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Master Thesis Proposal

How are Municipal Solid Waste Managed in different Cultures?

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Abbreviations.

GHG	Green House Gas
GIS	Geographical Information System
ISWM	Integrated Solid Waste Management
ISWMM	Integrated Solid Waste Management Model
MSWM	Municipal Solid Waste Management
SEM	Structural Equation Model

Background

The problem of Municipal solid waste management has been a major problem faced my many countries. This problem is fuelled by increasing industrialization that is been experience by many countries. One of the direct consequences of this positive development of many countries is the problem of the waste that is generated through activities of households and businesses. If not managed well, waste has significant consequence on the environment and the health of the citizens of the world. This increasing problem has stimulated interdisciplinary research in law, engineering, economics and other fields to find sustainable ways to manage the problem of municipal waste. In spite of such efforts, there still exist wide difference in management practices, practiced around the world. Most of the less effective systems are particularly found in cultures that are developing in nature while developed cultures have near perfect system. This master thesis looks at the problem by analysis how Municipal solid waste are managed in different cultures within the context of the Integrated Solid waste management Model. (ISMWM)

Objective: This Master thesis aims to analyse how Municipal Solid waste are managed in different cultures within the context of the Integrated Solid Management Model.

Method: The problem is analysed by using the structural equation model (SEM) to find the relationship between the defined dependent and independent variables. Variables such as waste disposal method, waste collection frequency and waste collection system are analysed.

1 Introduction.

According to the world bank, global municipal solid waste generation level currently stands at 1.3 billion tonnes per year, with an estimation of it increasing to 2.2billion metric tonnes by 2025 and to 3.40 billion metric tons by 2050 (Silpa, Lisa, Perinaz & Frank 2018). It is also estimated that, per capita waste generation rates will increase from 1.2 to 1.42 kg per person per day in the next fifteen years. (World Bank 2018). This presents a significant challenge to the course of environmental sustainability, since significant proportion of these waste generated are uncollected or are managed using unscientific technologies and methodologies which result in negative effects such as Leaches, air pollution and Greenhouse gas (GHG) emissions on the environment. (Ray, Roychoudhury, Mukherjee, Roy & Lahiri 2005; Rathi 2006; Kansal 2002). High- and middle-income countries have near perfect collection system by accounting for about 90% to 100% of MSW generated while low income countries, mainly identified with countries in Africa and some Asian countries (South East), accounts for only 40% of waste generated with the figure reducing to about only 26% in rural and less urban cities (World Bank 2018). With about two thirds of these collected waste dumped in these low-income countries, MSWM practices in these countries is a significant threat to the world's quest of saving the environment. Such poor MSW management practices does not only negatively affect the environment but also results in low quality of life with respect to health, increased GHG emissions, accumulation of non-biodegradable waste, that have toxic substances and negative effect on the environment (Raab & Wagner, 2018).

The awareness of this problem has stimulated interdisciplinary research in economics, law, engineering, sociology and psychology to find ways to better manage and deal with this difficulty. Among the recommended ways to deal with the rising problem of municipal solid waste management include: Instituting pricing and incentive schemes, as recommended by the

economist (Curlee 1986), leveraging innovative and alternative technologies as suggested by the engineer, (Duan, Liu, Yamazaki, & Jiang 2011), Regulatory intervention as enjoined by legal practitioners (Viscusi, Huber, Bell & Cecot 2013**)** and appealing to the moral norms, as posited by the sociologist (Burn and Oskamp 1986**).** Notwithstanding the potency of all the afore-mentioned recommendations in contributing to mitigating the negative impact of MSW, the most important stakeholders to the execution of all these recommendations are the people who represents communities and municipalities who are shaped by their culture and who are major players in the generation and management of municipal solid waste. The People (community) factor is important because it has been proven that there is a strong correlation between their cultural identification and how they interact with their environment (Raab & Wagner 2017). Thus, the cultural capital and unique identity of a people (municipality) can be leveraged to influence a community to engage in environmentally sustainable practices (Hutter 1996) by understanding how they approach MSWM. With the culture of a community providing the context within which a group of people interact with their environment, it helps to maintain a balance between humans and their physical environment (Akpabio & Subramanian 2012) and results in cultural diversity (Timokhina, Ürkmez & Wagner 2019). There are significant variations in how different cultures interact with their environment (Maffi
& Woodley 2010) and deals with issues of waste management. Profound understanding of such variations can invaluably feed into MSWM policies and procedures that are informed by an appreciation of the linkage between nature and humans.

With the motivation that, culture provides the background within which human activities occur, (Schneider 1972, Winston 1933), including waste management, (Zender 1999, Crociata, Agovino & Sacco 2015) instituted a research to investigate how the willingness of the people in a society to engage in cultural activities influence how they engage in environmentally sustainable behaviour. They found a strong positive relationship between the tendency to engage

in cultural activities and abide by recycling guidelines. The inherent motivation in the form of culture and values of any group of people sets the stage to how they deal with problems around them and can be an influential variable in solving problems in a society. This was confirmed by Hornik, Cherian, Madansky & Narayana (1995), when they established among five classified variables (intrinsic incentives, extrinsic incentives, internal facilitators, and external facilitators) affecting consumer recycling behaviour that, internal facilitators are the stronger predictor of a person's tendency to engage in environmentally sustainable waste management practice. It is also well asserted that, people deal with objects in their surroundings, depending on the meaning they ascribe to those objects, which (Meaning) is influenced by their culture identification (Babe 1997). Thus, within the larger issue of Municipal solid waste management practices, practices of a municipality can be explained by the meaning they attach to such practices.

Certain management and disposal practices are general in nature while some practices are peculiar to certain cultures and communities. Sharholy, Mahmood, Ahmad & Trivedi (2008) found that, making use of informal practices such as monetizing by encouraging municipalities to separate waste and market to informal networks is an effective option in India. Can this be replicated in other cultures? Obviously, the success of such a practice will depend on the economic structure of the culture in question. With high poverty rate (Amit, Reeve, Sonalde & Amaresh 2017) and less structured municipal solid waste management systems in India, the informal network and the monetary motivation can be a good inducement measure for India like cultures. Thus, management of municipal solid waste are different across cultures and mainly determined by the economic structure and the cultural identification of a particular municipality.

Another dimension of possible MSWM influential factor relates to harnessing the religious and socio-economic demographic of a community of people to effect positive MSW management practices. Since religion is obviously connected to the moral fibre of a municipality,

it can serve as a valuable source of influence in waste management, since the morals of the people can be appealed to. In a study in Palestine, which is mostly of the Muslim religious faith, Al-Khatib, Arafat, Daoud & Shwahneh, (2009) found significant correlation between a religion and littering. Thus, people who are more religiously inclined are motivated not to engage in littering. In a separate study in Malaysia, Mohamad, Idris, Baharuddin, Muhammad & Sulaiman (2012), identified the potency of going beyond the influence of religious values and ethics but using the religious structures and their characteristics to influence municipal waste management behaviour. To add to the empirical literature on the influence of religion, this thesis proposes to look at the MSWM practices that are engaged in by people with different religious coloration.

Notwithstanding efforts that have been made to propagate good MSWM practices across cultures, the problem continues to persist as already highlighted. Its effects on the environment and health is devastating and a detailed understanding of how different cultures approaches MSW management will be invaluable to policy and the quest for sustainability. This study seeks to add to the current body of knowledge by examining how MSW are managed in different cultures. The important dimension of religion and sport participation influence will also be examined. This thesis proposes to undertake this examination by empirically answering the question, "How are municipal solid waste managed in different cultures?" To answer this question, the following sub topic arears are been proposed to be considered in this thesis.

1. How different cultures takes responsibility to management of their solid waste.
2. Waste disposal methods in different cultures.
3. The relation of a community's spiritual believes to how they approach solid waste disposal.
4. The environmental consciousness of different cultures in Municipal solid waste management.

It must be said that, the issue of the cultural dimension to waste management has become important because it plays significant role in regulation intervention. With an understanding of this, policy formulators and authorities dealing with Municipal solid waste management can leverage on this knowledge for better results.

2 Review of Related Literature.

The literature on MSW is wide. Different dimensions of the topic have been explored to give a solution perspective to the problem. For the purpose of our research we will review literature on six main dimensions of municipal solid waste. They include, the Analysis of generation and composition of municipal Solid waste in different cultures, Management practices and organisational structure of management institutions, their different disposal methods, using religion as a control tool, the sense of responsibility of municipalities responsible for solid waste generation and management and the cost of Municipal Solid waste management. The next section of this proposal reviews related literature on the topic and followed by the proposed hypothesis and methodology for the topic which includes description of the data and the variables of interest in terms of our dependent and independent variables of interest to the topic

2.1 Theoretical Framework. - Integrated Solid Waste Management (ISWM) Model.

The model of Integrated solid waste management is represented by two key words, Integrated and sustainable. By sustainable, ISWM model implements a waste management system that can stand the test of time socially, economically, financially and environmentally. By integrated, ISWM model is recognised as a holistic system, that integrates all parts and components, that are critical for proper functioning and flow of a municipal waste management system. Integration

include the use of different waste collection and treatment options, based on community characteristics, involvement of all stakeholders (Hogland 2013), consideration of interrelation between waste management system and other urban systems (Klundert 1999). This model's development dates back to the 1980s, when it was developed by development organisations in developing countries (Klundert 1999; Waste 2004) to consider the full range of waste management practices that are available and select the best management technique for a country, based on their unique social, cultural, financial and political situation (Browne & Morrissey 2004). The principle of adaptation of ISWM model to the prevailing context of a city or a country and appreciation of the importance of key stakeholders (Hogland 2013; Anschutz, IJgosse, Scheinberg 2009).in the development of a MSWM makes it practicable for different socio-economic, economic and political situation of different countries. This is because the success of a MSWM system is highly influenced by the attitudes and patterns of waste handling of a society, how the people identify with it, the system of administration and the level of economic development of a society (Schübeler 1996).

ISWM system as represented in Figure 1 is defined by three main dimensions to ensure and effective system that have positive effect on sustainability. They include; (1) Stakeholders who have different roles to play and interest MWM (Hogland et al., 2013; Anschutz et al., 2009) As presented in figure 1, there are different key stakeholders in a MSWM system who carries different levels of interest and influence. It is paramount that an ISWM system coordinates all these stakeholders and steer their interest and influence towards a common goal to ensure a

seamless functioning of the system and positive effect on sustainability, which is the eventual goal of the system. (2) Waste system elements represents the technical aspects of the waste management process and involves the flow of materials from generation through

Integrated Sustainable Waste Management

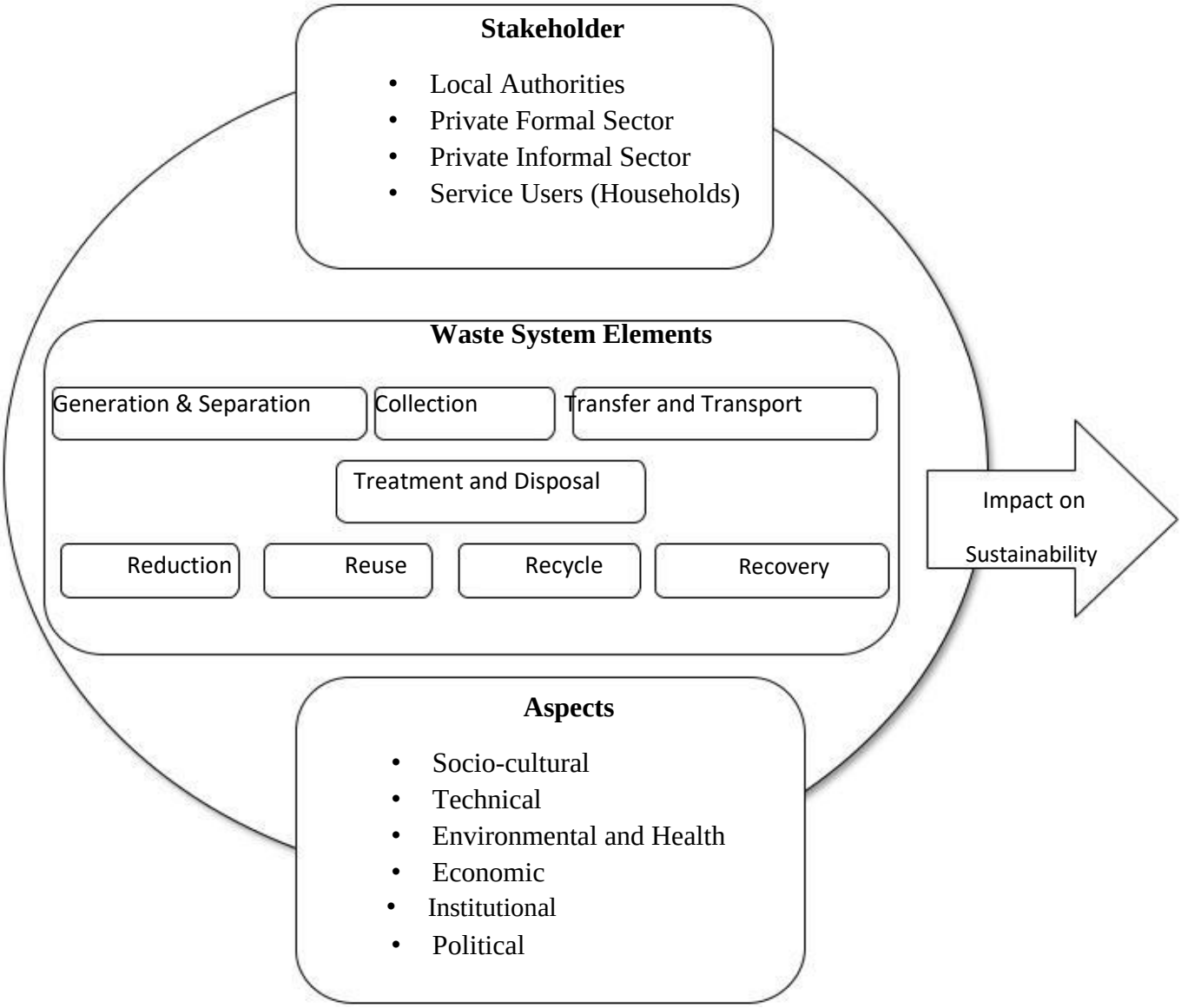

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Fig 1 The integrated sustainable waste management model (WASTE 2004; adapted from Anschutz, IJgosse, Scheinberg 2009).

collection to recovery and disposal stage. This dimension has important implication on how the system functions since all the technical and technological approaches that are adopted by the system are present in this stage. It also incorporates the 3R rule of waste management, which essentially helps to cut down on waste usage, and ensures a sustainable life cycle for materials.
The ISWM model identifies six influential aspects, that should underpin the whole system. An assessment and planning of a MSWM system should consider all these aspects with respect to how they influence the system and how they affect the environment. (Scheinberg, Wilson & Rodic-Wiersma 2010; van de Klundert & Anschutz 2001; Farahbakhsh & Marshall 2013).

Because ISWM presents a system and holistic approach to how waste should be managed and recognises that, different influential factors in each community results in differing waste management practices in different cultures, this paper is situated within the framework of ISWM. It assesses management practices in different cultures within the lenses of the model of integrated solid waste management (ISWM) and how these practices have the potency to affect sustainability, which is the oeventual goal of the model.

2.2 Generation and Compositional analysis of Municipal Solid Waste

Organisation for Economic Co-operation and Development (OECD) defines MSW to include "waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden, street sweepings" (World Bank 2012). By definition, hazardous waste and medical waste are not identified as components of MSW (Schübeler 1996). MSW mainly includes non-hazardous organic and inorganic waste. Organic waste mostly comprises of plant and animal waste that easily disintegrate, like food waste like fruit and vegetable husk. Thus, they consist of waste that can be easily decomposed,

while organic waste comprises of waste that are difficult to disintegrate. They include plastic shopping bags, plastic water bottles, metals, and glasses (Jha, Sondhi & Pansare 2003).

The quantity composition of the different types of municipal solid waste potentially depends on the life style habits and income of a particular culture. This is not a coincidence that affluent societies generate high volumes of inorganic waste compared to less developed countries (Hoornweg & Bhada, 2012). The more leaned a culture is to the industrialization, hence higher income, the high probability of them producing more inorganic related MSW and vice versa (UNEP 2001). High inorganic waste has been found to have significant threat to human health and the environment than organic waste (Tahiret, Hussain, Behayh & Tilahin, 2015). Particularly, an increase in inorganic waste in the environment or water for instance can cause permanent damage to human health and the environment, for which reason scientific treatment of such waste is of high importance. Hoornweg & Bhada (2012) established that, organic waste matter constitutes about 40 to 80% of the waste composition of less developed countries while inorganic waste matter constitutes a higher percentage of the waste composition of developed countries.

As a function of income, Table 1 gives a quantitative representation of organic and inorganic municipal solid waste types in different income groups. Low income groups have the highest proportion of organic waste (64%), compared to 28% of high-income groups. On a regional level, Africa and countries in East Asia that falls mostly under these low-income groups have a fraction of 59% and 62% of organic waste composition and 5%,8%.3% and 3% of Paper, Plastic, Glass and metal (Inorganic Waste) respectively, while most OECD countries that fallunder high income groups have a fraction of 27% of organic waste and high inorganic waste composition.

Quantity wise, waste generation has a direct positive relationship with affluence. The more affluent a society is, the more waste they generate and vice versa (Shekdar 2009). According to the world bank, OECD member countries which are mostly identified as high-income countries generates on average, 2.2 kg per capita of waste per day, while lower income countries from sub Saharan Africa generates on average of 0.65 kg per capita of waste per day. Other factors underpinning these generation rates are size of family, level of education, food

habits, standard of living, degree of commercial activities, seasons and occupational status. (Sujauddin, Huda & Hoque 2008; Sharholy, Ahmad, Mahmood & Trivedi 2007; Rawat & Daverey 2018). Within countries, evidence in china have also found that, different community strata's have different waste generation rates, and waste generation pattern will evolve with social economic transition of communities. Further posited that, among the underpinning factors enumerated above, waste generation pattern will move from economic driven to family structure. (Xiao, Lin, Chen, Zhang, Ye, & Yu 2015). Since households are major stakeholders in waste management (Guerrero, Hogland & Mass 2013) , understanding of such waste generation factor patterns will help with targeted and differentiation policies and control measures for waste reduction at the household level, which will by extension reduce waste generation rates at the community level and country as a whole.

Income Level	Organic (%)	Paper (%)	Plastic (%)	Glass (%)	Metal (%)
Low Income	64	5	8	3	3
Lower Middle Income	59	9	12	3	2
Upper Middle Income	54	14	11	5	3
High Income	28	31	11	7	6

Table 1: Reproduced from World Bank Urban Development Series-Knowledge Papers

Understanding the data and the culture of waste generation types in different municipalities helps to adopt the right management practice and technology for a particular culture. For this purpose, this research paper will further explore literature position on the waste generation types in terms of composition of different cultures within the context of continents, countries and then on a narrow view of municipalities. The literature will be reviewed along topics of organic materials, paper, plastics, Metals and Electronics.

2.3 Collection, Transfer and Transport.

Although MSWM is multidisciplinary, requiring a mix of activities involving generation, separation, collection, transfer, transportation and treatment, Wagner & Bilitewski (2009); Minoglou & Komilis (2013) transport and collection phase is critical for the proper functioning of the system, since it represents the foundation (Eisted, Larsen & Christensen 2009) of the whole process. Failure of it will mean less or no waste collected. The transport and collection phase accounts for a lion share of the MSWM budget in most countries (Jacobsen, Buysse & Gellynck 2013). It is estimated to amount to 80% to 90% of the cost in low income countries and 50% to 80% in middle to high income countries (Aremu 2013; Tavares, Zsigraiova, Semiao & Carvalho 2009). . For this reason, a well organised and structured collection and transport system is non-negotiable. This high cost can be attributed to the laborious nature and the high need and usage of transportation at this phase (Amponsah & Salhi 2004).

To optimize the waste collection and transport process to save cost, Das & Bhattacharyy (2015) proposed a heuristic solution of computing optimal waste collection and transport path to find the best rout to adopt based on how scattered the collection points are, and heterogenous the

waste contents are. With this, waste management system designers learn about the best and shortest route to reduce transportation and transfer distance which has a bearing on csot. Other proposed cost optimization techniques include, integrating a Geographical information system (GIS) optimal routing model, which considers variables such as population density, road networks and waste generation capacity (Ghose, Dikshit & Sharma 2006); Parallel routes generation using insertion procedure (Chapleau, Ferland, Lapalme & Rousseau 1983) and GIS 3D optimal routing system which considers variables such as road inclination and vehicle weight (Tavares et al., 2009). All cost optimization propositions aim at reducing the routing distance since it has effect on cost and pollution.

Because of the different service user stakeholders in MW collection, it is impossible to use one collection system. A variety of collection methods are used, which is dependent on the municipal characteristics and the structure of the MWM system. These methods include house-to-house, curb side-collection and hand delivery by waste generating households. Since the collection method adopted are mostly country specific, with strong consideration for local information, this section reviews the collection systems of developing and developed countries. Optimal collection proposals from source to transfer centres are also review It also looks at frequency of waste collection (UN-HABITAT,. 2010).

2.4 Waste Disposal and treatment options

There are a variety of waste disposal and treatment options available. These options are mostly dependent on the type of waste generated and have underlying motivations that influence the choice of discarding option at the household level (David & David 1995). Disposal

mechanisms of municipal solid waste mostly include traditional landfill sites, open dumping, thermal treatment techniques such as incinerations, composting, recycling and other means of disposal that are sometimes peculiar to certain cultures. It is estimated that about 37% of global waste are disposed in landfills, 33% are openly dumped, 19% are recovered through recycling and only 11% are processed using incineration technologies. (Hoornweg & Bhada 2012). Land filling and open dumping are the most practiced disposal method in most developing and low-income countries with about 90% of towns and cities in India for instance, disposing off their waste through landfilling (Sharholy et al., 2007) and a global figure of 33% of waste been openly dumped in low income countries. Incinerations involves the process of using high temperature levels to combust and burn solid waste. This is practiced mostly in high income countries with about 19% of waste in most European countries been treated and disposed with incineration technology. For reasons related to cost (estimated capital expenditure of 600$ to 1000$ per annual tonne, Kaza and Bhada-Tata (2018) andlack of technological and technical capacity, incineration technologies are rarely part of the waste disposal method portfolio of developing and low- and middle-income countries. Literatures in china has indicated improvement in the use of the technology particularly in the eastern part (Li et al., 2016) with the use of landfilling and open dumping subsiding because of limited availability of land and its unsustainable nature. (Zhao, Jiang & Li 2016).

Disposal practices varies across municipalities and mainly depends on the kind of waste generated, the environment and the economics features to be considered (David & David 1995) and the supply of waste disposal facilities (Tadesse, Rudjis & Hagos 2008). The supply of these facilities significantly determines the choice of waste disposal by a community or a household. The farther disposal collection facilities are from the households, the higher the probability of indiscriminate dumping. (Guerrero et al., 2013). The lack of legislative instruments and well technologically equipped and oriented landfill sites have also been identified as a significant

contributor to open dumping that has plaguing most developing countries. Pokhrel and Viraraghavan 2005; Guerrero et al., 2013).

This section of the literature review will therefore look at each of the disposal practices presented above in light of how they are implemented in different regions and income groups and its effectiveness in supporting the course of sustainability. Determinants of each disposal methods, particularly recycling (Troschinetz & Mihelcic, 2009) will also be reviewed. Reviewing determinant factors such as finance, policy, waste characterization, education and technology will help to identify barriers and incentives to recycling to stimulate proper focus of policy and programmes. Adoption of treatment methods such incinerations will also be reviewed.

2.5 Institutional Structure and Municipal Solid waste Management Practices

Management of MSW is a holistic process that requires a strong social contract between stakeholders. An effective MSW management system implementation need to be done within the context of the 3R strategy (Reducing, Reusing and Recycling) (Phillips, Read, Green & Bates 1999; Mushtaq 2010). Thus, the system should aim at reducing waste generated, reusing it and recycling generated waste. The holistic system of advanced cultures in the western world have been found to have more integrated and effective approaches and conforms to sustainable practices (Rachael & Khosrow 2013). They do it with strong appreciation to the local context in terms of cultural characteristics, technical, political and a strong concern for public health, cost, safety measures and environmental protection (Worrell & Vesilind 2012; Wilson 2007), while the opposite is the case for less advanced economies. This part of the literature review will assess

the 3R strategy of different countries, under the topics of effectiveness of source separation, recycling, system of transportation, emphasis on technologies adopted in

Different phases of MSW management, treatment and final disposal (Tchobanoglous, Theisen & Vigil 1993). The institutional structure of MSW management system of different countries

where the effectiveness of the two main institutional arrangements of decentralized systems and centralized systems will also be analysed. This will be done under the umbrella of the administrative authority, under which MSW management structure of different countries fall. Thus, if they fall under local authorities, the main government, private companies or municipal waste companies.

2.6 Religion as a potential control factor.

Appealing to the intrinsic incentives and beliefs of municipalities have been found in literature to be an effective tool in motivating municipalities to engage in sustainable municipal waste management practices (Wagner and Raab 2017). Depending on the religious Socio dynamics of a country, the religious perspective of a community can be harnessed to encourage environmentally sustainable practices. Mostly found to be strong in communities and countries with strong religious background; (a case of India (Lakshmikantha 2006)), (a case of Malaysia, (Wahid and Chamhuri 2007)) and a specific case of pakistan (Al- Khatib 2009). All the forgoing works found evidence of a positive correlation between the

Religious conviction, ideals and ethics of a community and readiness to engage in environmentally friendly municipal solid waste management practices. An empirical case in Malaysia by Mohamad, Idris, Baharuddin, Muhammad & Sulaiman 2012, found that, the power

of religion can be harnessed by not only concentrating on the positive influence of religious ideological inclination of a community, but also the characteristics of each religious community. They indicated that, their distinct characteristics can be useful in shaping positive behaviour with regard to waste management. By characteristics they examined their capacity to undertake educational programmes, using their institutional structures and their structured way of operating. Wagner and Raab (2017) also investigated how the prevalence of religion, affects waste management practices and found a positive relationship between the two variables (religion and responsible waste disposal behaviour). Thus, the more important religion is to a people, the more they engage in sustainable disposal practices. To add to the debate about the potential of religion, this section of the thesis will undertake an open analysis of different religious perspectives to capture how to religious faith of a people influences their municipal waste management behaviour.

3 Research question and Hypothesis.

Based on the problems highlighted in the introduction and the current state of literature reviewed on the topic, this paper seeks to answer the question,

- "how are Municipal Solid Waste Managed in different Cultures"?

It answers this question by hypothesizing as follows;

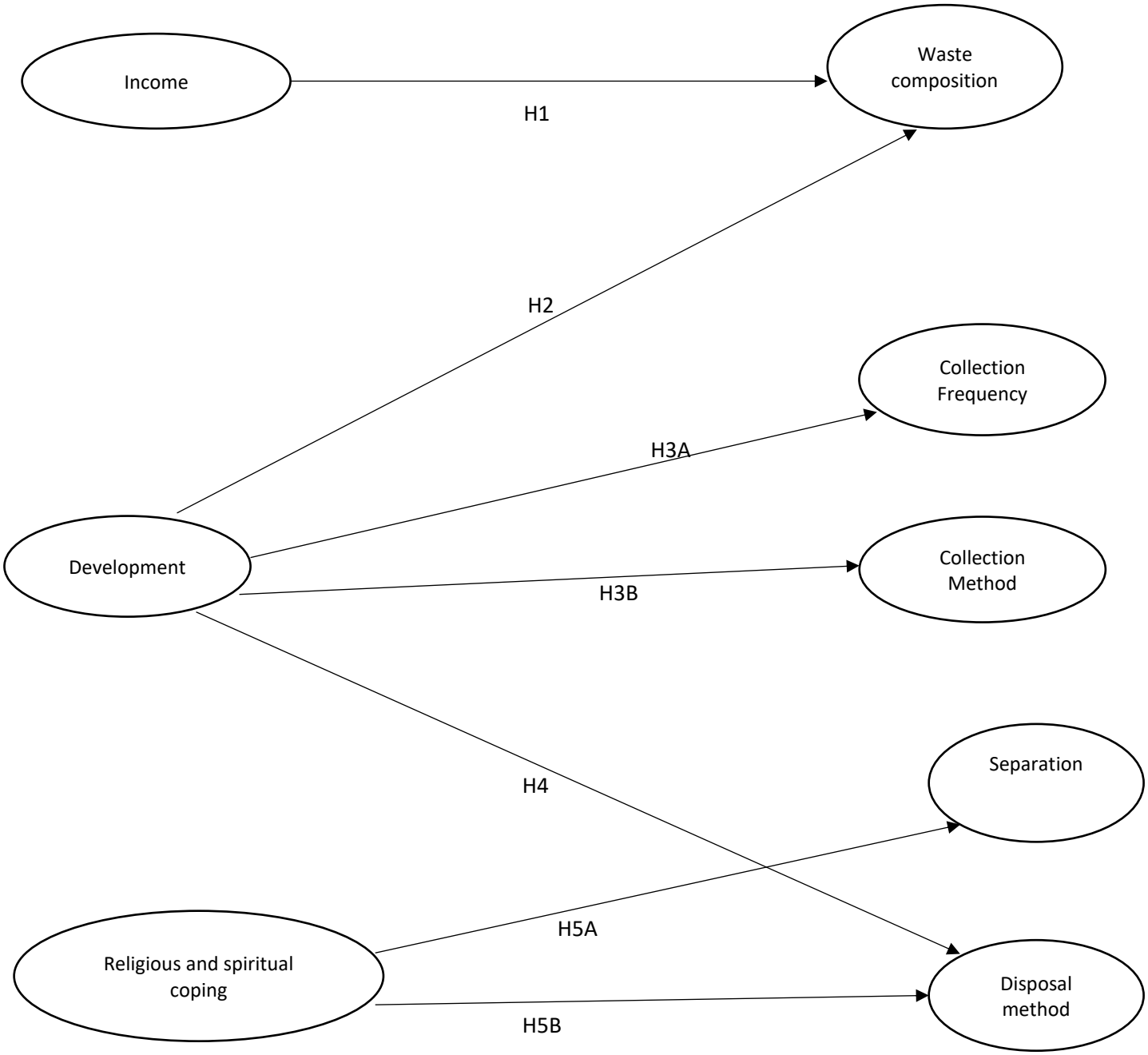

Fig. 2: Structural Equation Model

H1a: There is an inverse proportional relationship between income and organic waste

H1b: There is a proportional relationship between income and Inorganic waste composition

The existence of an inverse proportional relationship between income and organic waste composition and direct proportional relationship between income and inorganic waste composition is supported by results from Ozcan, Guvenc, Guvenc & Demir 2016 and Sujaudd 2008**.** Results from these studies indicated that societies and households in low income groups tend to have high organic waste composition in their generated waste while high income group societies and households have high inorganic waste component in their waste portfolio.

H2: Developed countries generates high inorganic waste while developing countries generates high organic waste.

Many studies have shown that, developed countries have high inorganic waste content with developing countries been identified to generate more organic waste. This hypothesis is supported by results from (Asase, Yanful, Mensah, Standford &Amposah 2009; Rushbrook and Pugh, 1999; Troschinetz, Mihelcic, 2009 and Vujic, Jovicic, Jovicic, Redžić, Batnic & Stanisaviljevic 2010). Asase et al., 2009 compared waste composition of the city of Kumasi in Ghana as a developing country to the city of London as a developed country. They found significant percentage variation in the organic waste and inorganic waste composition in the two cities with London having higher inorganic waste content while Kumasi had high organic waste content. A more detailed waste composition analysis from Troschinetz and Mihelcic, 2009 between 19 developing countries and European union and the USA revealed similar percentage variation between the composition of developed and developing countries, with developing countries having about 55% average organic waste composition, while developed countries had high inorganic composition.

H3A and H3B: There is a positive relationship between level of development and Sustainable waste management collection practices :(Collection Method and Frequency of Collection).

By definition, an effective waste collection system utilizes segregation techniques of separating the waste content and mixed collection system and service models with high collection frequency. It also involves the process of loading and transporting waste from collection points to transfer centres. A case of the west bank of Palestine, which has economic and political features of a developing country and Umbria city in Italy of a developed country, concluded that, developed countries collects about 100% of their waste generated while developing countries Palestine collects less than 50% of waste generated (Maria, Lovak & Caniato 2018). A case of a developing country such as Nepal, revealed an inefficient frequency of collection system with about 62% of waste generators receiving collection service once a week and 26% having no collection service (Rai, Nepal, Khadayat & Bhardwaj 2019), while waste generators in advanced cities such as Umbria in Italy received 2-3 times a week collection service. Developing countries such as Ghana has also been found to have a frequency of collection of Once a week (Kwarteng 2017). High usage of self-delivery and sometime no collection model have been found to be prevalent in developing countries such as Ghana (Kwarteng 2017) and Nepal (Rai, Nepal, Khadayat & Bhardwaj 2019), while developed countries uses a combination of Door to door systems and curb side Pick-ups which has proved superior in the amount of waste collected (Maria, Lovak & Caniato 2018).

H4: Developed countries utilizes sustainable disposal practices (recycling, Incineration) while developing countries utilizes more unsustainable disposal methods such as uncontrolled and unsanitary landfills and open dumps.

Sustainable waste disposal practices have considerable consideration for effect of the disposal on the environment and the cost associated with the practice (Bilitewski, Hardtle, Marek, Weissbach &

Boeddicker 1994). Open dumping (Ogwueleka 2009; Al-Khatib 2015; Maria, Mersky, Daskal, Ayalon and Ghosh 2020) and uncontrolled landfills (Meidiana and Gamse 2010; Hilburn 2015; Asase et al., 2009; Narayana 2009) and composting (Narayana 2009) are the most common disposal practices in developing and least developed countries, while developed countries utilizes a mix of high-level recycling technologies, incinerations to treat their waste (Narayana 2009) and well-engineered and controlled landfill sites. Landfills are last resort for waste disposal, but when they are part of the waste disposal mix of developed countries, they are done in sanitary conditions with facilities for treatment and intersection of leachate (Tchobanoglous et al., 1993). Large amount of waste generated in developed countries are reused and recycled, with a case in Italy indicating about 44% of waste disposed through recycling (Maria et al., 2020). Most developed countries have been found to have an effective 3R (Reduce, Reuse and Recycle) system, with recycling playing a major role in the implementation of this policy (Vasanthy, Karthika and Seethadevi 2011).

H5A and H5B: Religious and Spiritual Coping have positive effect on sustainable Municipal waste Management practices. (Disposal Method and Seperation)

Wagner and Raab (2017) have established that the "more relevant religion is to a people, the less waste they produce". Thus, there exist an inverse relationship between religion and sustainable waste behaviour. This hypothesis is rooted in the work of Wagner and Raab (2017), who found results that pointed to positive effect of religion on waste disposal behaviour. Similar results were found by Mohamad et al., (2012) in Malaysia where they empirically concluded that, religious communities have a high potential to create ecological transformation through adaptation of recycling programmes and behaviour change.

4 Methodology.

This study uses a structured questionnaire survey tool to collect data needed for analysis. Thus, participants independently and anonymously answer open and closed ended questions (Decker and Wagner 2002), to satisfy the basic requirement of questionnaire data collection in research. The questionnaire collected information about the socio -economic characteristics of the respondents along with variables related to respondents MSW management practices. The questionnaire consists of six (5) independent variables which included: (1) Nationality (Defines level of development of the country), (2) Income, (3) Religion, (4) Education, and (5) Gender. The inclusion of these independent variables was informed by literature that has included these variables in their model and analysis. With respect to Income, Al-Khatib et al., 2009 and Johnstone and Labone, 2004 included it in their covariates to access its relationship with MSW management Included level of income. Wagner and Raab 2017, Al-Khatib et al., 2009 and Mohamad et al., 2012 as well included religious conviction in their model to explain their relationship with littering behaviour and recycling respectively, Crociata et al., 2015 and as well included gender in their model to analyse its determination effect on recycling. Six dependent groups of variables will be included in the survey. The consisted of; (1) MSW composition, (2) Disposal Methods, (3) Social Competence and (4) Collection Method.

Secondary data about the municipal waste generation, recovery and disposal methods from low income countries in certain African countries will also be collected and utilized, using special data sources for analysis. This will help to present a rich outlook of how MSW are managed in theses cultures and compare to more advanced cultures. For the purpose of our analyses and examination of our hypothesis, countries of respondents are classified into developed and developing using united nation's World Economic Situations of prospects (WESP) and world bank categorization of countries into developed, transitional and developing.

5 Measurement Instrument

The hypothesis presented above will be examined using the structural equation model (SEM). The structural equation model is used to undertake quantitative research on practical problems by assessing how the theoretical model is compatible with the data set. (Hair, Anderson, Tatham & Black 2006; Anderson and Gerbing 1988). It utilizes a mix of factor analysis, path analysis and linear regression to establish the relationship between dependent and independent variables (Hou, Tabbaa, Chen & mamic 2014). It has the advantage of inferring latent variable, that cannot be measured with questionnaire instrument. This model has been used in waste management research by Zhang, Huang, Yin and Gong (2015), to measure waste separation behaviour in china and also by Chong, Chu, So & Chung 2019, to explain the factors that influence illegal waste disposal. Because my hypothesis suggests complex linkages and association with variable, I choose to use apply the SEM to test my hypothesis and answer my research question. R Programming Environment will be used to undertake the data analysis and draw conclusions.

6 Proposed Structure

The following structure is proposed.

1 Introduction

2 Definition of Concepts

2.1 What is Municipal Solid Waste (MSW).

2.2 Cultural Diversity by Country.

3.1 Models of Integrated Solid Waste Management

3.1.1 The Integrated Sustainable Waste Management (ISWM) Model

3.1.2 The practical and technical elements MSWM system,

3.1.3 Local context to be considered in MSWM system planning

3.14. Stakeholders involved.

4. Characteristics and Composition of Municipal Solid Waste.

4.1 Composition in developed cultures or Communities.

4.2 Composition in developing cultures or communities.

5. Institutional Structure of Municipal solid waste management in developed and developing cultures.

6. Municipal Solid waste Management Practices.

6.1 The 3Rs (Reduce, Reuse and Recycling)

6.2 Storage and Collection of MSW.

6.3 Transfer and Transport of MSW.

6.4 MSW Disposal and Treatment methods.

7 The Income Effect

8 The spirituality (Religion) effect.

9 Research methodology and the Data (The Structural Equation Model)

10 Hypotheses and Research question

11 Data analysis and Results Presentation

13 Discussion of results

15 Conclusion and Theoretical and practical Implication

16 Limitations

7 Proposed Time Table.

SECTION OF THESIS	PLANNED EXECUTION DATE
Introduction	July
Literature review	July and August
Data analysis	September
Results presentation and Discussion	October
Planned Colloquium date	November

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