assess a theory through measurements and observations (O'Leary, 2004). The researcher considers that scientists collect the knowledge presented, independently from the researcher him/herself. In this case, the world is considered external and the perspective is purely objective. Moreover, according to Hall et al. (2013), a

positivist research philosophy adopts a deductive reasoning to formulate rational and objective hypothesis.

In this research, the positivism approach is adopted. From observable data, all genuine knowledge is gathered. Since this approach is also called the scientific paradigm, it will provide an opportunity to analyze the scientific facts collected about the barriers affecting the implementation and performance of environmental projects.

b. Reasoning type and design

The initial point that the researcher adopts while dealing with theories and observations defines the type of reasoning. Two extensive methods of reasoning are the most commonly followed; the inductive and the deductive methodologies. Each has its own uses and features.

Inductive reasoning was first backed up by Aristotle, a philosopher of science, that emphasized on the fact that induction is crucial for the development of new theories (Woiceshyn & Daellenbach, 2018). He mentioned that, logically, induction preceded deduction that was needed to assess and refine any newly developed theory. Both methodologies were considered as complementary but further researches divided them in terms of concepts (Woiceshyn and Daellenbach, 2018). At the early stages of research, induction is more exploratory and flexible. In fact, the researcher does not refer to previously existing theories but examines deeply the patterns obtained to generalize and explain the findings. Based on Locke (2007), inductive method is widely used in psychology and some organizational behavior studies since such topics require detailed observations and longtime experimentation. He also added that induction included going from the specific to the broader and end up forming new concepts compliant with the observation results. It is a bottom up approach. To note that mainly qualitative data are used in this method.

On the other hand, deductive reasoning is more narrow and focuses on confirming or rejecting hypothesis. This approach is linked to arguments that are true or existent by definition (Ormerod, 2010). No evidence is mandatory as a proof to proceed in the study. It englobes mathematics and philosophical reasoning (Ormerod, 2010). It works form the general and narrows down to the specific. It is called the top-down approach. The scholar starts with a specific theory and goes down the funnel to develop hypothesis to be tested. Quantitative data collected will back up the suggested assumptions taken.

In this study, hypotheses regarding variables that shape recycling intentions and behaviors are formulated. Quantitative data is collected through surveys to confirm or reject the suggested hypotheses and detect the main influencers on recycling behaviors in Lebanon. Thus, a deductive reasoning is followed along this work.

c. Research Method

Diverse research methods are available; questionnaires and interviews are mainly used to collect quantitative and qualitative data while observation and content analysis gather qualitative data. Each research strategy has a set of corresponding research methods to be adopted. Surveys will be adopted for this study in the form of questionnaires.

A survey assists in studying and analyzing a phenomenon in its natural environment or social context in order to better understand it (Aspers & Corte, 2019). It is actually a method to collect both qualitative and quantitative data all at once from a specific sample through questionnaires or interviews. A questionnaire was developed and sent through social media platforms to collect information from household members concerning their recycling know-how level as well as their readiness to adapt to change. It will help understand closely the major influencing variables on recycling intentions and behaviors in the Lebanese community.

d. Research Sample

The main purpose of conducting a study is to answer the research questions proposed. Thus, data collection is mandatory synchronized with an adequate sample selection (Wilson, 2010). The sum of cases from which the scholars select their sample is named population. Due to the lack of resources and time to explore the entire population, sampling techniques are adopted to minimize the number of studied cases. In fact, it is impractical to study the population as a whole. According to Taherdoost (2016), three stages are followed when choosing the sample of a study. The first is to 'clearly define the target population' that is commonly linked to the number of individuals residing in a selected country. The second is to 'select the sampling frame' which is selecting some real cases from which the sample will be taken. These should be representative of the entire population. And finally, the researcher should 'choose the adequate sampling technique' that would go along with the type of the study.

Sampling techniques are of two types: probability sampling method and non-probability sampling method. In probability or random sampling, the scholar begins with setting a frame for all eligible participants that can be part of the sample to be chosen. This will allow equal chances for all individuals of a population to be part of the study. This method is costly and time-consuming compared to the non-probability methods (Teddlie & Yu, 2007). The random sampling method includes four types:

1. **Simple Random Sampling**

Simple random sampling (SRS) allows every individual part of the population to have equal probability of being part of the chosen sample (Taherdoost, 2016). Nevertheless, one main drawback is that the researcher may not choose sufficient number of individuals having the characteristic of interest particularly if the characteristic is not common (Wilson, 2010).

2. **Systematic Sampling**

In the systematic sampling method, participants are selected at regular intervals from the sampling frame. The intervals are chosen in a way to ensure an adequate sample size. This method is convenient and easy to direct.

3. **Stratified Sampling**

Stratified random sampling includes dividing the population into different sections that will be further sampled in the future (Wilson, 2010). It is convenient whenever the population includes a homogeneous set of respondents.

4. **Clustered Sampling**

In the clustered sampling method, subgroups from the population are taken and used as sampling unit instead of individuals. These are known as clusters. It is very effective for studies that cover large geographic areas (Taherdoost, 2016).

On the other hand, non-probability or non-random sampling does not start with setting a sampling frame. Thus, some individuals would have zero chance of being chosen to participate in the study. The sampling error is difficult to estimate in this case and one can end up with a non-representative sample leading to non-generalizable results (Wilson, 2010). This method is often used for qualitative research. It is a convenient and cheaper for hypothesis development and exploratory research. Moreover, non-random methods are suitable for use whenever it is left up to the person him/herself to decide whether to participate or not in the survey (Teddlie & Yu, 2007). Non-random sampling necessitates less time to be accomplished. The following are the types of non-probability sampling methods:

1. **Convenience sampling**

This method is considered to be the easiest. Participants are designated based on their willingness to participate and their availability to respond (Taherdoost, 2016).

2. **Quota Sampling**

The quota sampling is widely adopted by market researchers. These researchers are required to identify quotas for respondents having the required characteristics (Gill et al., 2010). This method depends on some standards previously set. The collection of data keeps on going until the targeted number of responses is obtained.

3. **Purposive Sampling**

This technique is also known as the judgement sampling. The scholar decides selectively who to participate in his/her research or study. He/she would form a representative group of people, based on his/her personal judgement, to satisfy the research's needs or required characteristics (Maxwell, 1996). However, this technique could result in some biases in the results related to errors in judgment by the scholar.

4. **Snowball Sampling**

Snowball sampling is a technique that relies on individuals encouraging others to participate in a certain study (Gill et al., 2010). Groups are asked to refer the researcher to people who might be interested in participating in the research. This will help in enlarging the size of the sample like a snowball (Teddlie & Yu, 2007). This technique is useful for small populations, societies with closed nature and inaccessible groups (Breweton & Millward, 2001). Snowball sampling is known

to be low in terms of cost but can lead to few biases in people selection; the sample chosen could have analogous characteristics with the initial individual chosen (Wilson, 2010).

In this study, the questionnaire developed was shared through social media platforms and people were then asked to share it with their friends and relatives. Thus, a snowball sampling method was adopted to reach a wider range of participants and obtain a reliable sample size, compared to the number of statements included in the questionnaire. In fact, with 38 statements and in order to have significant results, the sample size should be compliant with the population chosen. Hair et al. (2014) confirm that in Structural Equation Modelling (the analysis method adopted and discussed later on in this chapter), the sample size should be at least five times the number of statements in the questionnaire. This criterion is met since 38 statements require a minimum of 190 respondents. In this study, the responses recorded were 317.

4. Instrumentation

Churchill (1979) has developed a set of principles to design research instruments. In this study, the instrument is developed following Churchill's procedures: identification of domain for the construct, generation of items through existing literature and focus group discussions, categorization of items into determinants, initial data collection and purification (including expert validation; pilot testing; and scale modification, refinement and finalization), data collection, Exploratory Factor Analysis (EFA) using IBM SPSS 26 and Confirmatory Factor Analysis (CFA) using IBM SPSS AMOS 22.

a. Domain's Construct Identification

The domain for the construct of this study is the recycling intentions and behaviors of Lebanese citizens.

b. Item Generation and Categorization

To develop the multiple statements and sections of the instrument and validate its outcome, two methods have been followed. First, a comprehensive literature review has been conducted and presented in the preceding chapter, englobing different parameters that could shape people recycling behaviors. Second, group discussions have been held and directed to collect different opinions and generate diverse items shaping recycling intentions and behaviors.

Discussion sessions were organized with professional people from various industries (Engineering, Management and Education) and with different educational levels (Bachelor, Masters and PhD). During these brainstorming sessions, notes were recorded and evaluated at a later stage to detect all relevant keywords that could be helpful in developing the questionnaire. These keywords were linked to the categories already found in literature. The demographic information of people involved in the brainstorming and discussion sessions are presented in Table 1. Three group discussion meetings were conducted with several members each. During these sessions, the discussion moved on by stating and arguing on the different variables affecting the recycling intentions and behaviors while taking the Lebanese society and context into consideration. Keywords were highlighted and notes were taken under each for comprehensive statements development

At the end of the sessions, 38 meaningful statements were developed and divided into eight different categories titled as follows: Attitude (6), Social Norms (5), Perceived Behavioral Control (5), Awareness (5), Role of Government (4), Infrastructure (4), Intention (5) and Behavior (4).

Table 1: Demographics of individuals part of the discussion groups

Demographics	Group One	Group Two	Group Three
Gender	2 females, 1 male	3 females	1 female, 2 males
Age	24, 25 and 42 years old	25, 30 and 45 years old	24, 25 & 53 years old
Education	PhD, BS in Law and BE in Chemical Engineering	BS in Economy, BS in Finance and BE in Chemical Engineering	BE in Chemical Engineering, BE in Civil Engineering and BS in Law

c. Initial Data Collection and Purification

After the instrument validation made by all the members that were part of the group discussions, a pilot study was conducted to make sure that all statements are clear and fit under the targeted factor/section that the researcher linked them to. The pilot study was conducted with 20 participants. Few commented on the fact that the statements under Intention and Behavior were close in terms of meaning and are therefore confusing. Consequently, an introductory sentence was added before each set of statements to clarify the exact aim of each section. The final refined version of the questionnaire was then made ready for data collection.

The questionnaire is divided into nine parts. Part I includes the respondents' demographic information. Part II contains statements assessing the respondents' attitude towards waste separation activities. Part III comprises statements that evaluate the way individuals perceive what others, in the same society, would expect them to do (i.e. Social Norms). In part IV, people's reflection on past experiences of waste sorting and separation, as well as their expectations of potential obstacles are tackled (i.e. PBC). Knowledge and awareness concerning environmental issues and key solutions are presented in part V. The Lebanese's governmental role and responsibilities are discussed in part VI. Part VII sheds light on how the accessibility to, and the

efficiency of waste separation/collection means would affect the intention to sort waste (i.e. Infrastructure). Part VIII presented the Lebanese citizens' intention to be involved in appropriate waste separation activities. Finally, part IX concludes how intention would be translated into active involvement in waste separation activities, i.e. behavior. Part II through IX are assessed using a 5-point Likert scale ranging from strongly disagree (1); disagree (2); neutral (3); agree (4) to strongly agree (5).

d. Data Collection

After the approval of the university's research board (IRB), an online version of the questionnaire was shared through social media platforms with potential participants. The survey link was shared through WhatsApp, Instagram and Facebook. The participants were asked to spread the link with their relatives and friends achieving the snowballing effect discussed previously in this chapter. In this way, the link would reach the larger amount of people possible and the required number of participants would be achieved. A consent form was added to the questionnaire to ensure for the participants that their participation is voluntary and their data will remain confidential and anonymous. To be able to submit their response, participants had to answer all the proposed questions. This feature was added to avoid any lack of data or disqualifications. The data collection process stretched over a two-week period.

After reviewing the final data excel sheet, each statement was coded by using the first three letters corresponding to the factor it belongs to, followed by a numerical digit. For instance, the first statement for Intention is coded INT1. Table 2 presents the factors with their corresponding statements coded.

Table 2: The seven dimensions/factors along with their statements

Factors	Statement Code	Statements
Factor One: Intention	INT1	I have the Intention to increase my environmental discipline (example: avoid using plastic cups, bring reusable bag to the supermarket, etc.)
	INT2	I have the Intention to learn how to separate my garbage appropriately
	INT3	I have the Intention to obey the rules related to waste separation
	INT4	I have the Intention to participate in environmental activities in my community
	INT5	I have the Intention to pay higher municipal fees in order to solve the waste problem
Factor Two: Governmental Role	GOV1	I sort my waste selectively, if/because Government/Municipality educates me about waste separation
	GOV2	I sort my waste selectively, if/because Government/Municipality does enough to fix the garbage problem in my village/city/country
	GOV3	I sort my waste selectively, if/because Government/Municipality is a truthful authority, so I cooperate with any waste management
	GOV4	I sort my waste selectively, if/because Government/Municipality imposes fines/penalties on those who do not obey the rules of waste separation
Factor Three: Social Norms	SN1	People around me are interested in protecting the environment
	SN2	People around me have a concern about/responsibility for the waste problem in our community
	SN3	People around me participate in environmental activities
	SN4	People around me will criticize me if I do not separate waste.
	SN5	If people around me separate their waste, I will start separating mine too
Factor Four: Awareness	AWA1	I am aware that the risks associated with waste problems are true and serious
	AWA2	I am aware that the waste problem poses a threat to my health and my family's health
	AWA3	I am aware how to separate my waste correctly and what are the types of waste that can be recycled.
	AWA4	I am aware that waste separation brings about economic benefits (natural fertilizer, electricity, selling used glass/aluminum...)
	AWA5	I am aware that waste separation at source helps reduce wastes accumulating in landfills and protects the environment

Factor Five: Perceived Behavioral Control	PBC1	Separating waste at home is something complicated and hard to do.
	PBC2	Waste separation takes too much time.
	PBC3	Waste separation takes up too much room/space.
	PBC4	Lack of satisfactory facilities (such as coded recycling bins for waste separation and collection means) prevents me from separating waste.
	PBC5	It is not easy to change my habits, as I am not used to separate waste
Factor Six: Attitude	Att1	I believe that efficient waste separation processes lead to a clean environment
	Att2	I feel glad to engage in any waste management/separation plan
	Att3	I feel that I have a responsibility to reduce the amount of waste generated
	Att4	I believe that waste separation at home is the key starting point for the whole waste management process
	Att5	I feel ashamed when littering (such as throwing a paper from my car's windows, etc.)
	Att6	I feel guilty if I use plastic utensils (cups, plates, straws, etc.)
	INF1	I have enough space for multiple waste separation bins in my
Factor Seven: Infrastructure	INF2	Government/municipality provides a modern collection Infrastructure (appropriate recycling bins, guiding protocols, etc.)
	INF3	Government/municipality provides a convenient collection Infrastructure (Recycling bins that are close to my home, colorful waste bags for different waste categories, etc.)
	INF4	Government/municipality provides timely waste collection services (e.g. daily)
Factor Eight: Behavior	BEH1	I would learn how to separate my garbage properly
	BEH2	I would be more responsible for my waste
	BEH3	I would support any recycling effort encouraged by the community/municipality
	BEH4	I would separate waste regardless of whether there are community incentives, or even governmental fines or penalties

e. Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) is a method carried out to validate scales of items in a questionnaire which has not been validated earlier (Samuel, 2016). This process is supported by IBM SPSS 26 that uses techniques such as Rotation Varimax and Component Analysis.

The decision to rotate the factors and the rotation type has an influencing impact on the results. Samuel (2016) states that the orthogonal rotation leads to an independency between factors. It can actually improve the output obtained. The most common orthogonal technique is Varimax; it decreases the number of variables with high loadings on factors.

The main purpose of conducting an Exploratory Factor Analysis (EFA) is to validate the loading of questionnaire statements on their relevant factors and identify the dimensional structure of the instrument. All observed variables are standardized in terms of mean and standard deviation. No expected loading distribution is predictable since EFA is an exploratory technique (Fontaine, 2005). EFA is frequently used whenever the model has more than one latent variable studied at the same time.

The reduced dimensions produced by a Factor Analysis (FA) are known as factors. FA explores the link between the item variances and the common variances shared between elements (Samuel, 2016). In fact, it is a technique of data reduction; it takes as inputs several variables, categorizes them under few factors and groups them together according to their correlations. In EFA, a factor corresponds to the latent variable itself and the relationship between observed and latent variable is termed factor loadings. The latter are standardized regression weights. According to Nguyen (2010), the minimum acceptable factor loading is 0.5. However, Stevens (2012) argues that factor loading and sample size are correlated. He discusses that for a sample size of 100 participants, the factor loadings are noteworthy whenever they are greater than 0.512.

As previously mentioned, the FA allows the quantification of the ratio of an item's own variance to the shared variance. This is labelled as communality. It is a measure of the extent that a single variable relates to all the others. Their values range between 0 and 1. The acceptable range for communalities stands between 0.5 and 0.6 for sample sizes of 100 to 200 participants (MacCallum

et al., 1999). Costello and Osborne (2005) explain that low communalities may refer to the need of adding factors to the study in order to reach the desired purpose. Also, it may suggest that the variable itself has no common grounds with the others and is prone to elimination. Thus, all variables having communalities less than 0.5 will be disregarded from the model.

On another note, conducting a reliability analysis is essential to check how consistent and trustworthy the instrument used is. The most common parameter used in Cronbach's alpha. Kline (1999) argues that the acceptable Cronbach's alpha values as a rule of thumb is any value above 0.7. These values would reflect excellent reliability of the instrument. Hair et al. (1998) propose a Cronbach's alpha cut-off value of 0.55. A reliability analysis enables the scholar to handle his/her variables as a group or unit associated with the same issue (Samuels, 2017). It minimizes the complexity and risk percentage of the analysis.

Some main statistics linked with FA are to be considered in order to ensure that the sample size is adequate. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) designates the ratio of variance in the variables that could be caused by underlying factors. It determines whether the collected data is appropriate for factor analysis. The minimum value acceptable on this test is 0.5 (Kaiser, 1974). The Bartlett's test of sphericity evaluates the hypothesis that the correlation matrix is an identity matrix, which would indicate that variables are unrelated in the population (Samuel, 2016). In this case, the instrument would be unsuitable for structure detection. Whenever the Bartlett's test of sphericity is significant, running an EFA would be noteworthy. Also, small values of the significance level (less than 0.05) indicate that a factor analysis may be convenient for the set of data (Samuel, 2017).

f. Confirmatory Factor Analysis (CFA)

Researchers tend to use Confirmatory Factor Analysis (CFA) for the validation of questionnaires (Prudon, 2015). To achieve this purpose, a covariance matrix is formed to calculate the scores of each variable. CFA is performed using a statistical model called the Structural Equation Modelling (SEM).

In SEM, the sample size is very critical (Prudon, 2015). In fact, this sort of analysis depends on tests that are subtle to the number of responses and to the level of differences in covariance matrices. SEM's main focus is complex theoretical models solved through analytical and statistical techniques like factor analysis, path analysis and measurement theory (Awang, 2015). SEM assesses the model based on the level of consistency between actual and theoretical data and helps the researcher conducts his/her quantitative analysis in order to solve practical social problems. Linear models are the core of SEM combining both factor and path analysis. SEM deals with variables directly measured called observed variables and variables that cannot be quantified called latent variables (Awang, 2015). The latter's effect is concluded from the observation of independent (observed) variables. Hou et al. (2014) state that an advantage of using SEM is that a latent variable can be at the same time a dependent and an independent one in different set of relations.

CFA is carried out in order to analyze and validate the measurement model for the set of statements representing each specific construct Awang (2015) endorses that the CFA should be performed for all variables before demonstrating their relationships in SEM. Unidimensionality, validity and reliability are assessed for each construct and are presented in details in the following chapter.

In order to determine the discrepancy and the degree of approximation of the model adopted, goodness of fit or approximate fit parameters are discussed. They also provide basis to determine whether the model is accepted or rejected (Prudon, 2015).

The model fit is measured by parameters englobing absolute, incremental and parsimonious indices of fit. Chi-square is the most famous index determining absolute fit. Another determinant is RMSEA (Root Mean Square Error of Approximation). A value of 0 designates perfect fit whereas the cutoff value is ≤ 0.06 (Prudon, 2015).

The incremental fit is determined based on the following measures: Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Normed Fit Index (NFI). The AGFI is the proportion of variance accounted for by the estimated population covariance. The CFI is a revised form of NFI. It is a parameter not sensitive to the sample size and it compares the fit of the studied model to the fit of an independent, or null, model (Prudon,2015). The CFI cutoff value is ≥ 0.9 and represents a good fit (Hu & Bentler, 1998). As for TLI, the good fit cutoff value is ≥ 0.9 and 1 refers to the perfect fit value (Hu & Bentler, 1998).

The parsimonious indices of fit are represented by the value of the ratio of chi-square over the degree of freedom. According to Awang (2015), the acceptable values should be <3.

5. Data Analysis

a. Descriptive Analysis

Descriptive analysis is a statistical tool in SPSS used to describe and present the characteristics of the data collected (Daniel, 2014). It allows the data to be easily displayed and to become meaningful for users. It arranges the data in a constructive approach that allows the researcher to conclude potential patterns or projections (Rawat, 2021). It is run in order to shed light on the

differences among respondents when it comes to the different demographic variables. A descriptive analysis is usually performed as a first step before any statistical test or modelling. It is a process deemed necessary to check if there is a variance in the effect of these demographic parameters on the diverse variables in the model. Thus, descriptive analysis of the participants' demographics is revealed before interpreting the EFA and CFA results in the following chapter.

The descriptive statistics in this study shed light on the participants' gender, age, education level, marital status, household number, household type, place of residency, income level, occupation and current recycling status. Such data should be well organized and interpreted since it will help recycling initiatives in Lebanon to adopt techniques targeting their audience appropriately. The message would be formulated in a way that catches the attention of the targeted audience, consequently, effectiveness in any implemented recommendation would be secured. For instance, if the majority of the respondents are from the Gen Z generation (age less than 25 years), the approach to encourage waste separation would include techniques or incentives compliant with their interests. The same applies for the educational level; educated people should be approached in different ways than non-educated ones.

b. Path Analysis

To test the formulated hypotheses, mediation analysis is used. This statistical method assesses the relationship between variables, mainly among an independent variable X and a resultant variable Y. Several models or conceptual diagrams have been developed englobing typical cases of causal effects. The following is the simplest mediation model developed by Hayes (2018), where M is the mediator between X and Y.

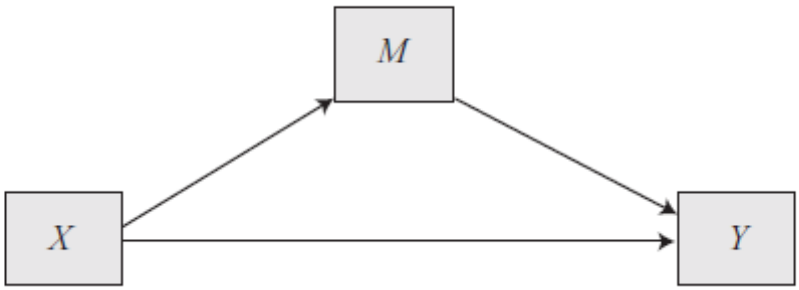

Figure 3: Conceptual diagram of a simple mediation model developed by Hayes (model 4)

Figure 3 comprises antecedent variables (X and M); where X causally shapes Y and M, and M causally affects variable Y. Hayes (2018) states that a simple mediation model is any causal system in which at least one causal antecedent X variable is proposed as influencing an outcome Y through a single intervening variable M. The pathways between X and Y are developed in a way that one cannot trace back in the opposite direction of the arrow. The pathway between X to Y (without going through M) is the direct effect of X on Y. The second path is the indirect effect going from X to Y passing through M. The interpretation and estimation of both direct and indirect effects is key to test a causal relationship including a mediating variable. Once variable X employs its outcome on M, the latter exerts its effect on Y producing variation in the results. To conceptualize the theory studied into a mediation procedure, it is crucial to consider the mediation process as a causal relationship. In other terms, M should be causally present between the independent variable X and the resultant variable Y. M cannot transmit the effect of X on Y if it is not located between them.

The statistical diagram of figure 3 is represented in figure 4. Two linear models are mandatory since there are two consequent variables (M and Y).

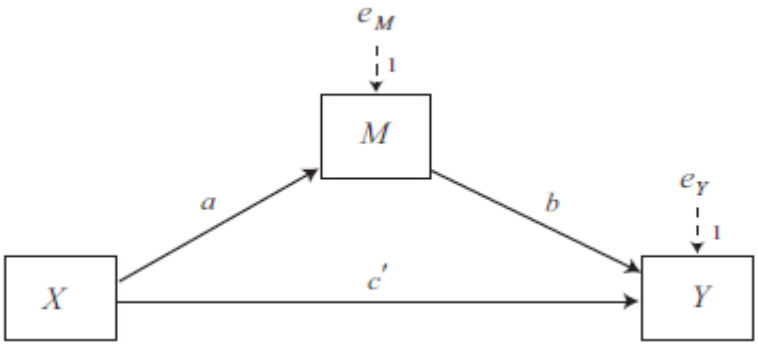

Figure 4: Statistical diagram of the simple mediation model.

Two equations are representatives for this statistical diagram:

$M = i_M + aX + e_M$ (1)

$Y = i_Y + c'X + bM + e_Y$ (2)

Where:

- i_M and i_Y are regression constants
- e_M and e_Y are errors in the estimation of M and Y respectively
- a, b and c' are regression coefficients given to the antecedent variables in the model in the estimation of the constants

The coefficients are considered estimates of the causal influence of the variables and the purpose of the model is to approximate these coefficients and interpret them.

PROCESS MACRO is a feature used in SPSS to approximate the regression coefficients in simple and complex mediation-moderation models (including unique or several mediators/moderators). It provides estimation of inferential tests, indirect/direct effects and additional information as well. The first step is identifying the best model that corresponds with the framework of the study. The model should include one mediator (Intention), two moderators (Governmental Role and Infrastructure) affecting the relationship between M and Y, one dependent variable (Behavior) and one independent variable at a time (Awareness, Attitude, PBC and Social Norms). All PROCESS

model templates include one dependent variable only. Therefore, the following has been followed as per Dr. Hayes' recommendation: fixing each time one of the independent variables as X, entering the rest as covariates and repeating the simulation for each variable. Model 16 is presented in figures 5 and 6 for both conceptual and statistical diagrams where V and Q are moderators being Governmental Role and Infrastructure respectively. Using OLS regression, PROCESS MACRO **model 16** estimates equation (2) and (3) and provides coefficients **a**, **b**, **c** and **c'**. It also delivers standard regression statistics like R^2.

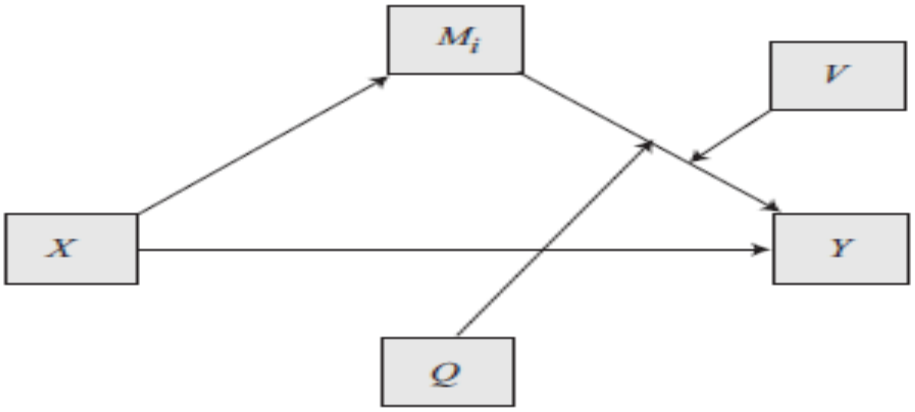

Figure 5: Conceptual Diagram of model 16

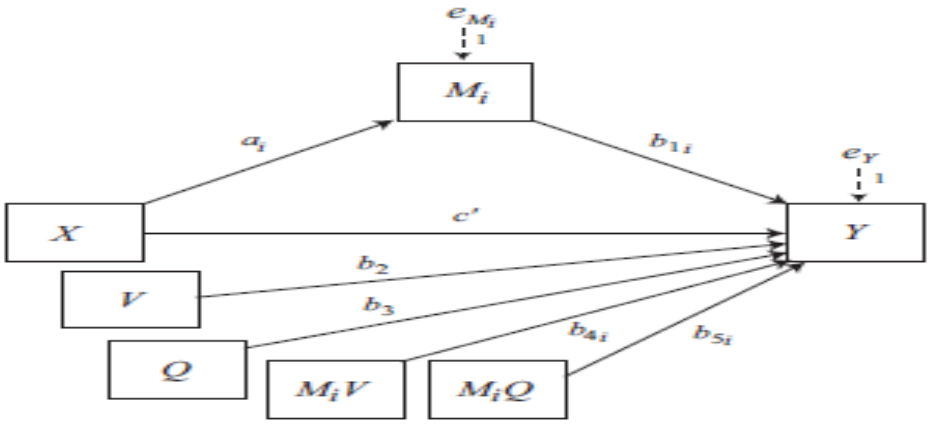

Figure 6: Statistical Diagram of model 16

6. Regression Analysis

Regression analysis is a statistical tool used for the analysis of interactions between variables (Sykes, 1993). Researchers usually aim to determine the causal relationship of one parameter upon another. To explore such connections, the data of interest is collected and regression is adopted to quantify the causal relationship between the variables (Li et al., 2018). In addition, the statistical significance of these relationships are estimated. The latter is the degree of confidence to which the exact relationship is close to the assessed relationship (Sykes, 1993). At the early stages of a regression analysis, hypotheses are formulated stating the assumed causal effect of one parameter on the other. The analysis will result in the acceptance or rejection of the suggested relationships.

A multiple regression analysis consists of assessing the links between the quantitative change of one dependent variable affected by two or more independent variables (Yu, 2014). This process relates the dependent variable Y with the n independent variables.

The overall fit of the model can be assessed by interpreting the R^2 value. The R^2 coefficient of determination represents the degree to which the model explains the observed variation in the dependent variable, relative to the mean. The R^2 always lies between 0 and 1, where a higher R^2 indicates a better model fit (Yu, 2014). When interpreting R^2, higher values indicate that more of the variation in Y is explained by variation in X.

In this study, a stepwise regression analysis is performed in order to determine whether the demographics collected affect or shape the variables in the model. For instance, the causal relationship between age and all parameters is assessed to define whether the age generation of

respondents (Gen Z, Millennials, Gen X, Boomers) would affect their intention to recycle or their waste sorting awareness level.

The multiple regression analysis performed investigates the effects of demographics; age, gender, educational level, marital status, number of people per household, household type, income level, occupation, place of residence and current separation behavior, on attitude, social norms, perceived behavioral controls, awareness, intention and behavior. All variables, except for both moderators (Governmental Role and Infrastructure), are included. The results are presented in the following chapter.

7. Conclusion

This chapter presents the suggested hypotheses to be tested. It also discusses the methodology of work that will be followed and the research strategy adopted. The positivism approach was chosen for the epistemology section as recycling intentions and behaviors are assessed based on actual collected data. Accordingly, the deductive reasoning was followed to confirm or reject the postulated hypotheses. A questionnaire was developed and sent to participants through social media platforms. A non-probability sampling method was adopted, the snowball sampling method specifically, to maximize the number of targeted respondents. The instrument was developed following Churchill's (1979) principles. It comprises nine sections with different statements under each. This chapter helps create an effective research framework and a strong basis for the development of the instrument. It assisted the researcher in adopting the adequate research techniques and methods for more accuracy in the results.

The results and the demographics collected were analyzed using IBM SPSS 26 and IBM SPSS AMOS 22. A descriptive analysis, an EFA and a CFA were conducted. Moreover, the relationships

between the variables of the model, the mediation and the moderation effects were tested using path analysis. Finally, to assess whether the demographics collected shape in a way or another the independent variables suggested, a regression analysis was run.

In the following chapter, the findings of the different test performed are presented and discussed. The reliability and validity of the questionnaire are also highlighted.

Chapter Three: Results and Analysis

1. Data

The instrument used in this study helped the researcher to collect and analyze data enabling her to evaluate the relationship between intention and behavioral acts, as well as to shed light on the effect of different parameters shaping the individual's intention to recycle. When developing the instrument, a thorough and detailed literature review was conducted to determine all possible parameters that could shape people's intention. Diverse factors were discussed in chapter two, including attitude, environmental awareness, PBC, social norms and others. Consequently, the instrument's statements were formulated and coded (as described in chapter two) based on the most influencing and relevant factors. A total of 38 statements were enlisted and grouped into eight subcategories. Each item was evaluated critically based on the factor it is linked to. The eight dimensions are as follow: Attitude (6), Social Norms (5), Perceived Behavioral Control (5), Awareness (5), Role of Government (4), Situational Factors (4), Intention (5) and Behavior (4). The instrument is shown in Appendix E. It comprises several sections, each including a specific set of statements linked to a variable from the model. The questionnaire was distributed via social media and reached a large sum of participants, with a final number of 317**,** considered valid to test the suggested hypotheses.

The coded excel sheet summarizing the data was imported to SPSS. The demographic variables were assessed and summarized in Tables 3 to 12. Descriptive statistics show that 67.9% of the respondents are female, 55.2 % belong to the Gen Z generation, 43.2% hold a BA/BS while 39.9% hold a Master's degree, and 73.7% are single. Approximately 50% of the respondents live with their families, 74% in an apartment in a building, and 76% live in Mount Lebanon. Around 28%

of the respondents do not work, 22.4% earn a monthly salary of above 6,000,000 L.L., and the rest are divided into different income brackets presented in table 10. Findings also revealed that 43.2% of the Lebanese citizens are currently separating their waste partially, which can be considered a promising step.

Table 3: Member's Gender Distribution

Gender	***Number of Responses***	***Percentage (%)***
Female	209	67.9%
Male	99	32.1%

Table 4: Member's Age Distribution

Age	***Number of Responses***	***Percentage (%)***
Less than or equal to 25	170	55.2%
26-44	97	31.5%
45-56	31	10.1%
57-75	10	3.2%
76 years or more	0	0.0%

Table 5: Members' Educational Level

Education Level	***Number of Responses***	***Percentage (%)***
School Level	28	9.1%
Technical	5	1.6%
BA/BS	133	43.2%
Masters	123	39.9%
PhD	18	5.8%
MD	1	0.3%

Table 6: Members' Marital Status

Marital Status	***Number of Responses***	***Percentage (%)***
Single	227	73.7%
Married	81	26.3%
Divorced/separated	0	0.0%
Widow/er	0	0.0%

Table 7: Members' Household Number of People

Household Number	***Number of Responses***	***Percentage (%)***
One	11	3.6%
Two	13	4.2%
Three	50	16.2%
Four	83	26.9%
Five or more	151	49.0%

Table 8: Members' Household Type

Household Type	***Number of Responses***	***Percentage (%)***
Apartment in a building	228	74.0%
Private house with a garden	80	26.0%

Table 9: Members' Place of Residence

Place of Residence	***Number of Responses***	***Percentage (%)***
Aakkar	7	2.3%
Baalbeck- hermel	0	0.0%
Beirut	23	7.5%
Beqaa	4	1.3%
Mount Lebanon	234	76.0%
Nabatiyeh	1	.3%
North Lebanon	18	5.8%
South Lebanon	21	6.8%

Table 10: Members' Income Level

Income Level	*Number of Responses*	*Percentage (%)*
None (I do not work)	85	27.6%
Less than 1,500,000 L.L.	40	13.0%
Between 1,500,000 and 3,000,000	59	19.2%
Between 3,000,000 and 6,000,000	55	17.9%
Above 6,000,000 L.L.	69	22.4%

Table 11: Members' Occupation

Occupation	*Number of Responses*	*Percentage (%)*
Education	44	14.3%
IT	6	1.9%
Advertising	2	.6%
Trade	3	1.0%
Engineering	56	18.2%
Architecture, Interior & Graphic	17	5.5%
Consultancy	8	2.6%
Banking	13	4.2%
Insurance	4	1.3%
Medical	17	5.5%
Pharmaceutical	11	3.6%
Fashion	5	1.6%
Others	122	39.6%

Table 12: Members' Current Recycling Status

Current Recycling Status	*Number of Responses*	*Percentage (%)*
Yes	57	18.5%
Partially	133	43.2%
No	118	38.3%

2. Exploratory Factor Analysis (EFA)

An EFA was conducted to confirm the relationship between the statements and the factor they loaded on. It is a tool used to discover which items in the instrument fit together while disregarding

any previous prejudice of the scholar. It is adopted whenever all the variables in the model are assumed to be measured/studied (Fontaine, 2005).

Factor analysis is adopted to reduce the amount of data collected by grouping them. It quantifies a statement's variance over the shared variance of the overall questionnaire under a variable named communality. The latter is a squared variance calculated for reflecting statistically the amount of variance represented by the factors in the model according to Lewis-Beck et al. (2004). In this study, five statements had low communality levels: Att5 (0.354/ I feel ashamed when littering (such as throwing a paper from my car's windows, etc.)); Att6 (0.452/ I feel guilty if I use plastic utensils (cups, plates, straws, etc.)); PBC5 (0.456/ It is not easy to change my habits, as I am not used to separate waste); AWA3 (0.441/ I am aware how to separate my waste correctly and what are the types of waste that can be recycled) and INF1 (0.465/ I have enough space for multiple waste separation bins in my house). They were removed and communalities were re-observed. The summarizing final table 1 in Appendix A presents all the results.

Att5 and Att6 focused on the feeling of guilt and shame towards random littering. These variables have shown no link or common grounds with the recycling intentions or behaviors due to their low communality levels (Costello & Osborne, 2005). In other words, it seems that Lebanese citizens do not consider this matter linked to shame and they do not feel guilty whenever they through away their waste. Therefore, when approaching Lebanese citizens with recycling topics, focusing on such key points would not be efficient. In addition, Lebanese people do not consider waste separation a matter of habit, contrarily to the author's opinion. This can be explained by the fact that the communality result of PBC5 was low. On another hand, it can be noted that residents showed indifference regarding the types of recyclables and the right methods to separate waste correctly (AWA3 removed). Finally, INF1 was removed and showed that people in Lebanon do

not consider having enough space for multiple bins in their household a key point to sort their waste. This can be explained by the fact that the majority of respondents, around 74%, live in an apartment in a building with no garden or backyard. The factor loadings of all the remaining statements exceeded the recommended level of 0.5.

Failure to load, cross loadings and items loading are assessed in order to interpret the factor structure of the instrument. A failure to load is whenever a variable or a statement does not show in the table of the rotated component matrix in SPSS. The researcher adds this condition in SPSS windows. In this study, no failure to load has been recorded and all statements were found in the Rotated component matrix (Table 13). When a variable is found to have multiple loadings with different sets of statements, it is termed cross-loading. It makes the process of distinguishing and labelling these factors hard and ambiguous. One approach to inspect such cases is to examine the loadings of each. The statements BEH1 and BEH3 loaded on two different factors; Behavior and Intention. However, their loadings were higher on the Behavior factor. Thus, they were kept. This could be a result of the ambiguous meaning of the statements themselves. It seems that the respondents considered the Intention and Behavior statements close enough or even tightly interlinked.

On another hand, two statements loaded on factors, different from those that the researcher expected them to load on. BEH4 loaded on Intention and SN5 loaded on Behavior. BEH4, ‘I would separate waste regardless of whether there are community incentives, or even governmental fines or penalties’, has a wording structure close to the Intention statements tackling the willingness of people to engage in environmental initiatives regardless of any incentive or fine. SN5, ‘If people around me separate their waste I will start separating mine too’, is very close in terms of meaning to the set of statements making up the Behavior factor.

Thus, the final set included 33 statements loading under eight different factors, all with a loading greater than 0.5 (Table 13), which accounted for 71.506% of the variation in the data (see Appendix B). As a general rule, this should be at least 50% (Streiner, 1994).

Afterwards, the Cronbach alpha is calculated to test the internal consistency and reliability of the Likert scale responses of the instrument. Cronbach's alpha values typically range between 0 and 1. Any value above 0.7 is excellent and indicates the strong reliability of the instrument used (Kline, 1999). Table 14 shows the result of the Cronbach alpha of the questionnaire adopted in this study. A value of 0.852 indicates a very good internal consistency of the instrument.

Table 13: Rotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
INT3	.769							
INT4	.767							
INT1	.751							
INT2	.734							
INT5	.643							
BEH4	.507							
GOV4		.866						
GOV1		.851						
GOV3		.835						
GOV2		.828						
SN2			.862					
SN1			.853					
SN3			.821					
SN4			.739					
AWA1				.817				
AWA5				.791				
AWA2				.763				
AWA4				.740				
PBC2					.867			
PBC1					.845			
PBC3					.796			
PBC4					.615			
Att1						.778		
Att4						.765		
Att2						.737		
Att3						.671		
INF4							.801	
INF3							.799	
INF2							.793	
BEH2								.715
BEH1	.524							.658
BEH3	.547							.616
SN5								.581

Table 14: Reliability Statistics

Cronbach's Alpha	N of Items
.852	33

In order to show the suitability of the data for structure detection and the adequacy of sample size, two tests were performed. First, the Kaiser-Mayer-Olkin (KMO) test to indicate how suitable the data is for factor analysis. The latter is generally applicable if the KMO test results are high values (close to 1). In other terms, the higher the KMO value is, the more reliable the instrument. In table 13, the results show that Kaiser-Mayer-Olkin MSA value is 0.844, indicating adequacy in the sampling method. Second, The Bartlett's test of sphericity tests whether the variables are correlated in the chosen population. It determines whether the collected data can be tested by FA or not based on the significance level presented in the result table. Any value less than 0.05 is acceptable. The results of these two tests are presented in Table 15 and reveal that the associations between the variables are significant.

Table 15: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.844
Bartlett's Test of Sphericity	Approx. Chi-Square	6404.300
	Df	528
	Sig.	.000

The Cronbach's Alpha coefficient of each dimension is presented, and shows good levels of internal consistency. The factors forming the instrument are described in the following paragraph. **Factor One, Intention (**α = 0.887)**:** The statements making up the Intention factor assess the Lebanese's Intention to be involved in appropriate waste separation activities. It sheds light on

their willingness to learn appropriate sorting techniques, be disciplined, obey the rules, be engaged in ecofriendly activities and pay higher municipal fees to help save their environment.

Factor Two, Governmental Role (α = 0.884): This factor focuses on the role of the government/municipality in shaping waste separation behaviors. It explains the individuals' perspective regarding the responsibilities that their government should assume when it comes to waste dumping or sorting. It focuses on the type of trustworthy relationship between citizens and their ruling entity. It also mentions the incentives or fines that should be present in order to attain a cleaner environment

Factor Three, Social Norms (α = 0.888): The statements under this factor evaluate the way respondents perceive what others, in the same society, would expect them to do. The factor reflects the standpoint of individuals towards the criticism of others and how much others' behaviors would affect theirs.

Factor Four, Awareness (α = 0.888)**:** This factor evaluates the knowledge and awareness of Lebanese citizens concerning environmental issues and key solutions. It detects any sort of gap in the information system and helps entities implement the appropriate awareness methods and techniques.

Factor Five, Perceived Behavioral Control (α = 0.891)**:** This factor assesses the individuals' reflection on past experiences of waste sorting and separation, as well as their expectations of prospective obstacles. It mentions all potential complications one could face when implementing waste sorting procedures.

Factor Six, Attitude (α = 0.889): This factor considers the respondents' attitude towards waste separation activities. It tackles the background of each person concerning their perspective of a

clean environment, their feeling towards being engaged in environmental activities, their sense of responsibility and their individual impact on their society.

Factor Seven Infrastructure ($\alpha = 0.885$): This factor highlights how the accessibility to, and the efficiency of waste separation/collection means would affect the intention of people to sort their waste. It sheds light on the respondents' perspective of the required infrastructure, and shows the importance of recycling bins labelling to facilitate the waste sorting process.

Factor Eight, Behavior ($\alpha = 0.887$): This factor evaluates the extent to which intention would be translated into active involvement in waste separation activities. Citizens' positive intention towards waste separation and recycling would be interpreted into positive actions and behaviors when the government/municipality shows genuine concern to fix environmental problems, and when it provides them with the proper facilities to do this.

3. Confirmatory Factor Analysis (CFA): Drawing and Validating the Model

Structural Equation Modelling (SEM) is the basis of a Confirmatory Factor Analysis (CFA). It is strictly related to the number of responses collected. It evaluates the model of the study by comparing real and theoretical data using factor analysis, path analysis and others. Zhang et al. (2015) mention that, in SWM, observing individually each household and monitoring the effect of latent variables is not feasible. Thus, distributing questionnaires is found to be the most effective technique in measuring such variables. In this study, respondents were asked to fill in the assessment based on their personal experience in waste management in Lebanon. In multiple studies (Ramkissoon et al., 2013; Bayard & Jolly, 2007; Davis et al., 2007 and Sparrevik et al., 2011), SEM was used to assess the intentions and behaviors of individuals in multiple sectors including risk perception, tourism, occupational exposure and agriculture. The hypothetical model

of this study reveals several path associations among the variables. Therefore, SEM was chosen as the analysis tool for this research.

Three basic assessments form the CFA: Unidimensionality, Validity and Reliability, accomplished in the previous section (EFA), showed that the process is unidimensional as all the factor loadings are positive, unidirectional and higher than 0.5 (Awang, 2015).

Awang (2015) argues that validity is the ability of an instrument to measure what it is supposed to measure for a latent construct. Each model requires three types of validity: convergent validity, construct validity and discriminant validity. First, the convergent validity of a model is verified by calculating the Average Variance Extracted (AVE) for every construct. To achieve this validity, AVE value must be 0.5 or above (Segars et al., 1997). Therefore, retaining low factor loading statements in a model would cause the failure of convergent validity. Second, construct validity is attained whenever the Fitness Indexes meet the required levels. These Fitness Indexes designate how fit are the statements in measuring their respective constructs. Finally, the discriminant validity is measured in order to detect any redundant statements in the measurement model. SPSS AMOS is able to identify such statements by measuring the Modification Indices (MI). Whenever MI is high, the corresponding statement is redundant. Another method to detect redundancies is comparing the square root of AVE, known as Maximum Shared Variance (MSV), to the values of AVE. The values of MSV should be less than the AVE.

According to Awang (2015), the reliability of a measurement model is its capacity of measuring the desired constructs. To assess reliability, two criteria could be evaluated: Composite Reliability (CR) and AVE, discussed above. The CR reflects the internal consistency and reliability of a construct. To meet CR requirements, values above 0.7 are targeted (Kline, 2010).

SPSS AMOS 22 calculates the Standardized Estimates and add them to the output path diagram shown in figure 7. It is important to note that covariances have been added, as suggested by AMOS (table 5), between e16 & e18; e15 & e17 and e6 & BEH (e being the error in estimation of a consequent variable of each statement). It is important to mention that e6 is the error relevant to the statement BEH4. Thus, the covariance between e6 and BEH factor is acceptable. However, the covariance between e6 and INT was not added for the only reason that covarying a factor and an error belonging to another construct is not possible as per Hayes' recommendation. High values of MI designate that the respective items are redundant. This will be further discussed in the following section.

Table 16: Covariance Suggested

			M.I.	Par Change
e16	<-->	e18	44.142	.144
e15	<-->	e17	36.283	.085
e6	<-->	BEH	55.270	.135
e6	<-->	INT	49.549	-.126

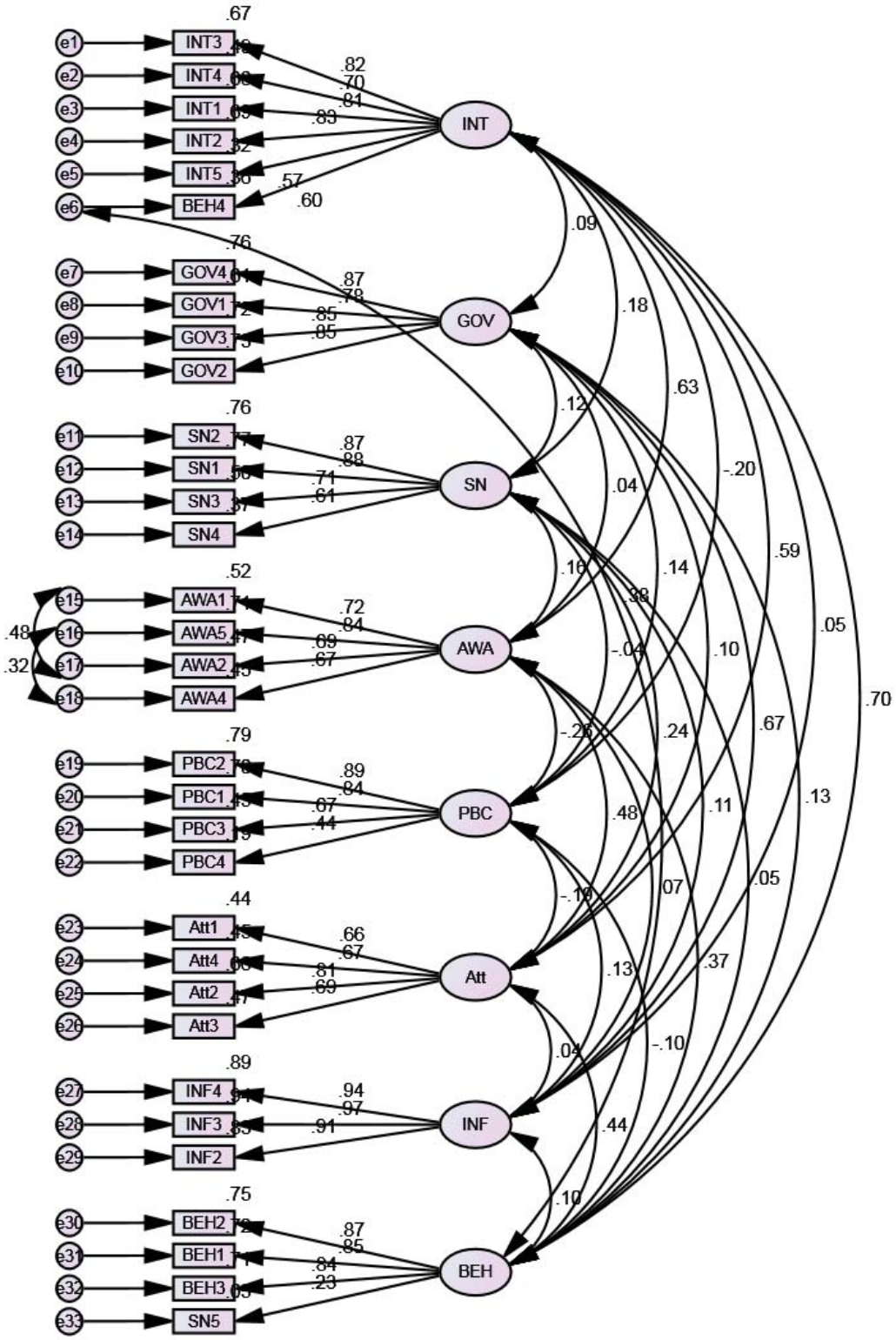

Figure 7: The Measurement Model combining all constructs involved in the study

The Average Variance Extracted (AVE), ranged between 0.504 and 0.886 surpassing the recommended level of 0.5 and achieving convergent validity and reliability. The values of MSV for all the 33 statements are greater than the corresponding values of AVE. Thus, the discriminant validity criteria are met. The Composite Reliability (CR) of all the constructs surpassed the threshold of 0.7 as shown in the table 17. Thus, the model is found to be reliable.

The fit of the model is evaluated by three indices: the absolute fit, the incremental fit and the parsimonious fit. The most popular index of absolute fit is Chi-square. The test applied to the overall model fit resulted in a Chi-square value of 771.010 with 433 degrees of freedom and a p-value of 0.455 (more than 0.05). Therefore, the model fits well the data.

As for the incremental fit that includes the AGFI, CFI, TLI and NFI, the results are the following. The AGFI value recorded in this study is 0.834. It is slightly less than the critical value of 0.9 and can be considered a good fit. As for the CFI, it is 0.944, above the required level of 0.9. The TLI, mainly calculated for small samples, is 0.936, which is a very good result. As for the NFI, it turned out to be 0.882 indicating that the studied model improved the fit by around 89 % compared to a hypothetical null model. Finally, the Chi Square/Degrees of Freedom recorded 1.781, meeting the acceptable threshold (less than 3).

Table 17: Results of the Measurement Model Assessment

Construct	Mean	Mean of construct	Factor Loading	CR	AVE	MSV	MI
Attitude (Att)		4.57		0.801	0.504	0.346	0.710
Att1	4.72		0.778				
Att2	4.46		0.737				
Att3	4.49		0.671				
Att4	4.60		0.765				
Social Norms (SN)		2.95		0.854	0.599	0.057	0.774
SN1	3.28		0.853				
SN2	3.25		0.862				
SN3	2.87		0.821				
SN4	2.39		0.739				
Perceived Behavioral Control (PBC)		2.89		0.811	0.533	0.065	0.730
PBC1	2.47		0.845				
PBC2	2.42		0.867				
PBC3	2.88		0.796				
PBC4	3.76		0.615				
Awareness (AWA)		4.50		0.821	0.536	0.399	0.732
AWA1	4.49		0.817				
AWA2	4.57		0.763				
AWA4	4.44		0.740				
AWA5	4.51		0.791				
Governmental Role (GOV)		3.49		0.905	0.704	0.454	0.839
GOV1	3.37		0.851				
GOV2	3.55		0.828				
GOV3	3.61		0.835				
GOV4	3.41		0.866				
Infrastructure (INF)		3.44		0.959	0.886	0.454	0.942
INF2	3.42		0.793				
INF3	3.45		0.799				
INF4	3.46		0.801				
Intention (INT)		4.26		0.869	0.531	0.490	0.729
INT1	4.28		0.751				
INT2	4.43		0.734				
INT3	4.46		0.769				
INT4	4.13		0.767				
INT5	3.84		0.643				
BEH4	4.44		0.507				
Behavior (BEH)		4.29		0.888	0.725	0.490	0.852
BEH1	4.45		0.658				
BEH2	4.56		0.751				
BEH3	4.52		0.616				
SN5	3.63		0.581				

Table 18: Goodness-of-Fit test results

	Fit Index	Suggested Value	Observed Value	Conclusion
Absolute Fit	Chi-Square (p-value)	>0.05	0.445	Excellent
	RMSEA	<0.06	0.050	Excellent
	GFI	>0.9	0.864	Good Fit
Incremental Fit	AGFI	>0.9	0.834	Good Fit
	CFI	>0.9	0.944	Good Fit
	TLI	>0.9	0.936	Good Fit
	NFI	>0.9	0.882	Acceptable
Parsimonious Fit	Chi-Square/ df	< 3	1.781	Excellent

4. Path Analysis

To test the relationships between the independent variables and the dependent variables, a path analysis is conducted. It also assesses the mediation and moderation relationships between the parameters. As mentioned in chapter two, Process Macro in SPSS is used for this purpose. Hayes' analysis model number 16 is the adequate model for the framework of this research. It will explore the relationships between the independent variables (Awareness, Attitude, PBC and Social Norms), the mediator (Intention) and the dependent variable (Behavior). Moreover, it will assess the effects of the two moderators (Role of Government and Infrastructure) on the Intention-Behavior relationship. The following section presents the results of the SPSS simulation for each of the independent variables plugged in.

a. Attitude - Intention - Behavior

The first simulation sets Attitude as the independent variable X and the others as covariates. The results are presented in table 1 (Appendix C) and will be discussed in this section.

The plugins for model 16 are the following:

- X: Attitude
- M: Intention
- Y: Behavior
- V: Governmental Role
- Q: Infrastructure

The direct effect of Attitude on Intention is found to be positive and statistically significant. In fact, the regression slope, also known as path **a**, is equal to 0.4334 (positive value) while the p-value is less than 0.05 leading to a statistical significance. Thus, it can be concluded that Attitude is a positive direct predictor of Intention and hypothesis H1 is accepted. It indicates that people having positive environmental attitudes are more likely to have positive intentions to engage in such activities.

In the second section of the output, where Behavior is the outcome variable, Attitude emerged as a significant and positive predictor of the Behavior. The direct path between X and Y resulted in a positive value of **c'** equal to 0.1222 with a p-value equals to 0.0357 (p-value<0.05).

As for Intention affecting Behavior, a positive direct effect is recorded with a slope value of 0.4068 (path b). This slope is not considered the main effect of Intention on Behavior. It is a conditional effect since other parameters in the model are also affecting Intention alongside the influence of moderators. Nevertheless, a positive value of path b would express that people scoring higher on Intentions are more likely to adopt environmental friendly Behaviors. The Governmental Role and Infrastructure parameters ended up with slope values of 0.0169 and 0.0304 respectively. These slopes are the essential predictors of the positive relationship between Governmental

Role/Infrastructure and Behavior. However, the interaction terms (Int_1 and Int_2) are negative (-0.0317 and -0.0233). Int_1 is actually the product term key of Intention x Behavior and Int_2 is the product term key of Intention x Infrastructure. These negative slopes indicate the absence of any evidence of moderation on the effect of Intention on Behavior by the role of government and infrastructure presence.

Another important section to analyze is the Direct and Indirect Effects present in Appendix C (Table 1 to table 4). First, the conditional effect of X on Y actually calculates the result of the multiplication of Path a and Path b and the values are presented in the Effects column at the level of the moderator variable. These conditional indirect effects are tested using the bootstrap confidence intervals presented under BootLLCI (lower limit confidence interval) and BootULCI (upper limit confidence interval) ranges. The null hypothesis proposed here is that the population indirect effect is zero. If zero falls between the lower and upper bounds of the confidence interval, the researcher infers that the moderation/ mediation is zero in the population and the null hypothesis is maintained. No statistical significance of the moderated mediation effect would be determined. In this study, the results show that the indirect effect of Attitude on Behavior is significant and is mediated by the presence of Intention. The null hypothesis is rejected. In order to determine whether the mediation is full or partial, the following is adopted: if a mediation evidence is present (zero does not statistically fall between the lower and upper bounds) and the direct effect (path c') is statistically non-significant, then the mediation would be a full mediation. Whereas whenever the mediation evidence is present and the direct effect is significant, it would indicate a partial mediation. For a partial mediation, the direct effect would be smaller than the indirect effect. In the case of the independent variable Attitude, Intention plays the role of a partial

mediator between Attitude and Behavior since the direct effect (0.1222) is significant and smaller than the indirect effect (0.1763).

The role of government and the presence of appropriate infrastructure show no sign of any moderated mediation between Intention and Behavior as previously mentioned. In the indices of partial moderated mediation section, it is shown that zero falls between the limits of the interval. In addition, the regression slopes of both moderators (Governmental Role and Infrastructure) are both negative (-0.0138 and -0.0101). Thus, a statistically moderated mediation effect is not taking place.

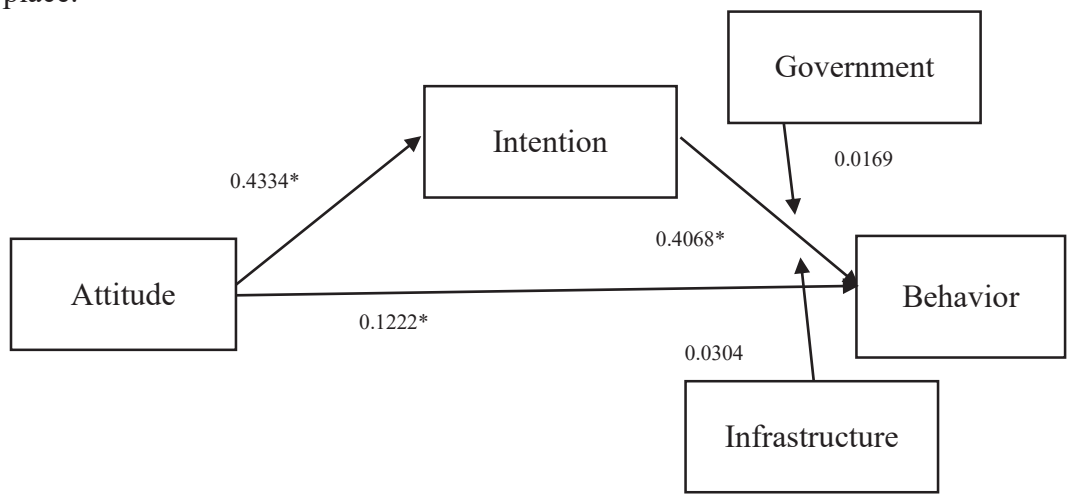

Figure 8: Conceptual Diagram of model 16 with Attitude as variable X

*significant (p-value<0.05)

b. Social Norms - Intention - Behavior

The second trial consists of fixing Social Norms as variable X. Table 2 (Appendix C) presents the effect of Social Norms and Intention while shaping Behaviors.

The plugins for model 16 are the following:

- X: Social Norms
- M: Intention
- Y: Behavior

- V: Governmental Role
- Q: Infrastructure

The direct relationship between Social Norms and Intention is positive with a regression slope of 0.1124. It is statistically significant with a p-value of 0.0150. Therefore, Social Norms shape positively the Intention of Lebanese people to get involved in activities and mainly in recycling their waste at source. Hypothesis H2 is accepted and proven.

When studying the direct effect of Social Norms on Behavior (path c'), it is shown that Social Norms has no significance in shaping the Behavioral acts of people. A negative influence of (-0.1021) has been recorded for path c'. Thus, social norms have no direct impact on Lebanese' behaviors. High levels of social pressure and criticism in the Lebanese society will not push citizens into adopting green practices.

The conditional effects will be discussed next. In fact, the digit zero falls outside of the lower and upper limits of the confidence interval. Thus, it can be concluded that a statistically significant moderated mediation effect is revealed between Social Norms and Behavior, mediated by Intention. Social norms would highly affect the intention of people to implement eco-friendly procedures and engage in such behaviors. The indirect effect (path a x path b) between Social Norms and Behavior is statistically significant and positive (0.0457). Path c' as previously mentioned is negative and statistically non-significant, therefore, Intention plays the role of a full mediator between Social Norms and Behavior. These results suggest that all the relationship between variable X (Social Norms) and variable Y (Behavior) is transmitted through the mediating variable (Intention).

Once again, the role of government and infrastructures demonstrate no effect on the relationship between intention and behaviors. In fact, path 'b' is not affected by any of the previously mentioned moderators having negative regression slopes of -0.0036 and -0.0026, respectively.

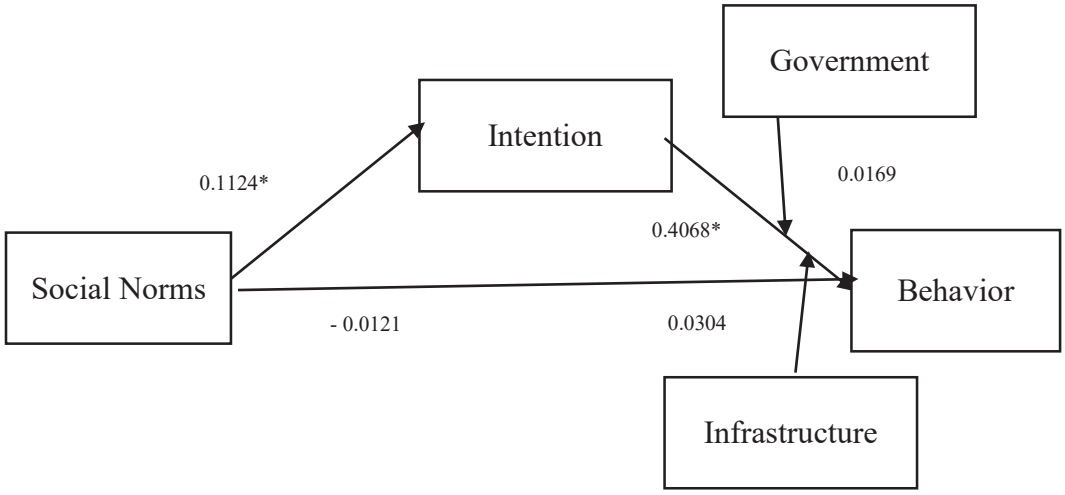

Figure 9: Conceptual Diagram of model 16 with Social Norms as variable X

*significant (p-value<0.05)

c. Perceived Behavioral Control - Intention - Behavior

The Perceived Behavioral Control (PBC) has shown a negative regression slope (-0.0359) and a non-statistical significance while studying its direct effect on Intention (path a). Table 3 (Appendix C) represents the obtained results. Therefore, it can be concluded that PBC is not a reliable predictor of, or influencer on the Lebanese's intentions to engage in environmental protection. Hypothesis H3 is rejected.

The product of path a and path b (0.4068) is then recorded as negative. Also, the digit zero does fall between the upper and lower bounds of the confidence interval. Therefore, Intention does not mediate the relationship between PBC and Behavior.

On another note, PBC has shown a positive effect when tackling path c', the direct influence of PBC on Behavior. The regression slope recorded is 0.0360. PBC then shapes the environmental

behaviors of the Lebanese citizens by assessing their past involvements in waste separation and sorting practices and by revealing their perceptions of potential implementation obstacles.

In the confidence interval of the indices of partial moderated mediation section presented by BootLLCI and BootULCI, '0' falls inside the boundaries. Thus, no statistically significant mediation is taking place by both moderators (Governmental Role and Infrastructure).

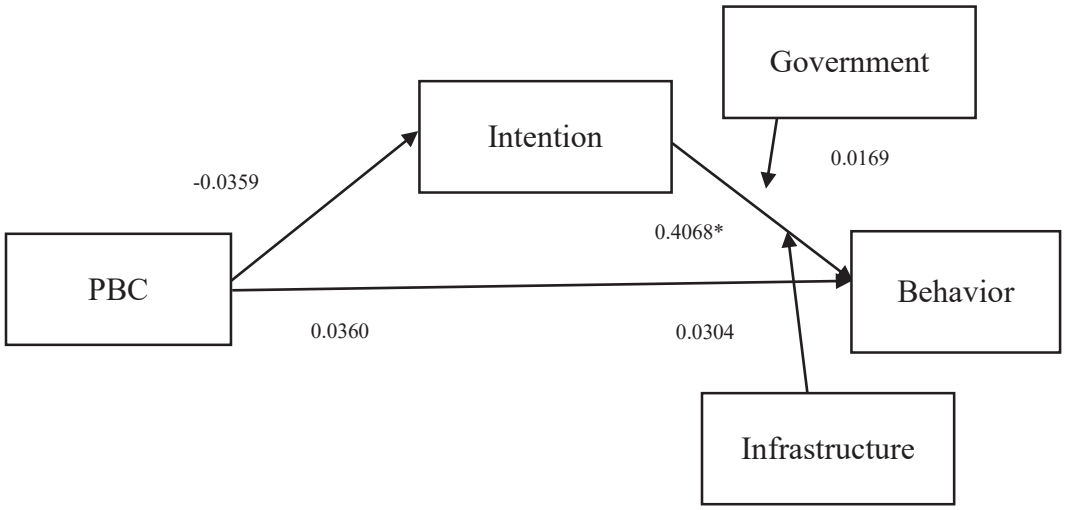

Figure 10: Conceptual Diagram of model 16 with PBC as variable X

*significant (p-value<0.05)

d. Awareness - Intention - Behavior

In the first simple or direct regression model, awareness is found to be a significant predictor of intention (slope b=0.4076; p<0.05) as presented in table 4 (Appendix C). This coefficient reveals the direct influence of Awareness on Intention within the path model. Hypothesis H4 is accepted. Being environmentally aware would then influence the intention of people to start going green.

In the second regression model, the direct effect of Awareness on Behavior (path c') is presented. It is shown that the direct outcome of Awareness on Behavior is positive with a regression slope value of 0.1941 and has statistical significance (p-value = 0.0001). Being aware of environmental practices and sorting methods would affect the resultant behavior of Lebanese citizens. In addition,

it can be noted that the product of path a and b, forming the indirect effect, is positive and significant. This leads to the role of partial mediator played by Intention between Awareness and Behavior.

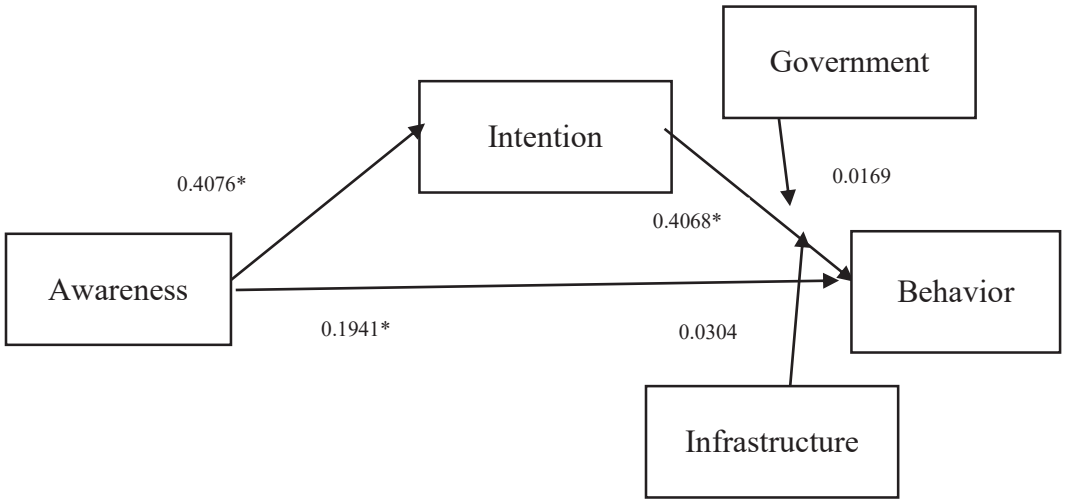

Figure 11: Conceptual Diagram of model 16 with Awareness as variable X

*significant (p-value<0.05)

5. Regression Analysis for Demographic Variables

A linear regression analysis is used whenever the researcher wants to forecast the value of a specific variable in his/her model based on the value of another parameter. The predicted variable is labelled dependent variable whereas the variable used for prediction is called the independent variable. In this study, a linear regression analysis is done to study the influence of the demographic variables on the different variables of the model. For example, it projects the effects of age groups on recycling behaviors or intentions.

As discussed earlier, the demographic variables collected are: age, gender, educational level, marital status, number of people per household, household type, income level, occupation, place

of residence and current separation behaviors. These are plugged in as independent variables in SPSS. This section presents their effects on Attitude, Social Norms, Perceived Behavioral Controls, Awareness, Intention and Behavior.

The results show no effect or relationship between the demographic variables collected and Attitude, Social Norms, Awareness and Behavior. However, perceived behavioral controls and intention are shaped by some of the demographic variables. Perceived behavioral controls were found to be affected by the current separation behavior of citizens and their educational level. The results are presented in Appendix D.

PBC, being all reflections on past experiences of waste sorting and separation, is associated with whether people are currently sorting their garbage and following ecofriendly practices. If their previous involvement in such procedures was successful, they would be separating their waste (partially or fully). In addition, it can be noticed that the citizens' education level shapes their perceptions towards sorting. The higher their educational level, the more their knowledge of green practices is and the more involved they would be.

As for the intention of people to be involved in appropriate waste separation activities, results show that it is shaped by their current separation behavior and their place of residence. In fact, if citizens in a specific geographic area are already used to sorting and recycling practices, their intention to be environmentally disciplined, obey the rules and participate in such campaigns would be significant. Not to forget that cities that already have their own sorting facilities and infrastructures would encourage its citizens or newcomers to adopt green behaviors. It would be easier for them to understand and apply the process since it would be concrete and can be visualized.

6. Discussion and Analysis of Results

This section discusses the results obtained in terms of direct and indirect effects between the variables and assesses the mediating role of intention in each relationship. It also analyzes the moderating effect of both, the governmental role and the availability of adequate infrastructure as well.

First, behavior is found to be directly affected by attitude and awareness. The most influencing factor, directly shaping environmental behaviors, is found to be the level of people's awareness (0.1941), followed by attitude (0.1222). Social norms and PBC are revealed to have no effect on environmental behaviors in the Lebanese community (no statistical significance).

Second, hypothesis 5 (H5) suggested that intention plays the role of a mediator between the four independent variables and behaviors. In fact, intention was found to be a partial mediator in both, the Attitude/Behavior and the Awareness/Behavior relationships. In the link between social norms and behavior, intention was noted as a full mediator since there is no direct relationship between social norms and behavior, as previously mentioned. In the case of perceived behavioral controls and behaviors, intention had no role in modeling this relationship, thus, no mediation effect was recorded.

As for the moderating effect, hypotheses 6 and 7 (H6 and H7) proposed that the relationship between recycling intentions and recycling behaviors is affected by the role of the government and the presence of the appropriate infrastructure. Nevertheless, this study confirmed that the governmental role and the availability of infrastructure have no effect in creating positive recycling behaviors for multiple reasons that will be discussed further in the following sections.

a. Hypothesis One (Attitude/Intention/Behavior)

H1: A positive Attitude toward recycling affects positively the Lebanese's Intention to recycle their household waste.

H1': A positive Attitude toward recycling affects positively the Lebanese's Behavior to recycle their household waste.

The first set of proposed hypotheses (H1) and (H1'), a positive attitude toward recycling affects positively the Lebanese's intention and behavior to recycle their household waste, are accepted. The results found are consistent with previous studies conducted in China, revealing that positive environmental attitudes would lead to higher recycling intentions and more efficient engagement (Song et al., 2016; Zhang et al., 2015). Hasan et al. (2021) argue that a positive attitude is developed towards the adoption of a specific behavior whenever its perceived value is high. They added that the later value or perspective is formed based on the altruistic or egoistic values of each individual in the community. In fact, Hasan et al. (2021) proved that an altruistic personality tends to have a positive attitude and intention to engage and would implement a suggested eco-friendly behavior easily. Sexton and Sexton (2011) implied that socially green proven benefits (named competitive altruism) are effective incentives for people to engage in pro-environmental behaviors. Helou (2020) discussed the altruistic disposition of the Lebanese community when it comes to positive outcomes in their society. Therefore, the altruistic character of the Lebanese people explains the effect of attitudes on intentions and behaviors. Intention plays the role of partial mediator in the relationship between attitude and behavior. Thus, a positive green attitude could shape behaviors directly or indirectly by creating positive recycling intentions.

On another note, Bendak and Attili (2016) argued that identifying people that would recycle is the first step towards a successful centralized waste management plan. In fact, age generation has been

shown to be one of the main demographic characteristics to identify, for higher environmental engagement percentages and higher green attitudes (Tyson et al., 2021). Chen (2010) confirmed that every 1% increase in age composition in a society leads to a decrease in MSW disposed by around 0.0224 kg/day. Around 55% of the Lebanese respondents in our study belong to the Gen Z age generation (9 to 24 years old), which explains the positive attitude revealed and the way it is positively affecting their intention to and their engagement in recycling behaviors. Generation Z is characterized by its high concern towards different environmental issues (Dangmei et al., 2016). They are considered the most knowledgeable about water and energy shortages and the importance of renewable sources of energy. They tend to be more responsible towards the preservation of natural resources and have the necessary green attitudes to engage properly.

b. Hypothesis two (Social Norms/Intention/Behavior)

H2: Social Norms affect positively the Lebanese's Intentions to recycle their household waste.

Social norms are found to positively affect the Lebanese recycling Intentions. Thus, hypothesis two (H2) is accepted. Social norms englobe the citizen's perception towards others' behavioral acts. Similar findings are reached in Malaysia, India and China (Amini et al., 2014; Miliute-Plepiene et al., 2016; Yuan et al., 2016). They are all Asian countries, embodying the collectivistic societies where harmony between their citizens is safeguarded. In fact, harmony is associated with productivity since people would tend to be courteous and kind even if they disagree with the other person's beliefs or practices. Such societies are characterized by the balance and unity in their societies leading to proper management and implementation of different projects, and recycling ones specifically. Different scholars revealed that the performance of environmental practices is tightly linked to the cultural system cherishing collective intentions (Oyserman et al., 2002; Lalwani et al., 2006). Indeed, Pratarelli (2010) revealed that the effectiveness of social pressures

varies with the cultural values in a specific region. Living in a collectivistic harmonious society and sharing a similar set of values, would encourage and favor community-based recycling initiatives, and consequently create favorable recycling intentions.

Hofstede (1991) revealed that the Arab countries, including Lebanon, are highly collectivistic societies. Citizens in such countries prefer group decision making and highly value cooperation and consensus. Lawler and Hundley (2008) argued that Lebanese citizens lean towards obedience and shared responsibilities and have a participative decision making system. They added that their motivation to participate in collective work derives from their deep sense of belonging and their loyalty to their group. Individuals in collectivistic societies, like Lebanon, tend to be group-centric (Neuliep, 2016). They could be bonded by religion, education, ethnicity or other traits and share a common history. Barakat (1993) noted that relationships between Lebanese citizens are best described as being hierarchical and collectivist. Collectivistic cultures generally result in interdependent citizens that have a sense of responsibility towards their community. Lebanese people tend to feel responsible for their waste and for polluting their environment, thus, they would actively sort their waste and recycle whenever the proper management system is applied. They would apt to imitate their neighbors/families in such eco-friendly practices. Thus, the significant positive relationship between social norms and recycling intentions is emanated from the fact that Lebanese are well rooted in a collectivistic culture where they work cooperatively for the sake of their community.

H2': Social Norms affect positively the Lebanese's Behaviors to recycle their household waste.

The direct relationship between social norms and behavior is found out to be negative and non-significant, thus rejecting H2'. This could be explained by the social loafing theory, introduced by Latane et al. (1979). The theory discusses how a person's contribution to a group work or effort

decreases in comparison with his/her performance alone. The authors argue that, even though people technically work individually when it comes to sorting and recycling within the larger group, the social loafing effect still affects their commitment and performance. Social loafing assumes that individuals would have a lower sense of responsibility while working in a group (Schwarz, 2006). They would exercise less effort to achieve the required tasks since it is divided among all participants, while working alone would make the person more accountable for his/her practices and mistakes. Social loafing explains the results obtained in this study considering the link between social norms and behaviors. These results came in accordance with the findings that Ulhasanah and Goto (2018) highlighted in Indonesia. In Vietnam too, social norms had no impact on recycling behaviors (Nguyen et al., 2015). Although social norms seem to influence the Lebanese's recycling intentions by creating some sort of social pressure, they were not found to directly triggering their recycling behaviors.

Indeed, with the monetary crisis that Lebanon has been undergoing since 2019, the state has not been able to finance the waste collection charges and consequently, garbage bags piled all over the streets. The Lebanese citizens lost motivation to sort their waste as only 15% of the collected waste is treated and 8% is recycled (Abbas et al., 2019). Lebanon as a whole remains a society with minimal stability, thus, recycling intentions were not translated into effective acts. Collectively, Lebanese citizens lost hope in their corrupted government's decisions and capabilities which affected their environmental behaviors and hindered their actions. This explains the full mediation effect that intention is playing by linking social norms and recycling behaviors. People do agree and influence each other's intentions but with zero actions.

c. Hypothesis three (PBC/Intention/Behavior)

H3: Perceived Behavioral Control affects positively the Lebanese's Intentions to recycle their household waste.

Hypothesis three (H3) suggests that perceived behavioral control affects positively the Lebanese's Intention to recycle their household waste. However, this study's findings made the researcher reject this hypothesis. PBC, being a sort of reflection on previous life experiences, is found to have no effect on the Lebanese's intentions to sort and recycle their waste. Different scholars revealed that PBC consists of two different constructs: self-efficacy and controllability (Rhodes & Courneya, 2010; Mendez et al., 2020 and Tavousi et al., 2009). Bandura (1982) and Conner and Armitage (1998) state that PBC and self-efficacy highlight the same concept, and that self-efficacy modifies the individual's intention to perform a designated behavior. Nevertheless, the findings in this study are not in line with the previously mentioned argument. Indeed, Norman and Hoyle (2004) argue that PBC and self-efficacy are considered two different concepts due to some external attributes such as income, time and ease of performance. The collected data revealed that 27.8% of respondents do not work, thus, have no income. In 2021, the midst of a financial collapse and a fatal pandemic, the Lebanese's major concern has been survival rather than environmental issues. Their limited resources are being spent on the necessities like food and rent. In addition, the corrupted governmental entities have not been financially capable to supply the proper trucks for daily waste pick up. Therefore, sorting at source would be seen by citizens as a difficult process that is not worth their time and effort.

Moreover, it is worth noting that the majority of participants (74%) live in apartments, usually small ones relatively, with multiple family members (49% live in the same apartment with five or more family members). Thus, they lack the physical space required for several recycling bins

dedicated for waste separation. In fact, recycling, being a morally responsible decision, is very easy to organize whenever the appropriate labeled recycling bins are present. In Lebanon, multiple supermarkets and factories are encouraging recycling practices by offering extra credits or special discounts for every recyclable material collected. Some people tend to gather a minimal amount of their recyclables (plastic bottles, aluminum cans, etc..) until their next visit to the store with the collection point; but definitely, this is not the most convenient and effective approach boosting the Lebanese's waste management and recycling intentions. Positive recycling intentions in the Lebanese community are not created by perceived behavioral controls due to all the drastic influencers found in Lebanon; no mediation effect is recorded.

H3': Perceived Behavioral Control affects positively the Lebanese's Behaviors to recycle their household waste.

PBC is found to positively affect the Lebanese's recycling behaviors but with no statistical significance. Hypothesis (H3') is also rejected. Perceived behavioral controls have no role in shaping the recycling intentions and behaviors in the Lebanese community. In fact, PBC represents citizens' reflections on past experiences of waste sorting and their expectations of potential obstacles. The idea of sorting at source is a very new concept in the Lebanese community. They had never undergone a similar process or participated in similar activities. They lack the required code of practice to engage in environmental activities, mainly sorting their waste at source (Azzi, 2017). They have no previous experience in this field, and they perceive multiple obstacles for the achievement of such projects since they have an insufficiency of information and are not actively encouraged and guided by the government to be engaged in such environmentally friendly practices. Yeow and Loo (2018) and Colesca et al. (2014) confirmed that whenever people are used to recycle their waste, it becomes a habit triggering continuous recycling behaviors. This

might explain the negative relationship between PBC and recycling behaviors as discussed earlier. Citizens expect to be told how to behave and act accordingly whenever possible. Habitude arises when a familiar set of conditions activates behaviors learned through previous execution. The formation of habit is therefore an important mechanism for sustaining beneficial behavior over a long period of time without the loss of motivation (Gardner et al., 2020). This will lead to lower self-control of people and push them to act habitually when dealing with waste source separation without the intervention of intentions. Unfortunately, recycling habits seem to be not yet initiated and safeguarded in the Lebanese community.

d. Hypothesis four (Awareness/Intention/Behavior)

H4: Environmental Awareness affect positively the Lebanese's Intentions to recycle their household waste.

H4': Environmental Awareness affect positively the Lebanese's Behaviors to recycle their household waste.

The findings in this research confirm the acceptance of both Hypotheses, H4 and H4'. They reveal a positive and significant relationship between awareness and both recycling Intentions as well as behaviors. Intention is found to partially mediate the relationship between awareness and environmental behaviors. Schmidt (2007) revealed that students enrolled in an environmental course were more aware of environmental hazards and had better pro-environmental behaviors. He linked the environmentally conscious intentions and attitudes to higher levels of participation and engagement. In fact, boosting people's environmental awareness would make the green concerns more relevant and accessible. Omran et al. (2009) emphasized the role of education in eliminating prospect barriers preventing people from recycling. Minimizing obstacles, such as ignorance here, would lead to a more efficient implementation procedure. In fact, every 1%

increase in the educational level of citizens would lead to a decrease of 3 kg of waste from the annual per capita base (Grazhdani, 2016). In China, the educational level of restaurant proprietors highly affected the amount of food waste produced daily (Lang et al., 2020). Babaei et al. (2015) revealed that the educational level (Bachelor's degree and above), along with the participants' gender (female) and occupation (government employees) were highly linked to their degree of environmental awareness. More specifically, these categories of respondents had the highest level of consistency when it comes to waste separation at source. Moreover, women tend to adopt eco-friendlier lifestyle and convey greater scientific knowledge of climate change than do men (McCright, 2010). Ziyue et al. (2021) reported that women show a more positive green consumption Intention, consume less carbon, and purchase green products more frequently. Brough et al. (2016) proved that women litter less, recycle more and also leave a smaller carbon footprint. These findings have something in common with what our research, conducted in Lebanon, has revealed. Indeed, 89.2% of the participants are holders of at least a bachelor's degree (i.e. BA/BS, Master's, PhD), 67.9% are female and around 15% work in the educational sector. These percentages explain the positive relationship between awareness and environmental intentions and behaviors. Being well educated, participants in this research would be more aware of the different types of recyclables, the benefits of recycling and the effects of waste segregation on human health. Furthermore, the relatively high percentage of female respondents explains the positive relationships discussed above. Brough et al. (2016) argued that women prioritize the altruism concept, and men worry that eco-friendly behaviors would brand them as feminine. This gender gap gives the feminine participants the advantages of high environmental awareness.

e. Hypothesis Five (Intention as Mediator)

This study looked at how recycling intentions would mediate the effect of attitude, social norms, PBC and awareness on recycling behaviors. In compliance with the TPB, Intentions should mediate the effects of variables that serve as predictors of Behaviors (Ajzen, 1991). Kok and Siero (1985) mentioned that recycling intentions are established by three determinants; social norms, PBC and attitude. Intention would then determine recycling behaviors accordingly. Thus, it is crucial to assess the mediating effect of Intention in the relationship between the independent variables proposed and recycling behaviors. Ajzen (1991) found that intention mediated the relationship between attitude, PBC, social norms and behaviors. Fundamentally, the TPB suggested that intention is the most influential predictor of behavior (Ajzen, 2002). Additionally, Linan et al. (2005) identified Intention as being the immediate antecedent of Behaviors. In this study, the relationship between recycling intentions and behaviors is noted to be a positive one, with a significant p-value. Lebanese citizens expressing positive recycling intentions have higher chances to adopt recycling practices. Gollwitzer and Schaal (1998) explored the motivational processes responsible for creating behavioral intentions (Intentions that would be translated into Behaviors). They showed that a behavioral intention would produce a sense of commitment to produce the desired response under specific circumstances. They explain that individuals would delegate control of their goal-directed behaviors to the situation desired. Intentions created would then activate a mental representation of the situation and make it accessible. Therefore, encountering the exact situation (like sorting waste) would not require any conscious intent and would be achieved automatically. This phenomenon is named the hallmark of automaticity (Bargh, 1996). At this stage, intentions can be considered equivalent to habits with the single difference that habits are repeated and reinforced actions whereas intentions are a set of automated

actions. Considering the mediating effects of intention, this study showed partial mediation of intention between attitude and behavior and between awareness and behavior. In this case, both positive recycling attitudes and a high level of environmental awareness could create effective recycling behaviors directly or indirectly by creating positive recycling intentions first, translated then into recycling actions. On another note, a full mediation has been noted between social norms and behaviors and no mediation effect between PBC and behaviors. Thus, social norms only lead to recycling behaviors by creating primarily recycling intentions. Whereas perceived behavioral controls could create recycling behaviors directly without the intervention of intention as a moderator.

f. Hypothesis Six and Seven (Role of Government and Infrastructure as moderators)

H6: The positive relationship between the Lebanese recycling Intentions and their recycling Behaviors is moderated by the role that the government/municipality plays in this respect.

H7: The positive relationship between the Lebanese recycling Intentions and their recycling Behaviors is moderated by the presence of adequate Infrastructure.

Hypotheses six and seven (H6, H7) propose that the Lebanese governmental role and the presence of proper infrastructure moderate the relationship between intention and behavior. In this study, they are both rejected. In fact, Lebanon has been facing, for the past three years, one of the worst financial and economic crises in the world according to the World Bank (Mroue, 2021). It has led to a three-digit inflation rate and to the depletion of the country's gross foreign reserve base. The devaluation of the currency hit almost 90% causing high prices of food, health care services and fuel, among others (Chehayeb, 2022). Around 36% of the Lebanese population live in an extreme poverty, according to the Human Rights Watch (2022). It also stated that more than 80% of the Lebanese residents do not have access to basic human rights like education, electricity and health.

The World Bank (2022) confirmed that the crisis in Lebanon is majorly due to the lack of effective decision making and the mismanagement of political parties and leaders. In 2022, the Lebanese parliament eventually reduced subsidies on medicine, wheat and fuel and failed to develop a proper social protection scheme for vulnerable people. To top it off, after Beirut's port blast on August 4, 2020, that killed around 220 people and devastated the capital, no one has been held accountable to this day (Human Rights Watch, 2021).

Whenever sequential preventable accidents or events occur in a country over an extended period of time, public trust is naturally eroded. In fact, the relationship between the citizens and their government is based on the extent of public trust. The latter enables effective policy development by gaining citizens' compliant behavioral responses. Abou Assi (2006) confirmed that less than a fifth of the Lebanese citizens trust their governmental institutions due to decades of corruption. Over the years, the Lebanese government has shown to be unable to exhibit and sustain effective governance. Zhu et al. (2021) acknowledged the importance of social trust in promoting green public governance and emphasizing environmental behaviors. It actually pushed farmers towards more frequent soil tests, more responsible fertilizers usage and organic waste composting. Social trust emanates from both, interpersonal trust and institutional one (Peng et al., 2020). Interpersonal trust englobes the trust of family members and neighbors, whereas institutional trust comes out from the trust of political and legal entities. Harring et al. (2019) and Daxini et al. (2019) showed that institutional trust has a significant positive impact on environmental behaviors. High levels of social trust would raise the people’s willingness to cooperate, and abide by their government's policies and regulations (Scafuto et al., 2018). In addition, fair legal ruling by governmental authorities increases the percentages of acceptance and execution of specific green procedures. Thus, governmental trust is a main parameter fostering recycling behaviors in

communities. This explains the absence of the influential governmental role in fostering the relationship between recycling intentions and behaviors in Lebanon. People do not trust the government and are less apt to engage in sorting and recycling behaviors; believing that their efforts will be lost in vain as no governmental institution will take proper care of the sorted garbage.

On another note, Bell et al. (2010) demonstrated that with the presence of stricter laws, the access to and availability of recycling centers tend to arise. After the eruption of the waste crisis in 2015 in Lebanon, new concepts and changes were introduced in the community. However, with the acute shortages of fuel for both, the private and the public sectors, severe electricity blackouts and high transportation costs have been lately experienced. Consequently, the application of waste sorting and recyclables collection laws vanished. The absence of the operations of pick-up vehicles and the termination of composting activities (since it needs electricity) were all impediments facing the application of environmental laws in Lebanon. In the UAE, the positive recycling attitude of citizens was not translated into high levels of engagement in recycling practices for the only reason that long distance is present to recycling bins, in addition to their convenient availability (Bendak & Attili, 2016). Therefore, the presence of numerous recycling bins, large collection points and appropriate pick-up vehicles are all facilitators for waste sorting implementation. However, all are somehow currently absent in Lebanon, which explains the missing moderating role that Infrastructure was assumed to play on the relationship between Intention and Behavior. Therefore, the Infrastructure in this study had no moderating effect in emphasizing the relationship between the Lebanese recycling Intentions and Behaviors.

7. Conclusion

The questionnaire developed for this study helped the scholar collect the data required to recognize which parameters shape recycling intentions and behaviors of the Lebanese citizens. In addition, it identified the influence of proper infrastructure and governmental role in the implementation of such projects. Three hundred and seventeen participants responded to the survey sent through social media platforms. The demographics of the participants were presented in detail in this chapter.

The relationships between the variables were assessed by a path analysis. A positive direct effect was found to be noteworthy between attitude and intention, social norms and intention, awareness and intention. However, PBC showed no effect on intention and is therefore considered not to be a reliable predictor of recycling intentions. Intention and behavior were positively correlated; positive recycling intentions would lead to positive recycling behaviors. Intention constitutes a mediator between the independent variables (Attitude, Awareness and Social Norms) and behavior. When it comes to the moderators (Role of Government and Infrastructure), they were found to be positive influencers on behavior. Nonetheless, no statistical significance of a moderated-mediation relationship is present by both moderators on the link between intention and behavior. Intention was shown to be a partial mediator in the relationship between attitude and behavior as well as between awareness and behavior. A full mediation effect is found in the link between social norms and behaviors, whereas no mediation is revealed in the relationship between PBC and behavior.

The following tables (19 and 20) present the hypotheses previously proposed and the direct/indirect effects between variables.

Table 19: Indirect effects

Hypothesis	Status	Path	Estimate	Boot SE	Significant	Intention Role
H1	Accepted	Att→Int→Beh	0.1763	0.0479	Yes	Partial mediator
H2	Accepted	SN→Int→Beh	0.0457	0.0205	Yes	Full mediator
H3	Rejected	PBC→Int→Beh	-0.0146	0.0175	No	No mediation
H4	Accepted	AWA→Int→Beh	0.1658	0.0442	Yes	Partial mediator

Table 20: Direct Effects

Hypothesis	Status	Path	Estimate	SE	Significant
H1'	Accepted	Att→ BEH	0.1222	0.0579	Yes
H2'	Rejected	SN→ BEH	-0.0121	0.0369	No
H3'	Rejected	PBC→ BEH	0.0360	0.0307	No
H4'	Accepted	AWA→ BEH	0.1941	0.0501	Yes

Finally, a regression analysis is run to test the effect of the demographic variables on the variables of the model. The demographics collected showed no influence on attitude, social norms, awareness and behavior. It affected PBC and intention. perceived behavioral controls are shaped

by the current recycling status or behaviors of citizens as well as their educational level. Intention is also affected by the current recycling status of people along with the effect of their place of residency. The results are showed in Appendices D.

The analysis revealed the major influencing parameters that help shape recycling intentions and behaviors in the Lebanese society. All the results obtained were assessed and linked to the diverse cultural and demographic aspects of the Lebanese society, represented by the sample considered for this study. Positive recycling attitudes were mainly related to the altruistic personality of the Lebanese citizens, that mainly leads to enthusiasm in environmental engagement and fauna/flora protection. Moreover, Gen Z, the most environmentally aware and active generation, affected the responses positively.

As for social norms, the geographical area that most of the respondents live in (Mount Lebanon and Beirut) has endured several crises related to the waste collection endeavor. They tend to have recycling intentions in order to eliminate all the hazards that could be caused by waste accumulation. However, they do not act accordingly due to the absence of proper waste collection services. Moreover, the positive environmental intentions recorded are probably linked to the collectivistic aspect of the Lebanese society that created interrelated responsible citizens. However, being a member of a group decreases the efficiency of the individual citizens' performance, as they would tend to rely on others to achieve the required purposes.

Perceived behavioral controls are found to have no effect on environmental intentions since people’s self-efficacy is highly influenced by their income level, the required time for performing waste sorting and the ease of such activities’ performance. These three parameters can highly alter people's recycling intentions. As previously mentioned, Lebanon has been going through a

financial collapse and a pandemic which lowered people's productivity and their engagement at all levels. Similarly, PBC seems not to affect recycling behaviors since it is considered a matter of developed habits. Waste sorting becomes an easy task for individuals to perform as it is frequently repeated. This habit seems to be not yet acquired by the Lebanese, which explains the results obtained. Finally, Awareness recorded the most influencing factor on recycling Intentions and Behaviors. In fact, awareness was found to be highly affected by the citizens' level of education and their gender. Environmental education was noted as highly important in creating the necessary awareness that would be translated into active engagement. In addition, females were shown to be more aware of environmental issues and ready to efficiently engage to protect their surroundings, including family and environment.

The proposed moderators, role of government and infrastructure, were both found neutral when it comes to shaping the relationship between recycling intentions and behaviors. Lebanese citizens do not trust their government in solving the solid waste crisis. Public trust was noted as highly important in increasing the effectiveness of environmental initiatives, as people would tend to engage better when they trust their public institutions. Moreover, the presence of recycling bins and the adequate infrastructure were recorded as facilitators for environmental behaviors. Nevertheless, with the shortage of funding and proper governance, they are not available. Thus, no effect was recorded for the role of government and the presence of infrastructure in moderating the relationship between green intentions and behaviors.

Conclusion and Recommendations

1. Summary of Findings

This research, conducted in Lebanon, has investigated the factors creating positive recycling intentions and thus effective behaviors. It postulated that Attitude, Social Norms, Perceived Behavioral Controls and Awareness are the main parameters that form positive recycling Intentions. It also studied the mediation role, whether partial or full, that Intention plays in the relationship between these variables and Behavior, inspired mainly from the Theory of Planned Behavior. The Governmental Role as well as the presence of the required Infrastructure were considered as moderators, moderating the association between Intentions and Behaviors. Moreover, this study tackled the direct effect of the independent variables on Behavior.

Findings revealed that positive recycling Intentions in the Lebanese community were created by Attitude, Social Norms and Awareness. Perceived Behavioral Controls had no role in shaping these Intentions fruitfully. As for the direct effect of these independent variables on recycling Behavior, Attitude and Awareness were noted as effective triggers for such Behaviors.

Intention partially mediated the Attitude/Behavior relationship and the Awareness/Behavior one, and fully mediated the Social Norms/Behaviors relationship. As for the relationship between PBC and Behaviors, Intention had no significant role as mediator.

2. Limitations

A research does not go without limitations, and this study is at no exception. First, the sample did not include people from older generations (3.2% only are Boomers, and none is in the '76 years old and above' range). Indeed, the questionnaire was sent through different social media platforms and the majority of these age groups do not have social media accounts or are not very active. They

would probably have had different Attitudes and Intentions towards recycling Behaviors, and it would have been really interesting to shed light on the way they perceive such green practices.

Second, 76% of the respondents live in the Mount Lebanon Kaza. The researcher, due to her place of residency and her connections in that area, had a limited chance to reach participants from different geographical parts covering the whole Lebanese territory. It is a sampling bias that may have led to the absence of a true random sample of the Lebanese participants. Moreover, around 30% of the participants live in a private house with a garden. They have the luxury of space for using multiple recycling bins. Nevertheless, since they are the minority, their responses might have had lower impact on the results, especially on the PBC/Intention/Behavior relationship, a relationship that turned out to be negative.

Third, given that the research was taking place during the midst of the Covid-19 pandemic, the researcher was afraid that the participants' answers did not reveal their true attitudes and intentions towards recycling activities, given that their main concern during these hard times is surviving the pandemic, rather than being engaged in green initiatives.

Finally, the self-reporting problem must be considered too. Participants could have claimed performing environmentally-conscious behaviors without actually doing them.

3. Research Implications

a. Theoretical Implications

This research that targeted the Lebanese community, a context where research is scarce, enriched the literature to a great extent. It tested the Theory of Planned Behavior that originally includes Attitude, Social Norms and Perceived Behavioral Controls as independent variables shaping the recycling Intentions and Behaviors in the Lebanese society, a collectivistic one experiencing disruption at all levels. Findings did not fully support the TPB model adopted for recycling

Behaviors. For instance, Perceived Behavioral Controls were shown to have no effect on Intentions in the Lebanese context. This could be attributed to the fact that Lebanese have no reflections on past experiences in waste sorting, given their lack of related Awareness or involvement. Moreover, they have diverse expectations of potential obstacles including the lack of required Infrastructure, the lack of needed space, shortage in time and hardness of the activity itself. This is why the role of government and Infrastructure were added as moderators influencing the relationship between Intention and Behavior, even though results did not confirm their crucial role. These findings are attributed to the lack of trust that the Lebanese exhibit towards their corrupted governmental entities in implementing such green projects, believing that funds for green initiatives will be used inefficiently, if not stolen. On another note, Awareness that has been added to the model, being another independent variable, is found to have a positive and significant impact on both, Intentions and Behaviors. From here the importance of supplying citizens with the right amount of information enabling them to engage properly and efficiently.

b. Practical Implications

The findings of this research will guide several environmentalists and social entrepreneurs in formulating and implementing the right strategy, and adopting the efficient techniques for higher engagement rates. They would know what to focus on while developing their projects or building a waste sorting facility. They would increase their focus on Awareness campaigns in order to spread the basic environmental knowledge required. Moreover, including environmental education in schools would be a smart technique for targeting Gen X individuals who would, at their turn, help their parents become ecofriendly and sort their waste properly. Indeed, research revealed that environmental Awareness and knowledge is not associated with the citizens' level of education. Thus, Awareness campaigns, seminars and workshops tackling environmental topics deem

necessary, irrespective of the targeted audience's level of education. They should be administered across the board to let people boost their Awareness with the latest enquiries in the field, or even acquire it.

At the political level, the waste management market should be liberalized in a developing country where corruption is well founded in its public system. Promoting decentralization and leaving the choice of sub-contracting to municipal entities could be the first step towards the establishment of waste management facilities in the different regions across Lebanon. In addition, standardizing the waste management sector is possible by granting permits to interested operators based on the quality of their service and the standards of their activities. Finally, adopting a weight-based billing for every municipality would encourage it to minimize littering and reuse their recyclables.

4. Recommendations

Shackelford (2006) revealed that recycling initiatives have been facing multiple impediments in application due to the resistance that people exhibit, especially when positive results such as lower pollution rates, slower global warming effect and fewer MSW landfills, are not reached and revealed directly. From here the need for extensive Awareness campaigns, accountability measures and continuous follow ups. Shackelford (2006) argued that recycling Behaviors are not natural and necessities focus on long-term benefits. In Lebanon, being an adaptable fast-paced society, introducing the discipline of sorting at source can be eased and presented to the citizens in a way that Awareness, imitation, and repetition would make them adapt to such activities. They would develop a routine of waste separation and work cooperatively to make their area of living stand out. Thus, an individual's Intention and Behavior can be easily altered by discussing environmental topics, embracing green spaces and acknowledging one's responsibility towards the environment. Therefore, the Lebanese Ministry of Education and Higher Education (MEHE) should refine the

different curricula to include environmental topics. This would be an effective way to provide learners, since their early childhood, with the necessary knowledge and skills enabling them to take care of their environment, making it healthier and securing its sustainability. Not to forget the crucial role that municipalities can play by organizing, through the assistance of different NGOs, workshops and seminars shedding light on such an important topic, and giving citizens incentives to participate in recycling activities. Moreover, since female are shown to be more environmentally conscious than man, they can be asked to volunteer in environmental educational activities to push individuals, especially man, to engage in such Behaviors. Engagement can be triggered by highlighting the economical as well as the environmental benefits of sorting at source, especially if the authorities that will take care of the whole process is trustworthy. From here the need for organizations, whether international or local, to handle the process, ensuing its proper implementation. The Lebanese government is not the suitable body to handle such process at the moment given its financial collapse, in addition to the lack of trust exhibited by its citizens.

Some supermarkets all over the Lebanese regions have added machines where individuals would litter their empty plastic bottles and exchange each 50 recycled bottles with six full water bottles. Such incentives, whether monetary or in kind, would encourage people to recycle, especially in these harsh times when people can barely afford their daily food needs. Different programs can be initiated with the support of international organizations (e.g. UN, USAID, and many more), assisting the Lebanese during such crucial financial crisis. For instance, people will be given the chance to collect a definite number of points for every kilogram of waste recycled, which will then be exchanged with food supplies or water bottles. This would be an excellent interactive way that would encourage people to sort and recycle.

Such plan should come hand in hand with the establishment of an appropriate recycling Infrastructure. Such Infrastructure should be efficiently and effectively put in place in all the Lebanese cities and villages in order to facilitate the process of sorting at source. Coded recycling bins, large and frequent waste collection tanks along with a timely pick-up schedule are key points for higher engagement rates. And as argued earlier, private organizations or international ones should handle the process, as the government is currently disabled.

5. Future Perspectives

This study opens door to future research that could be conducted in developing countries in order to test the citizens' Awareness level, readiness to engage and Intention to recycle their waste. These countries could be ones with corrupted governments or ones facing financial problems. Consequently, results will be compared to check whether the results obtained in this research are unique to the Lebanese society and its structure, or can be replicated in similar contexts. Moreover, similar research can be conducted in individualistic societies, enabling scholars to spot any similarity or difference in the results, especially when it comes to the impact of Social Norms on Intention and Behavior. Furthermore, incorporating personality traits in similar research would be of great importance too.

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List of Figures

List of Tables

Appendices

Appendix A

Table 1: Communalities

	Initial	Extraction
Att1	1.000	.654
Att2	1.000	.697
Att3	1.000	.573
Att4	1.000	.678
SN1	1.000	.770
SN2	1.000	.769
SN3	1.000	.693
SN4	1.000	.635
SN5	1.000	.628
PBC1	1.000	.757
PBC2	1.000	.816
PBC3	1.000	.656
PBC4	1.000	.571
AWA1	1.000	.755
AWA2	1.000	.701
AWA4	1.000	.678
AWA5	1.000	.761
GOV1	1.000	.757
GOV2	1.000	.757
GOV3	1.000	.756
GOV4	1.000	.799
INT1	1.000	.661
INT2	1.000	.675
INT3	1.000	.682
INT4	1.000	.666
INT5	1.000	.516
BEH1	1.000	.751
BEH2	1.000	.787
BEH3	1.000	.737
BEH4	1.000	.606
INF2	1.000	.864
INF3	1.000	.899
INF4	1.000	.894

Appendix B

Table 1: Total Variance Explained

Component	Rotation Sums of Squared Loadings				
	Total	% of Variance	Total	% of Variance	Cumulative %
1	7.684	23.284	4.284	12.982	12.982
2	4.893	14.826	3.772	11.430	24.412
3	2.835	8.590	2.945	8.925	33.337
4	2.439	7.390	2.882	8.734	42.071
5	1.662	5.037	2.616	7.927	49.998
6	1.599	4.846	2.536	7.684	57.682
7	1.289	3.906	2.323	7.041	64.723
8	1.197	3.627	2.238	6.782	71.506

Appendix C

Results of PROCESS MACRO

Table 1: Attitude as independent variable

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Version 3.5.3 ***************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2018). www.guilford.com/p/hayes3

**************************************************************************
Model  : 16
    Y  : AVGBEH
    X  : AVGAtt
    M  : AVGINT
    W  : AVGGOV
    Z  : AVGINF

Covariates:
 AVGSN    AVGPBC   AVGAWA

Sample
Size:  308

**************************************************************************
OUTCOME VARIABLE:
 AVGINT

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6036      .3643      .3892    43.4114     4.0000   303.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant    -4.0578      .3659   -11.0887      .0000    -4.7779    -3.3377
AVGAtt        .4334      .0684     6.3367      .0000      .2988      .5679
AVGSN         .1124      .0459     2.4468      .0150      .0220      .2028
AVGPBC       -.0359      .0383     -.9375      .3492     -.1113      .0395
AVGAWA        .4076      .0585     6.9644      .0000      .2924      .5228

**************************************************************************
```

OUTCOME VARIABLE:
 AVGBEH

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6801	.4625	.2410	28.4894	9.0000	298.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.9991	.3450	8.6936	.0000	2.3202	3.6781
AVGAtt	.1222	.0579	2.1095	.0357	.0082	.2362
AVGINT	.4068	.0458	8.8715	.0000	.3165	.4970
AVGGOV	.0169	.0293	.5764	.5648	-.0407	.0745
Int_1	-.0317	.0385	-.8250	.4100	-.1075	.0440
AVGINF	.0304	.0252	1.2072	.2283	-.0192	.0801
Int_2	-.0233	.0330	-.7064	.4805	-.0882	.0416
AVGSN	-.0121	.0369	-.3277	.7434	-.0848	.0606
AVGPBC	.0360	.0307	1.1713	.2424	-.0245	.0964
AVGAWA	.1941	.0501	3.8755	.0001	.0955	.2926

Product terms key:
 Int_1 : AVGINT x AVGGOV
 Int_2 : AVGINT x AVGINF

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
M*W	.0012	.6806	1.0000	298.0000	.4100
M*Z	.0009	.4990	1.0000	298.0000	.4805
BOTH(M)	.0058	1.6033	2.0000	298.0000	.2030

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
.1222	.0579	2.1095	.0357	.0082	.2362

Conditional indirect effects of X on Y:

INDIRECT EFFECT:
 AVGAtt -> AVGINT -> AVGBEH

AVGGOV	AVGINF	Effect	BootSE	BootLLCI	BootULCI
-1.2583	-1.4498	.2082	.0601	.1041	.3390
-1.2583	.0000	.1936	.0527	.1005	.3064
-1.2583	1.4498	.1789	.0646	.0566	.3128
.0000	-1.4498	.1909	.0669	.0895	.3527
.0000	.0000	.1763	.0479	.0953	.2842
.0000	1.4498	.1616	.0483	.0775	.2643

```
     1.2583    -1.4498      .1736      .0850      .0573      .3795
     1.2583      .0000      .1590      .0608      .0703      .3053
     1.2583     1.4498      .1443      .0488      .0646      .2517

      Indices of partial moderated mediation:
            Index     BootSE   BootLLCI   BootULCI
AVGGOV     -.0138      .0244     -.0568      .0398
AVGINF     -.0101      .0230     -.0641      .0253
---

************************ ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

W values in conditional tables are the mean and +/- SD from the mean.

Z values in conditional tables are the mean and +/- SD from the mean.

NOTE: The following variables were mean centered prior to analysis:
          AVGGOV   AVGINF   AVGINT

NOTE: Standardized coefficients not available for models with moderators.

------ END MATRIX -----
```

Table 2: Social Norms as independent variable

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Version 3.5.3 ***************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2018). www.guilford.com/p/hayes3

**************************************************************************
Model  : 16
    Y  : AVGBEH
    X  : AVGSN
    M  : AVGINT
    W  : AVGGOV
    Z  : AVGINF

Covariates:
 AVGPBC   AVGAWA   AVGAtt

Sample
Size:  308

**************************************************************************
OUTCOME VARIABLE:
 AVGINT

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6036      .3643      .3892    43.4114     4.0000   303.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant    -4.0578      .3659   -11.0887      .0000    -4.7779    -3.3377
AVGSN         .1124      .0459     2.4468      .0150      .0220      .2028
AVGPBC       -.0359      .0383     -.9375      .3492     -.1113      .0395
AVGAWA        .4076      .0585     6.9644      .0000      .2924      .5228
AVGAtt        .4334      .0684     6.3367      .0000      .2988      .5679

**************************************************************************
```

```
OUTCOME VARIABLE:
 AVGBEH

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6801      .4625      .2410    28.4894     9.0000   298.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant     2.9991      .3450     8.6936      .0000     2.3202     3.6781
AVGSN        -.0121      .0369     -.3277      .7434     -.0848      .0606
AVGINT        .4068      .0458     8.8715      .0000      .3165      .4970
AVGGOV        .0169      .0293      .5764      .5648     -.0407      .0745
Int_1        -.0317      .0385     -.8250      .4100     -.1075      .0440
AVGINF        .0304      .0252     1.2072      .2283     -.0192      .0801
Int_2        -.0233      .0330     -.7064      .4805     -.0882      .0416
AVGPBC        .0360      .0307     1.1713      .2424     -.0245      .0964
AVGAWA        .1941      .0501     3.8755      .0001      .0955      .2926
AVGAtt        .1222      .0579     2.1095      .0357      .0082      .2362

Product terms key:
 Int_1    :        AVGINT   x        AVGGOV
 Int_2    :        AVGINT   x        AVGINF

Test(s) of highest order unconditional interaction(s):
           R2-chng          F        df1        df2          p
M*W          .0012      .6806     1.0000   298.0000      .4100
M*Z          .0009      .4990     1.0000   298.0000      .4805
BOTH(M)      .0058     1.6033     2.0000   298.0000      .2030

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
     -.0121      .0369     -.3277      .7434     -.0848      .0606

Conditional indirect effects of X on Y:

INDIRECT EFFECT:
 AVGSN       ->    AVGINT      ->    AVGBEH

     AVGGOV     AVGINF     Effect     BootSE   BootLLCI   BootULCI
    -1.2583    -1.4498      .0540      .0246      .0097      .1064
    -1.2583      .0000      .0502      .0250      .0082      .1070
    -1.2583     1.4498      .0464      .0280      .0042      .1123
      .0000    -1.4498      .0495      .0224      .0093      .0978
      .0000      .0000      .0457      .0205      .0087      .0891
      .0000     1.4498      .0419      .0221      .0065      .0921
```

```
     1.2583    -1.4498      .0450      .0235      .0085      .0995
     1.2583      .0000      .0412      .0195      .0082      .0843
     1.2583     1.4498      .0374      .0189      .0065      .0789
```

Indices of partial moderated mediation:

	Index	BootSE	BootLLCI	BootULCI
AVGGOV	-.0036	.0071	-.0200	.0085
AVGINF	-.0026	.0059	-.0155	.0089

```
********************** ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

W values in conditional tables are the mean and +/- SD from the mean.

Z values in conditional tables are the mean and +/- SD from the mean.

NOTE: The following variables were mean centered prior to analysis:
          AVGGOV   AVGINF   AVGINT

NOTE: Standardized coefficients not available for models with moderators.

------ END MATRIX -----
```

Table 3: Perceived Behavioral Control as independent variable

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Version 3.5.3 ***************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2018). www.guilford.com/p/hayes3

**************************************************************************
Model  : 16
    Y  : AVGBEH
    X  : AVGPBC
    M  : AVGINT
    W  : AVGGOV
    Z  : AVGINF

Covariates:
 AVGAWA   AVGAtt   AVGSN

Sample
Size:  308

**************************************************************************
OUTCOME VARIABLE:
 AVGINT

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6036      .3643      .3892    43.4114     4.0000   303.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant    -4.0578      .3659   -11.0887      .0000    -4.7779    -3.3377
AVGPBC       -.0359      .0383     -.9375      .3492     -.1113      .0395
AVGAWA        .4076      .0585     6.9644      .0000      .2924      .5228
AVGAtt        .4334      .0684     6.3367      .0000      .2988      .5679
AVGSN         .1124      .0459     2.4468      .0150      .0220      .2028

**************************************************************************
```

```
OUTCOME VARIABLE:
 AVGBEH

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6801      .4625      .2410    28.4894     9.0000   298.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant     2.9991      .3450     8.6936      .0000     2.3202     3.6781
AVGPBC        .0360      .0307     1.1713      .2424     -.0245      .0964
AVGINT        .4068      .0458     8.8715      .0000      .3165      .4970
AVGGOV        .0169      .0293      .5764      .5648     -.0407      .0745
Int_1        -.0317      .0385     -.8250      .4100     -.1075      .0440
AVGINF        .0304      .0252     1.2072      .2283     -.0192      .0801
Int_2        -.0233      .0330     -.7064      .4805     -.0882      .0416
AVGAWA        .1941      .0501     3.8755      .0001      .0955      .2926
AVGAtt        .1222      .0579     2.1095      .0357      .0082      .2362
AVGSN        -.0121      .0369     -.3277      .7434     -.0848      .0606

Product terms key:
 Int_1    :        AVGINT    x        AVGGOV
 Int_2    :        AVGINT    x        AVGINF

Test(s) of highest order unconditional interaction(s):
           R2-chng          F        df1        df2          p
M*W          .0012      .6806     1.0000   298.0000      .4100
M*Z          .0009      .4990     1.0000   298.0000      .4805
BOTH(M)      .0058     1.6033     2.0000   298.0000      .2030

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
      .0360      .0307     1.1713      .2424     -.0245      .0964

Conditional indirect effects of X on Y:

INDIRECT EFFECT:
 AVGPBC      ->    AVGINT      ->    AVGBEH

     AVGGOV     AVGINF     Effect     BootSE   BootLLCI   BootULCI
    -1.2583    -1.4498     -.0172      .0206     -.0580      .0238
    -1.2583      .0000     -.0160      .0189     -.0539      .0222
    -1.2583     1.4498     -.0148      .0181     -.0531      .0216
      .0000    -1.4498     -.0158      .0198     -.0573      .0204
      .0000      .0000     -.0146      .0175     -.0497      .0185
      .0000     1.4498     -.0134      .0162     -.0472      .0179
```

```
     1.2583    -1.4498     -.0144      .0197     -.0602      .0170
     1.2583      .0000     -.0132      .0170     -.0506      .0159
     1.2583     1.4498     -.0120      .0150     -.0445      .0145

      Indices of partial moderated mediation:
            Index     BootSE   BootLLCI   BootULCI
AVGGOV      .0011      .0032     -.0062      .0073
AVGINF      .0008      .0030     -.0036      .0089
---

************************ ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

W values in conditional tables are the mean and +/- SD from the mean.

Z values in conditional tables are the mean and +/- SD from the mean.

NOTE: The following variables were mean centered prior to analysis:
          AVGGOV   AVGINF   AVGINT

NOTE: Standardized coefficients not available for models with moderators.

------ END MATRIX -----
```

Table 4: Awareness as independent variable

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Version 3.5.3 ***************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2018). www.guilford.com/p/hayes3

**************************************************************************
Model  : 16
    Y  : AVGBEH
    X  : AVGAWA
    M  : AVGINT
    W  : AVGGOV
    Z  : AVGINF

Covariates:
 AVGAtt   AVGSN    AVGPBC

Sample
Size:  308

**************************************************************************
OUTCOME VARIABLE:
 AVGINT

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6036      .3643      .3892    43.4114     4.0000   303.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant    -4.0578      .3659   -11.0887      .0000    -4.7779    -3.3377
AVGAWA        .4076      .0585     6.9644      .0000      .2924      .5228
AVGAtt        .4334      .0684     6.3367      .0000      .2988      .5679
AVGSN         .1124      .0459     2.4468      .0150      .0220      .2028
AVGPBC       -.0359      .0383     -.9375      .3492     -.1113      .0395

**************************************************************************

OUTCOME VARIABLE:
 AVGBEH

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .6801      .4625      .2410    28.4894     9.0000   298.0000      .0000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.9991	.3450	8.6936	.0000	2.3202	3.6781
AVGAWA	.1941	.0501	3.8755	.0001	.0955	.2926
AVGINT	.4068	.0458	8.8715	.0000	.3165	.4970
AVGGOV	.0169	.0293	.5764	.5648	-.0407	.0745
Int_1	-.0317	.0385	-.8250	.4100	-.1075	.0440
AVGINF	.0304	.0252	1.2072	.2283	-.0192	.0801
Int_2	-.0233	.0330	-.7064	.4805	-.0882	.0416
AVGAtt	.1222	.0579	2.1095	.0357	.0082	.2362
AVGSN	-.0121	.0369	-.3277	.7434	-.0848	.0606
AVGPBC	.0360	.0307	1.1713	.2424	-.0245	.0964

Product terms key:

Int_1	:	AVGINT	x	AVGGOV
Int_2	:	AVGINT	x	AVGINF

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
M*W	.0012	.6806	1.0000	298.0000	.4100
M*Z	.0009	.4990	1.0000	298.0000	.4805
BOTH(M)	.0058	1.6033	2.0000	298.0000	.2030

********** DIRECT AND INDIRECT EFFECTS OF X ON Y **********

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
.1941	.0501	3.8755	.0001	.0955	.2926

Conditional indirect effects of X on Y:

INDIRECT EFFECT:

AVGAWA -> AVGINT -> AVGBEH

AVGGOV	AVGINF	Effect	BootSE	BootLLCI	BootULCI
-1.2583	-1.4498	.1958	.0601	.0972	.3339
-1.2583	.0000	.1821	.0583	.0862	.3102
-1.2583	1.4498	.1683	.0706	.0454	.3163
.0000	-1.4498	.1796	.0571	.0922	.3111
.0000	.0000	.1658	.0442	.0905	.2638
.0000	1.4498	.1520	.0495	.0661	.2581
1.2583	-1.4498	.1633	.0692	.0633	.3268
1.2583	.0000	.1495	.0489	.0761	.2642
1.2583	1.4498	.1357	.0423	.0625	.2276

Indices of partial moderated mediation:

Index	BootSE	BootLLCI	BootULCI

```
AVGGOV     -.0129      .0243     -.0645      .0339
AVGINF     -.0095      .0207     -.0557      .0268
---

********************** ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

W values in conditional tables are the mean and +/- SD from the mean.

Z values in conditional tables are the mean and +/- SD from the mean.

NOTE: The following variables were mean centered prior to analysis:
          AVGGOV   AVGINF   AVGINT

NOTE: Standardized coefficients not available for models with moderators.

------ END MATRIX -----
```

Appendix D: Results of Regression Analysis for Demographic Variables

Table 1: Effects of Demographic variables on Perceived Behavioral Controls

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.640	.155		10.571	.000
	Seperation	.566	.067	.435	8.455	.000
2	(Constant)	1.218	.221		5.498	.000
	Seperation	.558	.066	.429	8.406	.000
	Educ level	.132	.050	.135	2.646	.009

a. Dependent Variable: AVGPBC

Table 2: Effects of Demographic variables on Intention

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.646	.139		33.435	.000
	Seperation	-.191	.060	-.179	-3.177	.002
2	(Constant)	5.051	.245		20.650	.000
	Seperation	-.210	.060	-.197	-3.467	.001
	Residence	-.071	.036	-.114	-2.005	.046

a. Dependent Variable: AVGINT

Appendix E

The Questionnaire

Dear Valued Respondents,

My name is Stephanie Saliba and I am currently pursing my Master's degree at Notre Dame University-Louaize (NDU). I am conducting a study about Lebanese recycling Behaviors under the supervision of Dr. Dorine Haddad. My thesis will be assessing potential variables affecting the Lebanese recycling Intentions and Behaviors. The results of this research aim to boost the efficiency of the recycling projects that are currently administered in different Lebanese regions, by focusing on the most important parameters that positively shape the people's tendency and Behaviors to recycle. The results of this study could motivate other Lebanese regions to adopt recycling initiatives and spread environmental Awareness.

This survey is part of my thesis, and your answers are highly valued for its success. Please be assured that anonymity is secured, and your answers will remain confidential. The entire survey consists of 38 questions and will take around 10 minutes.

I am really grateful for your time and cooperation. I will be glad to share with you the results of my study at a later stage.

For any query, please do not hesitate to contact me on: sfsaliba@ndu.edu.lb

'Informed Consent'

I, [Insert Name], have carefully read the above information and state that my participation in this research is totally voluntary. Any refusal will not involve any penalty. I may as well stop participation at any time without any loss of benefits.

Demographic information

1. Age
    1. Less than or equal to 25
    2. 26-44
    3. 45-56
    4. 57-75
    5. 76 years or more

2. Gender
    1. Female
    2. Male

3. Education level
    1. School Level
    2. Technical
    3. BA/BS
    4. Masters
    5. PhD
    6. MD

4. Marital status
    1. Single
    2. Married
    3. Divorced/separated
    4. Widow/er

5. How many people live in your household?
    1. One
    2. Two
    3. Three
    4. Four
    5. Five or more

6. Household type
    1. Apartment in a building
    2. Private house with a garden

7. What is your monthly income? (in Lebanese Pounds)
    1. None (I do not work)
    2. Less than 1,500,000 L.L.
    3. Between 1,500,000 and 3,000,000
    4. Between 3,000,000 and 6,000,000
    5. Above 6,000,000 L.L.

8. Occupation/ Industry:
    1. Education
    2. IT
    3. Advertising
    4. Trade
    5. Engineering
    6. Architecture, Interior Design, Graphic Design
    7. Consultancy
    8. Banking
    9. Insurance

10. Medical
11. Pharmaceutical
12. Fashion
13. Others

9. Place of Residence (Governate)
    1. Aakkar
    2. Baalbeck- hermel
    3. Beirut
    4. Beqaa
    5. Mount Lebanon
    6. Nabatiyeh
    7. North Lebanon
    8. South Lebanon

10. Do you currently separate waste?
    1. Yes
    2. Partially
    3. Not at all

The following statements will be assessed using a 5-point Likert scale ranging from strongly disagree (1); disagree (2); neutral (3); agree (4) to strongly agree (5).

Attitude

The following statements assess your Attitude towards waste separation activities.

1. I believe that efficient waste separation processes lead to a clean environment
2. I feel glad to engage in any waste management/separation plan
3. I feel that I have a responsibility to reduce the amount of waste generated
4. I believe that waste separation at home is the key starting point for the whole waste management process
5. I feel ashamed when littering (such as throwing a paper from my car's windows, etc.)
6. I feel guilty if I use plastic utensils (cups, plates, straws, etc.)

Social Norms

The following statements assess the way you perceive what others, in the same society, would expect you to do.

1. People around me are interested in protecting the environment
2. People around me have a concern about/responsibility for the waste problem in our community
3. People around me participate in environmental activities
4. People around me will criticize me if I do not separate waste.
5. If people around me separate their waste I will start separating mine too

Perceived Behavioral Control

The following statements assess your reflection on past experiences of waste sorting and separation, as well as your expectations of potential obstacles.

1. Separating waste at home is something complicated and hard to do.
2. Waste separation takes too much time.
3. Waste separation takes up too much room/space.
4. Lack of satisfactory facilities (such as coded recycling bins for waste separation and collection means) prevents me from separating waste.
5. It is not easy to change my habits, as I am not used to separate waste

Awareness

The following statements assess your knowledge and Awareness concerning environmental issues and key solutions.

1. I am aware that the risks associated with waste problems are true and serious
2. I am aware that the waste problem poses a threat to my health and my family's health
3. I am aware how to separate my waste correctly and what are the types of waste that can be recycled.
4. I am aware that waste separation brings about economic benefits (natural fertilizer, electricity, selling used glass/aluminum...)
5. I am aware that waste separation at source helps reduce wastes accumulating in landfills and protects the environment

Role of Government

The following statements assess the role of the government/municipality in shaping your waste separation Behavior.

I sort my waste selectively, if/because Government/Municipality:

1. educates me about waste separation
2. does enough to fix the garbage problem in my village/city/country
3. is a truthful authority, so I cooperate with any waste management law/regulation imposed
4. imposes fines/penalties on those who do not obey the rules of waste separation

Collection Infrastructure

The following statements assess how the accessibility to, and the efficiency of waste separation/collection means would affect your Intention to sort your waste.

I sort my waste selectively, if/because:

1. I have enough space for multiple waste separation bins in my house
2. Government/municipality provides a modern collection Infrastructure (appropriate recycling bins, guiding protocols, etc.)
3. Government/municipality provides a convenient collection Infrastructure (Recycling bins that are close to my home, colorful waste bags for different waste categories, etc.)
4. Government/municipality provides timely waste collection services (e.g. daily)

Intention

The following statements assess your Intention to be involved in appropriate waste separation activities.

I have the Intention to:

1. increase my environmental discipline (example: avoid using plastic cups, bring reusable bag to the supermarket, etc.)
2. learn how to separate my garbage appropriately
3. obey the rules related to waste separation
4. participate in environmental activities in my community
5. pay higher municipal fees in order to solve the waste problem

Recycling Behavior

The following statements assess how your Intention would be translated into active involvement in waste separation activities.

My positive Intention towards waste separation and recycling is translated into positive actions and Behaviors when the government/municipality shows genuine concern to fix environmental problems, and when it provides us with the proper facilities to do this. Then, I would:

1. learn how to separate my garbage properly
2. be more responsible for my waste
3. support any recycling effort encouraged by the community/municipality
4. separate waste regardless of whether there are community incentives, or even governmental fines or penalties