CULTURE OF MUNICIPAL SOLID WASTE MANAGEMENT: ANALYSIS OF VALUES, ATTITUDES AND BEHAVIOURS

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Thesis Supervisor

In Dedication, my Mother and Father for making me be who I am and my beloved husband for supporting me all the way

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ABSTRACT

Culture of municipal solid waste management: analysis of values, attitudes, and behaviours

Developing countries like Sri Lanka are having huge stinking garbage dumps which is a "silent looming crisis" as cities grow day by day. Even though, there are strategies already implemented in municipal solid waste management (MSWM), most of those were either failed or not sufficient to address the current waste crisis. This is mainly due to the poor planning and implementation practices in MSWM, where the relevant authorities are responsible. They are not enthusiastic in pursuing solutions for the growing public concerns towards MSWM. Because they are not aware about the exact importance of proper MSWM for the country. Thus, there is a need of an attitudinal and behavioural change to overcome this problem. Despite the availability of research on community attitudes and behaviours in MSWM, a gap in literature could be identified in identifying the values, attitudes, and behaviours of authorities in planning and implementation of MSWM in Sri Lanka. Therefore, this research intends to provide a culture-based solution for MSWM by investigating values, attitudes, and behaviours of authority personals in MSWM. A Comprehensive literature review was conducted to review the concepts of value, attitude, and behaviour in MSWM context, including the waste management strategies adopted in MSWM. Positioning this research in an interpretivist stance, a qualitative approach was used adapting qualitative survey as the research strategy to achieve the aim of the research. Seventeen semi structured interviews were held with the key authorities who responsible for planning and implementation of MSWM in Sri Lanka. Manual content analysis was used to analyse the results of qualitative survey. The verdicts of the research revealed the common MSWM practices in Sri Lanka, which are open dumping, landfilling, composting, adaptation of 3R concept and so on along with the accompanying values, attitudes, and behaviours. Positive values, attitudes and behaviours along with noteworthy negative values, attitudes and behaviours such as community cooperation is less in MSWM, open dumping of waste is the easiest method of getting rid of waste and adapting new technologies is not affordable to Sri Lanka, which is result in the behaviours like open dumping of waste without any treatment and reluctancy in allocating fund for latest technologies in MSWM. Although many positive values are held by Sri Lankans in MSWM, such values are not reflected through the attitudes and behaviours. Moreover, it was revealed through the findings that future positive behaviour of an individual influences changing the attitude of another while creating a positive value to the authorities responsible for MSWM. Thus, the research could be concluded that behaviours should be improved as it was already revealed that the cycle of culture management can do a great influence on managing MSW. Finally, the study was concluded by proposing strategies to manage MSW from a cultural perspective by refining the conceptual framework. The knowledge generated through this research can be used by respective authorities in Sri Lanka in successful planning and implementing MSWM strategies.

Key words: *Attitudes; Behaviours; Authorities; Culture; Municipal Solid Waste Management (MSWM) Value*

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ABBREVIATIONS

CEA	- **C**entral **E**nvironmental **A**uthority
GDP	- **G**ross **D**omestic **P**roduction
ISWM	- **I**ntegrated **S**olid **W**aste **M**anagement
MC	- **M**unicipal **C**ouncil
MSW	- **M**unicipal **S**olid **W**aste
MSWM	- **M**unicipal **S**olid **W**aste **M**anagement
UC	- **U**rban **C**ouncil
UDA	- **U**rban **D**evelopment **A**uthority
WtE	- **W**aste to **E**nergy

CHAPTER 01

1.0 INTRODUCTION

1.1 Background

Exponential population growth, urbanisation and developments of economies together with the enrichment of living standards have triggered changes in consumer choices, which led to a dramatic upsurge in the Municipal Solid Waste generation (MSW) (Karak, Bhagat, & Bhattacharyya, 2012; Alzamora & Barros, 2020). Ibáñez-Forés et al (2018) describes that the volume of MSW has a continuous growth compared to Gross Domestic Production (GDP). Generally, MSW is generated from commercial, domestic, and construction activities, which includes both inorganic and organic waste such as kitchen reuse, glass clippings, product packaging, cloth, paper, bottles, batteries, paint cans, and polythene bags to name a few, which are produced in the society and is collected and treated by municipalities (Karak et al., 2012). Zhao et al. (2011) explains that due to the upsurge of the MSW generation, the composition of MSW is also drastically changing which imposes an enormous pressure on the environmental stability, human health, and Municipal Solid Waste Management (MSWM) systems.

According to Melnyk and Kravchenko (2019), globally, about 1.3 billion metric tons of MSW was generated as per the estimations in 1990 and by the year 2025 these are expected to surge approximately 2.2 billion tons/year. Moreover, Khandelwal, Dhar, Thalla, and Kumar (2019), explains that on average, developed countries are generating 521.95–759.2 per year and typically 109.5–525.6 kg per person by developing countries. According to the area or the region, country and even within cities or villages these rates might be vary (Palacio et al., 2019). MSWM in Sri Lanka, as a developing country is also not at an acceptable level. The local authorities amass only a fraction of the total MSW generated in Sri Lanka (Gunasekara & Gunaruwan, 2016). Hikkaduwa, Gunawardana, Halwatura, Youn, and Hee (2015) elaborates that 3,242 Mt of waste is collected daily by local authorities. Moreover, the highest amount of waste (1,783 metric tons) is collected daily in Western province. The authors further indicate that composition of MSW collection as: 49.5% (1,696 Mt) from Municipal

Councils; 33.1 % (1,133 Mt) from Divisional Councils, and 17.4% (594.5 Mt) from Urban Councils.

According to Manaf, Samah, and Zukki (2009), the increasing rate of MSW is mainly due to the poor management of waste. i.e. irregular and low collection of waste, crude open dumping, absence of water and air pollution control systems in burning and treating waste and informal scavenging activities. This unsanitary and unscientific practices could be observed in most of developing and least developed countries (Sharholy, Ahmad, Mahmood, & Trivedi, 2008; Khandelwal, Dhar, Thalla, & Kumar 2019). Similar to most of developing Asian countries, the common MSWM practice in Sri Lanka is open dumping without any treatment (Sharholy et al, 2008; Bandara, 2010; Basnayake et al, 2019). Furthermore, in Sri Lanka there are several large-scale and medium scale open dumpsites around the main city (Gunasekara & Gunaruwan, 2016). According to Karunarathne (2015), open burning, landfilling, composting, and disposal processes are also practicing up to some extent in Sri Lanka.

It is noticeable that the relevant authorities are being unable to respond to the increasing demand for MSWM services (Hilles, 2011). This state is far more critical in most of the developing countries due to the diversified factors which are affecting different stages of waste management process like legal requirements, unplanned management, international influences, operational and maintenance cost, technical and financial affordability, infrastructure and technology by deterring an adequate MSWM system by the local authorities (Alwis, 2008; Hogland, Guerrero, & Maas, 2013; Moya, Aldás, Jaramillo, Játiva, & Kaparaju, 2017). In highlighting the significance of attitudes and behaviours, Ekere et al. (2009) and Scheinberg, Spies, Simpson, and Mol (2011) emphasised that cultural and socioeconomics aspects are also enormously affecting the MSWM. There is a strong relationship between the waste and culture, which is influential to the waste generation and as well as waste management (Hawkins & Muecke, 2002).

Culture can be identified as what a group will learn with time to solve its challenges in internal integration and challenges of survival in an external environment (Schein, 1990). When inferring further, within the context of culture, a group will be sharing

the ultimate fundamental determinants of espoused values, attitudes, feelings, and overt behaviour (Kroeber & Kluckhohn, 1952; Hofstede, 1984; Schein,1990). Among above mentioned determinants, most of the activists in sustainable development highlight the importance and relationship between human values, attitudes, and behaviours (Leiserowitz, Kates, & Parris, 2006). Values are the abstract ideals, inducing emotional reactions and are expressed as desirability or avoidance, better or worse, good, or bad (Brigitte, 2017). Those are directing the path to goals, frame attitudes, and offer standards in contradiction of which behaviours of societies or individuals can be judged (Barr, 2007). Values are the core principles and ideals, which are also an expression of people's motivational goals upon which an entire community exists (Hicks, Cinner, Stoeckl, & McClanahan, 2015). Attitudes can be identified as the evaluation of behaviour as positive or negative, good or bad or evaluation of specific object and quality (Nordlund, 2009). Likewise, behaviours can be any action, or a specific decision taken by an individual or a group which is based upon a rooted attitude (Hilles, 2011). Leiserowitz et al. (2006) indicate that through attitudes and behaviours, values are often be expressed. Thus, it is evident that values embedded in waste management is also can be expressed through waste behaviours and attitudes (Tucker & Speirs, 2003). For instance, the study done by Shrum and McCarty (1994) on recycling as a waste management strategy identifies that value factors like collectivism, self-gratification, security which affecting the positive or negative attitudes like "recycling is inconvenient", resulting them to behave in a way that they do not actively participate in recycling.

The generation and management of waste is influenced by the community culture as well as the culture of pertinent authorities of a particular country (Zhuang, Wu, Wang, Wu, & Chen, 2008; Scheinberg et al., 2011). On the other hand, De Kadt (1999) highlights the necessity of understanding the existing culture of people bringing in suitable changes to the culture to create sustainable solutions to waste management. Because the attitudes and behaviours of waste management authorities are no less critical as attitudes and behaviours of the community to establish a successful waste management. Brown (2015) explains that the behaviour and attitude for waste management of authorities differ corresponding to the development level of a country.

Developed countries such as the United States of America have effectual MSWM mechanisms (Shanks, Platt, & Rathje, 2004). Further, nearly developed countries such as China exhibit positive environment behaviours with new conducts of approaching MSWM by stressing the significance of waste reduction and encouraging recycling (Chen et al., 2011). Developing countries such as American Samoa displays under-collection of refuse, lacking the desire to dedicate scarce land towards increased demand of landfills and conducts a number of public information campaigns about MSWM (Shanks et al. 2004). Hence, De Kadt (1999) stresses that a culture should be created within the society, where consumers buy products concerning on durability, reusability, and recyclability, while manufacturers produce which are more readily reusable or recyclable. Accordingly, the platform for above mentioned mind set should be set by the authorities of a country who are responsible for waste management where they profoundly depend upon their attitudes and behaviours (Jatau, 2013). Bringing in empirical evidence, waste management programs, notably waste treatment practices ignoring the social aspects are always leading to failure (Joos, Carabias, Winistoerfer & Stuecheli, 2010). Authority involvement in planning and implementation with their value systems and behaviour are no less crucial than technical and economic aspects in research of MSW and in decision-making. Hence, this study will identify, “how to improve the management of MSW by local authorities through a cultural approach”.

1.2 Research Problem

Countries like Sri Lanka are already allocating a high proportion of their municipal budget for MSW because of high costs allied with its management. Yet, MSWM is a crucial challenge for most of developing countries. This is mainly due to the lack of understanding on diversified factors, which affect the MSWM, including the linkages required to assist the functioning of entire waste handling system (Guerrero et al., 2013). The recent tragic incident in Meethotamulla is one of the superlative examples for the consequence of poor MSWM in Sri Lanka (Mallawarachchi & De Silva, 2017). Additionally, the most recent problem in Arawakkalu waste dumping site which halted the collection of garbage in Colombo for three days is also can be acknowledged as a effect of poor decision making of MSWM authorities (The Sunday Times, 2019; News First, 2019)

Even though an enormous amount of finances were spent within past two decades, very limited solutions for MSWM have been generated which could considered to be successful (Muller, 2002; Minelgaitė, & Liobikienė, 2019). Most of the outcomes were either not economically feasible or unacceptable to the community (Mintz, Henn, Park, & Kurman, 2019). According to a study done by Gunawardena and Udugama (2016), local authorities in a country are obligated by the Law to provide MSWM services. However, the responsible authorities are unable to provide a satisfactory level of service in related to MSWM (Perera, 2003; Spoann, Fujiwara, Seng, & Lay, 2018). While the populated and wealthier local authorities are sustaining higher waste collection coverage compared to other authorities in other countries, the perception of having a socially and an environmentally acceptable disposal system is still new concept to all (Karunasena, Amaratunga, Haigh, & Irene, 2009; Spoann, Fujiwara, Seng, & Lay, 2018). Even with the growing public concerns in waste management, most of the authorities are still not enthusiastic in seeking more constructive and sustainable solutions (Gunawardena & Udugama, 2016). For instance, in Sri Lanka, there is a conventional approach of MSWM system which is more concerned on collection and disposal disregarding on concepts of reuse and reduction, without any encouragement towards an obligatory social partnership with regards to MSWM (Mallawarachchi & Karunasena, 2012; Fernando, 2019).

Thus, it is observable that the problem lays within the authorities as they provide MSWM solutions without touching the minds and hearts of the community. The problem being identified by Karunarathne (2015) is that still Sri Lankans including the authorities are not aware of, why waste management essential for the country. There are numerous studies have been done on the impact of community in MSWM, but there are only fewer studies are been done in relation to the authorities and their impact on MSWM (Fernando, 2019). Further mentioned that people need attitudinal and thus a behavioural change to overcome this problem. Mwiinga (2014) highlighted that cultural values impact the attitudes and behaviours of people in the formation of successful waste management strategies. There are limited number of cultural studies done on MSW since most of the research has overlooked the gravity of the cultural concerns during MSW management, as highlighted essentially by Joos et al. (2010).

Since cultures are diverge across countries, cultural studies are mostly demanding discrete studies for separate geographical regions. Since there are only a limited number of cultural studies are been done of MSW specifically in an authority perspective in Sri Lankan context, this research intends to fill these existing research gap. Thus, as a timely requirement with the prevailing circumstance there is a necessity of exploring the cultural values, which are shaping the attitudes and behaviours of authorities who are managing waste which contribute to the achievement of sustainable success in MSWM. Hence, this study identifies, how to manage MSW successfully through a cultural approach through the manifestations of values, attitudes, and behaviours.

1.3 Aims and objectives

Aim: Analyse the cultural values, attitudes, and behaviours of local authorities to better manage municipal solid waste in Sri Lanka.

To achieve above mentioned aim, below objectives are formulated:

01) Review the concept of 'cultural manifestations' (values, attitudes and behaviours) in solid waste management
02) Investigate the municipal solid waste management practices of waste management authorities in Sri Lanka
03) Derive the existing cultural values, attitudes, and behaviours of authorities in municipal solid waste management
04) Develop a framework to enhance management of municipal solid waste by recommending strategies to improve the existing adverse cultural behaviours, attitudes, and values of authorities

1.4 Significance of the research

This research is contributing to the knowledge domain of cultural behaviour in waste management by broadening the understanding of the cultural manifestations; values, attitudes, and behaviours in MSWM. Moreover, the methodology to be set out to derive such manifestations is also be a new contribution to the knowledge, since the data collection was done in an indirect form which was context-specific to municipal

solid waste management. This research unveiled the values, attitudes and behaviours hidden within different local authorities and community regarding the MSWM. The knowledge created about cultural manifestations provides reasons for the failure of many MSWM practices already being initiated in Sri Lanka. Further, such understanding of reasons helps to predict possible corrective actions too. Accordingly, the output of this research (i.e. a framework for better management of MSW in Sri Lanka) is helpful for negotiations between the local authorities and community for successful management of MSW and to enhance the decision-making processes of the local authorities.

1.5 Research Methodology

The study was conducted through several stages. Initially, a thorough literature review was carried out to explore the concepts of solid waste management and cultural manifestations in order to achieve the first Objective of the study. Under the cultural manifestations, the concepts of values, attitudes and behaviours and the relationship among those manifestations was discussed using the sources such as journal articles, books, reports, newspapers, conference proceedings. Based on the literature findings, a conceptual framework was developed in this stage.

The research question for this study is “how to improve the management of MSW by local authorities through a cultural approach?”. A qualitative research approach was undertaken to achieve the aim, which is to analyse the cultural values, attitudes, and behaviours in MSWM authorities in Sri Lanka. The research strategy followed was a qualitative interview survey research strategy using semi-structured interviews with the authority personals who are engaged in the planning and implementation of MSWM strategies in Sri Lanka. Therefore, purposive sampling, which falls under non-probability sampling, was chosen in selecting the sample, and sample size was rely upon the data saturation. Through these, the Objectives 2 and 3 were achieved in this stage. The collected data was analysed using content analysis, and ultimately, a framework was developed using the analysed data. Thus, the Objective 04 of the study was achieved.

1.6 Scope and Limitations

The waste type considered in this research study was MSW, which is considered to be a predominant matter in Sri Lanka among the waste types of industrial wastes, agricultural wastes, hazardous wastes, and construction and demolition wastes (Kawamoto, 2014). Data were collected from authority personnel who are responsible for planning and implementation of MSWM strategies in Sri Lanka by covering the provinces which are having a higher rate of MSW generation (i.e., Western Province, Southern Province and North Western Province). The term "authority personnel" indicates all authority personnel responsible for waste management within Sri Lanka.

1.7 Chapter Breakdown

Chapter one –Introduction

The chapter one includes an introduction to the research study, providing a background to the research study, aim, objectives, scope and limitations of the study and elaborating the structure of the report.

Chapter two – Literature Review

The chapter defines the concept of MSWM and cultural manifestations including values, attitudes and behaviours in MSWM. A conceptual framework was thereby developed using the findings of literature review.

Chapter three- Research Methodology

This chapter consist with the methodology which was used to conduct the research including research process, research design, research approach and strategy and ultimately the data analysing method. Methodology chapter also includes the steps taken to enhance the trustworthiness of the research.

Chapter four – Research findings and Data analysis

This lead includes data collection, analysis on the MSWM practices in Sri Lanka, responding cultural values, attitudes and behaviours of local authorities in MSWM and development of a framework for better management of MSW through the

understanding of values, attitudes and behaviours of local waste management authority personnel in Sri Lanka.

Chapter five – Conclusions and Recommendation

The last chapter of the research emphasises the conclusions, necessary practical solutions as recommendations and further research areas.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

The chapter 02 gives a detailed explanation of the cultural manifestations in Municipal Solid Waste Management (MSWM). Chapter initiates with a brief discussion about Municipal Solid Waste (MSW) and MSWM. Then, it describes the culture and its manifestations, highlighting values, attitudes, and behaviours. Consequently, the values, attitudes, and behaviours of personals who are responsible for MSWM are identified through the literature review. Finally, a conceptual framework is developed based on the literature findings, which provides the basis for this study.

2.2 Introduction to Municipal Solid Waste

Solid waste can be referred to non-liquid waste created from trade, domestic, industrial, commercial, mining, agriculture activities, and public services (Ramachandra, Bharath, Kulkarni, & Han, 2018). It can be any movable semi-solid or semi-liquid object which are discarded as unwanted and useless (Mbu, 2015). Further, solid waste comprises of both organic and inorganic waste components, and they will pocesses no any value to its first user (Ramachandra et al., 2018). According to Modal (2018), forms of solid waste can be categorised mainly as MSW, industrial wastes, agricultural wastes, bio-medical waste and hazardous wastes. From above the identified types of waste, only MSW is considered in this study. MSW can be defined as the waste that is generated from the households, commercial waste from the hotels, schools, offices, commercial buildings in a municipality (Chifari, Lo, Matsumoto, & Tasaki, 2017).

2.2.1 Composition of MSW

Waste composition is the classification of forms of materials in MSW (Dahlén & Lagerkvist, 2008). The physical characteristics and the compositions of MSW are depended upon numerous factors, i.e. demography, socioeconomic profile, collection frequency, the extent of recycling, climatic conditions and so on (Burnley, 2007). Utilising the studies reported earlier on physical categorization of MSW, eight (08) different components of waste stream has been identified, namely food and green,

plastic, glass, paper and cardboard, rubber and leather, wood, metal and other miscellaneous waste as elaborated in Table 2.1.

Table 2.1 - Physical classification of MSW

Component	Material
Food and Green	Food waste (e.g. fruit skins, food and vegetable refuse, corncob), yard litter (e.g., grass, leaves, tree trimmings), etc.
Paper/ cardboard	Paper bags, corrugated board, cardboard, newsprint, box board, tissue, magazines, office paper, mixed paper, and etc.
Plastic	High-valued plastics LDPE bottles (shampoo bottles, detergent bottles, etc.), polypropylene bottles PET bottles, Low valued plastics (Polythene plastic bags, polystyrene plastic packages such as mess tins made from flexible plastics and plastic cup for yoghurt, ice-cream, etc.)
Metals	Ferrous (e.g., food cans, etc.), non-ferrous (e.g., aluminium cans, foil, ware, and bimetal, etc.), fence, wire, bottle covers, knives, etc.
Glass	Glassware, bottles, ceramics, light bulbs, etc.
Rubber and leather	Unvulcanised compound from process, scorched compound (large volume), trims and flashes
Wood	Scrap wood from sawmills, unprocessed wood offcuts from building sites (scaffolding planks, struts), used wood includes wooden building parts and wooden materials such as wooden packaging (crates, palettes), wooden furniture
Miscellaneous	Soil, stones and silt, dust, ash, other inorganic materials, used medical waste, batteries, Nappies/sanitary products, discarded clothes etc

Adapted from: Qu et al. (2009); Eddine and Salah, (2012); Bajic´ et al. (2015)

When considering about the global composition of waste, according to a recent study done by Kaza, Yao, Bhada-Tata, and Woerden (2018), the highest proportion of MSW is food, and green waste (44%) and the percentage of paper and cardboard is about 17%, glass 14% and plastic takes of 12% of the total composition of MSW as shown in Figure 2.1.

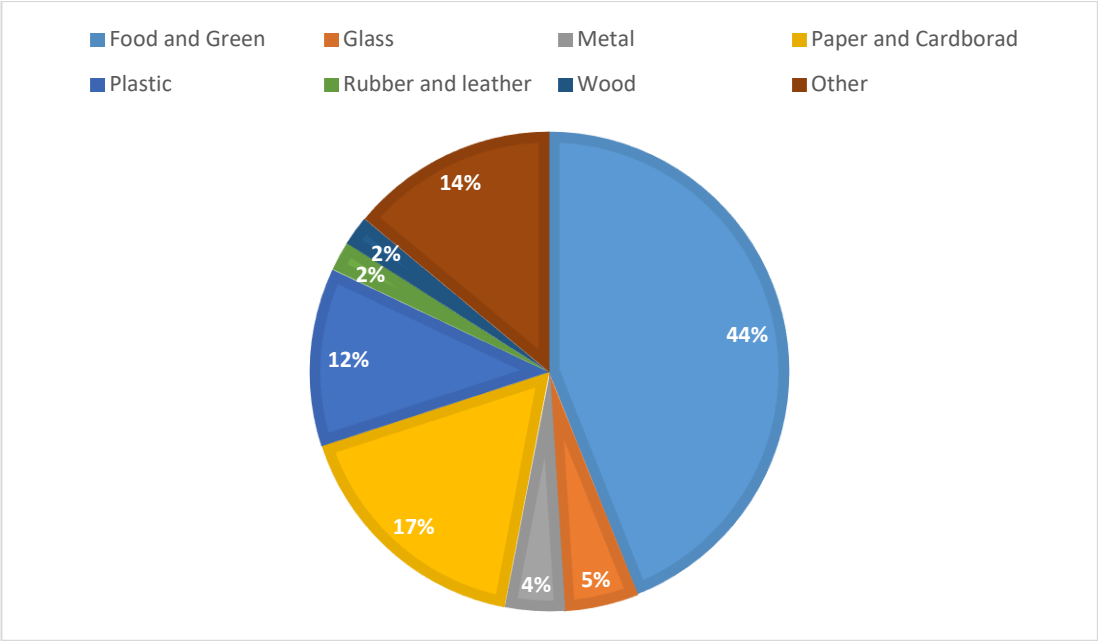

Figure 2.1 - Global composition of MSW

Source: Kaza et al. (2018)

According to Kaza et al. (2018) previous studies have identified that about ten years back, 0.64 kg of MSW was generated by 2.9 billion of urban residents per day per person. However, today it is increased up to 1.2 kg per person per day with a population of 3 billion urban residents (Refer Figure 2.2). The present generation level of MSW is almost 2.01 billion tonnes per year. The predicted MSW generation by the year 2030 will be about 2.59 billion tonnes, and in 2050, it has a projected increase of up to 3.40 billion tons Kaza et al. (2018). In lower-income countries, MSW generation levels will be more than twice of the present status within next twenty years.

As shown in Figure 2.3, when comparing the waste generation status among the regions worldwide, highest generation of waste was reported in Pacific and East Asia, 468 million tons (23%), and 129 million tonnes (6%) in the Middle East and North Africa, the lowest waste generation worldwide. In the South Asian region, wherein Sri Lanka is included, reported, MSW generation of 334 million tonnes (17%).

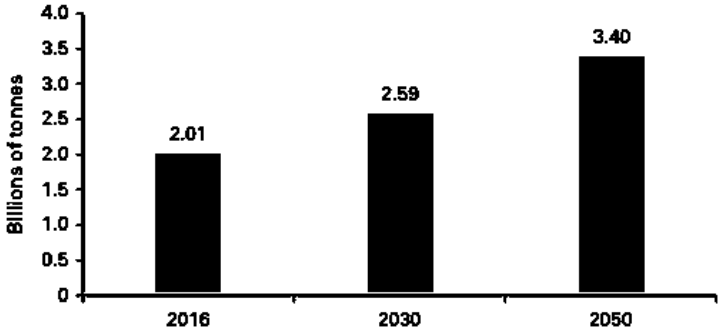

Figure 2.2 - Projected Global MSW Generation

Source: Kaza et al. (2018)

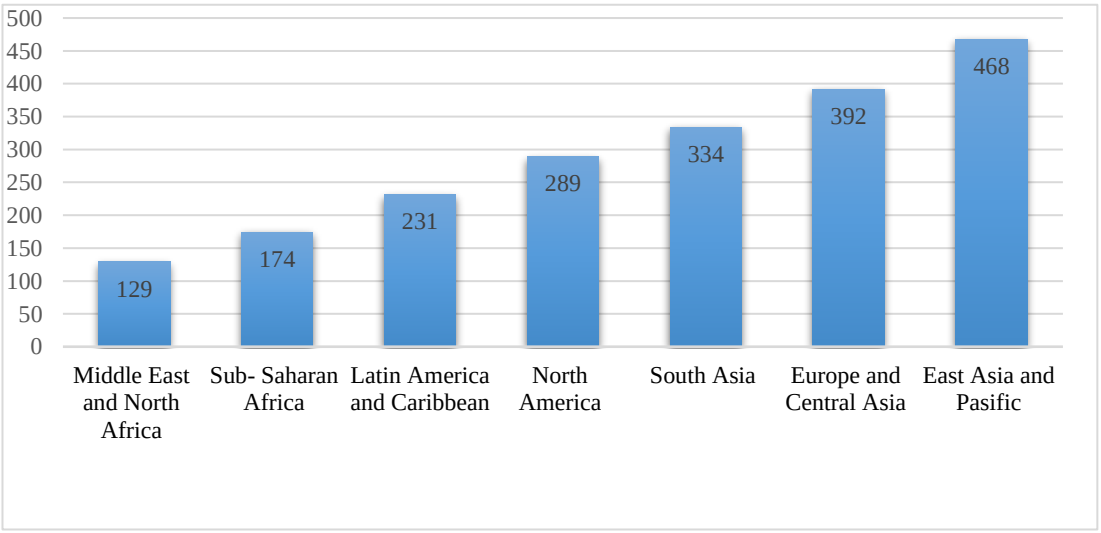

Figure 2.3 - Amount of Waste Generated by Region (Millions of tonnes per year)

Source: Kaza et al. (2018)

Shifting of countries from low-income to middle- and high-income levels, affect the development of their waste generation situations (Dahlén & Lagerkvist, 2018). Progress in wealth and shifting to urban areas are associated with the rise in production of waste per person. Moreover, rapid population growth and urbanisation produce outsized population centres, which has made the waste collection and the acquiring of land for treatment and disposal more and more challenging (Kaza et al. 2018). Thus, in Sri Lanka, as a middle-income country, MSW generation is around 6,500 to 10,000 metric tons per day of which 50% is collected and disposed of by local authorities (Gunawardena & Udugama, 2016). Table 2.2 includes the MSW generation rates in

Sri Lanka according to the statistics gathered from the Japan International Cooperation Agency (JIKA), (2016). Accordingly, the highest amount of MSW is generated in Western province, which collects 3502 metric tons of MSW of which Colombo Municipality is responsible for 775 metric tons per day, and the least amount of MSW generation has been recorded from Northern Province. According to the research done by De Silva and Yatawara (2017) indicates, MSW generation per capita in many municipalities are between 0.5 to 1.09 kg on a daily basis. Further, food and organic waste take the highest proportion in the composition of MSW, which includes the waste generated from households, markets such as tree cuttings, paddy, sawdust (De Silva & Yatawara, 2017). Hence, the moisture content of MSW is relatively above average, and there is a low calorific value due to the absence of high thermal value substances in MSW in Sri Lankan context.

Table 2.2 - MSW generation rates in Sri Lanka

Province	Generation Amounts (ton/day)	Percentage
Northern	566	5%
Eastern	785	7%
North-central	616	6%
North-western	1134	11%
Central	1585	15%
Sabaragamuwa	835	8%
Uva	587	6%
Western	3502	33%
Southern	1158	11%
Total	10768	100%

Source: Japan International Cooperation Agency (JIKA) (2016)

The reason for the mass generation of MSW is due to the speedy growth of population, urbanisation, economic developments, and the upsurge of consumer choices (Palanivel & Sulaiman, 2014). Moreover, some researchers have pinpointed factors affecting the quantity of produced MSW. Following Hogland et al. (2013), the MSW generation is shaped by the scope of the family, income, education level, peer influence, gender, land size, the setting of the household and participation of environmental organisations. The study carried out by the Eastern European countries (Lithuania, Russia, Ukraine, Georgia) specified that the MSW generation alters on the economic

aspects, cultural, regional aspects, and the social, behavioural patterns (Denafas et al., 2014). Additionally, Chandrappa and Das (2012), highlighted that new wrapping materials, new living approaches, expectations and lifestyles also led to a surge in the waste generation.

The global nature of MSW includes the contribution to GHG emissions, for instance, the methane emission from the organic fraction of waste stream, and the growing global linkages of products, urban practices, and recycling industry. Further, Sharholy et al. (2008) and Verma, Borongan and Memon (2016), explains that rapid generation of MSW are leading to many problems in terms of biological, economic, environmental losses such as waste from the street resulting blockages of drains, water pollution soil pollution bad smell, communicable diseases, growth of insects and public nuisance is inviting scavengers (Sharma et al., 2013). Waste transportation and waste treatment will root for airborne releases of, NOx, SO2, dust and CO2, CH4, N2O as well (Yang et al., 2017). Moreover, Sharma et al. (2013) highlighted in undeveloped countries the problem of MSW is mainly owing to lack of awareness, funds, technology, resources, knowledge and education.

The emission of greenhouse gases from MSW landfills impact the atmosphere and be led to global warming and changes in the weather condition (Weitz, Thorneloe, Nishtala, Yarkosky, & Zannes, 2017). Moreover, industrial waste and MSW are significant reasons for the problem of surface pollution and groundwater pollution (Vishwakarma, Kulshrestha, & Kulshreshtha, 2012). Hence, due to above discussed issues, the management of waste is becoming a key challenge, and this is a more severe issue for the developing countries more than the developed countries (Potdar et al., 2016). Therefore, the next section discusses the previous literature on MSWM, including the methods of MSWM and issues engaged in MSWM.

2.3 Municipal Solid Waste Management Strategies

Thus, a proper MSWM system is essential to control the issues in generation of MSW, such as collection, processing, transportation and mainly the problems like atmospheric emissions, bad odour, and so on arouse due to the landfilling. Moreover, MSWM will upsurges the urban environmental quality, reduction of environmental

impact, income generation and support to boost the productivity of an economy (Ogwueleka, 2009). Further, the studies conducted by Sharholy et al. (2008), Saxena, Srivastava, and Samaddar (2010) and Tan et al. (2015) emphasise that MSWM comprises with the activities such 1] generation, 2] segregation, collection, and transport 3] disposal/treatment MSW. According to Hoornweg & Bhada (2012), managing MSW is an intensive service. Moreover, municipalities require capacities for procurement, managing contracts, professional and unionised labour management, and continuing expertise in capital and operating budgeting. Similarly, MSWM requires a sturdy social convention between the community and municipality. These skills are prerequisites for other municipal services as well (Hoornweg & Bhada, 2012).

There are many methods of MSWM, but Moghadam et al. (2009) reported that open dumping, landfilling, composting, and incineration are the methods which are used as the MSW disposal methods worldwide. Moreover, recover of glass, plastics, paper, and metal which are collected by the individual collectors is also can be considered as a significant method of MSWM (Metin, Eröztürk, & Neyim, 2003). The open dumping system has developed up to options such as landfilling, incineration, recycling, and energy recovery (Zia & Devadas, 2007). Studies conducted in India have identified that landfilling become more prevalent in India as MSWM practice because it is cheaper and there is no requirement of a proper plan, although there are other methods of MSWM (Rajasekhar et al. 2015). These Strategies in MSWM can be explained furthermore through the waste management hierarchy as in Figure 2.4.

Demirer (2006), reported that waste management hierarchy is also a great way of categorising the available MSWM methods from least desirable to most desirable as shown in Figure 2.4. Simultaneously, the most favourable MSWM methods are waste minimisation, waste reuse, material recycling, thermal treatments and land disposal, as mentioned in the waste management hierarchy (Tan et al., 2015). Moreover, Fodor and Klemes (2012) stated that MSWM is the management of waste according to the waste management hierarchy.

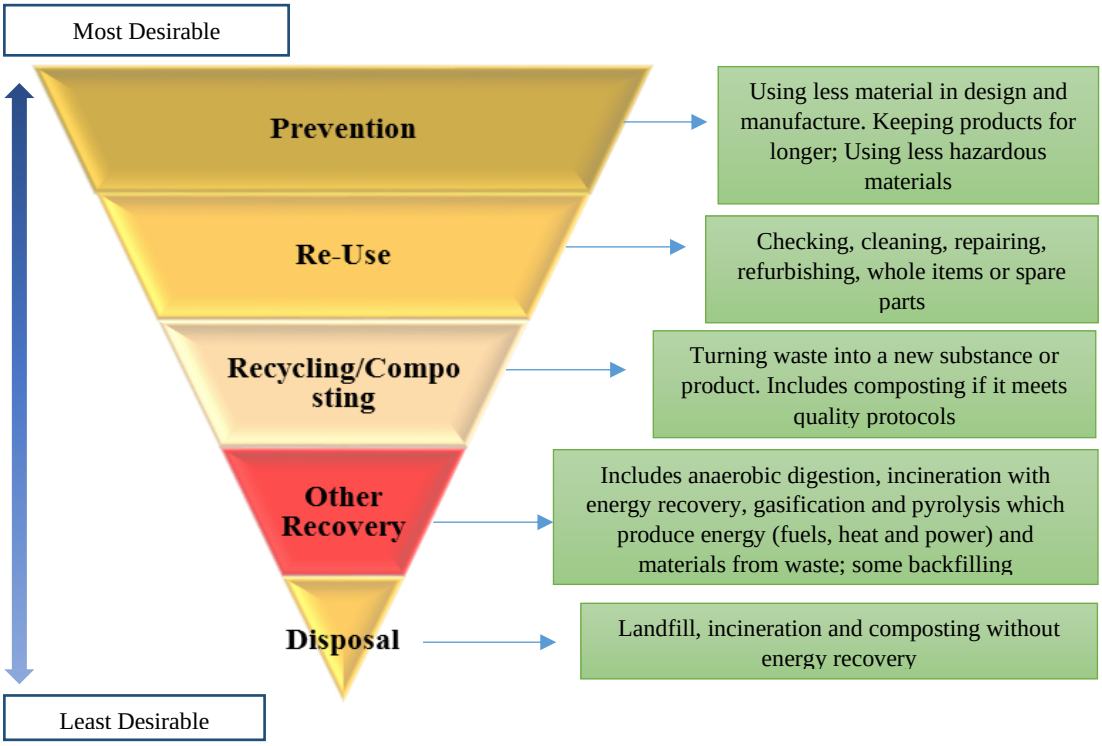

Figure 2.4 - Waste management hierarchy

Source: adapted from Department for Environment Food and Rural Affairs, (2011); Cucchiella, D'Adamo, & Gastaldi, (2014); Waste Management Hierarchy, (2016)

Prevention: In waste management hierarchy, this is the most desirable MSWM option (Waste Management Hierarchy, 2016). Prevention highlights that all the products or the materials should be designed and produced in a way that reduce its waste components or the reduction of the usage of natural materials or the potential harmfulness waste generation during the production and the after use (Gertsakis & Lewis, 2003).

Reuse: Reusing can be relating to the products, materials which are still having a potential of reusing (Aadal, Rad, Fard, Sabet, & Harirchian, 2013). Initially, the waste separation should be done to identify the waste which can be reused, then those waste should be collected and transported to the place where sorting and cleaning are done and ultimately prosses them to produce a marketable material and sell the final product (Kofoworola, 2007).

Recycling and composting: Recycling can be identified as a better MSWM system because the waste is considered as a resource which has the potential for producing another product (Aadal et al., 2013). Paper, glass, plastics, metal, batteries, electronic and electric items are the most common waste types which are using for the recycling (Hogland et al., 2013).

Other recovery: MSW can be converted into energy, various chemicals, and as compost (Bonk, Oyanedel, & Schmidt, 2015). Ng, Lam, Varbanov, and Klemeš (2014) further explains that MSW can be used for the generation of heat energy and biofuels like char, bio-oil and syngas, which will be positively affected for the reduction of the volume of the MSW using different types of thermal conversion techniques. Hence as a substitute for fossil fuels, syngas which is produced by treating the MSW can be used for the electricity and heat creation (Bonk et al., 2015). Furthermore, Bonk et al. (2015) identified that by treating the residues generated in urban areas, forest residues, animal residues and agricultural residues, biomass energy also could be generated.

Disposal: In the waste management hierarchy, this is the least desirable MSWM option (Waste Management Hierarchy, 2016). Disposal includes landfilling, incineration, and composting (Ekmekçiog˘lu, Kaya, & Kahraman, 2010), And open dumping is the most preferable disposal method of MSW in most of the developing countries. Landfills are the most widespread waste disposal technique and are important part of an integrated waste management system (El-Fadel, Findikakis, & Leckie, 1997). Methane gas, a by-product of decomposing waste, can be accumulated and utilised as fuel for electricity generation. When a landfill is overlaid, the land could be used for recreation sites such as ski slopes, parks, and golf courses (Swati, Vijay, & Ghosh, 2018).

However, the tendency of applying an option within a country or a region according to the waste management hierarchy depends upon the population density, socioeconomics, topography, transportation infrastructures and imposed environmental regulations (Sakai et al., 1996). Further several studies proposed Integrated Solid Waste Management (ISWM) approach which is proposed as a holistic solution for MSWM (Abdoli, Rezaei, & Hasanian 2016; Ikhlayel, Higano, Yabar, & Mizunoya, 2016; Tsai et al., 2019).

- **Integrated Solid Waste Management (ISWM)**

Ikhlayel et al. (2016) and USEPA (2002), emphasise that an effective ISWM system considers integrating of prevention of waste, composting, recycle, and manage/disposal of solid waste in a most effective manner to protect human health and environment within a single system. Identifying the local needs and conditions, selecting and merging the most appropriate waste management activities for idetified conditions could be evaluated through a ISWM system. The ISWM activities includes waste prevention, recycling and composting, and combustion and disposal in properly designed, constructed, and managed landfills (USEPA, 2002).

Countries are more likely to be successful by selecting locally fitting solutions instead of open dumping and other basic waste management methods (Rodrigues et al., 2018). The World Bank Report in 2018 mentioned that, generally, most waste is presently discarded or disposed to a landfill. 37% of waste is disposed in landfills, while 8% of waste disposed in sanitary landfills which are equipped with gas collection systems. 33% of waste are disposed in open dumping sites in which 19% is retrieved through recycling and composting, and 11% is cremated for final disposal. The most exclusive domain of high and upper middle income countries for sufficient waste disposal or treatment are controlled landfills or more strictly operated facilities while in general lower-income countries are rely upon open dumping. Whereas, low-income countries dump 93% of waste while only 2% of waste is dupmed by high-income countries. The highest percentage of waste in landfills are in the upper-middle-income countries at 54%. In high-income countries, this rate decreases to 39%, with a deviation of 35% of waste to recycling and composting and the rest of 22% for incineration (The World Bank, 2018). Incineration is used mainly in high-capacity, high-income, and land-restricted countries (Kaza et al. 2018). According to Rigamonti, Sterpi and Grosso, (2016), it is a common misunderstanding that technology is the resolution to the dilemma of unmanaged and growing waste. Thus it is only one factor to take into account when managing solid waste (Rigamonti et al., 2016)

2.3.1 Municipal Solid Waste Management in Sri Lanka

As claimed by the Municipal Council Ordinance and Urban Council Ordinance, there are 23 Municipal councils (MC) and 41 Urban councils (UC) in Sri Lanka in which waste collection and disposal is happening. Around 6400 tons/day of solid waste is produced in Sri Lanka (Visvanathan, 2006). In almost all municipalities in Sri Lanka, open burning, landfilling (not technical) and open dumping of wastes which are not counted as environmentally friendly are most often practised. Besides, nearly 85 % of MSW in Sri Lanka is subjected to open dumping (Visvanathan, 2006). Since, local authorities are not effectively and efficiently implementing the operational activities, maintenance activities, and progress monitoring and evaluations, many MSWM issues could be seen in Sri Lanka. Thus, MSW is becoming a major environmental problem and a state issue for Sri Lanka.

2.4 Challenges in Municipal Solid Waste Management

Highly developing and least developed countries are facing serious challenges at present. It can be improved if the conventional development plans are still in persistence (Vidanaarachchi et al. 2015). Similarly, this has no difference in the aspect of MSWM. In urban areas of these countries, the produced MSW is accumulated and dumped in random dump sites which lacks the suitable standards (Bonk et al., 2015). According to Sakai et al. (2016), such disposal needs to be collected, transported, and dumped into the closest open space area. Across most countries MSW is discarded into water bodies and wetlands. Considerable portion of the waste is incinerated in order to lower the volume (Sakai et al., 2016). These procedures have impacted the environment harmfully, ranging from the natural resource and ecological pollution to the initiation of health difficulties that might turn into continuing public health issues.

Furthermore, in general terms, the activities related to MSWM are considering as a public service mostly handled by the government authorities. If such arrangements are weak, lacking sufficient market mechanisms, the economic incentives would not be useful to improve and develop MSWM services (Vidanaarachchi et al. 2015). Moreover, Khatib, (2011) and Vidanaarachchi et al. (2015) explains that there is a lack of political willingness and public commitment towards proper MSWM. Swati et al.

(2018) identified, inadequate technical expertism, insufficient financial resources, unfitting allocation of available resources, and unapproachability to suitable lands for waste disposal sites are some other main challenges in MSWM.

Another issue is the absence of an effective and comprehensive legislative framework governing the solid waste management sector and insufficient enforcement mechanisms (Abas & Wee, 2014). In several developing countries in which financial resources are available, deficiencies are observed in both the human and organizational positions (Swati et al., 2018). Unavailability of the substantial amount of precise background data on the solid waste, including MSW, for instance, assessment of natural resources and land-use, rate of generation of MSW, scenarios of treatment, collection and transportation needs, which is connected to numerous driving forces also become challenging when developing MSW management systems including the sufficient supervising of the segment (Scheinberg et al., 2011; Khatib, 2011; Abas & Wee, 2014).

According to Sujauddin et al. (2008), the generation and management of waste are influenced by the community culture as well as the culture of relevant authorities of a particular country (Zhuang et al. 2008; Scheinberg et al. 2011). Bringing in pragmatic evidence, Joos et al. (2010) mention that waste management programs, specially waste treatment techniques which ignore social aspects are leading to a failure. Aspects concerning the identification of problems in public acceptance, authority participation in planning and implementation, and behaviour and values are no less important than the technical and economic aspects in waste management research and decision making. Furthermore, De Kadt (1999) highlights the necessity of understanding the existing culture of people bringing in suitable changes to the culture to create sustainable solutions to MSWM. Thus, the below sections explain in detail about the culture and its relationship with waste management.

2.5 Cultural manifestations in MSWM

Different scholars have given different definitions to the term “culture”, Table 2.3 depicts such definitions extracted from the literature.

Table 2.3 - Definitions of culture

Year	Source	Definition
1945	(Linton, 1945)	Culture is a configuration of learned behaviours and results of behaviour whose component elements are shared and transmitted by the members of a particular society.
1949	(Parson, 1949)	Culture consists in those patterns relative to behaviour and the products of human action which may be inherited, that is, passed on from generation to generation independently of the biological genes
1952	(Kroeber & Kluckhohn, 1952)	Culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artefacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered as products of action, on the other as conditioning elements of further action
1963	(Useem & Useem, 1963)	Culture has been defined in a number of ways, but most simply, as the learned and shared behaviour of a community of interacting human beings
1976	(Hall, 1976)	Culture is what gives man identifies no matter where he is born, culture is formed by communication framework: words, actions, gestures, tones of voice, facial expressions, the way of handles time, space, materials, and the way of working, plays, makes love, and defends himself
1984	(Hofstede, 1984)	Culture is the collective programming of the mind which distinguishes the members of one category of people from another

1995	(Lederach, 1995)	Culture is the shared knowledge and schemes created by a set of people for perceiving, interpreting, expressing, and responding to the social realities around them
2001	(Hofstede, 2001)	Holistic, referring to a whole which is more than the sum of its parts, historically determined reflecting the history of the organization, related to the things anthropologists' study like rituals and symbols, socially constructed, created and preserved by the group of people who together form the organization, soft, and difficult to change
2011	(Schewartz, 2011)	Culture is the press to, which individuals are exposed by virtue of living in particular social systems

Thus, according to the above definitions on culture, the researcher is suggesting that there could be individual culture, a culture of a group of people and organisational culture. Since this study focus on the values, attitudes, and behaviours of authorities in managing MSW, the culture of a group of people is chosen. Concerning the above definitions, the following working definition (refer Figure 2.5) is developed by the researcher for the use of this research;

"*Culture is shared knowledge and structures created by a set of individuals for interpreting, observing, expressing, and responding to, social realities which consist of, behaviours and attitudes (which constitute of distinctive achievement of human groups), including their embodiments in artefacts and the essential core of the culture consisting of traditional ideas and specially the attached values (which distinguishes the affiliates of one category of individuals from another)*".

Figure 2.5 - Working Definition for Culture

2.5.1 Levels of culture

According to the Schein (1985) the extent to which the cultural phenomenon is noticeable to the observer is described as the term "Level". Schein (1985) has

contended that culture is consist of three levels. Namely; assumptions, values, and artefacts which is presented in Figure 2.6.

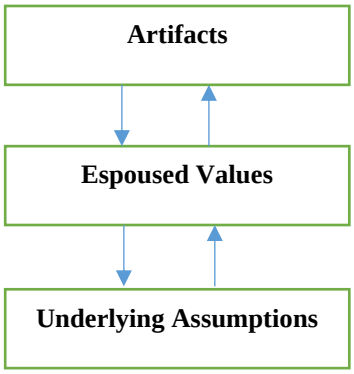

Figure 2.6 - Levels of Culture

Adapted from Schein (1985)

Assumptions are rooted, hidden perceptions of social relationships and human nature which are taken for granted. Values are the preferences of different consequences including the means of achieving those outcomes. Artefacts are the physical interpretation of culture which is solid in nature. "Widely shared and strongly held values" are characterised as the organisational culture (Chatman & Jehn, 1994). It is the value dimension of culture reflected in the cultural artefacts of an organisation (Zammuto and Krakower,1991). Moreover, culture is considerably about values (Kabanoff, Waldersee & Cohen, 1995; Ryan, 2006), which have been termed "embedded codes" (Sayers & Smollan, 2009) and values are prominent compared to assumptions or artefacts respecting the fact that values are more reliable than artefacts and more accessible than assumptions (Howard, 1998).

The below sections depict how values are important in the formation of attitudes and behaviours through the values, attitudes and behaviours hierarchy. The concepts of above-mentioned cultural manifestations will be discussed in detail afterwards.

2.5.2 Value-Attitude-Behaviour Hierarchy

The model introduced by Homer and Kahle (1988) presents how values are influencing attitudes and behaviours, directly or indirectly. Furthermore, this model explains a hierarchical relationship among the values, attitudes and behaviours. Values are influencing behaviour directly or indirectly through attitudes corresponding to this

model. Nevertheless, the main aspect of the model is to emphasise the intermediating role of attitudes on values and behavioural relations (Homer & Kahle's, 2004).

Thus, the model suggests a hierarchy of cognitions, whereas the effects theoretically flow from a more abstract cognition (i.e., value) to a medium cognition (i.e., attitude) to specific behaviour. Therefore, the model can be visually depicted in causal sequence: value → attitude → behaviour. Even though the value-attitude-behavioural intellectual hierarchy model has been applied to the varies areas (Shim et al., 1999; Vaske, Donnelly, Williams, & Jonker, 2001), such as explaining professional attitudes. Moreover, the model is mainly used for studies on environmental concerns (Shim et al., 1999). The theory suggests an individual's perception of environment can be organised into a cognitive hierarchy of values, attitudes, and behaviour (Fulton, Manfredo, & Lipscomb, 1996; Homer & Kahle, 2004). Each of these elements is built with each other, as described in Figure 2.7 as an inverted pyramid (Vaske et al., 2001).

The hierarchical impact of values, attitudes, and behaviours are found in a number of studies done on environmental issues. These studies were done to identify the effects of values on environmental attitudes and behaviour, as well as to identify the intermediating responsibility of environmental attitudes (Fulton et al., 1996; Stern, Dietz, & Guagnano, 1995; Fransgson & Garling, 1999; Garling, Fujii, Garling, & Jakobsson, 2003; Kaiser & Scheuthle, 2003; Nordlund, 2009).

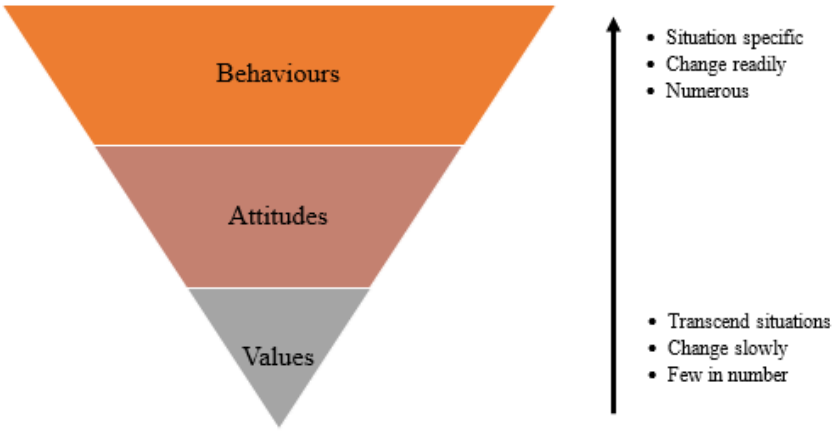

Figure 2.7 - Cognitive hierarchy model of human behavior

Adapted from Fulton et al. (1996)

2.5.3 The concept of Values

Formerly, values were considered to be philosophical concepts which were tied to virtuous morality and living (Laird, 1927). According to Nepomuceno and Porto (2010), the study of human values perceives to be good or bad by allowing the comprehension of cultural traits and fundamentals of the society. Table 2.4 depicts the definitions of the concept of value given by different researchers.

Table 2.4 - Definitions of value

Definition	Reference
A persistent belief that a particular mode of behaviour or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence	(Rokeach (1973; 1979)
Belief pertaining to desirable end states or modes of conduct that transcends specific situations, guides selection or evaluation of behaviour, people, and events, and is ordered by importance relative to other values to form a system of value priorities	(Schwartz, 1994)
Values can be viewed as representing motivations, because they are criteria used by individuals to select and justify actions, and to evaluate people, the self, and events	(Grunert & Juhl, 1995)
Desirable, trans-situational goals, varying in importance, that serve as guiding principles in people's lives	(Schwartz & Sagie, 2000)
Values are understood as motivations, which refer to goals desired by individuals	(Nepomuceno & Porto, 2010)

Values are acknowledged to be develop in childhood, shaping through socialisation, habits with interactions with the world and staying constant during adult life (Stern, &, Dietz, 1994; Vaske, et al., 2001). As steady moral guidelines, values are more fundamental, influential, salient normative, emotional, and motivational than preferences or attitudes (Reser & Bentrupperbäumer, 2005). Moreover, Grunert and Juhl (1995) explain, value is a self- centred and social-centred by defining both an individual and society. These principles are supposed to diverge in content (Grunert & Juhl, 1995). The expressive content of values can be described as intellectual interpretations of three types of common human needs (Kluckhohn, 1951; Maslow, 1959; Rokeach, 1973):

- Biologically based needs
- Social interactional privileges for interpersonal coordination, and
- Social institutional requirements for group survival and welfare

Hence, values are serving both individualistic and collectivist interests and a blend of both (Hofstede, 1984; Triandis, McCusker, & Hui, 1990). Culture and subcultures differ only in relative weight of importance on values (Clay & Fleischmann, 2011). In examining ongoing arguments, values show the importance of an issue to a party. Values are thus, a crucial next phase in unfolding the cultural dimensions of a matter of an individual. The work of Shalom Schwartz argues that human values are universal. Furthermore, human value often serves as a justification for positive or negative evaluation of a thing or reason of an action (Wallace, 1992).

Thus, values can be identified as;

"Concepts or beliefs of individuals or, groups about desirable end states or behaviours that transcend specific situations which guides the selection or evaluation of behaviour ordered by relative importance by representing motivations which are either personally or socially preferable and are influencing attitudes and behaviours"

Figure 2.8: Working Definition for Values

2.5.4 The concept of Attitudes

A widely held attitude has always been viewed as an essential aspect of culture (Kashima et al., 2015). The concept of attitude has been defined by several authors (Refer Table 2.5).

Table 2.5 - Definitions of attitude

Definition	Reference
An attitude is defined as a complex set of people's beliefs and feelings about particular concepts, situations or others	(Griffin, 1996)
Attitude is the explicit or implicit tendency to favourably or unfavourably think or feel or behave on an object or class of objects	(Gibson, Ivancevich, & Donnelly, 1997).
Attitude refers to a summary evaluation of a psychological object	(Ajzen, 2001)

Moreover, Fazio et al. (1986), Eagly and Chaiken (1998), Ajzen and Fishbein (2005) have identified the following features of an attitude.

(1) An evaluative process - relate to specific objects, concepts, or people that an individual has direct or indirect contact with. For an attitude to survive, an object should be assessed

(2) Create an assessment (positive/ negative) - the process is leading to a positive or negative evaluation

(3) Linking above two concepts

Fishbein (1966), suggested to have three components in attitudes: cognitive, affective, and conative. The cognitive component is an intellectual interpretation of an object; which is associated with knowledge, beliefs, other evidence and adjectives linked to it. The affective component is the negative or positive emotion toward an object, while the conative component entails by what means an individual wishes to behave on an object. According to the studies, attitudes may fluctuate. For instance, Petty (1995) ignored the conative component, and Ajzen and Fishbein (2005) defined attitudes only as the emotion in favour or disfavour of an object. Attitudes are also regarded as evaluative tendencies influencing a behaviour (Petty, 2006), wherein a single association exist), explicit ambivalent (both negative and positive associations exist) or implicit ambivalent (though it exists, one association is supported, and the opposite is rejected).

People have a tendency to form attitudes towards the objects, people, and ideas they confront. Established attitudes could be quite tough to change (Olson & Zanna, 1993). Attitudes have important individual psychological functions. For instance; the utilitarian function exists in attitudes which maximise rewards and minimise penances obtained from the outside environment. The knowledge functions exist in attitudes to give a connotation to the self and its relation to objections in the environment. The ego defensive function exists in attitudes to protect the ego from intolerable impulses which is causing anxiety. The values expressive function in attitude are used to express values and self-respect (Katz,1960).

Moreover, attitudes determine the tendency to certain aspects of the humankind. An individual might have a positive or negative attitude when describing to a situation or problem. Attitude provides an emotional foundation for interpersonal relationships and identity with others as well (Gibson et al., 1997). Attitudes may influence perception towards people, who may be culturally similar or dissimilar. Academics in this field paid close attention to attitudes and cultural diversity. Various studies have revealed that there are disparities in attitudes between cultures in the aspects of gender, race, financial status, and affirmative actions taken (King, 2000). Importantly, Weisbuch and Ambady (2008) stated that some cultural practices causing favourable or unfavourable responses to objects. Thus, an individual may get an implicit attitude by observing other individuals 's cultural practices which are implied by such attitudes.

Thus, attitudes can be identified as;

"*People's beliefs and feelings that could also be an evaluation favourable or unfavourable for a behaviour or on.an object or class of objects or concept or situation"*

Figure 2.9: Working Definition for Attitudes

2.5.5 The concept of Behaviour

Several theories of behaviour and pro-environmental behaviour have progressed the choice in an environmental context is not as simple as objectives. Desires are moderated by social, cognitive situations and cultural limitations (Jackson, 2004). Table 2.6 indicates some definitions of behaviour presented by different authors.

Table 2.6 - Definitions of behaviour

Definition	Reference
The organised entirety of the relationships of the living being and its environment (in the wider sense considering all relationships of whatever nature they may be; in the narrower sense considering only sensory-motor relationships)	(Pichot, 1999)
Human Behaviour refers to the full range of physical and emotional behaviours that humans engage in; biologically, socially,	(Eckhardt, 2002)

intellectually, etc. and are influenced by culture, attitudes, emotions, values, ethics, authority, rapport, persuasion, coercion and/or genetics	
The internally coordinated responses (actions or inactions) of whole living organisms (individuals or groups) to internal and/or external stimuli, excluding responses more easily understood as developmental changes"	(Levitis et al., 2009)
Verbal utterances (excluding verbal reports in psychological assessment contexts) or movements that are potentially available to careful observers using normal sensory processes	(Furr, 2009)

The social psychological models demonstrate how the cognitive processes and mechanical preferences impact on behaviour. For instance, individual practices perform a crucial role in controlling behaviour. Unconscious and routine activities, such as carrying waste to the waste bins and driving to work can require intrusions of information and incentives (Jackson, 2004).

Behaviour is an integral part of cultural adaptation strategies that are manifested in every day cross-cultural encounters, and changes in all aspects of cultural adaptation may occur at different rates (Romero, Laroche, Aurup, & Ferraz, 2018). In the study conducted in the United States, the effect seems small but consistent. Zelezny, Chua, and Aldrich (2000) reported that women have a tendency to pay more attention on environmental issues and account more involvement in environmental behaviour and activism than men. Zelezny et al. (2000) stated similar findings in children (6-10 years old) and in different cultures. Behaviour is considered a manifestation of a culture that reflects society, values, economy, race, ethnicity, religion, education, family, attitudes and other experiences. Such root causes may also affect individual ambitions, assumptions, expectations, tendencies and opinions. It is said that certain aspects of deep-rooted culture and sincere faith could be difficult to change.

In contrast, behavioural changes can be achieved quickly and relatively easily (Thomas, 2014). The survey results show that contemporary concerns about corporate values and culture are difficult to prove. If the goal is to achieve behavioural change, then achieving changes in values and culture is often problematic and unnecessary. The next section

discusses the interrelationship between cultural values, attitudes, and behaviours of people.

Thus, behaviours can be identified as;

> *"Internally coordinated retorts of an individual/group which could be physical or emotional, verbal or movements and are affected by attitudes, values, emotions, rapport, ethics, authority, persuasion, and/or genetics"*

Figure 2.10: Working Definition for Behaviours

2.6 The interrelationship between values, attitudes, and behaviours

The relationship between. [1]values and behaviours, [2]values and attitudes, and [3]attitudes and behaviours are explained in below sections.

2.6.1 Relationship between values and behaviours

The concept of human values is been explored in numerous fields which interested in its impact on behaviour. For instance, sociology (Zelizer, 1978), marketing (Kahle, 1986) psychology (Rokeach, 1979; Schwartz, 1992) and organisational behaviour (Ros et al., 1999; Kabanoff and Daly, 2000). The importance of values intended for behaviour remains in their role as the most theoretical type of social perceptions which support to understand the interpersonal world (Grunert & Juhl, 1995). Exploring cross-cultural resemblances and differences in values is also helpful in examining cross-cultural differences in concrete behaviours, because cultural variances in specific behaviours may more easily be explained by denoting to the more abstract level of peoples' cognitive hierarchy (Grunert & Juhl, 1995).

Further, scholars have used values as the utmost concealed structure for constructing behaviour (Homer & Kahle, 1988; Kamakura & Mazzon, 1991; Chryssohoidis & Krystallis, 2005). The significance of values as a guide to human life through emotional systems impacts behaviour. Value has undergone vital things, and therefore it begins to conduct itself. Comportment is driven by the strength of motivation, strength or value and depends on other factors. Although they are motivated by values, they also form a part of the behaviour. It can also be the cause and the behaviour

because the behaviour expresses something external (Cieciuch, 2017). Therefore, it can be concluded that cultural values can change people's behaviour.

2.6.2 Relationship between attitudes and values

As indicated by Dembkowski and Hammer-Loyd (1994), values are associated with abstract concepts and are more resistant to change as they are developed over a long period. Instead, attitudes are more objective and speak of objects, thus are more frequent than values and more vulnerable to change. Homer and Kahle (1988) have demonstrated that values can impact the attitudes in substantial ways, which in turn affect behaviour. The direct impact of values on behaviour is small, and the attitudes act as a mediator in the value-attitude-behaviour relationship. Although their study was performed within a particular framework (purchase of natural food), others have also demonstrated such a relationship. As presented by Maio and Olson (1995), when an attitude is expressing a value, the connection between the two constructs is observed to be stronger.

Values are cognitively related to attitudes (Hitlin & Piliavin, 2004). Attitude function has also been used to clarify the relationship between values and attitudes (Kristiansen & Zanna, 1988; Maio & Olson, 1995) (Refer Section 2.5.4). Values are the guiding principles in one's life wherein an evaluation of abstract ideas (e.g., equality and honesty) in terms of their importance (Schwartz,1992). There is a potential to influence many different attitudes as values are abstract (Fishbein & Ajzen, 1975). Mostly, value expressive attitudes are presumably based on values. Thus, it is predictable that value-attitude correspondence is strong when attitudes serves a value-expressive function (Maio & Olson, 1995) (Refer Section 2.5.4). However, the values showed little or no impact on the attitude of those who have had negative incidents with the services. The attitudes are expressing the values of the people with attitudes of environmentally concerned since they are interrelated with their personal values.

Thus, based on individual evaluations, attitudes toward action are expressed in a positive or negative continuum (Leiserowitz et al., 2006). Similarly, environmental attitudes are defined as psychological tendencies to assess environmental problems and to some degree to facilitate their disclosure (Milfont et al., 2010). More

specifically, people with an environmentally friendly attitude are concerned about the ecosystem and aim to act in a way that does not harm the environment (Steg & Vlek, 2009). Here it can be pinpointed that human pro-attitudes can form a series of values in a society. Contrastively, the pro-environmental attitude of an individual could be influenced by environmental values (Shin, Moon, Jung, & Severt, 2017).

2.6.3 Relationship between attitudes and behaviours

A study done by Dolnicar and Hurlimann (2010) about Australians water Conservation attitudes and behaviours, both attitudes and behaviours are incorporated in this study in acknowledging the fact that, although it is ultimately behaviour that matters, attitudes are known to affect behavioural intentions and behaviour (Ajzen, 1991). Moreover, Frymier and Nadler (2017), emphasize that vested interest and relevance generate links between an attitude and behaviour, creating a stronger relationship. between the attitude and the behaviour.

The way an attitude is established can also impact whether attitudes affect behaviour. When attitudes are formed through direct experience, they tend to have more influence on behaviour. Attitudes formed through. direct experience tends to be better predictors of future behaviour than. attitudes formed through indirect experience.

The research done by Dillard (1993) challenges the traditional model that attitude causes behaviour. The research on direct experience together with contemporary views of attitude imply that behaviour can be the basis of attitude formation, or in other terms, behaviour can cause an attitude to form (Dillard, 1993). Figure 2.11 illustrates behaviour leading to an attitude, which in turn influences future behaviour. If direct experience leads to attitude formation, the persuaders might plan efforts. to include behaviour first.

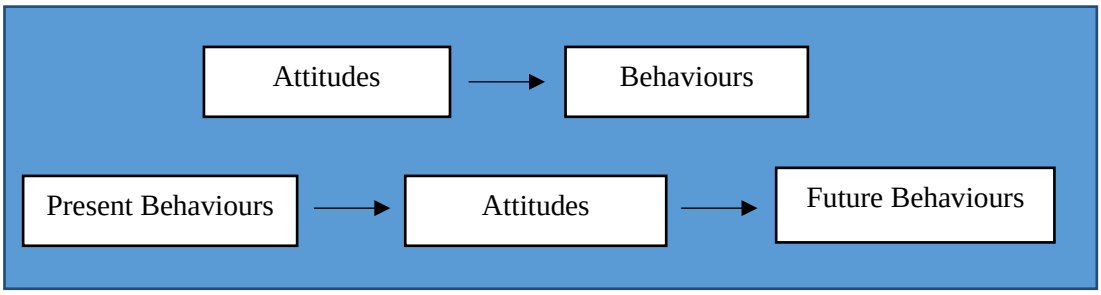

Figure 2.11 - Two views of attitude - behaviour relationship

2.7 Values, attitudes, and behaviours in municipal solid waste management

According to Schultz (2002), solving environmental problems requires the joint efforts of a large group of people. Studies done in collectivist cultures including Asia have shown that loaf tends to be less susceptible to individuals in individualistic culture. The prominence of social relations (the core element of collectivist culture) has led to a tremendous effort to achieve goals that benefit groups rather than individuals. This shows that in a collectivist culture, people should be more likely to take action to solve large-scale social problems such as environmental problems, even if the problems do not directly affect them, or the actions cannot directly benefit the individual (Schultz, 2002).

Managing MSW can be considered as an intensive service. Relevant authorities need capacities in procurement, contract management, professional and unionised labour management, expertise in capital and operating budgeting, and finance in implementing MSWM strategies. MSWM also requires a strong social contract between the authorities and community. Positive attitudes and behaviours of the authorities are also mattering in the planning and implementation of MSWM strategies (Gakungu et al., 2012).

2.7.1 Values, attitudes, and behaviours in municipal solid waste management authorities

Generally, in a country, not only the socio-economic status and housing characteristics affect and influencing the generation and management of MSW, the behaviour and perceptions of the people who are engaged in managing MSW are also affecting (Emery et al., 2003). When examining the MSWM behaviour of most the developing countries, it is observable that MSWM is habitually characterised by insufficient coverage of services, limited engagement in waste recycling and insufficient landfill disposal (Asase, Yanful, Mensah, Stanford, & Amponsah, 2009). Hence, Assa (2013), reported that over billions of people who live in low-income countries are lacking appropriate MSWM services. In Kenya, MSW collection systems and disposal systems are ineffective and observed to be not environmentally friendly and less than 50 percent of the total population is served (Gakungu et al., 2012). Bennett (1975)

explains that human characteristics are affecting the behaviours in waste management. Furthermore, Factors such as knowledge, skills, attitudes and desires determine the behaviour of an individual and the capability to change behaviour (Bennett, 1975). Moreover, Barr (2007), reported that social pressure might also influence the behaviour of authorities in waste management. Although the perception of most of the local authorities' attitude is that a single solution may enough to address all MSWM requirements in a country, logically, no single, uniform solution can be expected to address all, due to the availability of diverse service areas (Davies, Fahy, Taylor, & Meade, 2005)

According to Domina and Koch (2002), people with a greater interest towards the environment, are tending more to engage in recycling. Meneses and Palacio (2005) states, the positive attitudes regarding ecology and people who are urged to protect environment are carrying a greater responsibility to recycle. However, Vining and Ebreo (1990) found that concern for the environment was indiscriminately expressed by both recyclers and non-recyclers. Likewise, Oskamp et al. (1991) did not find any substantial differences between recyclers and non-recyclers in their general ecological attitudes in the seriousness of environmental problems.

Moreover, behaviour and attitude for waste management differ according to the status of development of a particular country (Brown, 2015). While developed countries such as the USA have efficient refuse disposal mechanisms (Shanks et al. 2004), nearly developed countries such as China exhibit positive environment behaviours with new ways of approaching the MSWM, underlining the significance of waste reduction and recycling (Chen et al., 2011). Moreover, developing countries such as American Samoa exhibit under-collection of refuse, denial to dedicate land towards increased demand for landfills and have an increased number of campaigns regarding MSWM (Shanks et al., 2004).

Further, Mintz, Henn, Park, and Kurman (2019) have shown that different structural circumstances associated with MSWM, for example, recycling systems and cultural influences affect the extent to which people participate in environmental behaviour, such as recycling and waste minimisation. In addition, the influence of personal

preferences and motivations, such as the effect of environmental orientation and social norms on environmentally friendly behaviour, is also culturally different. Therefore, more efforts should be made to develop research models that consider cultural factors. The established relationship between the values and environmentally friendly behaviour is also considered to be regulated by cultural background. Hence, values may be more significant in collectivism than in individualistic culture (Zou et al., 2009; Eom, Kim, Sherman, & Ishii, 2016). The smaller number of studies, which researched this hypothesis have been certainly confirmed it (Chan & Lau, 2002; Eom et al., 2016). However, yet in Sri Lanka, top level authorities are not aware of the actual need of managing MSW. Therefore, it is noticeable that Sri Lankans need an attitudinal change (Karunarathne, 2015).

Table 2.7 depicts the values, behaviours and attitudes of authorities who are responsible for the planning and implementation of MSWM strategies. The negative values, behaviours and attitudes are separately shown in red colour. The findings pointed out that although the values of people are positive, most of the attitudes and behaviours are negative. Although twelve behaviours were identified from the literature, landfilling and open dumping of MSW are the behaviours of authorities mostly highlighted in managing MSW. Open burning of MSW without any pre-treatment or segregation of MSW also another behaviour mentioned by most of the authors.

Moreover, from the literature six attitudes of authorities in managing MSW were identified, among them, the attitudes; waste should segregate, could be used for energy recovery, and should treat before the authors mentioned disposal. Similarly, they have identified that the attitude of most of the authority personnel in managing MSW is that there is less community support for MSWM. Out of the ten values identified from the literature in managing MSW, what they value most is the protection of public health and to ensure the establishment of integrated, economically feasible and environmentally favourable MSWM practices within the country.

Table 2.7 - Values, behaviours, and attitudes of authorities in MSWM

Cultural manifestation	Reference source																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Behaviours																				
Land filling of waste	√		√	√				√							√	√	√			
Open dumping of waste**	√	√	√	√		√							√							
Provision of poor funding**			√						√				√						√	
Provision of inadequate dumping sites**		√									√									
Lack of maintenance of operational equipment**			√												√			√		
Lack of precise guidelines and laws relating to solid waste management**				√						√										√
Not segregating the waste**					√						√									
Unplanned and uncontrolled industrialisation and urbanisation **	√													√						√
Inefficiencies in existing waste management practices and systems**											√									
Burning away or dumping recyclable materials without taking to a recycling facility**					√			√						√						
Busy with other public health-oriented duties (clinics and vaccination programs) by leaving the waste management functions to untrained subordinate staff **		√											√							√
Disincline to adapt new technologies by sticking to the same practices in waste management**					√															
Attitudes																				
Waste must have undergone sorting, material and energy recovery, and treatment before disposal.	√					√											√			√

With the amount of organic waste, adopting better composting practices will result in the improvement of MSWM, in addition to providing financial benefits and employment opportunities																√				
Educating residents on the dangers of improper disposal method can arrest prevailing waste problem														√		√				
Improved education, both formal and informal, about positive waste management behaviour is pivotal for reducing the amount of waste produced and dealing with it more benignly	√			√																√
Recycling is good		√													√					
There is less community support**			√					√			√	√								
Values																				
Minimise environmental impact and the amount of waste to be disposed,	√													√						√
Conserve resources																				
Protecting public health	√		√		√	√							√	√	√	√	√			√
Ensure establishing integrated, environmentally favourable, and economically feasible waste management practices within the country	√				√	√	√	√				√							√	
Maximise resource recovery by minimising the amount of waste disposing		√						√					√				√			
Minimise adverse environmental impacts	√			√			√								√					
Accepting the workability of alternatives in waste management and disposal mechanisms		√														√	√	√		
Reusing of discarded materials to the maximum before the final disposal	√									√	√	√								
Community awareness			√					√												
Encouraging creative and proactive means for the development of practical solutions for MSWM														√			√		√	

1- (Nnaji, 2015)
2- (Dauda & Osita, 2003)
3- (Clarke & Maantay, 2006)
4- (Barr, Gilg, & Ford, 2001)
5- (Bendak, S., & Attili, A. 2016)
6- (Kaplan, Henn, Park, & Kurman, 2019)
7- (Chan & Lau, 2002)
8- (Barr, 2003)
9- (Rahardyan, Matsuto, Kakuta, & Tanaka, 2004)
10- (Vidanaarachchi et al., 2006)
11- (Menikpura, Gheewala, & Bonnet , 2012)
12- (Eom et al., 2016)
13- (Domina & Koch, 2002)
14- (Oskamp et al., 1991)
15- (Meneses & Palacio, 2005)
16- (Shanks et al., 2004)
17- (Brown, 2015)
18- (Schultz, 2002)
19- (Zia & Devadas, 2007)
20- (Gunawardena & Udugama, 2016)

**** Negative behaviours/attitudes**

2.8 Conceptual framework for managing values, attitudes, and behaviours in MSWM

The interrelationship between values, attitudes, and behaviours related to MSWM and in general were identified in the preceding sections. Thus, the discussion revealed, how MSW can manage through a cultural perspective, as shown in Figure 2.8, a conceptual framework for managing values, attitudes, and behaviours in MSWM in Sri Lanka. Definitions for values, attitudes and behaviours were derived from the literature review.

Table 1.8 - Working definitions for values, attitudes and behaviours

Cultural Manifestation	Definition
Values	Concepts or beliefs of individuals or, groups about desirable end states or behaviours that transcend specific situations which guides the selection or evaluation of behaviour ordered by relative importance by representing motivations which are either personally or socially preferable and are influencing attitudes and behaviours
Attitudes	People's beliefs and feelings that could also be an evaluation favourable or unfavourable for a behaviour or on.an object or class of objects or concept or situation
Behaviours	Internally coordinated retorts of an individual/group which could be physical or emotional, verbal or movements and are affected by attitudes, values, emotions, rapport, ethics, authority, persuasion, and/or genetics.

Moreover, according to the literature findings and as depicted in the framework, there is a hierarchical relationship between values, attitudes, and behaviours (Refer Section 2.5.2). Hence, values related to MSWM impact (influence) the attitudes in MSWM, and attitudes will impact (influence) the behaviours related to MSWM. In simpler terms, behaviours are reliant on attitudes and attitudes are formed based upon the values. In the framework, thick blue colour arrows are showing this primary linkage.

Nevertheless, the management of values, attitudes and behaviours could be achieved only in a reverse manner to the value, attitude, and behaviour hierarchy as shown by thick black arrows in Figure 2.12. These reverse links are explained below;

- Behaviour of the authorities in MSWM influence in the creation of good attitudes in authorities in managing MSW (management of future attitudes through future behaviours) (refer Sub section 2.6.3).

- Positive attitudes influence in creating cultural values (Management of Values through Attitudes) – Here, there is only a induced relationship between values and attitudes because it is difficult to change one's values, but obviously there is an impact of good attitudes to the change of values in to pro-values as shown in the figure 2.12 in dotted arrow (refer Sub section 2.6.2).

- The next link would be socially accepted values have an influence in changing negative behaviours of authorities into future positive behaviours (Management of behaviours through Values) (refer Sub section 2.6.1) which will influence in changing attitudes and inducing in those attitudes to form pro-values.

As explained in the Figure 2.12 , these changes could be achieved in two ways (refer section 2.5.5), i) by managing present behaviours into future positive behaviours (by applying strategies) leading to have future positive attitudes and ultimately result in the refinement of values as explained above and ii) there is a possibility of changing present attitudes to future positive attitudes by applying suitable strategies which will also ultimately result in the refinement of values (Refer Section 2.5.4).

In simpler terms, the white box is presenting the basic relationship among values, attitudes and behaviours in a hierarchical manner and blue box is depicting a managing of values, attitudes and behaviours in MSWM.

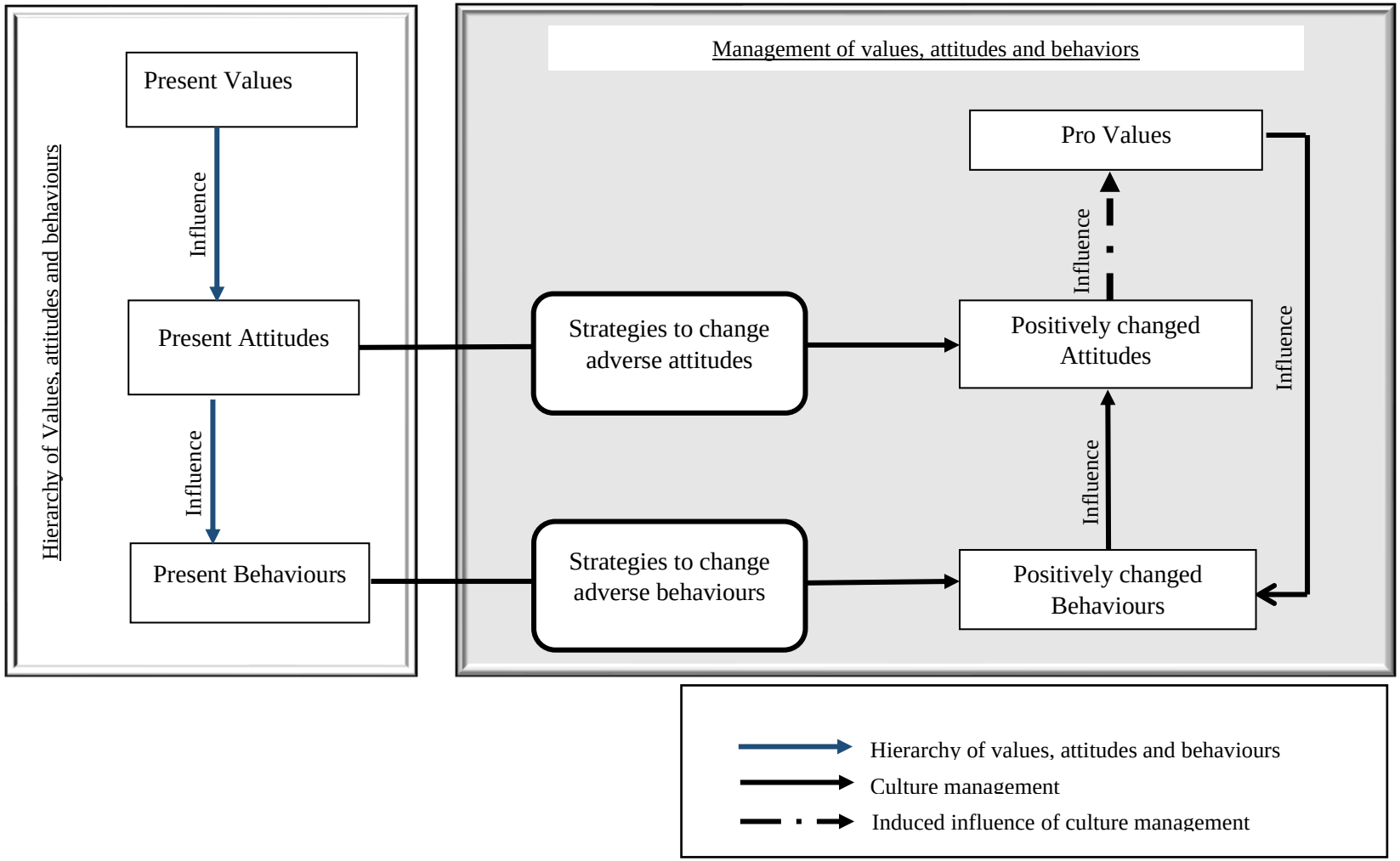

Figure 2.12 - Conceptual Framework in managing MSW in a cultural perspective

2.9 Chapter summery

The literature review of this study was focused on finding a culture-based solution for MSWM in Sri Lanka through reviewing waste management practices in Sri Lanka, reviewing values, attitudes and behaviours in MSWM, identifying the linkage between cultural values, attitudes, and behaviours of people, and recognising the cultural value, attitudes and behaviours in MSWM and authorities in MSWM. It is identified that there are three manifestations of culture; values, attitudes, and behaviours. Moreover, through the best practices of worldwide in managing waste, the values can be created in a waste management context.

It is noticeable that Sri Lankans are still not aware about the actual need of waste management. Thus, it is evident that Sri Lankans requires an attitudinal and behavioural change which shapes their values in MSWM using strategies like raising awareness to have MSWM practices by touching the minds and hearts of the community. Therefore, first, MSWM culture should mainly focus on solving the matter regarding the MSW in Sri Lanka. This change should be mainly needful for the government authorities of Sri Lanka and policymakers who are focusing on implementing new MSWM practices. Therefore, according to the defined cultural values existing all over the world, a mechanism should be created to change the human attitudes and behaviours on MSWM. If a mechanism can be created, an effective MSWM system can be established in Sri Lanka.

CHAPTER 03

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The research methodology is the outline of solicitation of procedures which are applicable to recognise, select, and analyse the information to comprehend the research problem. Hence, this chapter explains the way to realise the aim and objectives of this research study through a methodological approach to identify a way of managing Municipal Solid Waste from a cultural perspective. It allows the reader to weigh up the overall reliability and the validity of this research. Thus, in this chapter, Initially, the research problem is identified. To address the research problem, the research philosophy, the research approach, research techniques and data analysis techniques related to this research is discussing step by step in this chapter.

3.2 Research Process

An appropriate research process is vital to minimalize the errors which can be occurred through-out the research as it illustrates the way of researching start to the end. Sousa (2014) stated that to ensue with research; an action plan must be explored, from the point of the background study including the research problem, aim and objectives, scope and limitations, and afterwards, identification of what information is to be collected, using which methods, and how this information is analysed to arrive at conclusions and recommendations is discussed. Accordingly, the process of this research study was presented in Figure 3.1. Each stage of the research process is discussed in subsequent sections.

Phase I – Identification of research problem

3.2.1 Background study

In chapter one, a background study was carried out by enabling the researcher to identify the current gap in the research area. In the background study, literature on MSW, the culture of MSW by including the cultural manifestations; values, attitudes and behaviours were reviewed, by highlighting the necessity of identifying the importance and impact of culture on MSW.

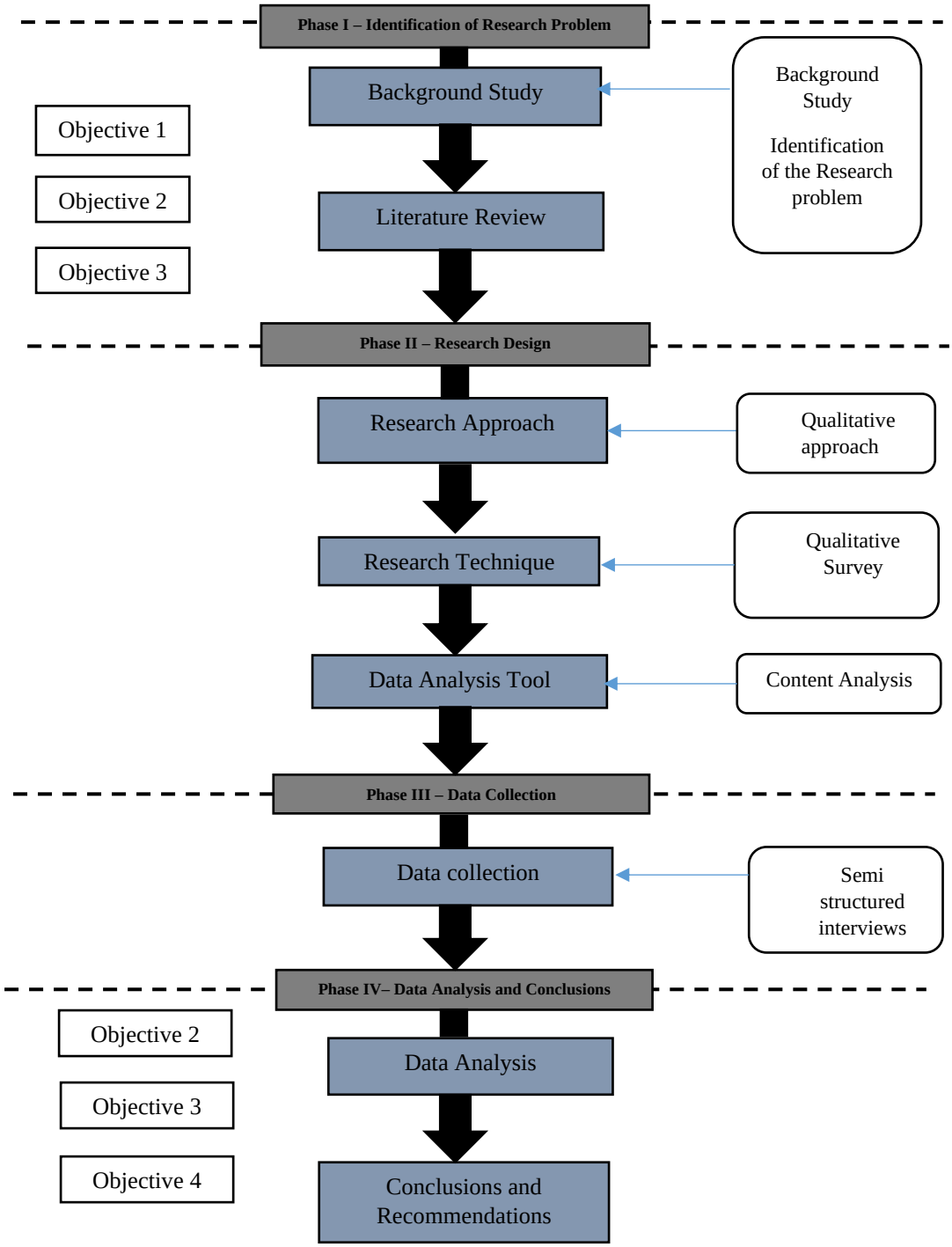

Figure 3.1 - Research process

It was recognised that there is a lack of studies on the impact of cultural manifestation for the proper management of MSW. Thus, the aim of the research was set to analyse the values, attitudes, and behaviours of local authorities in MSW management in Sri Lanka. The background study was done by to referring journal articles, reports, conference proceedings and official web sites of organisations in order to identify the research gap.

3.2.2 Literature Review

A comprehensive literature review was carried out by aligning with the aim and objectives of the research. An in-depth review was carried out on the concepts MSW, MSWM, culture and its manifestations: values, attitudes, and behaviours. Further, the interrelatedness among the values, attitudes and behaviours were identified. This literature review provided a base to ensue with the study. The significant findings haul out from the literature review had been used to build a conceptual model, which will be used as a guide in empirical investigation.

3.2.3 Research problem

Having identified the need of analysing the values, attitudes, and behaviours in MSWM in Sri Lanka through the background study, the researcher formulated the research question as **"how to improve the management of MSW by local authorities through a cultural approach?".**

Phase II – Research Design

3.2.4 Research Design

A research design will be the intermediate connector of the research problem and gathered data. (Punch, 2014). Furthermore, the overall strategy, integrating different components of a research study in a logical way to make certain the research problem is being addressed can be identified as a research design (De Vaus, 2001). A general research design consists of decisions like where, what, how much, by what means and when, related to research decisions (Kothari, 2004). For this study, research onion was used, comprising of research philosophy, approach, methodological choice, strategy, time horizon, technique and procedures as in Figure 3.2.

Below subsections are explaining the research design step by step of this study, which will be used to analyse the cultural values, attitudes and behaviours of local authorities in managing MSW.

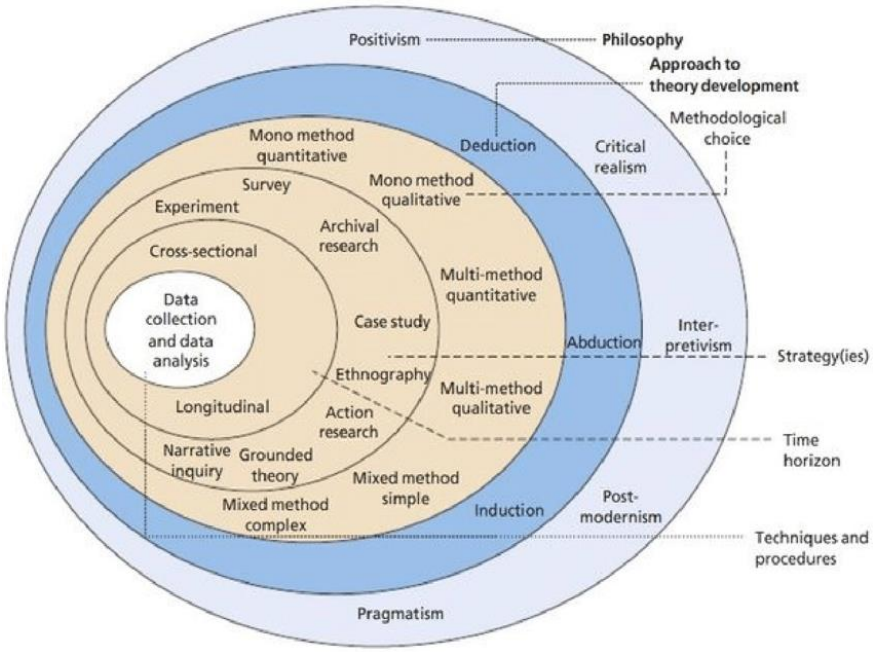

Figure 3.2 - Research Onion

Source: Saunders et al.,.2009

3.2.4.1 Research philosophy

Research philosophy consists of the assumptions on researchers' perceptions of the world and the way this affects in selecting the research strategy and method. The research philosophy will be clearing us a path on having an understanding of what we are researching for. Furthermore, the relationship between knowledge and methodology adapted to create that knowledge from the researcher's perspective is also being reflected through this. According to Saunders, Philip, & Thornhill, (2009), research philosophy is depending upon the type of research question. There are three philosophical assumptions as ontology, epistemology and axiology (Saunders et al., 2009).

- **Ontology**

Ontology can be considered as the nature of reality (Kulatunga, Amaratunga, & Haigh, 2008). It explains the way of how world operates (Saunders et al., 2009). There are two extremes of ontology; objectivism and subjectivism. Objectivism suggests that the reality exists independently from social actors. In contrast, subjectivism is that reality is depend on social actors and is conceived through the perceptions and sub consequent actions of social actors. This is also viewed as social constructionism.

- **Epistemology**

Epistemologies suggest how the knowledge is acquired and accepted (Kulatunga et al., 2008). According to Creswell (2009), epistemology can be explained by questioning the rapport between the researcher and what is being researched. Saunders et al. (2009) contended that two extremes of epistemology consist that the sufficient knowledge can be acquired through an objective measurement or by subjective means of knowledge attainment along with dense descriptions and narrations**.**

- **Axiology**

Axiology is suggesting how much value is retained by the researcher on his or her research study during the research process. In subjectivism, the amount of value placed by the researcher is high in the "objectivist-subjectivist" continuum. More value input is called value-laden, and lesser value input is known to be value-free (Kulatunge et al., 2008).

There are different types of philosophical positions based upon those assumptions. Saunders et al. (2009), proposes that there are four significant sorts of research philosophies as Positivism, Realism, Interpretivism, and Pragmatism. Further, Creswell (2009) named them as research paradigms or worldviews. As the most common philosophical positions, Positivism, Interpretivism and Pragmatism are being discussed in detail in the below sections.

Interpretivism

Interpretivism integrates human interest into a particular study by the involvement of the researcher in the interpretation of elements of a study. Thus, interpretivists assumes that access to given or socially constructed reality can be gain through the social constructions, for instance, shared meanings, consciousness, language and instruments (Myers, 2008), by holding holds ontological assumptions. Interpretivism stresses on qualitative analysis compared to quantitative analysis and associated with the philosophical position of idealism.

Thus, leading to epistemological assumptions on creating subjective measures. According to the interpretivist approach, it is imperative for the researcher to act as a social actor to appreciate the differences between people (Saunders et al., 2009). Moreover, interpretivism researchers usually have an emphasis on meaning and might employ multiple methods to reflect different aspects of the problem. The axiology of the paradigm in interpretivism is value-laden with difficulty in separating the researcher from what is being researched (Saunders et al., 2009).

Positivism

A positivist argues only on a single reality which is impractical for the studies on human actions and behaviours (Creswell, 2009). It governs the research arena with some concerns of multiple perspectives of participants. In positivism, the ontological assumptions are independent of social actors, external and objective.

Epistemological assumptions are focused on causality with high generalisability by reducing the phenomena to simple elements. Axiological assumptions are carrying a value freeway from the researcher. This sort of a research paradigm directs for quantitative means of knowledge creation (Saunders et al., 2009).

Pragmatism

In pragmatism, according to the belief of the researcher, the research question is the determinant of epistemological, ontological, and axiological assumptions. If the research question is neither arguing on interpretivism or positivism where the research

approach (quantitative or qualitative) solely would not serve in knowledge creation where the mixed method approach is the most suitable, pragmatism is the research pragmatism/ philosophy which is most suitable (Saunders et al., 2009).

Philosophical stance of this reaserch

For this study, interpretivism is the ideal research philosophy. This is because, the main aim and objectives of the study are to identify and analyse the cultural values, attitudes and behaviours of respondents (authorities in managing MSW) in MSWM, which could only be derived from the different views and observing their actions on MSWM. By the understanding gain from the analysis of aforesaid cultural manifestations, from the respondents' views, measures and methods could be suggested to change their culture positively. Moreover, this study entails the MSWM practices of local waste management authorities in Sri Lanka. Thus, this research is significantly encouraged the free flow of their perceptions, ideas and viewpoints based upon their experience in MSWM, and these should be human interactions to exploit the needful.

Therefore, it is observable that this particular study has an interpretivist philosophy. The research has an ontological assumption that reality is not pre-determined and socially constructed (idealism). The epistemological assumption is that the knowledge is acquired by subjective measures, by means of participation and interaction of people and thus, examine their views. The research environment is not controlled and simplified with assumptions as in deductive research in positivist studies. For this study, an inductive research approach was used to build up theories instead of testing theories, since this study requires an in-depth analysis to collect facts on the research environment. The features of interpretivism and positivism and the philosophical stance refer to this research are illustrated in Figure 3.3.

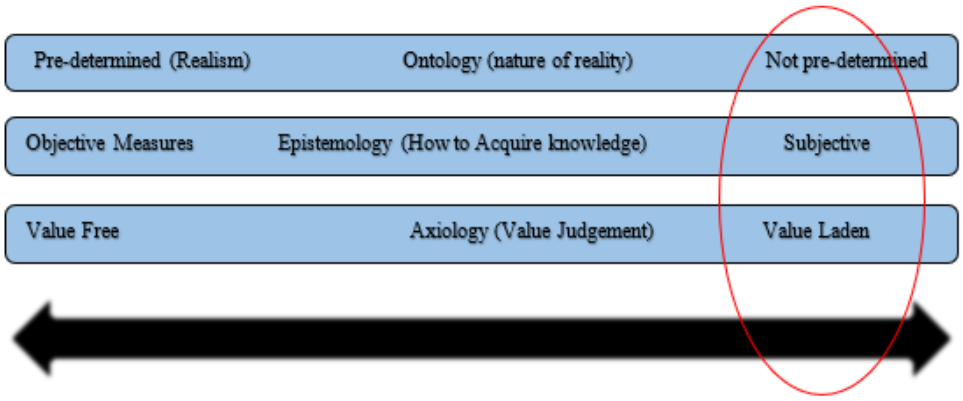

Figure 3.3 - Philosophical stances

Source: (Kulatunga et al., 2008)

3.2.4.2 Research approach

The research approach for this study will be inductive. Creswell (2009) defined the research approach as plans and procedures, which spans broad assumptions to detailed data collection methods, analysis, and interpretations. Further, Lu and Sexton (2004) emphasise that the stability of a research methodology is heightened by selecting a proper research approach. They can be classified in broad terms as the qualitative, quantitative, and mixed approach.

- **Quantitative Approach**

To prove the objectives through the development of relationships among the variable, quantitative approach is being used, and for the measurements and analysis of the data, statistical procedures are being followed (Creswell, 2014). In addition to that, through a quantitative study, results related to a sample population can be generated (Harwell, 2011).

- **Qualitative Approach**

Qualitative research is used to acquire in-depth opinions of the participants and attitudes, experience and behaviours can be observed while conducting the interviews with the participants (Dawson, 2007). Similarly, Creswell (2007) also stated that, in a qualitative approach, participants' behaviour, opinions, attitudes and experience could be observed.

- **Mixed Approach**

In simple terms, a mixed approach is defined as the combination of both qualitative and quantitative approaches (Caruth, 2013). Furthermore, through the mixed approach, weaknesses of the study are removed while the strengths are highlighted (Greene, 2007).

- **Selected approach for this study**

Impact of the culture of local authorities in managing MSW is still a novel concept in Sri Lanka. According to Marshall (1996), in order to select the ideal approach, it is essential to identify the research question. The research question of this study is highlighting the need of having an in-depth analysis of cultural values, attitudes and behaviours of local authorities in managing MSW (refer subsection 3.2.3). When the research entails the experience and diverse perspectives of people, the ideal approach is known to be the qualitative approach (Bricki & Green, 2007). Qualitative research has the pros, such as the ability to analyse a complex event based upon the relevant facts, perform cross-case analysis and hidden causes are being addressed (Yin, 1994). Furthermore, using a qualitative approach is allowed the researcher to realise novel relationships and variables (Kumar, 2011) and are generally used to evaluate behaviours and opinions signifying the biasness (Braun & Clarke, 2006). Since the exploration of values, attitudes and behaviours of participants should be done in a more interactively in a detailed and contextual manner other than in the way of statistical or numerical manner, the qualitative approach is the most suitable approach for this study. Therefore, in order to analyse the values, attitudes and behaviours of local authorities in managing MSW, a qualitative approach is being used over a quantitative approach. Moreover, Saunders et al. (2009) explain that based on the research approach, a research strategy is designed to test the hypothesis. Hence, the research strategy of this study is discussed in the next subsection.

3.2.4.3 Research Strategy

The research strategy is based upon the research approach, and it can be decided via answering to the research problem. According to Saunders et al. (2009), case study, experiments, survey, action research, archival research, ethnography and grounded theory, narrative inquiry are the strategies included in research onion. Each of these

strategies is a different mean of collecting and analysing empirical evidence. Among these for this research, a qualitative survey strategy was selected.

According to Groves et al. (2004), The survey is a systematic method for gathering information from (a sample of) entities for the purpose of constructing quantitative descriptors of the attributes of the larger population of which the entities are members (Groves et al., 2004). As in the definition presented by Groves et al. (2004) which is quoted above, in general, the word "survey" covers only the quantitative researchers primarily aiming at describing the distributions of numerical variables of the population. However, there is a qualitative way of defining and investigating variation in populations as well. The qualitative surveys determines the diversity of some areas of interest contained by an assigned population. The qualitative survey does not count the number of people with the same characters, but it establishes a profound variation (relevant values and dimensions) contained by that population (Datt, 2016). According to the survey handbook of Fink (2003**),** *qualitative survey* is for the exploration of experiences and meanings. Furthermore, Wester (1995, 2000) applies the term qualitative survey to indicate one of three (03) major types of qualitative research. Thus, since the researcher wants to consider a sample of the population (authorities responsible for MSWM) in order to understand the values, attitudes, and behaviours in a cultural context qualitative survey method was selected over other methods. Moreover, the qualitative survey method was chosen instead of a statistical survey because the cultural manifestations, i.e. values, needed to be derived in a theoretical manner by interacting with people. The time horizon of this study is cross-sectional, which helps in the observation of the behaviour of an aspect of a group of people.

3.2.4.4 Research Technique

Research techniques stipulate the data collection technique and the data analysis technique which are discussed in the below sections

- **Data collection technique**

Research data collection methods and data analysis methods were based on the research strategy. Under the data collection techniques, there are interviews, questionnaires, participation, document survey, observation, and simulation

(Yin,1994). Among those techniques, interviews were selected as the data collection technique.

- **Interviews**

Interviews were selected to collect data which requires to proceed with the research in the most reliable way. Punch (2014) emphasised the interview method as one of the most commonly used data collection method for qualitative approaches. For this study semi structured interviews are using because it guides to the right direction to the interview enabling the researcher to have more clarifications at the point where the interview is done.

- **Sampling Method and Sample Size**

Hoffmeyer-Zlotnik (2003) defines sampling as selecting a particular number of units from a distinct population. Generally, samples for qualitative studies are comparatively smaller than in quantitative studies (Jansen, 2010). There are two main categories of sampling as probability sampling and non-probability sampling. The method of sampling should be selected upon the research problem and data analysis technique, which is in relevance to the research (Rowley, 2014). Probability sampling would not be that most suitable method since it is used for statistical surveys which are aiming at estimating or evaluating the frequencies of characteristics of units in a population (Jansen, 2010). However, the purposive sampling, which comes under non-probability sampling, which involves selecting respondents based on a specific purpose instead of selecting randomly (Tashakkori & Teddlie, 2003). It is more effective if the study has done with experts within the research area (Tongco, 2007). Sample sizes, which may or may not be fixed prior to data collection, depend on the resources and time available, as well as the study's objectives. Purposive sample sizes are often determined based on theoretical saturation. Purposive sampling is, therefore, most successful when data review and analysis are done in conjunction with data collection. Among purposive sampling methods, Heterogeneous sampling was selected where the researcher's judgment relies on selecting participants with diverse characteristics. to assure the

presence of maximum variability within the primary data (Saunders, Lewis, & Thornhill, 2012)

Since the research is focused on analysing the values, attitudes, and behaviours of authorities in MSWM, the sample will be consisting of experienced and knowledgeable respondents, who are responsible for MSWM strategy planning and implementation to come up with a reliable upshot. Therefore, adhering to the purposive sampling method, this study was targeting a sample, which consists of policymakers, planners and implementors, who are well experienced and knowledgeable in MSWM.

Selection of respondents: According to a study done by Jansen (2010) adapted from Bertaux (1981), *qualitative survey research* shall be more of fifteen per sample as explained in Section 3.2.4.3. Thus, for this study, a sample of nineteen (19) respondents chose which was also determined upon the saturation of data. The sample of respondents for this research was the authorized personnel who engaged in MSWM.

- **Data Analysis Technique**

The collected data should be analysed with strong attention; for this study, content analysis will be used as the data analysis technique.

Content Analysis: Content analysis can be acknowledged as the often-used technique for data analysis in qualitative research approaches. In this study, for the data collection and analysis, the semi-structured interviews were used to collect opinions of the personnel. Manual content analysis was used for the data analysis process due to lesser number of interviewees and thus using manual content analysis was more prolific to interpret analysed data.

Phase III – Data collection

3.2.5 Data collection

In the data collection process, Data was collected using the technique which was designed in phase II (refer Section 3.2.4.1). Thus, semi-structured interviews were carried out with nineteen experienced personals from three visible levels of

organisations, namely national waste management level, Local Authority level and community contact level.

- National waste management level - planning and implementing MSWM strategies covering the entire country
- Local Authority Level - planning and implementing MSWM strategies in local authority levels (urban councils, municipal councils).
- Community contact level – personnel's who have direct contacts with the community

People who are responsible for planning and implementing MSWM strategies in Sri Lanka were selected to capture the detailed information on their behaviours, attitudes, and values in MSWM. The Table 3.1 summarises the profile of interviews.

Data collection was done in as indirect approach since it is difficult to extract their true values, attitudes, and behaviours by directing questions in a straightforward manner. Thus, semi – structured questions were asked as in below example (Figure 3.4).

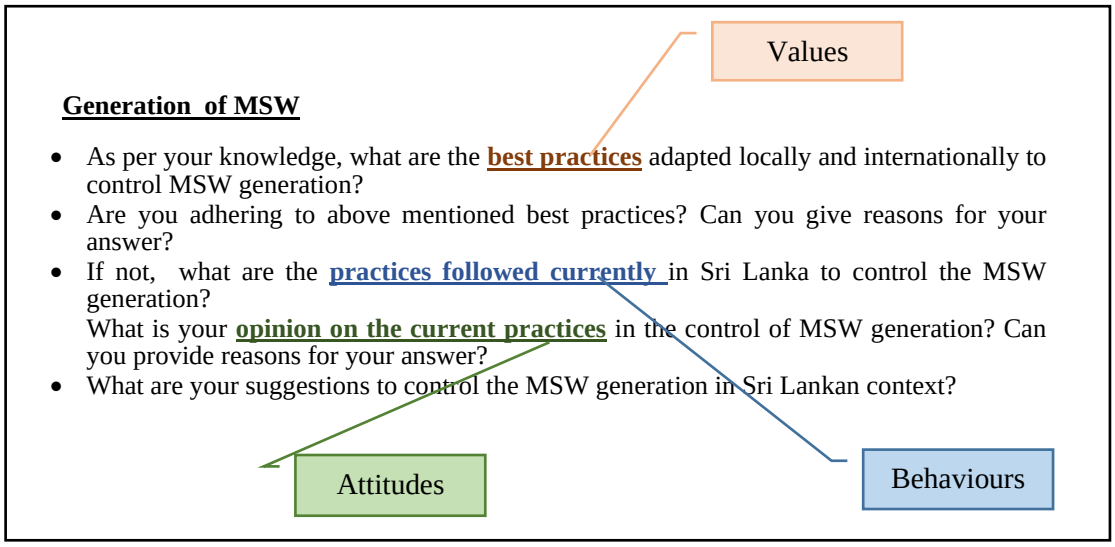

Figure 3.4 - Structure of the interview guideline

Table 3.1 : Profile of Interviewees

	Level	Designation	code	Experience (yrs.)	Role in MSWM
1	National waste management level	Director WMA	T 1	15	Preparation of policies, guidelines on WM Responsible for the implementation of WM projects
2		Assistant Director – WM	T 2	12	Preparation of policies, guidelines on WM responsible for the implementation of WM projects
3		Chief commercial officer	T 3	08	Oversee the financial aspects of WM projects
4		Chief Technical officer	T 4	05	Oversee the technical aspects of WM projects
5		Director	T 5	17	Responsible for National/Provincial/District level initiatives for Policies /Strategies/Guidelines/ Plans regarding SWM
6		Chair-person WMA	T 6	07	Responsible for National/Provincial/District level initiatives for Policies /Strategies/Guidelines/ Plans regarding SWM
7		Zonal Manager	T 7	08	Responsible for enforcement and implementation of special WM Projects Monitor the environmental feasibility of WM projects
8	Local Authority Level	Director (SW)	M1	16	Responsible for enforcement and implementation of WM Projects
9		Assistant Director	M 2	10	Responsible for enforcement and implementation of WM Projects

10		Engineer (NSW MSW)	M 3	10	Responsible implementation and oversee the technical aspects of WM projects
11		Medical officer of Health	L 1	10	Guide and supervise the proper management and disposal of waste, by the community
12		Medical officer of Health	L 2	17	Guide and supervise the proper management and disposal of waste, by the community
13		Municipal commissioner	L 3	10	Guide and supervise the proper management and disposal of waste, by the community
14		Public Health Inspector	L 4	18	Supervise the scavenging services of the Local Authorities and ensure regular collection and proper disposal of waste, including at household level
15		Public Health Inspector	L 5	15	Supervise the scavenging services of the Local Authorities and ensure regular collection and proper disposal of waste, including at household level
16		Public Health Inspector	L 6	6	Supervise the scavenging services of the Local Authorities and ensure regular collection and proper disposal of waste, including at household level
17	Community contact level	Waste collector	L 7	30	Collecting and segregating waste
18		Waste collector	L 8	25	Collecting and segregating waste
19		Waste collector	L 9	27	Collecting and segregating waste

As shown in the Figure 3.4, best practice is referred to a value in this study because it is the end state that the authorities desire to achieve. The practices followed currently is the exiting behaviours of the authorities in managing MSW. Moreover, the researcher has extracted the existing attitudes in MSWM through the opinion on the current practice.

Phase IV – Data analysis and Conclusions

3.2.6 Data analysis

The analysis was carried out under the sections of MSWM practices available in Sri Lanka, identification and analysis of current values, attitudes, and behaviours of authority personals in MSWM. After the analysis, conclusions were drowned, and a framework was developed for better management of municipal solid waste through an understanding of responding cultural values, attitudes, and behaviours of local waste management authorities in Sri Lanka.

3.3 Write up

The write up of the dissertation can be considered as a final step of the research process. However, the write-up process was started at the initial stage of research, and it was carried out throughout the study. Different visual aids, such as figure, tables, were adapted to write up the dissertation for the convenience of the reader. The write up was considered as expressive writing and create conclusions for the overall study.

3.4 Validation of research findings

There are four tests used to establish the quality of any qualitative research: 1] construct validity 2] internal validity 3] external validity 4] reliability (Yin, 1994) which is presented in Table 3.2

Table 3.2 - Validation of research findings

Tests	tactic	Phase of research in which tactic occurs
Construct validity	• Triangulation: Interviewed seventeen people • Nineteen (19) Semi-structured interviews were carried out with different personals related to MSW	Data collection

	• Adapted questions where necessary, clarified doubts, picked up the nonverbal clues from the respondent for better understanding	
Internal validity	• Developed research question and application of analysis structure- cross-reference between literature and analysed data	Data analysis
External validity	• Adapted a logical criterion for selecting interviewees – purposive sampling method	Research design
Reliability	• Transparent interviews were thereby providing a consistent interview guideline; moreover, note-taking, recording of interviews was done • Confidentiality was maintained	Data collection

3.5 Chapter Summery

A research methodology is a systematic approach, use to achieve the research aim and objectives effectively. Hence, to attain the determined objectives, a qualitative approach was selected for this research. The research strategy selected is a qualitative survey. Data collection was done through semi-structured interviews. Lastly, data analysis was done using the manual content analysis. Based on the selected research design, objective one was covered, and Objective 2 was partially achieving from the literature review stage. Afterwards, Objectives 2, 3, and 4 are started achieving with the data collection and analysis stage. Furthermore, in the next chapter, research findings will be described in a detailed manner.

CHAPTER 04

4.0 DATA ANALYSIS AND RESEARCH FINDINGS

4.1 Introduction

The purpose of this chapter is to convey the understanding and implications of the information collected after a systematic data analysis. Data analysis accomplished through the data collected through the interview survey is presented through this chapter. Discussion on the analysis of collected data expands to identify the waste management strategies adopted in Municipal Solid Waste Management (MSWM), analysis of existing cultural attitudes, behaviours, and values in MSWM in Sri Lanka via a cultural perspective. Finally, results from data collection and analysis refined the conceptual framework developed in Chapter two.

4.2 Findings and analysis of qualitative survey

In this section, Municipal solid waste management practices in waste management authorities in Sri Lanka, identified existing behaviours, attitudes and values, proposed strategies to manage MSW in a cultural aspect and the refinement of the framework are discussed.

4.2.1 Municipal solid waste management practices in waste management authorities in Sri Lanka

Respondents from the interview survey have emphasised on having a proper MSWM system within Sri Lanka. There are few organisations in Sri Lanka responsible for the management of MSW namely, Waste Management Authority, Megapolis, Central Environmental Authority (CEA), Urban Development Authority (UDA), Urban Councils, and Municipal councils. Although there are common policies and guidelines available for Sri Lanka, different areas in the country are following different practices. In order to determine the current MSWM practices adapted, a qualitative survey was conducted with municipal councils and other authorities who are responsible for MSWM. From the literature review, it was identified that there are three phases in MSWM, [1] waste generation, [2] segregation, collection, transportation, and [3]

treatment/disposal (Section 2.3). MSWM practices in each phase identified according to the respondents are explained in the below section.

4.2.1.1 MSW generation

According to the respondents, in Sri Lanka, the current MSW generation has been drastically increased compared to previous years, mainly due to urbanisation and changing the lifestyles of people. All most all the interviewees have mentioned that the most suitable method of controlling the waste generation is source reduction. However, two respondents were mentioning that the generation of waste cannot be controlled, but the generated waste should be managed properly.

Respondents have mentioned that the reason for the higher generation of MSW is the excessive amount of polythene usage and being unable to manage the current consumable goods. T1 mentioned have that " *in Sri Lanka, the estimated waste generation is 7500 MT/Day and among them, the highest proportion of MSW is consist of organic waste which is in between 60%-65% mainly consist of food waste; thus the best way to reduce MSW is to manage properly what we consume*, and *adaptation of 3R (reduce, reuse and recycle) concept is the best method to control the waste generation in Sri Lanka".* According to the respondents, at present Sri Lanka is adopting the 3R concept to reduce the waste, which is collected by the municipals, which is explained in the below sections. Furthermore, they have highlighted the fact that *"waste is always a resource".*

- *Waste reduction and reuse*

The main aim of waste reduction is to minimise the amount of waste sending to disposal sites which therefore will be a lesser burden to the government. Thus, Under the waste minimisation, respondents T2, T3, T4, T5 have mentioned that they have initiated projects to implement green industries, green villages, green hospitals, green school projects to promote waste minimisation among the community. Furthermore, respondent T1, highlighted that, to reduce the polythene usage; currently, they are discussing with the manufacturers to reduce the amount of product packaging and the production of reusable products. Currently, the trend of transferring industries to green industries have created competition among the manufactures since there is more demand for green products from the local customer as well as from foreign importers.

Thus, the provision of green certification to organisations now has become a trend as well as value addition to the organisation which will eventually result in the reduction of the waste generated from a particular organisation. The respondent T5 have mentioned that "in order to promote waste minimisation and reusing government is offering awards such as;

National Cleaner Production Awards

- National Productivity Secretariat – Green Productivity
- SLIDA Training Centre– Green Productivity
- R & D Award by Universities on Environment based studies.

"Parisara Pola" is another waste reduction strategy adopted by the municipal council. L1 mentioned that *"monthly, we are organising a parisala pola/kasala pola where the community can bring their reusable waste to one ground and people who require those could purchase such".* Furthermore, interviewee L1, L2, and L3 mentioned that the MC has enacted a regulation for the local residents, who has more than ten perch land area are not allowing to give their degradable waste to MC to encourage them to make compost from that waste. The purpose of this regulation to encourage them to make compost from that waste. However, the waste collector, L7 mentioned that *"it is not realistic to collect waste only from the houses which have less than ten perches, as it is difficult to identify such separately".* Further, T3 stated that the municipal councils are collecting any trash that people dump.

- *Waste recycling*

To control the waste generation at the source, Composting, and directly sell the collected waste to recycling parties by the waste collectors are the methods the municipality has adopted to recycle MSW. Apart from that, there are different recycling plants implemented attached to the dumping sites, mentioned by L1. According to the respondents, composting also can be identified as a method of recycling of biodegradable waste. Thus, both the CEA and municipal councils are providing composting bins to promote home composting as a strategy for waste reduction. The municipal council officers explained that other municipalities have also been following the same by providing the community, the composting bins at an affordable price. This emphasises that organisational behaviour is causing to change

the attitude of another organisation which is resulting from creating a pro value to the society.

4.2.1.2 Waste segregation, collection, and transportation

As agreed by all interviewees, the waste generation rate is comparatively high in Sri Lanka. They have further highlighted the fact that the difficulty of treating mixed waste due to its composition. M2 mentioned that *"separation of waste types could be the best approach for waste reduction".* The M1 supported this statement as "*through proper waste segregation, organic wastes can be utilised for composting, plastics and polythene can be recycled, and glass and paper waste also can be separately recycled and use again".* Thus, if all the waste is mixed up together, above-mentioned practices could be not practical or otherwise would be inefficient. Therefore, waste can be minimised and treated efficiently by minimalizing cost and environmental damage. Moreover, all the respondent agreed that Post-collection segregation takes longer time, costs more. If the recyclable waste being sent to dumping sites will lead to damage to the environment. Thus, the greenest way to solve this matter is to solve it by practising proper on-site segregation of MSW.

There is a separate colour coding system to segregate waste which is accepted in Sri Lanka. This bin system mainly adapted by the organisations, but most of the residents are segregating their waste separately without any colour coding system. According to the interviewees, colour codes given by the government are as follows.

- Green Colour - Organic Waste
- Blue Colour - Paper
- Red Colour - Glass Bottles
- Brown Colour - Metals / Coconut shells
- Orange Colour - Plastic & Polythene

Interviewees from the lower level stated that in most of the cases in Sri Lanka are using mainly three colour codes, green blue and orange for the MSW segregation. L2 further highlighted that all the municipalities are strict on MSW segregation. *"If they are not properly segregated, municipalities are not bound to collect them"* L4 added. As per

findings from the interview survey, the current practice is, residents should separate their waste as food waste, polythene with food leavings, polythene and plastic waste, glass waste, paper and cardboard waste, and sanitary waste using the colour coding system as mentioned earlier.

According to the interview survey findings, waste collection is one of the most crucial responsibilities of the municipal council in managing MSW and is responsible for collecting waste regularly. The waste collection could be done with segregation or without segregation of waste. Representatives from the municipal council stated that MSW is collected separately regularly based upon its composition. Having a separate day for each type of waste segregated is the collection strategy followed by the relevant local authority. This method is convenient because it is avoiding the waste being mixing up together.

L3 mentioned that "*the waste collection is the frequency and the date is different from each municipality. In our case, food and garden waste will be collected on Tuesday, Thursday, and Friday. Plastic, glass, and paper waste will be collected on Monday, Wednesday, and Saturday. There are separate collectors appointed to collect waste from each zone of the municipality, and there is one person called "overseers" who is accountable for the waste collection of each zone".* Furthermore, L5 added that "*waste from the street bins will be collected daily from 6-9 am and again in 4-6 pm".*
Waste transportation is mainly done in Sri Lanka by tractors. There are separate spaces allocated for different types of waste. For instance, L4 stresses that biodegradable waste is dumped at the dumpsite and paper waste, garden waste is being sent to the incinerators at Holcim.

Furthermore, representatives from the MC have mentioned the loopholes in the waste collection procedure. All interviewees of the municipal council mentioned that lack of workforce, necessary equipment, and collection vehicles are the main issues in MCs. L6 stated, there is lesser number of vehicles to collect waste. Further, he added, "mostly, *we are using tractors to collect waste instead of vehicles with compactors due to insufficient availability and most of the standing vehicles are also broken*".

Stressing out the L6 opinion, L5 expressed that the available vehicles are poorly maintained, eventually causing breakdowns disrupting the waste collection procedure.

All the interviewees from the municipal council have given similar views about the waste collection procedure and transportation with different days. At the same time, L4 emphasized that "*A leaflet have distributed among all the residents and organizations within the municipality to educate them on the proper waste segregation and collection procedure".*

Furthermore, interviewees (L2, L4 and L6) from the municipal council stresses that *"community is not giving their fullest support to the waste collection procedure by separating their waste properly since many of them are lacking the sense of social responsibility".* L1 highlighted that there is an incentive provided (i.e. pohora deemanawa) for waste collectors to motivate them to collect only segregated waste and to make MSW collection procedure more efficient.

4.2.1.3 Treatment/ disposal of MSW

According to the literature, the final step in MSWM is waste treatment or the final disposal of MSW. The collected MSW are subjected to vary depending upon its composition. For instance, the treatment/disposal practices of MSW are primarily composting, recycling, incineration, energy recovery, landfilling and open dumping as discovered from the interview survey. Supporting opinions of interviewees, M1 and M3 emphasized that *"we have already implemented the "pilisaru project" to provide infrastructure and facilities to local authorities for composting, biogas generation, recycling".* Under this project, one hundred twenty composting Plants, 22 Biogas Plants and 03 Sanitary landfills were constructed covering the entire country. Moreover, interviewee L3 have mentioned that "Kawashima Composting machines were implemented in all the 09 provinces and 07 Mega recycling plants polythene, paper, glass, and plastic through private investments are functioning in national level". Waste to Energy plants is another practice advocated by the local authorities, which is under the implementation process in Sri Lanka. Currently, there is two mass scale waste to energy projects going on in Sri Lanka. Additionally, there is small scale private waste to energy projects available for most of the organisations. As an example,

T3 mentioned that, *"there is a waste to energy plant attached to a garment factory in the industrial zone in Awissawella, that garment factory is incinerating their material waste which is not hazardous and convert them into electricity, a proportion is use by them and the rest is sold to the electricity board".* Furthermore, M3 added that, "*biogas plants are also a form of waste to energy and there are many small-scale biogas plants available within Sri Lanka even in condominiums".*

Moreover, the practices to treat/dispose of MSW adapted is differs from each municipality. L4 of MC A stresses that they have a separate composting plant attached to their dumping site targeting the degradable waste.

4.2.2 Existing Values, attitudes, and behaviours in MSWM in Sri Lanka

Since the study is focused on the managing MSW in a cultural perspective, it is necessary to identify the existing behaviours, attitudes and values of the people who are engaged in planning and implementation of MSWM strategies. Existing behaviours, attitudes and values were acknowledged through the interview survey are discussed under the following sub-themes.

4.2.2.1 Existing behaviours in MSWM in Sri Lanka

> *"Internally coordinated retorts of an individual/group which could be physical or emotional, verbal or movements and are affected by attitudes, values, emotions, rapport, ethics, authority, persuasion, and/or genetics"*

Figure 4.1: Working Definition for Behaviours

Referring to the working definition built-up in the literature review (Figure 4.1), the identification of behaviours was done as well as from the method explained in the Section 3.2.5, exiting behaviours were derived. Existing behaviours of authorities who are engaged in planning and implementation of policies, strategies, and guidelines in MSWM were identified through the interview survey. The researcher is interpreting the "current practice" of managing MSW also as the existing behaviours of MSWM (Refer section 4.2.1). However, apart from that, there are more behaviours observable to the researcher during the interview process.

As per the findings, there were negatives behaviours as well as positive behaviours in MSW generation. These existing behaviours were identified in the following sub-themes

- Existing behaviours in MSW generation
- Existing behaviours in MSW segregation, collection, and transportation
- Existing behaviours in MSW treatment/disposal

4.2.2.1.1 Existing behaviours in MSW generation

Under this subsection, behaviours of authorized personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSW generation were discussed.

The existing behaviours in MSW authority personals who are engaged in planning and implementation of policies, strategies, and guidelines in controlling and handling MSWM generation are also can be identified as the existing practices which were discussed in section 4.5. Through the interview survey, it was identified that one of the primary behaviours identified was an adaptation of the 3R concept in MSWM. Under this, behaviours such as promoting the production of reusable products, production of recyclable products, products with lesser packaging and so on could be identified. T3 mentioned that "*currently most of the manufactures are focusing on producing the reusable or recyclable products since their concerns are on sustainability, they are using such type of methodologies intending to have less environmental pollution by less waste disposal. This has created as a competition among the organisations*". Further, M1 added to the same as "*not all the organisations are having such kind of practices, they are not considering about the waste that was going to be made but just producing them without considering such. However, as the authorities, we are promoting activities such as the production of reusable products, recyclable products with the aim of reducing the waste".* Interviewees from the top-level have mentioned that they are planning to impose laws regarding the reaction of polythene usage, which will reduce the amount disposed of without the harming the environment.

Another behaviour that was identified through the interviewee was conducting awareness programs. Each level of authority personal is conducting programs to make

aware of the community about methods of reducing the waste generation. According to the survey results, the most common behaviour among the authorities in a waste generation was conducting awareness programs. The top-level management is conducting such awareness programs to both community as well as for the lowers levels of authorities to enhance the knowledge on the importance of MSW generation. Further, to reduce the waste being generated within the community, some municipal councils are providing home composting facilities aiming the source reduction. L1 have mentioned that " *we are proving composting bins at a very lower price to the households to reduce the degradable waste that they are being disposed of, and we have given them the option to sell the excess production of compost to us, some are doing this well but, the people who are lives within a municipality are always busy and having lesser space to have such; thus, there are some practical difficulties in doing so*".

Another behaviour identified through the interview survey was that most of the municipalities are doing nothing on the controlling of waste generation but focusing on the waste collection treatment and disposal. The main reason for this is their attitude is that waste generation is not their responsibility, but only the rest of waste management (collection, treatment, and disposal) is their responsibility, T2 added.

Overall, when considering about the behaviours MSW generation, more good behaviours were observed compared to destructive behaviours when it comes to the control and handling of MSW generation. Table 4.1 depicts the identified existing behaviours in MSW generation. The "Red" coloured cells indicate the negative behaviours

Table 4.1 – Summery of existing behaviour(s) in MSW generation

Identified existing positive/negative behaviour(s) in MSW generation	**Source**
Promote the production of reusable and recyclable products to manufacturers	T1, T2, T3, T5, T6, M2, M3, L1, L2, L4,
Promote the production of recyclable products to manufacturers	T1, T3, T4, T6, M1, L1, L2, L4, L5, L6
Promote selecting products with less/without packaging	T2, T5, T6, T7, M1, M3, L1, L4

Conduct public awareness campaigns	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L4, L5, L6
Provision of home composting facilities aiming source reduction	L1, L2, , L5, L6
Take no action to control waste generation	L3

4.2.2.1.2 Existing behaviours in MSW segregation, collection, and transportation

Under this subsection, behaviours of authorized personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSW segregation, collection and transportation were discussed.

Both negative and positive behaviours of authorities who are engaged in planning and implementation of policies, strategies, and guidelines in MSWM in MSW segregation, collection, and transportation were identified through the interview survey. The researcher has taken segregation, collection, and transportation together because all three activities are interrelated together. Thus, as per the MSW segregation, the most common behaviour identified was the provision of a colour coding system to segregate waste (discussed in section 4.2.1.2). According to the interviewees, many municipalities are strict on this colour coding system. L3 have mentioned that *"we are not collecting waste if they are not separated, separating waste at its source is the most efficient way in MSWM". "But still there are some of the municipalities who do not encourage waste segregation, who collects waste in a mixed state and dump in dumping sites"* T2 added. T2 further mentioned that the problem lays within the authority attitude on MSWM because they are collecting and disposing of waste without thinking about future consequences (environmental impacts, less space). Another behaviour identified was the collection of e-waste separately. T4 explained that "*in Sri Lanka, each type of waste has its method of treating/ disposing, but for e-waste, there is no such management procedure".* Thus, the researcher has identified that the e-waste being collected separately and disposed in disposal yards.

Moreover, in the waste collection process, different kind of behaviours were identified. L2 have mentioned that "*we have a rule that we are not collecting MSW from the houses in the municipality which has more than ten perches. This can be foreseen as*

a negative behaviour, but the aim of doing so is to encourage them to dispose their waste". However, according to the researcher, this can be identified as malicious behaviour because all households within a municipality are paying a fee inclusive of waste management. Thus, such kind of behaviour is not acceptable as an MSWM activity.

Furthermore, interviewees (T1, T2, T3, T5, T6, M1, M2, L1, L3, L4, L5, L6) have mentioned that they are routinely collecting waste. Nevertheless, different kinds of behaviours are being identified in the collection process. For instance, although the community have segregated waste, during the collection process, all the waste is being collected. However, contradictory to the above statement, M3 clarified that *"we are collecting waste according to a routine for different types of waste. That means separate day per week to collect separate types of waste (section 4.1.3)".* Furthermore, L2 added that *"we are not collecting waste if they are not separated properly". From the interviewees from the municipal council have explained that "still we are using traditional methods to collect waste, there are vehicles with compactors but still due to the low budget allocated we are using tractors for the MSW collection".*

Other behaviours identified was the provision of inadequate container capacity at the communal collection points. Moreover, during the interview survey, the following behaviours were identified indirectly. Such as authorities are failed to optimize vehicle productivity by selecting the appropriate crew size and shift duration, a lesser number of collection staff. Furthermore, it was identified that the authorities are not collecting a collecting fee from the residents and the large-scale waste generators, but a tipping fee is charged to the MSW collecting outside the municipality.

For the storage of waste, until the waste is being treated or disposed of, from the survey, it was identified as there are separate storage facilities have been provided for different types of MSW. Nevertheless, L2 has mentioned that still in some places, and necessary storage facilities are lacking due to low budget allocation or poor planning.

Overall, when considering about the behaviours in MSW **s**egregation, collection, and transportation, both good behaviours and destructive behaviours were identified. Nevertheless, when compared to MSW generation, more negative behaviours can be

observed within this phase. Table 4.2 depicts the identified existing behaviours in MSW segregation, collection, and transportation. The "Red" coloured cells indicate the negative behaviours.

Table 4.2 – Summery of existing behaviour(s) in MSW segregation collection, and transportation

Identified existing positive/negative behaviour(s) in MSW segregation collection, and transportation	**Source**
Provision of a colour cording system to segregate waste	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Separate collection of e-waste	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Routine collection of waste	T1, T2, T3, T5, T6, M1, M2, L1, L3, L4, L5, L6
Collection of waste only if they are segregated	T1, T3, T5, T6, M1, M2, M3, L1, L3, L4, L5
Provision of separate vehicles for waste transportation	T1, T2, T3
Charge a collection fee neither for residents nor large scale waste generators.	T1, T2, L4, L5, L6
Charge a tipping fee for the solid waste collected outside the municipality	L3, L4
Provision of separate storage facilities for different types of wastes	T2, T3
Implement Public awareness activities are being implemented to promote implementation of separate collection services	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Employ traditional methods to collect waste	T4, T5, T6, L1, L2, L3, L4, L5, L6
Provision of inadequate container capacity at the communal collection points	M2, L1, L4, L5, L6
Unable to optimize vehicle productivity by selecting the appropriate crew size and shift duration	T3, T5, T6, L3, L4
Employ only a lesser number of collection staff	L5, L6
Collect waste in a mix state	T2

4.2.2.1.2 Existing behaviours in MSW treatment/disposal

Behaviours of authority personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSWM treatment/disposal were discussed under this section.

During the interview survey, it was highlighted the fact that most of the negative behaviours could be identified in this stage of MSWM. For instance, interviewees (T1, T2, M3, L2, L3, L5, L6) have mentioned that even though there are several practices have been adapted in Sri Lanka for waste treatment/disposal, in there are areas where MSW are being dumped in dumpsites without any treatment. The main reason identified for this matter was lack of proper understanding of the MSWM, lesser provision of required infrastructure facilities, and corrupted services of authorities.

However, in most of the cases in Sri Lanka are being considered on having proper waste treatment/disposal practices due to the current problems arose due to the dumping of waste in bare lands. L5 stated that "we *are separating the recycle and usable waste before dumping waste."* Similar, responses were received from the other interviews as well. Furthermore, L1 asserted that *"we are allowing waste pickers to collect recyclable waste from the sites", and rest of the waste which can be reused or recycled are being sold at "parisala Pola "which is arranged by us every week so that people who want the stuff can come and take them at a very reasonable price" L2 added.* It was recognized that most of the municipalities are following up this practice in order to reduce the waste that needed to be treated or to be disposed of.

Moreover, through the response of the interviewees, production of eco-bricks out of the waste also could be identified as behaviour in waste treatment/disposal stage. These behaviours are creating positive attitudes in other municipalities that the waste cannot be disregard as a waste, but it is a resource. Additionally, instead of having dumping sites or landfills, another behaviour that the researcher could observe is the adaptation of engineered landfills to dump wastes. Nevertheless, L5 stated that *"due to the scarcity of land in Sri Lanka, and the objections from the community to have such type of landfills are bit difficult in the case of Sri Lanka".*

Consequently, incinerators are also being used at the moment in Sri Lanka for waste treatment/disposal. Added this behaviour, interviewees L3, and L4 have mentioned that, *"since adapting incinerators are costly, we are sending our paper waste to the incinerators in Holcim".* The researcher has acknowledged that most of the authority

behaviours are traditional compared to other countries because they are following the same method instead of following innovations.

However, T2 has mentioned that they have prepared action plans for future years for MSWM. This fact was also acknowledged by the other interviewees. Nevertheless, according to the statement of L2, most of the authorities are proposing projects without doing prior feasibility studies which will later face failures. Additionally, the absence rate of disposal site workers is another negative behaviour identified by the researcher.

Lastly, one of the primary crucial behaviour observed by the researcher through the interviewee survey was the lack of coordination between the relevant authorities. Supporting this fact, T2 agreed that, *"there is no hierarchy in MSWM in Sri Lanka, each organisation related to MSMM are proposing and establishing strategies to manage waste, but there is no proper mechanism to control, observe, govern those strategies".* Table 4.3 depicts the identified existing behaviours in MSWM treatment/disposal. The "Red" coloured cells indicate the negative behaviours

Table 4.3 – Summery of existing behaviour(s) in MSW treatment/disposal

Identified existing positive/negative behaviour(s) in MSW treatment/disposal	**Source**
Separate recyclable waste and reusable waste prior to dumping	T1, L5, L6
Conduct "Parisala pola" program	M3, L1, L2
Adapt engineered landfills to dump waste	T1, T2, M3, L1, L3, L4, L5
Adapt incinerators to incinerate waste	T1, T3, T4, T6, M1, M2, M3, L2, L3, L5
Prepare action plans for future years on MSWM	T1, T2, T5, T6, T7, M1, M2, M3, L1, L3, L4
Produce of eco bricks using the MSW	M1, M3
Direct dumping of waste in dump sites without any treatment	T1, T2, M3, L2, L3, L5, L6
Propose projects without prior feasibility studies	T2, T3, M3, L5, L6
Reluctant to work cooperatively among authorities	T1, T2, T3, T4, T5, T6, T7, M1, L1, L2, L3, L4, L5, L6
Employ lesser number of disposal site workers	M1, L1, L2
Dispose collected waste in a mixed state	T1, M3, L3, L4, L5, L6

Overall, when considering about the behaviours in MSW treatment/disposal, more positive behaviours were observed compared to negative behaviours.

Moreover, in terms of behaviours a clear-cut difference could be observable within the levels of authorities. These levels of authorities are holding contradictory behaviours within all generation, segregation, collection, and transportation and treatment/disposal stages in MSWM. For instance, while the national level waste management authorities are always enthusiastic in seeking modern innovative solutions for MSW, local authorities are still likely to follow only traditional methods to manage MSW. Additionally, different behaviours between local authorities could also be noticeable during the data analysis process. While a particular municipal council is conducting a "parisara pola" to resell to segregated waste to the people who needs them or manufactured "eco bricks" out of the MSW, another municipality is engage with the same old routine which is collection, segregation, and disposal of MSW.

4.2.2.2 Existing attitudes in MSWM in Sri Lanka

"People's beliefs and feelings that could also be an evaluation favourable or unfavourable for a behaviour or on an object or class of objects or concept or situation"

Figure 4.2: Working Definition for attitudes

Existing attitudes of authority personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSWM were identified through the interview survey. The attitudes were extracted indirectly by asking their opinions on MSWM by referring to the working definition came up in the literature review (Figure 4.2). For instance, "waste is resource " is positive attitude which was derived by asking about the opinion current MSWM in Sri Lankas. As per the findings, there were negatives behaviours as well as positive behaviours in MSW generation. These existing behaviours were identified in the following sub-themes

- Existing attitudes in MSW generation
- Existing attitudes in MSW segregation, collection, and transportation

- Existing attitudes in MSW treatment/disposal

4.2.2.2.1 Existing attitudes in MSW generation

Under this subsection, attitudes of authority personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSW generation are discussed.

According to the interviewees, the most common attitude among them is ‘*’waste is a resource’’.* All most all the interviewees had the same opinion. The attitude among them is that waste generated should not be discarded as anything but should be considered as a resource. Supporting the above statement, interviewee TI4 mentioned that, “*most of the people are considering the waste as a burden for them. They do not consider the implied value that it has”.* As an addition to his statement, interviewee TI5 emphasis that *“if the waste generated is utilized properly, it is not a burden but a real income source”.*

The attitude of all the interviewees is that “*the current MSW generation is comparatively increasing”*. The reason behind this attitude is the rapid rate in the increase in population and urbanization. Moreover, findings revealed that the generation of polythene and plastics are also higher comparatively which are harmful to the environment and costly to manage. Thus, the opinion of the respondents was that polythene and plastics should be banned by imposing laws.

Consequent to the above statement among the interviewees, many of them held the attitude that this amount of MSW generated is difficult to control. Nevertheless, opposing to their attitude, the attitude held by respondents is that the MSW generated can be easily controlled. Confirming this statement interviewee, LI3 highlighted that, “*all they required is an attitudinal and behavioral change among the community if so, the amount of MSW generated can be easily controllable*”. Furthermore, interviewees opinion is that “*the dilemma prevails community is reluctant to reduce their MSW generation*”.

Thus, there should be more tactics to make them encourage to minimize the generation of MSW. Conferring to making aware the community about MSW minimization, there are several strategies that have been already adapted to control or minimise the MSW

generation (refer subsection 4.2.1.1). However, the attitude among the authority personnel is that the available strategies for the control of MSW are not in a satisfactory level. Interviewee TI2 elaborates this as "*although there are various methods adapted to control the waste generation, still in Sri Lanka the amount of waste being generated is unbearable level, the main reason is only a few organisations, and people from the community are trying to minimise their waste".* Thus, there should be more effort regarding this matter.

Identified summery of existing attitudes in MSW generation are presented in Table 4.4. The "Red" coloured cells indicate the negative attitudes.

Table 4.4 – Summery of existing attitudes in MSW generation

Identified existing positive/negative attitudes in MSW generation	**Source**
Waste is a resource	T1, T2, T3, T4, M1, M2, M3
Waste generation can be minimised/controlled	M1, M2, M3, MI2, LI1, LI3, LI4
Plastics and polythene should be banned	TI1, TI3, TI5, MI3, LI2
MSW generation is high	T1, T2, T3, T4
It is difficult to control waste generation	TI6, LI4, LI5, LI5
Community is reluctant to reduce generation of MSW	T1, T2, T3, T4, M1, M2, M3
Substandard practices to control waste generation	T1, T2, T3, M1, M2, MI2, LI1, LI3, LI4

Overall, when considering the attitudes in MSW generation, more negative attitudes were observed compared to positive attitudes in controlling and handling the MSW generation.

4.2.2.2.2 Existing attitudes in MSW segregation, collection, and transportation

Attitudes of the authority personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSW segregation, collection and transportation are discussed under this section.

Several key attitudes of authority personals in MSW were identified in segregation, collection, and transportation. Regarding the segregation of MSW, the attitude that

they held was that the waste should be separated at its source. Confirming this statement, interviewees T5, T7, and M1 have mentioned that "*waste should be segregated at the first place; otherwise there will be many difficulties in collecting, treating and in disposal processes".* Supporting the above attitude, interviewees T1, T3, L2, L3, L4, and L5 have mentioned that "*segregating waste after the collection is a nightmare, it is costly, time-consuming, more labor intensive and most of the time is not effective"*. The problem is that community, or the organisations are taking the segregation as an extra burden to them. "*They think that separating waste is not their task, since they are paying tax, they think that it is not their task but waste collectors' task to separate them",* added by interviewee L3. Thus, the authority personals concluded that the people, including the organisations in the municipality, are not segregating their waste correctly. In order to resolve this problem, the only opinion they had was strengthening the laws and regulations with regards to waste segregation. *"We are following up this process, and if a particular resident or an organisation have not separated their waste, we will be not collecting them, that is the only way of encouraging people to segregate waste in Sri Lanka"* highlighted by interviewee L3.

Regarding the MSW collection and transportation, the respond of most of the interviewees was the collection of MSW in a satisfactory level in Sri Lanka. This can be considered as an authority attitude in MSW collection and transportation. Also, the authority personnel emphasize that there is not enough workers and vehicles for waste collection, yet they are managing them properly. The municipal level authority personnel held this attitude. However, in contrast to that, top-level interviewees insist that they are being provided with all the necessary workforce and vehicles. "there is no deficiency of workers or any vehicles for the waste collection. *"The only problem is most of the time; we are getting lack of support of the community do perform this process",* interviewee T5 added. Furthermore, all the respondents held the attitude that MSW should be collected in a routine manner. This is because separate waste types will therefore be collected on different days to avoid been ending up of mixing together. Furthermore, according to the attitude held by the top-level personnel in MSWM, there should be a proper MSW transportation plan to carry MSW to disposal sites. Although they held the above attitude, municipal level authority personnel insist

that adopting such kind of a plan is not practical due to the lack of infrastructure to deploy such kind of plan.

The Table 4.5 illustrates the summary of existing attitudes in MSW segregation, collection, and transportation. The "Red" coloured cells indicate the negative attitudes.

Table 4.5 – Summery of existing attitudes in MSW segregation, collection, and transportation

Identified existing positive/negative attitudes in MSW segregation, collection, and transportation	**Source**
Community is supporting waste segregation	L5, L6
Waste should be separated at its source	T1, T3, T5, T7, M1, M3, L1, L2, L3, L4, LI5
Adapt more strict laws and regulations to segregate waste	L1, L2, L3, L4, LI5
Collection of MSW waste is performed properly within the municipality	T5, T7, M1, M3, L1, L2, L3, L4, LI5, LI6
Waste should be collected in a routine manner	L4, L5, L1, L2
Proper waste transportation plan should be adapted	L2, L5, M1, M2, L2
Sufficient workforce and vehicles are available to collect MSW	T1, T3, T5
There are deficiencies of workers and vehicles for waste collection	M3, L1, L2, L3, L4, L5
Poor garbage storage/discharge practices are a nuisance	L1, L2, L3, L4
Community is not properly engaged with MSW segregation	T1, T3, T5, T7, M1, M3, L1, L2, L3, L4, LI5
Segregation considered to be an extra burden to people	T3, T6, L1, L2, L3, L4, LI5

Overall, when considering the attitudes in MSW segregation, collection, and transportation, more positive attitudes were observed compared to negative attitudes.

4.2.2.2.3 Existing attitudes in MSW treatment/disposal

Attitudes of authority personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSW treatment/disposal were discussed under this section.

According to Table 4.6, both negative and positive attitudes of authority personals in MSW treatment/disposal practices were identified through the interview survey. All

the respondents were insisting that the available strategies for MSW treatment/disposal are not at a satisfactory level. The reason identified was that although there are plenty of strategies implemented, most of them are not effectively functioning. Interviewees T2, T3, T4, T5, T6, T7, and M3 have held the attitude that this is due to the lesser cooperation from the community side. However, in contrast to their attitude, interviewees T1, T4, T5, M1, M2, L5 and L6 the insist that the community support is in a satisfactory level, but many other problems are causing these inefficiencies in the treatment/disposal practices. Another attitude found within the interviewees was, there is not any centralised system to manage MSW in Sri Lanka. Interviewee T1 highlighted that "*In Sri Lanka, each authority relates with MSW are trying to provide suggestions to manage them. For example, CEA has their own MSWM projects, WMA also having their own projects, but there is not any responsible authority to monitor them closely*". Supporting the previous opinion, interviewee T2 has mentioned that *"there is a need of having a proper hierarchy to implement MSWM strategies. There should be a central body to govern all these matters. There should be a separate body to suggest a suitable project for Sri Lanka, another party should have implemented them, and there should be a separate entity to monitor them properly".*

In addition to attitudes mentioned above, interviewees L1, L2 and L3 held that there is a political interference to MSWM projects in Sri Lanka. "*in our country, the most feasible project will not be selected for the implementation, but a project with more financial values will be selected since the final decisions are mostly with a political party with a lesser knowledge of the area*". Moreover, the attitude held by interviewees T1, T2, T3, T4 is that MSWM is considered only as one of their duty but not as a social responsibility, which makes the outcome inefficient and ineffective.

When discussing the adapted technologies to treat/dispose MSW, the researcher has found several attitudes held by the clusters of respondents. There were two contradictory attitudes regarding the adaptation of conventional methods of MSWM and adaptation of new technologies. Interviewees L1, L2 and L3, have argued that there is no actual requirement of adapting new technologies for the Sri Lankan scenario of managing MSW. They have insisted that the available technologies are adequate to manage the MSW in Sri Lanka, only if they are practiced properly. However, the remaining respondents held mentioned that it is better to adopt new technologies to

manage MSW because the adaptation of such technologies will be a valuable addition to the existing MSWM system in Sri Lanka. Moreover, through the interview survey, the opinion of the open burning and open dumping were asked to uncover the attitude on those strategies. Their attitude is that both of those practices are unacceptable. L4 mentioned that "according to the available law, the burning of waste is an offensive act". Another attitude identified from the interviewees is the sanitary landfills are not suitable for Sri Lanka. The rationale was the limited space available in Sri Lanka. Furthermore, L1 stresses that although there are WtE projects are going on in Sri Lanka, they are not feasible projects for Sri Lanka. Supporting that statement, L3 has mentioned that "*countries like Sri Lanka are having more of food waste in MSW composition. Therefore, a lesser proportion of waste will be there for incineration. Thus, adapting mega-scale Waste to energy (WtE) projects which are high investments are not suitable for Sri Lanka".*

Table 4.6 depicts the identified summery of existing attitudes in MSW treatment/disposal. The "Red" coloured cells indicate the negative attitudes.

Table 4.6 – Summery of existing attitudes(s) in MSW treatment/disposal

Identified existing positive/negative attitudes(s) in MSW treatment/disposal	**Source**
New technologies should be adapted	T1, T2, T3, T4, T5, M1, M2, M3
Open burning of waste is unacceptable	L1, L2, L3, T3
Open dumping waste is unacceptable	T1, T3, T7, M1, M3, L1, L2, L3, L4, LI5
Waste should be recycled	T3, T4, L2, L3, T3
Insufficient regulatory provisions to manage MSW	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Unsatisfactory level of community participation in MSW	T1, T4, T5, M1, M2, L5, L6
There should be a centralized system to manage waste	T1, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Waste management is considered only as one of their duties but not as a social responsibility	T1, T2, T3, T4

Engineered landfills are not suitable for Sri Lanka	M1, L2
Waste to Energy plants is not practical for Sri Lanka	L1, L2, L3, L4
Available MSWM practices are not in a satisfactory level	T2, T3, T4, T5, T6, M1, M2, M3, L2, L3, L5, L6
Community cooperation is lesser in implementing waste treatment facilities	T2, T3, T4, T5, T6, T7, M3
Sri Lanka does not require latest technologies to manage waste	L1, L2, L3
Political interference in managing waste is a problem	L1, L2, L3

Moreover, same as in behaviours a clear-cut difference can be identified within the levels of authorities. These levels of authorities are holding contradictory attitudes within all generation, segregation, collection, and transportation and treatment/disposal stages in MSWM. For instance, while the national level waste management authorities' attitude is MSW is waste which is difficult to control and manage but the local authority levels' attitude is if the MSW is at a manageable status is the management process is done right. Overall, considering the attitudes in MSW treatment/disposal, more negative attitudes were observed compared to positive attitudes.

4.2.2.3 Existing values in MSWM in Sri Lanka

> *"Concepts or beliefs of individuals or, groups about desirable end states or behaviours that transcend specific situations which guides the selection or evaluation of behaviour ordered by relative importance by representing motivations which are either personally or socially preferable and are influencing attitudes and behaviours"*

Figure 4.3: Working Definition for Values

Identification of values was made through the attitudes and behaviours based upon the principles and standards of authority personnel who are engaged in planning and implementation of policies, strategies, and guidelines in MSWM (refer subsection 3.2.5). For instance; "adapting environmentally acceptable practices" can be considered as self's core belief or a concept which is reflected by the behaviours such

as ignoring projects which are harmful to the environment and through the attitudes such as “we should not harm the environment”. Thus, using the hierarchy of values, attitudes and behaviours, the researcher came on to conclusion that the above-mentioned attitude and behaviour could be a result of the value; “adapting environmentally acceptable practices”. Moreover, in the interview guideline, the researcher refers the best practices as the values as well based upon the working definition in Figure 4.3.

The summarised values are extracted from the MSWM activities such as generation, segregation, collection, transportation, and treatment/ disposal of waste. Unlike in the identification of attitudes and behaviours in each of MSW phase the previous sections, values of the entire MSWM system were identified since it is a broader concept than other two manifestations and interviewees were holding a common value set applicable to every phase in MSMW.

Adapting environmentally acceptable practices is also identified as a current value in MSWM under the environmental value category, which was mentioned by all most all the interviewees. This can be confirmed by quoting a statement of interviewee T2, *“the ultimate aim of having a proper MSWM system is to ensure proper environmental protection and the protection of the health safety of the people”.* Furthermore, it was noticeable that all other values identified are linked with practising environmentally acceptable MSWM practices. There were several values other which were identified. Source reduction is such value held by the respondents. All most all the respondents were strongly agreed as source reduction as a significant positive value in MSWM. T2 have mentioned that “ *in Sri Lankan context what we value the most in MSWM is source reduction”.* Following his statement T4 mentioned that “*this value provides the basis for the planning of rest of the MSWM practices, by choosing waste control, minimising, recycling, and composting, to name a few*”. Mostly, the prospect of source reduction is to reduce the amount of waste being directly dumped in dumpsites. Based on this, the value of adapting the 3R concept was acknowledged.

According to the interview survey results, one of the most important values they process was the proper application of the 3R concept. As for the same situation, another value that can be identified is the reduction of the usage of single-use products.

Through that, the attitude of having a lesser amount of waste has been created by using a product more than one time. In MSWM, the authorities are considering the minimisation of aesthetic pollution are also as a value because one of the main objectives of managing MSW is to have pleasant and cleaner cities. Furthermore, pollution-free cities are another value in MSWM. This is also linked with environmentally favourable MSWM practices. Since one of the significant expectations of having such practices is to reduce both air and water pollution, encouraging creative and proactive means for the development of practical solutions for MSWM is also can be identified as environmental value, because having such practical solutions are important for the protection of the environment. According to the interviewees' perception, maintaining sustainability is another value which could be acknowledged under environmental value category, because valuing sustainability for MSWM practices will be effective in having environmentally friendly activities to manage waste as the term sustainability consists of the three pillars, social, environmental and economic.

One of the major values that have been mentioned by the interviewees is the efficient use of the available resources. As the available resources are limited in Sri Lanka, utilising the existing resources efficiently is the value held by the authorities to manage MSWM. Throughout the interview survey, each interviewees' opinion was, waste should not be considered as a burden but should be considered as a resource. This can also be identified as an economic value because according to the T4 *"waste is a great source of income if they are utilised properly".* Supporting his statement, L5 has mentioned that *"by compost made out of waste is a very good fertiliser which can be made effortlessly and can be sold at a very reasonable price too and by recycling them properly we can remake another product which is having a better commercial value".* Moreover, T3 insist that converting waste to energy is also adding up a decent economic value to waste.

Since waste creates many hygienical issues causing harm to the health and safety of the community, interviewees value the protection of health and safety of the community, and it is also a foremost goal of a proper MSWM system. Thus, the provision of satisfactory service to the community by accepting their perceptions and

responding to their requests also can be considered as values as mentioned by the interviewees.

Moreover, the researcher has interpreted individualism as a value which has a negative sensation in the context of MSWM. According to the perceptions of interviewees, this is because municipals deem to be considered about their municipality without cooperating with other municipalities. The value "cooperation" cannot be seen in the context of Sri Lankan MSWM. The same can be applied to top-level authorities as well because, as explained above, every organisation tries to provide a solution for the MSWM crisis alone without cooperating with others. Thus, "*individualism*" can be identified as a negative value in MSWM in Sri Lanka.

The values in the "Red" coloured in Table 4.7 indicate the negative values.

Table 4.7 – Summery of values in MSWM

Identified positive/negative values in MSWM	Source
Adapting environmentally acceptable practices	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Source reduction of MSWM	T1, T2, L1, L2
Promotion of cleaner cities	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Adapting economically feasible MSWM projects	T4, T7, M3, L2, L3
Adapting socially acceptable practices	T3, T4, T5, T6, T7, M1, M2, M3, L5, L6
Curtailing the aesthetic pollution in cities	T1, T2, T6, T7, M1, L6
Controlling air and water pollution	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Encouraging composting and recycling	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Reduction of the amount of waste which are directly dumping without any treatment	T2, T5, L1, L2, L3, L5, L6
Promote innovative methods to manage MSW	T1, T2, T3, T4, T5, M1, M2, M3
Maintain sustainability in all MSW practices	T1, T2, T3, T4, T5
Use the available resources efficiently	T3, T4, T5, T7, L2, L3, L4, L6
Waste is considered as a resource	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6

Be supportive to the economy	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Acknowledge community suggestions and ideas	T1, T3, T4, T6, M1, M2, M3, L1, L3, L4, L6
Teamwork gives better results	T1, T3, T6, M1, M3, L3, L4, L6
Health and safety of all citizens is a priority	T1, T2, T3, T4, T5, T6, T7, M1, M2, M3, L1, L2, L3, L4, L5, L6
Provide a satisfactory MSWM service to citizens	T2, T3, T4, T6, T7, M1, M2, L1, L2, L4, L5, L6
Maintain effective coordination among responsible MSWM parties	T1, T3, T4, T5, T7, M2, M3, L1, L2, L5, L6
Focus on the set goals of your organisation	M3, LI, L5

4.2.3 Strategies to Manage Municipal Solid Waste through Cultural Values, Attitudes, and Behaviours

Strategies were also found as per the suggestions of interviewees as explained below

- Establishment of a proper code of conduct

Even though there are rules and regulations enforced for waste management, the interviewees' perception was to have more strict rules, regulations, and more organised code of conduct within the authority level describing the proper way of managing waste. Thus, having such rules and regulations will make following the code of conduct. T1 asserted that "*having a proper code of conduct is a better way to have a proper MSWM system. Since a code of conduct explains the rules, ethics, values, and vision for the organisation, it provides staff with clear expectations and standards of how to perform their duties and responsibilities well"*. Furthermore, *"to ensure the workability of the code of conduct, weekly/monthly/yearly inspections and audits could be done"* T3 added.

- Training programs

Respondents recommended conducting training programmes on MSWM as a strategy for MSWM. L2 stressed that "*training programs should be organized within the organization level to change the authority personnel's' attitude and behaviours while describing the value of proper MSWM".* Supporting that notion, L4 mentioned that having training programs on the proper mechanisms of waste management, newest

technologies, ways conducting appropriate feasibility studies, adverse effects of mishandling the waste and so on will be a successful strategy to change attitudes and behaviours of the authority personnel.

- Provision of required facilities

According to the interview survey, one of the main issues of failing to provide proper MSWM service was lacking required facilities, including the infrastructure and insufficient funds. This affects the proper behaviour of authority personnel in managing MSW. For instance, it was revealed, in the current practice for managing MSW, many of the resources (vehicles, trained personnel, required spaces and so on) are lacking. Thus, provision of such facilities will act as a trigger to enhance positive behaviours among the workers, which will therefore shape their attitudes in doing things right.

- Implement new practices, which used by the foreign countries to manage MSW

Although all the respondents were aware of the MSWM strategies adopted by foreign countries, some of them were preferred the traditional methods instead of adapted foreign techniques. However, still, the opinion of most of the respondents was that top-level authority should introduce and adapt the new technologies or new strategies within Sri Lanka. L5 mentioned that *"China has this automated machine sweeper using to sweep and collect waste in and beside the roads without leaving any dust in roads and doing automatic garbage sorting without any human being".* Furthermore, L1, L2, L4 stated that recycling machines should be employed by each of the Municipal council to recycle plastic and polythene waste. Additionally, M1 stated, *"the actual knowledge and technology is not enough to manage waste in Sri Lanka".* Supporting that perception, T3 mentioned that *"even though the actual knowledge and the technology are enough, but they are not practical, then the exiting knowledge should be updated."*

- Proper coordination among the relevant authorities

One of the major reasons for improper management of MSW in Sri Lanka, as highlighted by the respondents was the absence of proper coordination between the available authorities responsible for MSWM. T4 mentioned that "*the problem in Sri Lanka for managing MSW is, there are few authorities (section 4.3.1) handling MSW*

in Sri Lanka, and each of this authorities is proposing and implementation MSWM strategies", M2 further mentioned that, "*there is no hierarchy of managing MSW in Sri Lanka and there is no pre-determined separate authority to do the controlling and inspections".* Thus, the respondent's opinion was to have a hierarchy for the authorities in MSWM. For instance, a separate authority to implement, another one to regulate, or to do the feasibility studies and so on.

- Private Public Partnership in MSWM

M3 stated delegation of authority to private companies to engage in MSWM, and the waste dilemma could be solved easily. Further M1 said that if there are investors, who are interested in investing in the waste generated, would be a better solution for MSWM.

- Earn the trust of the community by the Municipal council

For proper MSWM, the assistance from both community and municipal council should be there. Thus, having a supportive community would make the implementation of MSWM practices much easier. Therefore, one of the main responsibilities of the authority personals is to earn the trust of the community. i.e. provision of quality service by collecting waste on time. L6 mentioned that *"waste collectors should always be supervised and inspected by the municipal council, to make sure whether they are performing their duties correctly".* Consequently, interviewee T2 stated, if the municipal council perform their work well, the community will support them for MSWM in a proper approach.

- Practice MSWM from kindergartens and schools

Respondents stated that the only way of improving waste management universally is to change the mindset of the people from their childhood. T3 stated that Waste management should be a part of college curriculum, since *"if we change their mindset of good practices of waste management, protecting the environment, at a very young age, when they raise, it will be a part of their life rooted as a value and therefore, eventually, there will not be problems with waste management anywhere".*

- Creating a competition among Municipalities

According to the notions of the respondents, another proposed strategy was to create a competition among the municipalities in the sense of MSWM. L6 mentioned that

" *competitions will optimize the management of MSW, the municipality which has adopted the best practices to manage their own MSW could be assessed and through award ceremonies, their performances could be appraised mainly by awarding cash prices*". Similarly, a star system could be introduced to municipalities which have to have the most efficient methods for MSW. For instance, the highest efficient could be given five starts while a comparatively law efficient municipality will be given three stars.

4.3 Refinement of the framework

To bridge the gap between managing MSW in cultural perspective and evidence-based practice, the conceptual framework developed via the literature review presented in Figure 2.8 needed to be refined. Therefore, Figure 2.8 was refined and updated further by including analysis of findings to provide a comprehensive framework. Through this framework, the overall output of the research findings is elaborated using a single figure which is presented in figure 5.1.

The refined framework includes the hierarchy of values, attitudes, and behaviours and the management of MSWM using a reverse cycle of values, attitudes, and behaviours. Identified existing values, attitudes and behaviours are displayed as positive and negative using different colour coding systems. Moreover, attitudes and behaviours are presented separately for each of the activity of MSW (waste generation, waste segregation, collection and transportation, disposal/treatment), which is inadeptly explained in section 4.5. However, a common set of values were identified, which is relatable for whole MSWM system (section 4.7). Moreover, this set of values were further identified as economic, social and environmental as decided by the researcher during the interview survey.

According to Figure 4.1, it clearly shows that though people hold so many positive values in managing MSW, most those have not reflected through their attitudes and behaviours. Through the findings from the collected data, it supported that the cycle of culture management, which is the reverse cycle of the value-attitude-behaviour hierarchy is more important in managing MSW (refer Section 2.8). The cycle of culture management concept was created through the literature findings. It revealed

through the findings that someone's pro-behaviour influences on changing another ones' attitude, while creating a positive value to the society in MSWM (refer Section 4.3.1.1 and 4.3.2.1). Therefore, it can be concluded that those types of pro-behaviours should be improved in a society as it has already revealed that the cycle of culture management can do a significant influence on managing MSW.

Hierarchy of values, attitudes, and behaviours

Values in MSWM
Adapting environmentally acceptable practices
Source reduction of MSWM
Promotion of cleaner cities
Adapting economically feasible MSWM projects
Adapting socially acceptable practices
Curtailing the aesthetic pollution in cities
Controlling air and water pollution
Encouraging composting and recycling
Reduction of the amount of waste which are directly dumping without any treatment
Promoting innovative methods to manage MSW
Maintaining sustainability
Efficient use of available resources
Considering waste as a resource
Be supportive to the economy
Acknowledge community suggestions and ideas
Working as a team
Health and safety of all citizens
Provision of a satisfactory MSWM service to citizens
Coordination among responsible MSWM parties
Individualism

Influence

Attitudes in MSWM	
Attitudes in MSW generation	
Positive attitudes	**Negative attitudes**
Waste is a resource	Higher generation of MSW
Waste generation can be minimised/controlled	Difficult to control waste generation
Plastics and polythene should be banned	Community reluctancy in MSW reduction
	Substandard practices to control waste generation
Attitudes in MSW segregation, collection, and transportation	
Community is supporting waste segregation	Deficiency of workers and vehicles for waste collection
Waste should be separated at its source	Poor garbage storage/discharge practices
Adapt more strict laws and regulations to segregate waste	Community is not properly engaged with MSW segregation
Collection of MSW waste is performed properly within the municipality	Segregation considered to be an extra burden to people
Waste should be collected in a routine manner	
Proper waste transportation plan should be adapted	
Sufficient workforce and vehicles are available to collect MSW	
Attitudes in MSW Treatment/disposal	
New technologies should be adapted to treat or dispose MSW	Waste management is considered only as one of their duty but not as a social responsibility
Open burning of waste is unacceptable	Engineered landfills are not suitable for Sri Lanka
Open dumping waste is unacceptable	Waste to Energy plants is not practical for Sri Lanka
Waste should be recycled	Available MSWM practices are not in a satisfactory level
Insufficient regulatory provisions to manage MSW	Community cooperation is lesser in implementing waste treatment facilities
Unsatisfactory level of community participation in MSW	Sri Lanka does not require latest technologies to manage waste
There should be a centralized system to manage waste	Political interference in managing waste

Influence

Behaviours in MSWM	
Behaviours in MSW generation	
Positive behaviours	**Negative behaviours**
Promote the production of reusable and recyclable products to manufacturers	Take no action to control waste generation
Promote the production of recyclable products to manufacturers	
Promote selecting products with less/without packaging	
Conduct public awareness campaigns	
Provision of home composting facilities aiming source reduction	
Behaviours in MSW segregation, collection, and transportation	
Provision of a colour cording system to segregate waste	Employ traditional methods to collect waste
Separate collection of e-waste	Provision of inadequate container capacity at the communal collection points
Routine collection of waste	Unable to optimize vehicle productivity by selecting the appropriate crew size and shift duration
Collection of waste only if they are segregated	Employ only a lesser number of collection staff
Provision of separate vehicles for waste transportation	Collect waste in a mix state
Charge a collection fee neither for residents nor large scale waste generators.	
Charge a tipping fee for the solid waste collected outside the municipality	
Provision of separate storage facilities for different types of wastes	
Implement Public awareness activities are being implemented to promote implementation of separate collection services	
Behaviours in MSW Treatment/disposal	
Separate recyclable waste and reusable waste prior to dumping	Direct dumping of waste in dump sites without any treatment
Conduct "Parisala pola" program	Propose projects without prior feasibility studies
Adapt engineered landfills to dump waste	Reluctant to work cooperatively among authorities
Adapt incinerators to incinerate waste	Employ lesser number of disposal site workers
Prepare action plans for future years on MSWM	Dispose collected waste in a mixed state
Produce of eco bricks using the MSW	

Management of values, attitudes, and behaviours

Pro Values

Influence

Positively changed Attitudes

- It is possible to control waste generation
- Community is supportive for MSWM
- Current practice to control waste generation is satisfactory
- People segregating their waste properly
- Segregation of waste is not an extra burden
- There are enough vehicles for waste collection
- Proper garbage storage facilities are being provided
- Latest technologies are better to control MSW
- Engineered landfills are also could be use for MSW dumping
- There is a properly managed system to manage MSW in Sri Lanka
- MSWM is not just a job but a social responsibility

Proposed strategies to change adverse behaviours and attitudes

- Establishment of a proper code of conduct
- Training programs
- Provision of required facilities
- Implement new practices, which used by the foreign countries to manage MSW
- Proper coordination among the relevant authorities
- Private Public Partnership in MSWM
- Practice MSWM from kindergartens and schools
- Earn the trust of the community by the Municipal council
- Creating a competition among Municipalities

Influence

Positively changed Behaviours

- Controlling MSW generation
- Collecting MSW from all the houses in the municipality
- Collect segregated waste
- Applying latest technologies to collect waste
- Provision of required facilities
- Minimise direct dumping of MSW
- Having a hierarchy to manage MSW
- Conducting proper feasibility studies prior to implementation of MSWM projects

Influence

Hierarchy of values, attitudes, and behaviours

Culture management

Induced Impact of culture management

Figure 4.4 – Framework for managing MSW in a cultural perspective

4.4 Discussion of the findings

At present MSWM is becoming a challenging job in most of the countries, including Sri Lanka, which is still developing and already having many issues due to its poor management. Through the background review, it was identified that in most of the cases, only technical solutions had been given ignoring the cultural aspects of managing MSW (Joos et al. 2010). Furthermore, Sri Lankans, including the authorities, are still not aware of the importance of MSWM for the country and has further identified the need of having an attitudinal and behavioral change to manage MSW properly. Thus, the researcher had identified the need for identifying the existing attitudes and behaviors, which shapes values in order to manage MSW from a cultural perspective. As the initial step, through a comprehensive literature survey, the concepts of values, attitudes and behaviors were identified. Findings revealed that there is a hierarchy of values, attitudes, and behaviors. However, through an in-depth review of the values, attitudes and behaviors, reverse the cycle of managing values, attitudes and behaviors was identified (Refer Sections 2.5 and 2.6). Through the data findings, the above phenomenal was able to be proved in the context of MSWM.

Findings from the interview survey revealed that the MSW generation has been increasing rapidly compared to the previous years. The interviewees acknowledged that the main reason for this increment is that the urbanisation, increasing rate of population, increasing the standards of lives. This has caused due to the use of more polythene products. Buenrostro et al. (2001) asserted that burning of waste, recycling, open dumping, and landfill, disposal is the most universally used management methods of MSW. Moreover, through the literature review, it was identified that the most common method of MSWM practices is open burning, landfilling (non-technical) and open dumping of waste (Refer Section 2.3). However, the interview survey revealed that most common practice is the open dumping of the waste but currently focusing on the 3R concept, WtE plants, engineered landfills and so on (Refer Section 4.2.1).

Shared values, attitudes and behaviors were identified through the literature survey due to lack of in-depth studies done on the culture and MSWM. Nonetheless, in the literature review, the process of MSWM was identified. The interview guideline was

prepared based upon the steps of MSWM to explore the existing cultural attitudes and behaviors. Thus, from the literature review, twelve (12) behaviors were identified, including eleven (11) negative behaviors and only one (1) positive behavior in MSWM. From the interview survey, behaviors were identified from each activity in MSWM process. For instance, seven (7) specific behaviors, including one (1) negative behavior were identified in controlling the waste generation, most identified behavior in a waste generation are the use of the 3R concept. The only negative behavior in MSW generation stage is that "doing nothing to control waste". Under the behaviors in MSW segregation, collection, and transportation. Nine (09) positive behaviors and seven (07) negative behaviors were identified. Moreover, eight (08) positive behaviors and five (05) negative behaviors were recognised related to waste treatment/disposal. For instance, under the segregation, collection and transportation of MSW, the most detectable behaviors are "the adaptation of a colour coding system for waste segregation", "routine collection of waste", "not collecting waste if they are not properly segregated", but contradictory to above, some of the interviewees mentioned that "still the waste is collected in a mixed state in some areas in Sri Lanka". Another significant fact highlighted in this research was through the literature review lesser number of negative behaviors were identified through the evidence-based practice.

Accepting a new attitude relies upon, who presents it, how it is presented, how people are perceived, the credibility of the communicator, and the conditions for acquiring the information (Ahmed & Mohammed Al-Mekhlafi, 2009). According to the responses of interviewees to the view of MSWM, not only the ideas of the professional but media, awareness programs can also be strongly influenced by someone's attitude. Thus, from the research findings seventeen (17) positive behaviors and sixteen (16) negative behaviors were identified, wherefrom the literature six (06) positive attitudes were found. It is noticeable that in Sri Lanka, the problems lay upon the attitudes compared to their behaviors. Even though they hold positive values, and due to their attitudinal problems, some negative behaviors have been created. However, from this study twenty-two (22) values were identified including one negative value.

Additionally, in the literature review, values, attitudes and behaviours of both developed and developing countries in general terms were identified. But compared

with Sri Lankan context a noticeable variance could be observed. For instance, three levels of authorities were identified in who are responsible for planning, implementing and monitoring MSWM systems (refer sub section 3.5.2) unlike the findings of the literature review. When analysing the attitudes and behaviours of those levels, contradictory attitudes and behaviours were identified (Refer Sections 4.2.2.1 and 4.2.2.2). Moreover, there were inconsistent attitudes and behaviours were observable within the same level in Sri Lanka as well. However, the significant fact is that all these levels of authorities possess a common set of values (Refer Section 4.2.2.3).

Furthermore, Homer and Kahle (1988) model suggest a rational hierarchy of the value-attitude-behavior. Conferring to that peoples' values are influencing behaviors and attitudes. Even if all the respondents possess the values on MSWM which support to improve the environment, it does not entirely tally with their existing behaviors and attitudes as per the interview survey. Thus, that, it is obvious that just being conscious of values is not enough as well as it does not impact the management of MSW. With the intention of managing MSW properly with attitudes and behaviors studied, a conceptual framework has been developed and refined.

4.5 Chapter Summery

This research intended at originating a culture-based solution for MSWM by reviewing MSWM practices in Sri Lanka, cultural manifestations (values, attitudes and behaviours) of authorities who are responsible for planning and implementing MSWM and identification of a relationship between values, attitudes, and behaviours in relation to MSWM. Moreover, a significant change over of values, attitudes, and behaviours of the authorities of MSWM is crucial to attain the maximum advantages of MSWM practices. Even though many positive values are existing with Sri Lankans findings revealed that, such a positivity is not manifested in the existing attitudes and behaviours of authorities responsible for MSWM. Accordingly, strategies were suggested to manage MSW. in a cultural perspective.

CHAPTER 05

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter 05 focuses on the findings and presents the conclusions and recommendations while stressing out the key outcomes of the research. Primarily, an overview of research was given while provoking how each of the objectives of this study was achieved to reach the aim of the research. Further, contributions which were made to knowledge and recommendations given to industry practitioners as well as to the academics. Besides, this chapter embraced limitations of the study.

5.2 Overview to the Objectives

Currently, MSW has become a vital issue for all most everywhere in the world. However, compared to developed countries, developing countries like Sri Lanka is more in a critical situation of managing its MSW. Thus, research is contributing to the knowledge realm of cultural behaviour in MSWM by broadening the understanding of the cultural manifestations of values, attitudes and behaviours. Thus, having identified the need for culture management and existing cultural manifestations, the research question was derived as "How to manage MSW successfully through a cultural approach?", This research unveils the values, attitudes and behaviours hidden in different local authorities and community on MSWM. The knowledge created about cultural manifestations is providing reasons for the failure of many MSWM activities initiated in Sri Lanka. Additionally, such understanding on reasons helped in predicting possible corrective actions too. Accordingly, the output of this research (i.e. a framework for better management of MSW in Sri Lanka) will be helpful for negotiations between the local authorities and community and to enhance the decision-making processes of the local authorities. However, in the literature, there is no proper methodology introduced to manage MSWM from a cultural perspective. The first chapter consists of ingression to the research with a background study. Thus, to answer the research problem, an aim for the research was established. As a provision to reach the aim, objectives were placed. Then a comprehensive literature review was done as

the Chapter 02 to proceed with the research process as described in Chapter 03 of this research. Moreover, utilising literature findings, a conceptual framework was developed.

The researcher has adopted a qualitative approach to attain research and objectives. A qualitative research strategy using semi-structured interviews with the authority personals who are engaged in the planning and implementation of MSWM strategies in Sri Lanka were used to collect the required data. Thus, it was used as it required in-depth information on the concepts of values, attitudes, and behaviours, MSWM practices in Sri Lanka, and the exiting values, attitudes, and behaviours in MSWM. Thus, 17 interviews were conducted with the top-level, middle level, and the lower level management of MSW. The data gathered was analysed using manual content analysis. Upon the completion of data collection and analysis, the conceptual framework, which was rendered through literature, was refined. Ultimately, the developed conceptual framework was modified using the analysed data.

5.3 Conclusions drawn from the Study

This section discusses the accomplishment of all four objectives of the research study.

Achievement of first objective - Review the concept of cultural manifestations (values, attitudes, and behaviours) in solid waste management

Objective 01 was accomplished through the comprehensive literature review (refer Section 2.5). The focus of this objective was to identify the cultural manifestations; values, attitudes, and behaviours and the linkage among the manifestations. The hierarchy of value-attitude-behaviour clarifies such three types' existence. Values affect attitudes according to this hierarchy, whereas attitudes influence behaviours. In addition to the established hierarchy, it was able to find out from the literature, that there is a reverse relationship among the cultural manifestations of the hierarchical model. It was revealed that people do tend to change their attitudes in a positive way when people see good behaviours in society. Furthermore, it was discovered that attitude is an intuitive concept that predicts a person's values from the literature. In this sense, it can be pointed out that in a society, human pro-attitudes may shape a set of

values as well as a series of socially accepted value set can change the behaviours of the society.

Achievement of second objective - Investigate the municipal solid waste management practices of local waste management authorities in Sri Lanka

Objective 02 was achieved through the literature review and interviews (Refer sections 2.3 and 4.2.1). Strategies identified in the literature were categorised in the analysis under the MSWM process, waste generation, segregation, collection, transportation, and disposal. Also, several waste management methods to accomplish management strategies were identified from the data collection. According to literature, open dumping, recycling, and landfill disposal are the most used management strategies of MSW. Even though in Sri Lanka, open burning is the strategy that most of the people have been adopted. Moreover, it was revealed that there are many strategies that the MC has implemented to manage MSW.

Achievement of third objective - Derive the existing cultural values, attitudes, and behaviours of local authorities in municipal solid waste management.

In order to achieve the third objective, existing cultural values, attitudes and behaviours of authority personnel who are responsible for planning and implementing were identified. Initially behaviours were identified through the current practice of MSWM. Positive behaviours such as promoting the production of reusable products, and recyclable products, promoting to select products with less/no packaging, conducting awareness programs, provision of a colour coding system for waste segregation, conducting “parisara pola” and negative behaviours such as collecting waste in a mixed state, absence of coordination between authorities, proceeding MSWM projects without proper feasibility studies were identified through the interview survey. Furthermore, exiting attitudes in MSWM were identified in both negative and positive states. Waste is a resource, plastic and polyethene should not use, waste should be collected in a routine manner, adaptation of new technologies is good are some of the positive attitudes identified. Additionally, contradictory to positive attitudes, negative attitudes were also identified such as current waste

generation is high and is difficult to control the waste generation, community is not segregating their waste when disposing, available waste disposal methodologies are not in a satisfactory level. Ultimately, existing values embedded in the authority personnel in relation to the MSWM such as coordination, environmentally acceptable MSWM practices, health and safety of the citizens were identified. It was observable that in Sri Lanka, there are many positive values exist compared with the attitudes and behaviours of authority personnel responsible for planning and implementing MSWM practices.

Achievement of fourth objective - Develop a framework for better management of municipal solid waste by recommending strategies to change the existing adverse cultural behaviours, attitudes, and values of local authorities

Initially, through a comprehensive literature review, the concepts of value, attitudes and behaviours were reviewed with its interrelationship each other (Refer Section). Thus, A hierarchical relationship was identified as values related to MSWM impact (influence) the attitudes in MSWM, and those attitudes will impact (influence) the behaviours related to MSWM. Furthermore, a reverse cycle of managing values, attitudes and behaviours was also identified by analysing their interrelationship with each manifestation. For instance; behaviour of the authorities in MSWM influence in the creation of good attitudes in authorities in managing MSW, Pro-attitudes have an induced influence in creating cultural values and values influence changing negative behaviours of authorities into future positive behaviours as demonstrate in the conceptual framework (Refer Section 2.8). Moreover, through the data collection, the conceptual framework was refined to a in detail framwork with existing values, attitudes, and behaviours of authorities engage in managing MSW with the strategies proposed to manage MSW through cultural values, attitudes, and behaviours (Refer to Section 4.2.3).

5.4 Contribution to Knowledge

This research had made a significant contribution to the knowledge and awareness of adopted MSW practices by MSW authorities in Sri Lanka. Furthermore, this study emphasised the way of managing MSW from a cultural perspective while addressing values, attitudes, and behaviours. In the Sri Lankan context, MSWM in a cultural perspective has not yet taken into consideration. Most of the MSWM strategies have become unsuccessful due to the policymakers being unable to consider the cultural factors stemming from socio-economic factors while implementing such strategies. Even though there is pre-established hierarchy of value-attitude-behaviour which can be considered as theory application, the researcher has done an extension to the theory by identifying a cycle of culture management which is a reverse cycle to the value-attitude-behaviour hierarchy. Furthermore, the researcher has identified working definitions for the terms culture, values, attitudes and behaviours which will lessen the complexity of the definitions presented by previous researches. The additional novelty in this research is that the value, attitude, behaviour hierarchy, which is known to be a generic concept has been specially considered in terms of MSWM by the researcher.

5.5 Implication to practice

There is a plethora of cultural studies have been done previously but only a few were done on culture and waste management. Furthermore, those cultural studies on waste management are only done considering the community perspective. However, the researcher has identified the necessity of analysing the authority culture in MSWM. Thus, this area is a still an unscathed area yet exceedingly crucial for MSWM. The findings of this research; analysis of values, attitudes, and behaviours as well as the outcome of the research; a framework to manage MSW in a cultural perspective would benefit the authorities to get a better understanding on where they are in terms of values, attitudes, and behaviours and to change accordingly. Moreover, this study will aid international organisations who are willing to implement MSW projects in Sri Lanka. They would be able to get a better insight on the way to deal with the authorities and be able to have a proper understanding on the dilemmas they will have to encounter beforehand.

5.6 Recommendations

To the industry practitioners

It is recommended relevant authorities to take the following steps in managing MSW in cultural perspective in Sri Lanka addressing the community behaviours, attitudes, and values. Increase the awareness of the householders on the practices, which have adopted by the municipal council, as it was revealed that only a few residents are aware of them.

- Apply strict rules and regulations to the residents in managing MSW.
- Establish council wise waste management centres adopting new technologies in order to manage MSW.
- Encourage the private sector to join hands with the government to solve exiting waste problems, while earning a profit.
- Policymakers' primary consideration should be on addressing peoples' values, attitudes, and behaviours.

5.7 Limitations of the Study

Although the research was successfully analysed via collected information. The researcher had some limitations while undertaking the research. 2-3 persons were interviewed from each organisation and only 03 Municipal councils, namely Colombo, Kurunegala and Galle were taken as samples for data collection. Although there are several cultural manifestations, only values, attitudes and behaviours were considered for this study. The qualitative survey method was selected to extract the values, attitudes, and behaviours of authority personnel since it should be done in a theoretical way (indirectly) instead of work out through statistical data. Moreover, findings of this study are limited only to the context of Sri Lanka, with the possibility of applying for similar cultures as well. Ultimately, it is necessary to mention that the COVID-19 global pandemic has made difficulties in the data collection process.

5.8 Further Research

For the academics, this research provides an overview management of MSW through a cultural perspective. The researcher recommends do conduct further research on;

- Conduct an in-depth analysis of attitudinal changes required in MSWM
- Conduct an in-depth study on the factors influencing behaviours in managing MSW in Sri Lanka.
- Analyse the values, attitudes, and behaviours in construction waste management in Sri Lanka.
- Adaptability of innovative waste management practices over traditional waste management practices in Sri Lanka

5.9 Chapter Summary

There are numerous studies on MSWM done in many countries. However, these studies are addressing mainly the technical aspects of managing MSW. There are only fewer studies on culture and MSWM, which are only focusing the community culture. Thus, the current study identified the existing cultural manifestations (values, attitudes, behaviours) of the authority personnel who are engaged in planning and implementation of MSWM strategies in Sri Lanka by proposing to manage MSW in a cultural aspect.

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7.0 APPENDIX A

RESEARCH BRIEF

CULTURE OF MUNICIPAL SOLID WASTE MANAGEMENT: ANALYSIS OF VALUES, ATTITUDES AND BEHAVIOURS

Overview

The aim of this research is to analyse the cultural values, attitudes and behaviours of local authorities in municipal solid waste management in Sri Lanka.

The aim of this research will be achieved through the below mentioned objectives:

05) to review the concept of cultural manifestations (values, attitudes and behaviours) in solid waste management
06) to investigate the municipal solid waste management practices of local waste management authorities in Sri Lanka
07) to analyse the responding cultural values, attitudes, and behaviours of local authorities in municipal solid waste management
08) to develop a framework for better management of municipal solid waste through understanding of responding cultural values, attitudes and behaviours of local waste management authorities in Sri Lanka

Target group

Research will be conducted among the authority personals who are engage in policy and strategy formation and implementation of MSWM in Sri Lanka.

I have identified yourself as a potential participant who could provide me valuable information to this research. Therefore, I would like to interview you for **approximately 60 minutes and the interview feedback will be written down and recorded (with the permission of the interviewee)** to collect data more accurately.

Confidentiality

The information collected through this interview will be kept strictly confidential and should be used only for the purpose of the particular research. Any personnel information will not be disclosed within the research.

Thank you,

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INTERVIEW GUIDELINE

SECTION A - GENERAL INTRODUCTION TO THE RESEARCH

Topic: Culture of municipal solid waste management: analysis of values, attitudes and behaviours

Aim: The aim of this research is to analyse the cultural values, attitudes and behaviours of local authorities in municipal solid waste management in Sri Lanka.

Objectives:

1) to review the concept of cultural manifestations (values, attitudes, and behaviours) in solid waste management
2) to investigate the municipal solid waste management practices of local waste management authorities in Sri Lanka
3) to analyse the responding cultural values, attitudes, and behaviours of local authorities in municipal solid waste management
4) to develop a framework for better management of municipal solid waste through understanding of responding cultural values, attitudes, and behaviours of local waste management authorities in Sri Lanka

The interview guideline consist of the areas as follows:

- General information
- MSW generation
- MSW segregation, collection, and transportation
- Waste treatment and disposal

SECTION B - GENERAL INFORMATION

Name of interviewee (Optional) :

Designation :

Experience in the respective field :

Name of the organisation (Optional):

SECTION C – MUNICIAPAL SOLID WASTE MANAGEMENT

Introduction: Municipal Solid waste (MSW) are generated from the households, commercial waste from the hotels, schools, offices, commercial buildings in a municipality. Municipal Solid Waste Management (MSWM) is comprises with the activities such as generation, segregation, collection and storage, transfer and transport, treatment, and disposal of MSW.

01) According to your opinion, what is the importance of having a proper waste management system?

02) There are several legislations (Laws, policies, guidelines etc.) available for MSWM in Sri Lanka. For instance; Municipal Council ordinance Section 129,130,131, Urban Council Ordinance Section 118, 119, 120 and Pradesheya Saba Act No:15 of 1987, Section 93, 94.

a. Are you aware of aforesaid legislations?

☐ Yes ☐ No

b. Do your organisation following those legislations (Laws, policies, guidelines etc.) related to MSW? Or are there any other legislations available?

c. Are you satisfied with the available legislations (Laws, policies, guidelines etc.) for managing MSW?

☐ Yes ☐ No

State reasons for your answer

d. What is your opinion on authority's contribution in following legislations in MSWM?

03) Do you think the coordination among the people who are engage in MSWM is important?

04) What is your opinion on allocating a high proportion of funds for waste management?

05) What will you be choosing over followings in planning a waste management strategy ?

- Financial viability
- Community acceptance
- Environmental friendliness
- Technical feasibility
- Legal perspectives
- Any other?

State reasons for your selections

06) Do other government sectors encourage in proper MSWM practices?

SECTION D – GENERATION, OF MUNICIPAL SOLID WASTE

07) As per your knowledge, what are the best practices adapted locally and internationally to control MSW generation?

08) Are you adhering to above mentioned best practices? If not, what are the practices followed currently in Sri Lanka to control the MSW generation?

09) What is your opinion on the current practices in the control of MSW generation? Can you provide reasons for your answer?

10) What are your further suggestions to control the MSW generation in Sri Lankan context?

SECTION E – SEGREGATION, COLLECTION, AND TRANSPORTATION OF MUNICIPAL SOLID WASTE

11) What you expect from the proper segregation ,collection, and transportation of MSW system?

12) What are the best practices in segregation ,collection, and transportation of MSW?

13) What is the standard way in Sri Lanka for MSW segregation ,collection, and transportation as per the legislations?.

14) Are you adhering to above mentioned best practices? Can you give reasons for your answer? If not, what are the practices followed currently in Sri Lanka for segregation ,collection, and transportation MSW?

15) Who are responsible for the MSW segregation, collection, and transportation in Sri Lanka?

16) What is your opinion on the current practices in the segregation, collection, and transportation of MSW? Can you provide reasons for your answer?

17) Do you encourage waste separation at source? Elaborate the reason for your answer and the current situation of waste separation at source in Sri Lanka.

18) Are you facing any difficulties in MSW segregation, collection, and transportation? Why?

SECTION F – TREATMENT AND DISPOSAL OF MSW

19) What are your principles in treating MSW? Are those vary according to the MSW composition ?

20) Are you aware about below mentioned waste management strategies?

b) If yes, state whether the Sri Lanka is practising those waste management strategies?

c) If yes, what is the suitability of that strategy in managing waste for Sri Lanka?

d) Are there any other waste management practices adapted in Sri Lanka apart from the below mentioned?

Strategy	Awareness (a)	Practicing (b)	Suitability (c)
	Y/N	Y/N	
Waste reduction and reuse			
Composting			
Recycling			
Energy recovery (WtE, Biomass etc)			
Open burning			
Open dumping			
Landfilling			

21) According to the literature, it was found that open dumping is the most common waste management practice in Sri Lanka.

a) Do you agree with the above statement?

☐ Yes ☐ No

b) Do you think open dumping is the most suitable solution for managing waste in Sri Lanka? Or any other suggestions?

22) What is your opinion on the new technologies available in managing MSW? Do you prefer to adapt them in Sri Lanka?

☐ Yes ☐ No

State reasons for your answer

23) What is your opinion on the level of community support in waste treatment and disposal practices?

24) Are you satisfied with the current waste treatment and disposal practices adapted in Sri Lanka?

☐ Yes ☐ No

If not, what are the loopholes in the waste treatment and disposal procedures in Sri Lanka?

25) What are your principles to improve MSWM ?

Thank you very much for your cooperation