MITIGATION MEASURES AGAINST CHALLENGES FACING TOWN BASED SOLID WASTE MANAGEMET PROJECTS

A CASE OF MKOANI TOWN COUNCIL PROJECTS

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE MASTERS DEGREE IN PROJECT MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA

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CERTIFICATION

This is to certify that I have read this dissertation titled: ***Mitigation measures against town based solid waste management projects: A Case of Mkoani Town Council Projects,*** and found it is acceptable in partial fulfillment of the requirements for the Master of Project Management of the Open University of Tanzania (2017).

Prof. Omar Fakih Hamad

(Supervisor)

……..

Date

STATEMENT COPYRIGHT

DECLARATION

I, Machano Mmanga Mgeni do hereby declare to the senate of the Open University of Tanzania that the work presented in this dissertation is the result of my original work and has not been published or submitted to any other University, publication or Institution for any degree award.

…….. ……..

Signature Date

DEDICATION

I take this opportunity to dedicate this Research Project to my family, Father, Mother and friends for their contributions and support that they rendered to me throughout the research process. My special and most profound appreciation is extended to my beloved sons Mudrik and Adnan together with their Mother who missed me the most of the times during my research process. Their encouragements, enthuse and endurance are highly esteemed.

AKNOWLEDGEMENTS

This study characterized by lot of thinking, writings, rewritings, discussions, sharing of ideas, creative moments as well as moments of hopelessness. All I did, I had had persons around me who have not only supported me, but they have also taken an active part in the process of completing this Dissertation. Hence, this Dissertation was the result of fruitful collaboration and creative time together with colleagues, family and friends. I would be failing in my duty if I do not give my grateful thanks to those who have helped and encouraged me in writing this research report.

First of all, I am gratified to give my genuine gratitude to my supervisor, respectable colleague and friend, Professor Omar Fakih Hamad. Thank Professor for believing on my potential from the beginning (when I did not yet comprehend myself that I truly liked doing research). Thanks for pushing me, supporting, inspiring, and for the close cooperation during the whole process. I'm looking forward to the future continuation!

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ABSTRACT

The general objective of this study was to find out, investigate, assess and develop mitigation measures against the challenges facing town based solid waste management projects with a case of Mkoani Town Council. This study was conducted in Mkoani areas. The data were collected from local Government representatives, household informants, environmentalist and town council personnel with varying responsibilities. Sample size of 70 respondents was used. Data were collected from both primary and secondary sources using self-administered questionnaires, face to face interviews, filed observations and focus group discussions. Similarly, photographic information was used to add the research value. The data were analyzed quantitatively and qualitatively using statistical package for social science (SPSS). The findings of the research revealed that in order to be able to overcome challenges facing TBSWPs Mkoani Town Council and other environmental stakeholders should adopt an integrated solid waste management system which considers all aspect of solid waste management process like solid waste generation, collection, treatment, transfer and disposal at all levels. The research provided recommendations for actions (implementation), policy making as well as for further research.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACTS	:	African Center for Technology study
CA	:	Council Authority
CSOs	:	Civil Society Organizations
MTC	:	Mkoani Town Council
NGOs	:	Non-Governmental Organizations
SWM	:	Solid Waste Management
SWMDs	:	Solid Waste Management Designs
SWMPs	:	Solid Waste Management Projects
SWMS	:	Solid Waste Management Schemes
SWMSs	:	Solid Waste Management Systems
SWMSs	:	Solid Waste Management Schemes
TBSWM	:	Town Based Solid Waste Management
UUSP	:	Uganda Urban Service Project
ZGSP	:	Zanzibar Growth Strategy for Poverty Reduction
ZUSPs	:	Zanzibar Urban Services Projects

CHAPTER ONE

INTRODUCTION

This chapter presents the preliminary information about the study. It involves the back ground information of study, asserting the problem statement, objectives of the study, study questions, significance of the study, scope of the study and study limitations.

1.1: Background of the Study

According to Theisen (2000), Solid waste management projects are important facets of environmental and health development of any Nation. Since the time immemorial in Mkoani Town Council the issue of solid waste management project has become among challenging areas of environmental health. In recent years Mkoani District implements various Solid waste management Projects. It was proved by MTC Report (2012) that in spite of much money invested to implement Solid waste management projects in Mkoani areas so far, well-functioning and effective projects for proper solid waste management is missed. All funded Solid waste management projects are faced by number of challenges that typically hindering the performance of Solid waste management projects. It is noted from Simonetto (2007), that the area has been in a quandary of how to effectively and efficiently manage the municipal solid waste management projects in order to enable them achieve their intended goals. Due to this concern, this research therefore, needed to fill the gap in developing mitigation measures against those challenge facing solid waste management projects.

1.2: Statement of the Problem

With population growth due to rural- urban migration and being economic center, the generation of wastes in the Zanzibar Municipality has increased (Gauff, 2005;SEZM, 2005). As part of the developing countries and East Africa in particular, Zanzibar experiences difficult in waste management. The management in most areas of Zanzibar is highly unsatisfactory.

Based on a review of literature as noted in this study, it is revealed that regardless of various programs which have been initiated in order to address the issues of solid waste management project, scantly literature have specifically written on examining and proposing the mitigation measures against challenges facing Town Based solid waste management Projects in Zanzibar. Many studies that are related to solid waste management globally, regionally and nationally have only considered the aspect of challenges facing SWM and not their mitigation measures. Hence, without an effective mediation program to help the identification, explanation and suggestion of various measures to be undertaken in order to overcome those challenges, the degree and challenges facing TBSWMPs will continue to escalate. It has been approved that without effective motivational packages like this study and procedures, the challenges facing TBSWMPs are likely to continue. This new, interactive approach was obligatory since was targeted at proposing the mitigation measures against the challenges facing TBSWMPs.

1.3: Objectives of the Study

This study section typically presented the related objectives through which the attainment of the focus point of the study was projected

1.3.1: General Objective

The general objective of this study was to find out, investigate, assess and develop mitigation measures against the challenges facing town based solid waste management projects with a case of Mkoani Town Council.

1.3.2: Specific objectives

On the bases of the above general objective, the study had the following specific objectives:-

(i) To analyze the existing schemes of solid waste management projects in Mkoani Town Council

(ii) To identify and analyze the potential challenges facing solid waste management projects.

(iii) To find out, investigate and assess mitigation measures against the challenges facing Town Based solid waste management projects

(iv) To provide the convenient suggestions and recommendations that will enable to have sound TBSWMPs

1.4: Study Questions

The central question of this study was:-

What are the most suitable measures for interventions in and prevention of the rise in the case of challenges facing solid waste management projects in Mkoani Town Council?

1.4.1: General Questions

i) What are the schemes applied by Mkoani Town Council in solid waste management projects?

ii) What are the potential challenges facing solid waste management projects in Mkoani Town Council?

iii) What are the mitigation measures against the challenges facing Town Based Solid Waste Management Projects?

1.5: Significance of the Study

This Research helped the Municipal administrators, Town council personnel, Local Government representatives, Environmentalist and Urban planners to understand the mitigation measures against challenges facing town based solid waste management Projects

Also, this research responded to some philosophical questions about the quintessence of the challenges facing solid SWM projects.

Moreover, this research developed theory that will help the university students, administrators, managers, and officials of respective institution to understand the mitigation measures to be taken against challenges facing town based solid waste management project and how SWMPs can be improved to work efficiently, effectively and help to improve the health and environmental status of MTC and other parts that have the same characteristics like Mkoani.

Finally, the Research made a theoretical contribution to the body of knowledge that is related to reducing the over increasing challenges that pessimistically facing solid waste management projects.

1.6: Scope of the Research

This is the research segment which designates the geographical and conceptual confines of this study so that the researcher is able to satisfactorily carry out the study (Fisher, 1958)

1.6.1: Content Scope

From the need to overcome the challenges facing town based solid waste management Project, the study was basically confined at developing the mitigation measures against challenges facing solid waste management projects and not beyond. All other aspects that were associated to solid waste management facet were not enclosed in this research.

1.6.2: Geographical Scopes

This research was carried out in Mkoani Town Council and its application would be in all areas with the similar physiognomies like Mkoani Town Council. It was proposed to be

undertaken in MTC with the hope of representing other areas with the same characteristics like Mkoani Town Council

1.7: Study Limitations

This study was circumscribed and delimited by a number of assumptions or parameters. As such, it was performed only in the significant areas in hope of at least providing a portion of the whole picture of the problem.

The research was taken place in areas where English was not medium for communication, instead Kiswahili subjugated the large part of the area, and it is the first language for the people of the area. This situation therefore, enforced questionnaires survey to be adjusted to suit the locality. If that was the case, there were questionnaires adulterations during translation from English to Kiswahili and vice versa

1.8: Organization of the Research

The research work was presented in Five (5) chapters. Chapter one provided a general introduction to the research. It scrutinized the extent of the problem in Mkoani and addressed the significance of the study in the area. Chapter two inspected existing literature on solid waste management. Chapter three described the methodology that was employed in data collection from the field. The Chapter Four presented the findings and results of the study whereas the last Chapter five was based on conclusion and recommendations for both actions and further research.

CHAPTER TWO

LITERATURE REVIEW

2.1: Introduction

This chapter explored literature on solid waste management projects. Key concepts and terminologies associated with the subject were also studied for a clearer picture of what is happening in this field. The researcher reviewed and synthesized various written documents with relevant information to this topic in order to provide realistic report of the study. Those documents were found from sources like government publications, libraries, government agencies, non-government agencies reports, legal institutions, national policies and magazines, internet, dissertations and other field reports. The chapter ended up with conceptual framework that brought together the different concepts examined in this review.

2.2: Conceptual Definitions

Waste: According to Rathje (2007) waste is unwanted or unusable materials that emanate from numerous sources from industry and agriculture as well as businesses and households. According to him waste can be liquid, solid or gaseous in nature, and hazardous or non-hazardous depending on its location and concentration.

Solid waste: According to Gill (2002) solid waste as material that has no longer any value to the person who is responsible for it, and is not intended to be discharged through a pipe. According to Gill (2002) solid waste does not normally include human excreta. It is generated by domestic, commercial, industrial, healthcare, agricultural and mineral extraction activities and accumulates in streets and public places.

Solid Waste Management: The term Solid Waste Management is defined by Mugenda (2002) as discipline associated with the control of generation, storage, collection, transfer

and transport, processing and disposal of solid wastes. He continued saying that process in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitudes

Solid waste Handling: Nganda (2007) has defined the term waste handling as to comprise activities associated with managing wastes until they are placed in the containers used for their storage, before collection or return to recycling centers.

Disposal: From the view point of (Alice, 2005) Solid waste disposal is deliberately discharged, deposited, injected, dumped, spilled, leaked, or placed of discarded solid waste so that such solid waste or a constituent thereof may enter the environment or be emitted into the air or discharged into waters

Scheme: According to Adesina (2003) scheme is a large-scale systematic plan or arrangement for attaining some particular object or putting a particular idea into effects. According to what has been presented by him, scheme always implies mental formulation and sometimes graphic representation of something else.

2.3: Theoretical Literature Review

This study on challenges facing solid waste management was guided by the Contingency Theory. The theory of management developed by Beatrice (20013) this study determined the challenges facing the management of solid waste in MTC. The theory postulated that there is no one the best way to manage: There are many external and internal constraints that could alter what is the best way to manage in a given situation. This study proceeded on the idea produced by Koster (2009) that based on the premise that the best way to manage solid waste is dependent on certain critical aspects in MTC. It was the fact that Contingency Theory links a management design to factors unique to an organization that made it suitable for this study. In order to have integrated solid waste management we have to consider all financial aspect, technical aspects, institutional, and social aspects,

and SWM as safe and reliable collection, transfer, and disposal of solid waste (Theisen, 2000). According to this theory developed by Beatrice, (20013) SWM process cannot be successful unless the above mentioned aspects are not taken into great attention simultaneously.

2.4: Empirical Review

This research involved some of empirical studies which have been done either in Tanzania or elsewhere. Those empirical literature based on how relevant are these studies to what researcher intended to examine. The empirical literature deeply observed what are the shortcomings of such studies? They were basically followed by this pattern of general studies, Studies in African countries, empirical studies in Tanzania and studies in Zanzibar. These helped researcher to link the findings to them later in the discussion chapter.

2.4.1: Schemes Applied in Solid Waste Management Projects

The paper presented by Biubwa et al. (2014) presents the current status of solid waste management Scheme in Zanzibar Municipality. The study provides an overview with focus of different aspects of MSWM. The information was collected from informants through questionnaires. Similarly, photograph, documentation, field and direct observation were considered to add value of information. The findings disclosed that MSWM schemes in Zanzibar still inadequate and very problematic which highly needs strong improvements. Thus, this research itself is needed as a cornerstone to improve those existing schemes.

Uganda Urban Service Project (2010) had conducted research on waste management. The study attempted to analyze the current waste management system on Uganda. The thesis was made as a Minor Field Study funded by SIDA and conducted as a literature study

complemented by a field study on Uganda. According to the study Uganda, as a part of a developing country in East Africa, struggles with a bad municipal solid waste management system. There are technical challenges facing the waste management departments and their schemes applied.

Beatrice (2013), conducted a study that endeavored to inspect the existing schemes applied in solid waste management projects in Nepal. In the study descriptive comparative as well as correlation design. 335 questionnaires were distributed to respondents and were collected and used for analysis. The result denoted that most of solid waste management project around the world use unacceptable solid waste management schemes failed to observe administrative, financial, legal, planning, and engineering functions involved in solution to all problems of solid wastes and that's why the challenges always increase Potential challenges facing solid waste management projects.

The study on challenges facing solid waste management projects was done in Tanzania by Halid (2011), in his study he used Operational research methodology particularly mixed - integer programming to model the proposed. The findings of the study has exposed that Poor institutional arrangement has also been found to be a barrier to effective solid waste management in Tanzania.

The study that focused on the challenges of community-based waste management in Nairobi, Kenya was done by Dedan (2007), The central purpose of the study was to assess the success of these composting projects in meeting their environmental and community development goals. A complementary purpose of the study is to add to the limited amount of research on waste in East Africa within several of the cities. The samples comprised 131 households and were selected randomly from each Ward. The researcher used both

quantitative and qualitative method in the collection of both primary and secondary in the form of self-administered questionnaire that were used to obtain important information about challenges facing SWMPs. In the study it was found that waste management institutions in Kenya are faced with financial problems making it difficult for them to pay contractors and procure equipment for the collection and disposal of wastes.

Kaila (2008), has written a lot on Environmental Problems in an Urbanizing World. The purpose of this paper was to identify the existing challenges facing solid waste management projects in an Urbanizing World. This research is both exploratory and causal. Out of a total population of 350 a sample size of 200 was used. Self-Administered Questionnaire instrument was used to collection data for the study. Quantitative and qualitative data analysis technique was used. It was found out that main challenges noted are lack of comprehensive legal and regulatory framework for SWM, weak enforcement of by-laws, inadequate data on generation rate and waste characteristics and poor urban planning and infrastructures and social cultural patterns.

The study was undertaken by Khatua (2011). The objective of this research was to ascertain the environmental and health impacts due to the challenges facing SWMPs. In the study of Khatua (2011) used a mixed-method approach involving interviewer-guided focus group discussions and piloted semi-structured questionnaires in the data collection The results depicted that a wide range of health problems, including respiratory symptoms, irritation of the skin, nose, and eyes, gastrointestinal problems are due to the challenges facing SWMPs.

Another significant study on the discussed issue was done by Juma (2011). The study attempted to explain the environmental and human impacts due to the challenges facing

SWMPs. In tackling this topic, the quantitative approach was adopted. Questionnaires were circulated to all informants. Based on the responses received through these questionnaires, the results attest that water Quality/Contamination, Hazardous gas emissions, Natural Habitat Degradation and Biodegradation can happen due to the challenges facing SWMPs.

Chen (2008), made an investigative study and focused on SMEs. The objective of this study was to determine the environmental impacts due to the challenges facing SWMPs. His research applied Statistical package of Social science to analyze data. Out of total 350 of a sample size of 200 was used. Self-administered questioners instruments were used to collect data for the study. Quantitative data analysis and qualitative data analysis were used to analyses the collected data. Results show that solid waste can also obstruct storm water runoff, resulting in the forming of stagnant water bodies that become the breeding ground of disease.

2.4.3: Efforts against Challenges Facing Solid Waste Management Projects

Adelaide (2012) conducted thesis on SWMPs. The thesis aimed at examining the solutions on challenges facing SWMPs. Case studies have been performed in different Towns. Data were collected using Questionnaire and field observation. The results reveal that the enactment of national environmental policies and national environmental management Acts is the solution against the challenges facing solid waste management projects in many parts of the world. Certainly, this is an inadequate way towards enhanced solid waste management project and for that case; this research should be conducted in order to find the best ways to mitigate those challenges.

Parker (2012), conducted study based on SWMPs. The aim of his study was to validate whether there is any effort taken to overcome challenges facing SWMPs or not. He

collected Data from scientific literature, existing data bases, and observations. Parker, (2012), made during visits to urban areas workshops and applied questionnaire to stakeholders. Through his findings it is acknowledged that the study exposed the aspect of technical aspect to be in place since it leads to institutional development and capacity for responsible parts to have enhanced SWMPs. Indeed, my research is needed to help in the developing more comprehensive scheme in order to have enhanced solid waste management projects.

In the last years, a large number of research studies as the one done by WRAP (2011), Nicholas (2004), the studies of WRAP (2011), and Nicholas (2004) have been undertaken to determine the alternative ways to improve SWMPs around the world. The main methods used to acquire information and data used to prepare this report are site survey and investigations together with checklist-guided interviews. Their findings revealed that there must be the participation of decision makers, practitioners, academicians, local community workers, the private sectors, industries, development partners and other beneficial on the relevance of local resource mobilization towards sustainable solid waste management. Thus, following the complexity nature and massive failure of many established projects yet, these researches do not provide a sound basis for the design of measures intended to improve SWMPs and there must be the establishment of a new research that specifically aims at providing appropriate model for mitigating challenges facing SWMPs.

Some scholars have identified factors influencing the elements of the waste management systems. For instance the research done by Kofoworola (2007), attempted to analyze efforts against the challenges facing solid waste management projects in Nigeria. The paper is a review of existing literature, information, policies and data on municipal waste

management in Nigeria. The paper presents an alternative frame work and approach providing solutions promoting efficient municipal waste management. The framework is non-supportive because responsibilities for SWM are not properly aligned with the requisite authority and financial resources. Therefore, is that has been the case, another research is needed in order to provide acceptable schematic model to enhance SWMPs.

2.5: Research Gap identification

Although several researchers had carried out a number of studies on the causes of poor waste management projects in different parts of the country and the world at large, it should be noted with great concern that most if not all these studies had basically been concerned with challenges facing SWMPs and not about mitigation measures to overcome the challenges. This was also supported by Khatua (2011).

Also, their studies carried out in big towns and not in the small emerging towns like Mkoani. Therefore, this research required to fill the missing gap of providing mitigation measures against those challenges by examining the causes of poor waste management projects in Mkoani Town council and finally established proposals for changes and improvement in waste management projects. This research will be anchored on the Contingency Theory, and guided by the framework in developing mitigation measure against SWMPs.

2.6: Conceptual Framework

The study adopted the modified systems conceptual model to describe the concept on examining and overcoming the challenges facing TBSWMPs in MTC. The conceptual framework depicted in Figure 2.1 illustrates the relationship between Independent

Variables and dependent variables in examining the mitigation measures against challenges facing Town Bases Solid Waste Management Projects

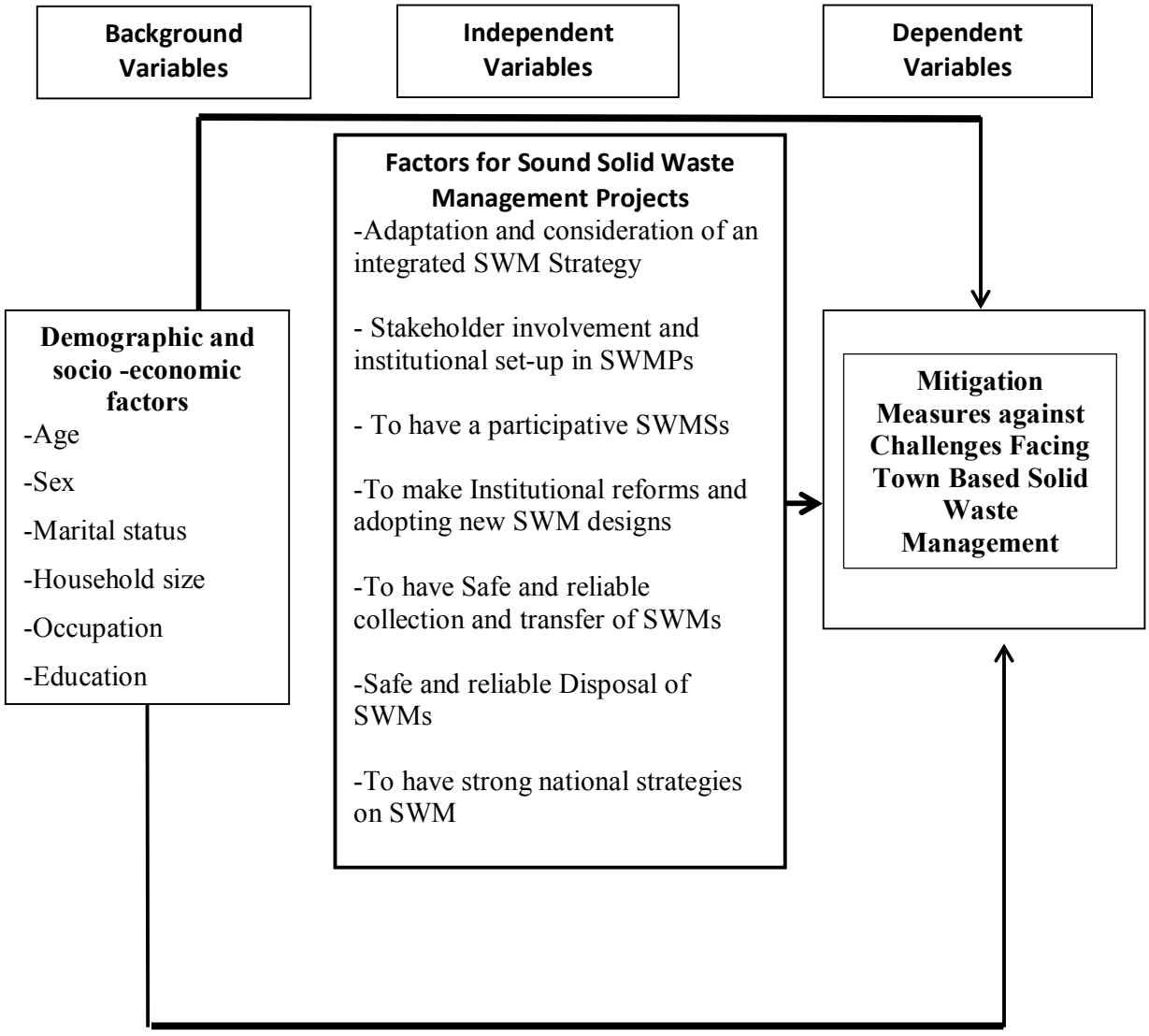

Figure 2.1: Key Elements of Sound Solid Waste Management

Source: Modified Figure

This Conceptual Framework summarizes various elements involved in the process of achieving the specific Solid Waste Management projects. It is the main target of this Dissertation. It is used to show how various dependent and independent variables

influencing each other to form a sound Waste Management Scheme. Other elements like demographic variables were considered in this framework.

2.7: Summary of Literature Review

The different type of literature review that were used in this Dissertation were systematically summarized as seemed here under

Table 2:1: Summary of Empirical Literature Review

S/N	Author	Year	Study	Findings	Comments
1	Biubwa at all	2014	Assess status of solid waste management Scheme in Zanzibar Municipality	Lack of comprehensive schemes in Zanzibar and very problematic which highly needs strong improvements.	Insight on understanding of solid waste management scheme applied in Zanzibar
2	UUSP	2010	Analyze the current waste management system in Uganda	Uganda struggles with a bad municipal solid waste management system	Failed to show how Uganda struggles with a bad municipal solid waste management system
3	Beatrice A	2013	Inspect the existing schemes applied in solid waste management projects in Nepal	Most of solid waste management schemes failed to observe administrative, financial, legal, planning, and engineering functions	Insights on understanding of solid waste management scheme applied in Zanzibar
4	Halid A.	2011	Assessing challenges facing solid waste management projects	Poor institutional arrangement has also been found to be a barrier to effective solid waste management.	Did not show how to overcome that challenges
5	Kaseva,	2003	Assess the success of these	Waste management institutions in Kenya are	Propose mitigating measure to help to

			composting projects in meeting their environmental and community development goals.	faced with financial problems making it difficult for them to pay contractors and procure equipment for the collection and disposal of wastes	help part of concern to solve solid waste management problems in their projects
S/N	**Author**	**Year**	**Study**	**Findings**	**Comments**
6	Kaila	2008	Identify the existing challenges facing solid waste management projects	Lack of comprehensive legal and regulatory framework for SWMPs and weak enforcement of by-laws	Is it a measure problem that leads SWM to be very problematic?
7	Khatua	2011	Find Environmental and health impacts due to the challenges facing SWMPs in UK	Waste left in streets create unpleasant odors and is breeding ground for vermin and insects which resulting into illness.	Did not propose what should be done in order to make good environmental and health condition of people.
8	Tukker	2006	Ascertain the Environmental impacts due to the challenges facing SWMPs	A wide range of health problems, including respiratory symptoms, irritation of the skin, nose, and eyes, gastrointestinal problems	What is the proposed solution in order to overcome the problem
9	WRAP.	2011	Discover the Environmental impacts due to the challenges facing SWMPs	Water Quality/Contamination, Hazardous gas emissions, Natural Habitat Degradation and Biodegradation	What is the proposed solution in order to overcome the problem
10	Salhofer	2007	Find out the Environmental	Obstruct storm water runoff, resulting in the	Did not propose how to overcome the

			impacts due to the challenges facing SWMPs	forming of stagnant water bodies that become the breeding ground of disease	problem
11	Chen X	2014	Find specific solutions on challenges facing SWMPs	Enactment of national environmental policies and environmental management Acts is the solution	Can be applied but not self-sufficient
S/N	**Author**	**Year**	**Study**	**Findings**	**Comments**
12	Parker D	2012	Validate whether there is any efforts taken to overcome challenges facing SWMPs or not	Aspect of technical aspect to be in place since it leads to institutional development and capacity for responsible parts to have enhanced SWMPs	Give insights on understanding of solid waste management scheme and mitigation measures
13	Sujauddin	2008	Analyze efforts against the challenges facing solid waste management projects in Nigeria	Presents an alternative frame work and approach providing solutions promoting efficient municipal waste management	The alternative frame work is not self-sufficient to provide the solution for the existing problem

2.8 Chapter summary

This chapter explored available literature on mitigation measures against challenges facing TBSWMPs. Key concepts and terminologies associated with the subject were also studied for a clearer picture of what is happening in this field. The researchers reviewed and synthesized various written documents with relevant information to this topic in order to provide realistic report of the study. Those documents were found from sources like

government publications, legal institutions, government courts agencies, non-government legal agencies, national policies, dissertations and other field reports.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1: Introduction

This chapter described how the study was carried out (Kumar, 2005). It covered the study design, study locale, study population and sample, data collection procedures, tools and methods of data collection. It generally described how the study was carried out and techniques adopted in collecting relevant information on the research topic (Mason, 1999)

3.2: Research Strategy

This research employed the exploratory survey research design. This strategy was highly preferred from the reason that it was an appropriate for this kind of research as it was applied by Agha (2006), who successfully undertaken the same research on mitigation measures against challenges facing solid waste management in Jamaica. The strategy also helped researcher to add the value of efficiency and effectiveness in whole process of data collection. This research used Mkoani Town Council as a primary case study. The choice was made because it is the first department responsible for ensuring that Mkoani is left clean. It employed correlation of qualitative design with little quantitative elements

3.3: Area of Research

This research was taken place in historical context covered many Shehias around Mkoani Town Council. Mkoani is one among nominated areas in Pemba for its familiarity among many people in Zanzibar (Zanzibar Urban Services Project 2010). It is situated at southern part of Pemba Island (Kalin, 2012). Four basic Shehias, namely Uweleni, Ng'ombeni, Kinyasini and Mbuguani were purposefully selected in order to ensure that both urban and 'peri-urban' areas were included. The areas were chosen because it was environmentally justified that they are frequently benefited by solid waste management projects that are

undertaken by Mkoani Town City Council. Also, they were chosen as suitable area for study because were accessible, less costly and any question concerning the study was easily answered directly from the whole community and all informants throughout the areas. Moreover, Based on the criteria used to select the study areas these four Shehias scored the maximum points and they were thus considered the best areas to deal with.

3.4: Survey Population and Sampling

This research interviewed and questioned different groups of people from different social settings from different parts of Mkoani Areas who had influence with this study. Basically, Local Government representatives, household informants, Environmentalist and Town council personnel were considered in this research. The researcher has chosen such population to represent the whole saga of the study. The population of about 99,876 people was drawn from around many areas (Respectfully Shehias) at Mkoani Town Council as a case study to represent other remaining areas with the same characteristics like Mkoani Town Council.

The study area and population were selected based on specific conditions ranged from their roles, relevance and degree of participation in solid waste management projects, or those for one way or another have to be influenced by solid waste management problems. Details were found in the following table here under:-

Table 3.1: Criteria for participant inclusion in the detailed study

S/No.	Criteria	Points
01	Areas which are mostly affected by solid SWMPs	8
02	Degree of solid waste materials generation and problems of management	6
03	Availability of the most relevant SWM informants	4
04	Areas with low solid waste management awareness	2

Table 3.2: Categorization of respondents of the study

Types of respondents	Size	Source of Social group	Total
Town council personnel	20	Mkoani Town Council	20
House hold informants	40	Four Representative Shehias	40
Environmentalist	05	Five Representative NGOs	05
Local Government representatives	05	District commissioner office	05
Total	**70**	-	**70**

Source: Own construction

3.5: Sampling design and procedures

For the interest of this research, the researcher selected a sample of 70 participants from 20 household informants, 40 Town council personnel with varying responsibilities 5 environmentalists and 5 Local Government representatives

The research mainly employed both purposive for questionnaires and simple random sampling technique for interviews. (Discombe, 2007). This was intentionally done to avoid bias in research and avoiding misleading of the targeted data. Highly, the population was chosen based on the designed criteria. Those were degree of solid waste materials' generation, availability of the most relevant informants, areas with high problems of solid waste management, areas with low solid waste management awareness and those areas which were mostly affected by solid waste Management projects

3.6: Research Variables

3.6.1: Dependent Variable

Under this study, the researcher used Mitigation Measures against Challenges Facing Town Based Solid Waste Management Projects as the study dependent variable.

3.6.2 Independent Variables

Under this study the researcher used the following as the study independent variables as they were analyzed in detail in conceptual framework of the research.

(i) Adaptation and consideration of an integrated SWM Strategy;

(ii) Stakeholder involvement and institutional set-up in SWMPs;

(iii) To have a participative SWMSs;

(iv) To make Institutional reforms and adopting new SWM designs;

(v) To have Safe and reliable collection and transfer of SWMs;

(vi) To have strong national strategies on SWM.

3.7: Data Collection Methods

Ghosh, (1982*)* insists that researcher should use different methods of data collection. In this research numbers of approved approaches of data collection were employed for both primary and secondary data. Regard to the information relating to the variables upon which the investigations were to be conducted, four methods of data collection were employed. These were the documentary method, the interview method, self-administered questionnaires and Field observation method. The review of selected legal and government frameworks and observation of various services regard to waste management was also done. Similarly, photograph were used to add study value and noted in this report

3.7.1: Data Sources

The data source means the aspect in which the researcher will develop the originality of the data that he/she is going to involve in the study (Ferber, 1962). The sources of data for this Dissertation were from both primary and secondary sources.

3.7.2 Primary Data

The primary data were obtained from the field through various data collection techniques including questionnaire survey, interviews, and field observation

3.7.3 Secondary Data

The main source of secondary data was through cutting across various official documents and reports from dissertations and various institutions of concern. Those records (Documents) should at least comprise with relevant information from resent years. The review of selected legal and government frameworks and observation of various services regard to waste management was also done.

3.7.4: Field Investigation

To obtain a better understanding of participant's perspective and to enable the comparison of findings the researcher is required to undertake observation of each participant (Burns, 2008). The researcher participated in day to day activities of the community around the selected areas while assessing the mitigation measures against challenges facing solid waste management projects. Those involved personal inspections.

3.7.5: Questionnaires Survey

The semi-structured questionnaires were developed for conducting the data collection process with various informants, the victims and the appropriators the household data were collected through questionnaires, based on the following variables:

The researcher used the questionnaire to collect available information during the field analysis. The questionnaires were distributed to the all respondents. Those questionnaires

were the combination of open-ended and closed questions and were prepared in two versions one in Swahili and other in English language to sweet the locality.

3.7.6: Face-to-Face Interviews

Best, (1986) explains the interview as a purposeful interaction in which one person tries to obtain information from another. Researcher used this method so as to get the data which could not be collected by other method. The researcher used this method to all respondents so as to get the key information. In so doing the structured interviews were administered. Interview questions were approximately 60 minutes in length and were conducted face to face at each participant's experience. Consent for tape recording was sought to each participant even though it was highly not acceptable.

3.7.7: Focus Group Discussions

The focus group discussions were held in both affected and non-affected areas were involved members from different social groups and institutions inclusively the victims group. The focus group discussions were made using specific prepared guide lines which was to be developed during preparation stage.

3.7.8: Data Analysis and Presentation

It was quoted from Barnes (2005) that Data analysis is the process of inspecting, transforming, modeling and interpreting data obtained from the field with the general highlighting useful information, suggestions, and conclusion and supporting decision-making

The data in this study remained both qualitative and quantitative. The qualitative data were analyzed by means of the statistical package for social science (SPSS). Software of newbies questionnaire data entry as a mathematical tool was also used to calculate and compute percentage, tabulation and cross-tabulation, graphs and description of responds.

The descriptive and statistical analyses were conducted based on the data and information collected from both primary and secondary sources. The analyses of each transcribed interview followed the process of data reduction, data display and the drawing of conclusion as outlined by Meidiana (2010). Also, data were organized and presented according to study objectives and questions.

3.8: Validity

Validity was an integrated part in this Dissertation. Validity was the way used to measure the accuracy and consistency of research tools. Researcher included approving that research questions measures what they were supposed to measure. Its consideration based on instrument for collecting data, the purpose of the study and the population for whom it was intended to give data. In ensuring the validity of the study, multiple 'pre-studies' were undertaken over different samples, and the collection of validity evidence covered specified areas involved. First items were constructed to act as a representative sample of all the possible questions that could have been derived from the construction. Predictive Validity was used to test the usefulness of a test in predicting some future performance whereas concurrent validity was used to look the usefulness of a test in closely relating to other measures.

3.9: Reliability

According to Strauss (1998), reliability refers to the degree to which the results obtained by a measurements and procedures can be replicated. For the interest of having a reliable report of this research, reliability was done to confirm the degree to which a test consistently measures whatever it measures. The most used technique to estimate reliability in this research was a measure of association. It was done by carefully designed directions for measurement with no variation from research informants, by using trained and motivated persons and panel of experts which explore theoretical construct. The

procedure was to administer the test to a group of respondents and then administered the same test to the same respondents at a later time. Finally, Validity of a questionnaire was established

3.10: Research Ethics

All ethical issues whether professional, technical, social or political were seriously taken into consideration and terms and conditions of confidentiality were accordingly applied. All the potential authorities including regional and district offices of government and other private institutions which were to participate in this research were officially informed in writing while the participants were asked for their voluntary participation in this research.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1: Introduction

This chapter presented the results and discussion of the study. A series of tables, charts and histograms are used. In this chapter, the researcher therefore presented the primary data collected and provides detailed discussions on it to help understand the mitigation measures against challenges facing town based solid waste management projects.

4.2: Profile of Respondents

The population characteristics examined in this research were; age, sex, marital status and education level. The purpose of choosing these characteristics was to get the general overview of what the respondents are composed of and how that influence solid waste management projects

4.2.1: Gender Perspective of Respondents

In this research both two genders participated much and provided their responses. If that was the case about 38 questions asked were typically answered by males and 32 questions were responded by females. The gender of respondents has been described in table 4.1. In generally we can say that there were more males than females than males in their response. The findings showed that male respondents were more active during the study.

Table 4:1: Distribution of Respondents` Sex variation

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	38	54.3	54.3	54.3
Female	32	45.7	45.7	100.0
Total	**70**	**100.0**	**100.0**	

4.2.2: Age of the Respondents

Age is an important demographic variable and is a primary basis of demographic classification in vital statistics, censuses and surveys (Chapman, 2005). Figure 4.2 presents age groups of respondents participating in this research ranging from below 18 to 61 and above years. Results in Table 4.2, indicates that about one third of respondents in the study areas were aged between 18-30 years followed by other group of the respondents aged below 18 years and the last age group was 50-59 years. This implied that apart from the age group of 20 – 29 years and 41-50 years of the respondents consist large portion of respondents. Other age groups were within the active age group as compared to rest of age groups of 51 – 60 years. The last part was 61 years and above of total respondents. The findings therefore showed that adults have more potential labor contribution in various social communal activities such as solid waste management activities. It was also proved by (Christenson, 1989) that they also have more experience and are able to access characteristics of new technologies/ideas. This finding supports the observation made by (Kaseva, 2003) which states that the age between 26 – 57years is within the labor force age group, that is, people in this age group tend to be active, creative and participate in many social and economic activities

Table 4.2: Distribution of Respondents` Age variation

	Age Group	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 18	13	18.6	18.6	18.6
	18-30	15	21.4	21.4	40.0
	31-39	23	32.9	32.9	72.9
	41-50	13	18.6	18.6	91.4
	51-60	2	2.9	2.9	94.3
	61 and above	4	5.7	5.7	100.0
	Total	**70**	**100.0**	**100.0**	

Source: Field data 2016

4.2.3: Marital Statuses of the Respondents

According to Ngeze (1983), marital status can have influence in analyzing the research data obtained from research respondents. In this Dissertation respondents were asked to state their marital status based on the option of whether they are single, married, divorced or widowed. The findings in Table 4.3 indicate that many among all respondents were married, and some of them were widowed. All single respondents were more than widowed one, and divorced were very few in numbers. The higher proportion of the married couples may suggest that there is high possibility of participation in solid waste management activities due to complementarities of men and women labor roles within the household as observed by Mandara (1998), observed that married couples show a high-level of participation in community development activities probably due to cooperation among them in the marriage institution in the society

Table 4.3: Distribution of Respondents` Currently Marital Status

Marital Status	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Single	20	28.6	28.6	28.6
Married	35	50.0	50.0	78.6
Divorced	7	10.0	10.0	88.6
Widowed	8	11.4	11.4	100.0
Total	**70**	**100.0**	**100.0**	

Source: Field Data 2016

4.2.4: Education Level

Education is always valued as a means of deliverance from ignorance and enables one to perform effectively to any given task within a specified period (UN-HABITAT, (2011). Education is said to be an important key to the development and decision on a place of residence. Education attainment of a particular population is an important determinant of their opportunities and behavior that has strong effects for solid waste management. Due to the importance of education recently developing countries have started to invest in education as the tool of poverty eradication and good decision marking (Biubwa, 2014).

In this research respondents were asked to state their level of education. Results in Table 4.4 below indicate that the majority of the respondents had attained primary education whereas the following groups of the respondents had no formal education. The rest of the respondents interviewed had attained Certificate education and certificate/diploma, respectively and the last portion of the respondents had reached at Advance Diploma/Degree and above education. The results therefore, suggested that the majority of

community members had attained basic education and therefore likely to adopt new practices and ideas. Most of the respondents in the study were therefore expected to be more helpful in relation to participation in solid waste management in their communities.

Table 4.4: Education Level of Participant by Sex

		Level of Education				
		No formal education	**Primary education**	**Secondary education**	**Certificate/Diploma**	**Adv. Dipl./Degree and above**
Sex	Male	13	15	1	2	4
	Female	4	4	14	6	7
	Total	**17**	**19**	**15**	**8**	**11**
	Percentage	**24.3**	**27.1**	**21.4**	**11.4**	**15.7**

Source: Field Data 2016

4.3: Types of Solid Waste Generation and Composition

The composition of waste depends on a wide range of factors such as food habits, cultural traditions, lifestyles, climate and income (Bhatia, 1996). In the research area, the results revealed that the composition of most of household solid waste is of organic or vegetable and food remains wastes which make up highest proportion. Results in Table 4.5 indicated that about 36 % of the solid waste generated in Mkoani Town Council comes from the kitchen forming vegetables and food remaining materials.

27% of the solid west generated in Mkoani areas was plastics and other like materials, large part of them being domestic plastic and rubber residues. About 4% of solid waste generated in MTC originated from other sources such as plant leaves, papers and textiles remains.

The last type of generated solid waste materials in Mkoani Town Council accounts for small percentage of not more than 3.0%. This is originated by remain of wood materials.

Thus, the results in this aspect are consistent with previous studies like of Tilotwa, (2013) which indicate that about 70 - 80% of the urban waste produced in Tanzania is of organic materials produced by the community from Vegetable and food origin. Pooley, (2004) also observed that urban agriculture is increasingly growing as an important sub sector in the Tanzanian economy. Most urban dwellers engage in urban agriculture as a source of food and income supplementation. Kimbi (2004), who conducted research in Dar Es Salaam observed that large portion of domestic solid wastes (62.5%) in the city come from the kitchen and most of it is of organic nature

Table 4.5: The main type of generated solid waste in Mkoani Areas

Sex	Vegetable and food remains	Leaves/ grass	Plastics/ bottles/cans	Wood	Total
Male	18	3	13	1	35
Female	18	1	14	2	35
Total	**36**	**4**	**27**	**3**	**70**

Source: Field Data 2016

4.4: Extent of Solid Waste Produced in Mkoani Town Council

From the survey and questionnaires results it was noted that, the waste generation rate in Mkoani Town Council is 0.3 ton/day as indicated in figure 43 by 44.3% of respondents in forming a total of all wastes generated in the area per day. According to the data exposed from the review of literatures, it is estimated to be increased rate of solid waste generated. According to Louis (2004), the quantity of waste generated has shown a gradual increase tendency with population increase in the area from 0.l tons/day in 2014 to 0.3tons/day in 2016. Regard to the date received from the field, it can be estimated that the projection of population growth in the Council by 2025 is more than 1 ton per day with MSW generation. Achankeng, (2003) has asserted that increased of municipal waste generation

in many African cities was related to rapid urban population growth. The findings for waste composition as indicated in table 4.6 also showed that 32.9 percent of interviewees indicated that in Mkoani Town Council more than 1 ton/day of solid waste materials are produced. Other respondents 11.4% had contributed towards the extent of solid waste by saying that in Mkoani Town Council 0.5 ton is produced per day. In the same question proportion of 6 respondents completing 8.6 percent in the figure 23 bellow indicated that Mkoani Town Council had the capacity of producing only 0.2 ton a day. Finally, the study found that the rate of solid waste materials produced in Mkoani Town Council is very limited of about 0.1 ton per day. This was justified by about 2 respondent totals of 2.9 percent of all respondents. Detail in Table 4.5 below:

Table 4.6: The Extent of Waste Generated in Mkoani Town Council

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0.1 ton/day	2	2.9	2.9	2.9
	0.2 ton/day	6	8.6	8.6	11.4
	0.3 ton/day	31	44.3	44.3	55.7
	0.5 ton/day	8	11.4	11.4	67.1
	More than 1 ton/day	23	32.9	32.9	100.0
	Total	**70**	**100.0**	**100.0**	

Source: Field data 2016

4.5: Types of Storage facilities available in MTC

The discussion question asked informants if Mkoani Town Council as a primary beneficiary of solid waste management projects and department that is responsible for solid waste management process in Mkoani District had adequate storage facility centers

for storing solid waste materials in the area. Following large number of responds derived from this question, researcher had reasonably concluded that the efforts of solid waste management in Mkoani Town Council should be considered in whatever efforts to be undertaken. From the response given by respondents it was revealed that about 82.9% of all Town Council officials and other informants who answered this question came up with answer "No," there was no adequate storage facility applied by Mkoani Town Council. From the same question about 11 given answers forming 15.7% of all responses have given answer 'Yes' and the last portion of about 1 respondent total of 1.4% has given answer 'Not sure' whether Mkoani Town Council has adequate storage facility centers for storing solid waste materials or not.

Table 4.7: Responses on Storage Facility for Storing Solid Waste Material

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	15.7	15.7	15.7
	No	58	82.9	82.9	98.6
	Not sure	1	1.4	1.4	100.0
	Total	**70**	**100.0**	**100.0**	

Source: Field observation

4.6: Type of Waste Storage Facility

The study reveals that, SWM generated in Mkoani Town Council is stored in different containers at different premises of Council. The findings reveal that Council provides Concrete (immovable) containers in size for communal collection points. This was justified by about 81.4% respondent's total mean.

In the same case about 8.6 percent consisted of both male and females revealed that metal plastic containers are used as type of storage facility in Mkoani Town Council. There were containers available for the whole municipality. From responses given by interviewees of about **70** together with direct field observation of the targeted areas it was found that there was also the use of basket or carton used around some residential areas. Within the household areas, the study showed that the waste generated is usually stored in plastic buckets and plastic sacks which later delivered in these communal collection centers by residents themselves, or they are kept outside the house for those who receive door to door collection services. Table 4.8 shows 1.4 percent as was indicated by respondents.

Table 4.8: Type of storage facility for waste storage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Metal or plastic container	6	8.6	8.6	8.6
	Concrete (immovable) container	57	81.4	81.4	90.0
	Plastic bags	1	1.4	1.4	91.4
	Others	6	8.6	8.6	100.0
	Total	**70**	**100.0**	**100.0**	

4.7 Disposal of waste after collection

Available data from different interviewees of about 40.0% showed that the metric tons/day of mixed waste collected from different premises of Mkoani Town Council was disposed at inadequate communal centers/ collection points. At present, there is no permanent landfill operated in the municipality since the closure of the Chokaani central dumping site.

Other responses accounting for 35.7% showed that, the municipal waste was disposed in the open dumping without any form of treatment after collection. Table 4.9 indicates the informal dumping sites used for waste disposal in Mkoani Town Council.

Normally sand quarries around Chokaani areas ware used as disposal site by municipal with the purpose of maintaining land reclamation. Field observation showed that these sites were no longer properly designed and there was the problem of the vicinity to the residence which was significantly public concern due to environmental nuisance, bad odor, presence of flies and rodents, and stray animals. Table 4.9 shows the location of these dumping sites.

Table 4.9: The way to dispose wastes after collection/storage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incineration	12	17.1	17.1	17.1
	Communal centers/collection points	28	40.0	40.0	57.1
	Refuse pits	5	7.1	7.1	64.3
	Open dumpsites	25	35.7	35.7	100.0
	Total	**70**	**100.0**	**100.0**	

The table also shows the commonest place of waste disposal was incineration (17.1 per cent). This method was used in the low class residential areas in Mkoani District. This answer was followed by storing waste in refuse pits (7.1 per cent) mostly in the high class residential areas and some middle class residential areas. This resulted in littering and heaping of waste thereby making the environment filthy. Therefore, the possibility of outbreak of cholera and other environmental related diseases was high if such practice would continue

4.8: Participation in Solid Waste Management Activities

Best (2007), pointed out that different people according to their cultural Context define community participation in communal activities differently. This is more emphasized by Mruma (2004), who assert that community participation means involving people; men and women in the development process as active participants and not as passive recipients at all levels. The results in this research indicated that large number of residence around Mkoani Town Council participated much in solid waste management process. As indicated in Table 4.10 bellow, 50 respondents about 71.4 percent showed positive responds and 20 respondents of about 28.6 percent gave out their negative responds.

Table 4:10: Participating in Solid Waste Management activities

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	50	71.4	71.4	71.4
No	20	28.6	28.6	100.0
Total	**70**	**100.0**	**100.0**	

Source: Field Work 2016

4.9: Level of Personal Participation

When, respondents asked to state the level of their participation in solid waste management projects answers were given differently from one respondent to another. The results show that both two types of genders in Mkoani Town Council participate in Solid waste management activities. Table 4.11 indicates that answers that are related to this question were based on gender equality. This means that male were 35 totals of 50 percent of all percentage and female ware 35 in number accounting for 50 percent. Furthermore, it was found that about 25 informants from different categories total of 35.7 percent participated much in collection and storage of SWM in Mkoani Town Council. From other

answers given by interviewees and through other means of data collection, it was exposed that about 15. 7 percent of Mkoani population participated in transportation and final disposal of the solid waste materials generated in Mkoani Town Council. Another significant response given to this question was that account for 11 respondents of about 15.7 percent which indicated that they participated in campaigning people towards participation in solid waste management. Participation in separation and re-use/recycling was another variable used in determining the level of participation of people in Mkoani Town Council. According to the answer given it was realized that separation and re-use/recycling was not formally used in the area as it involved 2 respondents of about 2.9 percent

At the end of interview it was further denoted that solid waste management projects in Mkoani City Council was still problematic from the reason that there was huge number of people who did not participate in solid waste management activities. This was vindicated by about 21 informant total of 30.0 percent of answers given on that question.

Table 4.11: The means/Levels of Participation

Sex	0	Participation in collection and storage of SW	Participation in transportation and final disposal	Participation in separation and re-use/recycling	Participation in campaign	**Total**
Male	10	11	8	2	4	35
Female	11	14	3	0	7	35
Total	**21**	**25**	**11**	**2**	**11**	**70**

Source: Field Work 2016

4.10: Types of contribution

The type of contribution of household informants and other interviewees in this research was measures using four variables of labor contribution, cash contribution, contribution of cash/ or in kind (Labor and materials) and last was material contribution as was used. According to the data gathered from the field it was proved that in Mkoani Town Council all types of contributions are provided by different groups of the people in the management of solid waste materials. From the study area it was exposed that there were very few groups of people involved in cash contribution in the process of solid waste management in Mkoa Town. Only 4.3 % of those interviewed had made cash contribution and material contribution as outlined in figure. It had also proven by Blight (1991), which cash and material contribution is one among the most challengeable aspect in the development of poor communities

It was also wide-opened that 15.7 per cent of residences in Mkoani Town Council provide Contribution of cash and/or in-kind (labor and material) in solid waste management projects

On the other hand, the observation from table 45 summarizes 75.7 per cent of respondents who made labor contribution in solid waste management projects. The types of contribution realized from this research had close relation with what had been developed by Tilotwa, (2013). In regard to the same question, about 4.3 per cent of Mkoani residents gave their contribution in material form. This is evidenced in Table 4.12.

Table 4.12: Types of contribution during solid waste management

	Frequency	Percent	Valid Percent	Cumulative Percent
Cash contribution	3	4.3	4.3	4.3
Labor contribution	53	75.7	75.7	80.0
Contribution of cash and/or in-kind (labor and material)	11	15.7	15.7	95.7
Material contribution	3	4.3	4.3	100.0
Total	**70**	**100.0**	**100.0**	

Source: Field Work 2016

4.11: Motivation to Participation in Solid Waste Management

All most all informants participated much in answering this question although they varied from time to time. According to their responses significant proportion of respondents (40.0%) identified that they were motivated by LGA staffs (Health officers) to participate in solid waste management. The results were consistent with the observations from the focus group discussions which indicated that the most members of the community were highly motivated by LGA staffs (Health officers). Focused group discussions were conducted in which respondents were asked to suggest who had motivated them to participate in Solid waste management. Results in Table 19 indicated that25.7 per cent in Mkoani Town Council was motivated to participate in solid waste management project by

Ward environmental committee. There were also about 24.3 percent among informants who denoted that they were motivated by their friends. The last group of informants forming about 10.0 per cent has shown that they always participate in solid waste management projects since they were motivated by their relatives. The Table 4.13 analyses the findings

Table 4.13: Motivation to participate in solid waste management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Friends	17	24.3	24.3	24.3
	Relatives	7	10.0	10.0	34.3
	LGA staffs (Health officers)	28	40.0	40.0	74.3
	Ward environmental committee	18	25.7	25.7	100.0
Total		**70**	**100.0**	**100.0**	

Source: Field Data 2016

4.12: Challenges facing Town Based Solid Waste Management Projects

Attitude towards challenges facing town based solid waste management projects among respondents were measured using Liker scale which had 15 statements. Every respondent was asked to indicate if he/she strongly disagreed (1), disagreed (2), neutral (3) agreed (4) or strongly agree (5) with each item of the scale. The responses were grouped into three categories. Strongly agree and agree were regrouped into agree; strongly disagree and disagree were regrouped into disagree while undecided (Neutral) was left to stand alone. A total of ten (10) statements were constructed to show the frequency of attitudes towards

challenges facing solid waste management projects. The questions were scored through checking and fill in the gaps. The scores in disagree ranged from 17-48 points, agree ranged between 37.1-77.1 points and neutral lied within1.4-31.4 points.

Table 4.8 shows that, 34.7of respondents had agreed that poor management of fund is the challenge faces TBSWMPs in MTC (that is, they scored less than 50 out of 100), 47.1disagreed the challenge and 1.4 per cent had neutral answers. 67.2 of respondents had agreed that limited fund for SWM Projects was among the challenging areas in TBSWMPs although 10.0 disagreed the idea whereas 22.9 were neutral. Lack of operating and financial costs accumulated total of 82.9 from those who agreed an idea and 8.5 points of the respondents who disagreed an idea. Neutral formed total of 8.6

Lack of knowledge of waste collection accounted total of 77.1points as depicted in figure 4.8 followed by 7.1 points suggested by all respondents who disagreed the cause. The last scores were from those who were neutral forming total of 15.7 points. Another factor used as variables to measure the challenges facing TBSWMPs was Lack of knowledge of waste Disposal. This factor involved total of 52.9 points for those who agreed this challenge. 24.4 points scored by those who disagreed. Neutral answers were about 22.9.

From the same research, it was revealed that lack of household participation in TBSWM projects is among the challenging areas of SWMPs in MTC. From the item given this scored 38.5 points from respondents who agreed and 42.8 from those who disagree. Total of neutral answers were 18.6 points. Rapid urbanization was agreed up on by 50 percent of interviewees whereas 40.0 percent was disagreed as the challenge facing TBSWM and 10.0 were neutral.

At the time of the research it was obviously grasped that lack of municipal skillful personnel for SWM stands as a leading factor facing TBSWMPs in MTC. 45.0 percent of all informants displayed positive responses in agreeing the point even though there were about 22.9 percent who completely rejected the points. Among them total of 31.4 were in-between

Furthermore, it was observed that 41.0 percent of informants approved that poor authority rules and regulations is a challenge facing TBSWMPs in the research area. Large number of respondents approximating 43.1 viewed that this was not among the challenges disturbing MTC in executing its SWWPs. The last share was characterized by 18.6 points of neutral answers.

According to the information gathered from MTC personnel and household informants, lack of strong national strategies on SWMPs is the heartbreak challenge facing Solid waste management projects in Mkoani areas as it was supported by 70.0 percent of all respondents. Small number of about17.2 viewed this point negatively as this is not a challenge facing those projects. Those neutral answers indicated about 12.9 points.

Hence, from the research findings characterized in this section, it was noted in to great consideration that lack of strong national strategies on SWM, lack of municipal skillful personnel for SWM, rapid urbanization, lack of knowledge of waste Disposal, lack of knowledge of waste collection, lack of operating and financial cost and limited fund for SWM Projects are the main challenges facing TBSWPs.

Table: 4.14: Challenges facing Town Based solid waste management Projects

S/N	Challenges facing solid waste management	Agree (%)	Disagree (%)	Neutral (%)
I	Poor management of fund	33.7	57.1	9.2
Ii	Limited fund for SWM Project	67.2	10.0	22.9
Iii	Lack of operating and financial cost	82.9	8.5	8.6
Iv	Lack of knowledge of waste collection	77.1	7.1	15.7
V	Lack of knowledge of waste Disposal	52.9	24.4	22.9
Vi	Lack of household participation in SWM project	38.5	42.8	18.6
Vii	Rapid urbanization	50	40.0	10.0
viii	Lack of municipal skillful personnel for SWM	45.0	22.9	31.4
Ix	Poor authority rules and regulations	40.0	42.1	18.0
X	Lack of strong national strategies on SWM	70.1	17.1	12.8

Source: Field data 2016

4.13: Environmental and human impacts caused by challenges facing TBSWMPs

The survey results from selected residential areas deemed indicated that out of 70 respondents, who returned back the field questionnaire forms, 51indicated that eruption and spread of different disease is a serious environmental and human impact caused by solid waste materials left in the streets. There were 51 people make total of 72.9 per cent of all respondents who approved to identify this effect. This implies that spread of disease is the main problem associated by solid waste materials. 10 respondents indicated that obstruct storm water runoff was another impact of solid waste material in Mkoani Town Council left in the streets. This was equal to 14.3%. Evidence of this has been shown in Table 4.9

The survey results from selected residential areas also denoted that habitat degradation was issued as a leading environmental and human impact caused by solid waste materials. It was justified by number of interviewee total of 7.1%. Another 4 informants approximating 5.7% of 70 respondents claimed that among environmental and human impacts caused by solid waste materials, flooding and unsanitary conditions could be included. Thus, according to the results obtained from the study it was proved that eruption and spread of disease is the main impact of solid waste materials in Mkoani Town Council. It is also the one among the leading challenging aspect to Mkoani Municipal Official, District health workers and all residents around Mkoani areas

Table 4.15: Environmental and human impacts of solid waste Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Spread of Disease	51	72.9	72.9	72.9
	Obstruct storm water runoff	10	14.3	14.3	87.1
	Flooding and unsanitary conditions	4	5.7	5.7	92.9
	Habitat Degradation	5	7.1	7.1	100.0
	Total	**70**	**100.0**	**100.0**	

Source: Field data 2016

4.14: Mitigation Measures Against Challenges Facing TBSWMPs

This question was administered to all informants. The discussion paper asked respondents to propose for the mitigation measures to be taken in order to solve the problems facing

solid waste management projects in Mkoani Town Council. In regard to the magnitude and seriousness of the problems, the following facts were observed

In order to mitigate the challenges facing solid waste management projects, figure4.8 indicates that 40% of respondents indicated that Mkoani Town Council and other environmental stakeholders should consider an integrated solid waste management at all levels of waste management process around targeted areas. This was also accepted by TakeleT (2014), as an appropriate approach for current solid waste management.

As far as other respondents were concerned in this particular issue, the field data collected during the study showed that the challenges facing solid waste management in MTC can be overcome by engaging in what so called stakeholders' involvement and institutional set up. This meant that more than 34.3% of residents around the areas suggested the idea. An examination of the mitigation measures to be undertaken in order to eradicate those challenges continued to other informants. About 15.7% out of 70 total 100% were also approached. The findings by this per cent indicated that in order to mitigate those challenges facing town based solid waste management projects in MTC there should be participative SWMSs at all levels.

On the other hand, through the findings of the study, it was established that there is crucial demand to by Council Authorities to make institutional reforms and new solid waste management designs. According to their responds given in this context about 10 percent of all respondents who answered this question, proposed for this method. This implies that this approach was accepted by low number of interviewees.

Table 4.16: Mitigation measures against challenges facing TBSWMPs

		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Institutional reforms and new SWM designs	7	10.0	10.0	10.0
	Participative SWMSs	11	15.7	15.7	25.7
	Stakeholder involvement and institutional set-up	24	34.3	34.3	60.0
	Integrated solid waste management	28	40.0	40.0	100.0
	Total	**70**	**100.0**	**100.0**	

Thus, the principal findings based on this question exposed that in order to achieve sustainable, effective and sound solid waste management systems (projects) in MTC, the Council should adopt an integrated solid waste management system as a basic mitigation measures against challenges facing solid waste management projects in MTC and elsewhere over the World as it was supported by the study of Boadi (2005).

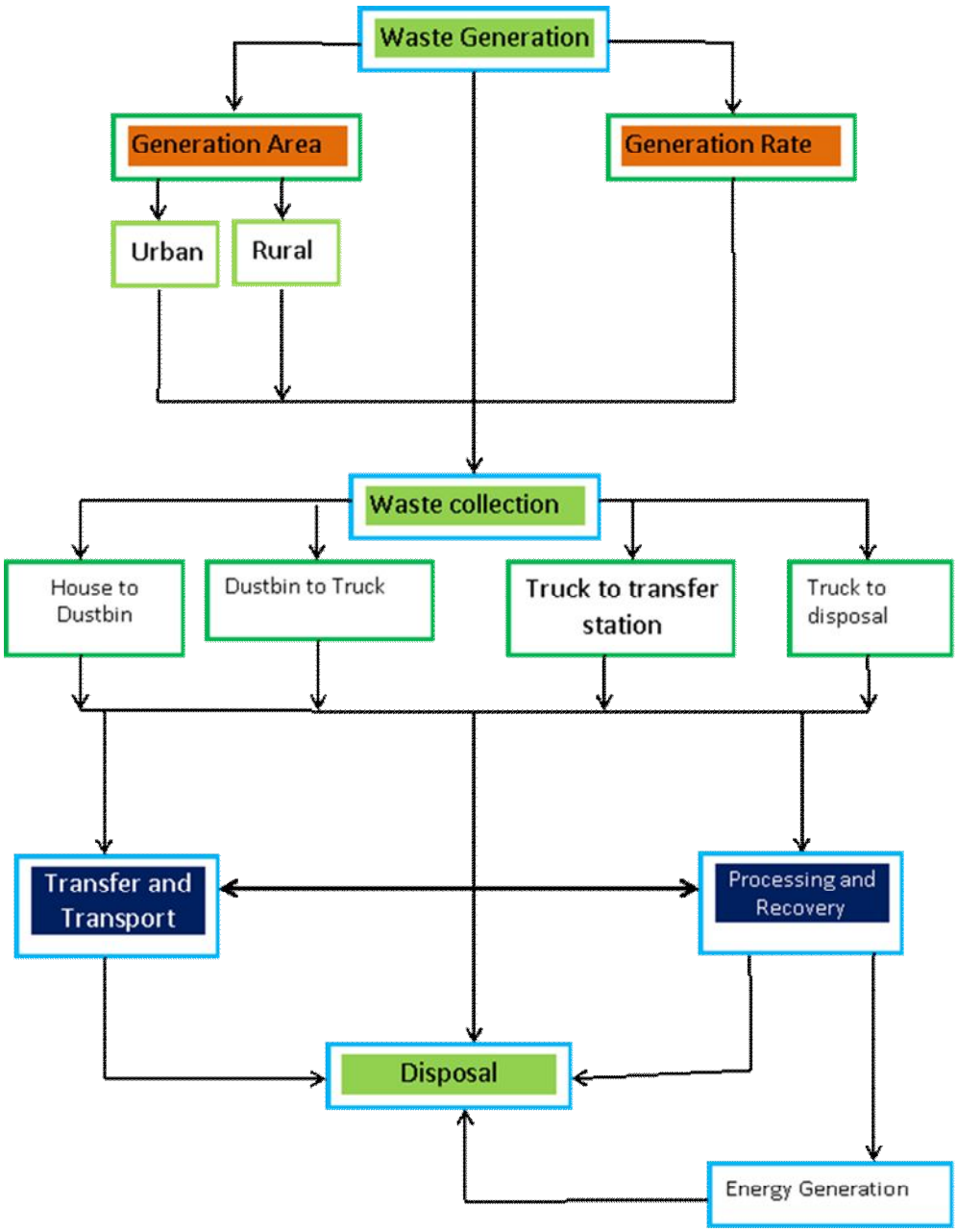

Figure 4.1: An integrated Solid Waste Management Scheme

Source: Modified from Boadi (2005).

It was documented by Tchobanoglous (1993), that an integrated solid waste management refers to the strategic approach to sustainable management of solid wastes covering all sources and all aspects, from waste generation, waste collection, waste segregation, waste transfer, waste treatment and waste disposal in an integrated method, with a stress on

make the best use of resources. According to Theisen (2000), an integrated solid waste management model comprises the following elements:-

4.15: Waste Generation

From the study findings it is exposed that it is important in waste generation to note that there is an identification steps that vary with each individual waste. Firstly, knowledge of the quantities of solid wastes generated. Secondly, separated for recycling and collected for further processing and thirdly disposal is of fundamental importance to all aspects of solid waste management projects. In order to have flat and effective solid waste management project in Mkoani Town Council and the rest of the World, there should be adequate knowledge of the most important areas for solid waste generation as proposed by Kerzner (2004). The area can be in the heart of the city (Urban) or peripheral (Rural) consist material produced by residents (Domestic wastes), commercial sectors (Commercial waste), industrial sectors (Industrial wastes) or farming activities (Agricultural wastes). (Kerzner, 2004).

4.16: Waste Collection

According to the study findings solid waste collection should be in a proper manner that will enable to have adequate activities associated with the gathering of solid wastes and the hauling of wastes after collection to the location where the collection vehicle is emptied. Conferring to the idea of Tchobanoglous (1993), Waste Collection includes gathering or picking up of solid waste from the various sources, taking the collected wastes to the site where it is deflated, and unloading of the collection vehicle.

4.17: Transfer and transport

From the survey finding, it was noted that Transfer and transport are important aspect in insuring the presence of an integrated solid waste management project. According to

Kreith (1994), transfer and transport involves two steps: (1) the transfer of wastes from the smaller collection vehicle to the larger transport equipment and (2) the subsequent transport of the wastes, usually over long distances to the final disposal site

It was also supported by Agha (2006) that typically, the contents of relatively small collection vehicles are transferred to larger vehicles that are used to transport the waste over extended distances either material recovery facilities or to disposal sites.

In order to have effective waste collection process transfer and transport station should provide welfare facilities for workers (lockers, toilets, showers); small stores for brooms, shovels, cleaning materials, lubricants, parking facilities for hand trucks, sweepers, refuse collectors, and office and telephone for the district inspector. (Agha, 2006).

4.18: Treatment and Recovery:

Another aspect to consider when we demand to have achievable solid waste management projects, Solid waste recovery is needed. It is a partial solid waste disposal and reclamation process. The element of processing and recovery includes all the technology, equipment, and facilities used both to improve the efficiency of other functional elements and to recover usable materials, conversion products or energy from solid wastes (Tchobanoglous, 1977). In the recovery, separation operations have been devised to recover valuable resources from the mixed solid wastes delivered to transfer stations or solid waste processing plants (Tchobanoglous, 1977). Those techniques, equipment and facilities used both to improve the efficiency of the other functional elements and to recover usable materials, conversion products, or energy from solid wastes

4.19: Waste Disposal

Another aspect to consider when we want to have achievable solid waste management projects, Solid waste recovery is needed. (Beatrice, 2013*).* It is the ultimate fate of all

solid wastes whether they are residential wastes collected and transported directly to landfill site. It is a partial solid waste disposal and reclamation process. Generally there are several methods of solid waste disposal that can be utilized. These methods are

1. Ordinary open dumping. 2 Controlled tipping/burial. 3 Incineration 4 Sanitary landfill and 5 Composts

CHAPTER FIVE:

CONCLUSION AND RECOMMENDATIONS

5.1: Introduction

This section summarized what was found in the field that was related to the topic. (Ferber,1962). Having been presented the findings of the study, the researchers proposed specific recommendations for both actions (Implementation) and for further studies through the same ground.

5.2: Conclusion

The general objective of this study was to find out, investigate, assess and develop mitigation measures against the challenges facing town based solid waste management projects with a case of Mkoani Town Council in order to solve the over escalating problems. The research was highly conducted in many areas around Mkoani District. To achieve the objectives of the study 70 respondents made up of 40 Household informants, 20 Town Council personnel, 05 Environmentalists and 05 Local Government representatives were interviewed and questioned by using specific structured questionnaires. The empirical results of this study found out that a holistic, comprehensive but pragmatic integrated solid waste management strategy should be the way to go, for the future effective Town Based Solid Waste Management Projects in Mkoani Town Council and other parts of the World with the same characteristics like MTC. Hence, Mkoani Town Council as the main responsible body to ensure that Mkoani Town remain clean, is required to make sure that it emphasize the usefulness of Integrated Solid Waste Management Model at all levels for all waged solid waste management Projects. Result also indicated that in order to have effective solid waste management schemes, there should be Stakeholder involvement and institutional set-up. In this case, various Stakeholders who have to take part in solid waste management process in the area should be involved in many ways and institutional set-up should be taken in to great consideration instead of giving the responsibility of west management process to Municipal Council only. Results further suggest that since the traditional SWM practices cannot work effectively and very problematic; there is a need to adapt participative

SWMSs. The process of ensuring that Mkoani areas remain clean should not be left in the hands of MTC. Various departments of concern should participate fully in the process. On the same study Institutional reforms and new SWM designs was denoted as among the important factors for overcoming the challenges facing Town Based Solid waste Management. Lastly, it was denoted through study findings that in order to have effective and more achievable SWMS that will comfort in eradication of the challenges facing Town Based Solid waste Management, Safe and reliable collection, transfer and Disposal of SWMs is necessary. Thus, based on research finding, the following recommendation were given

5.3: Recommendations

Based on the study findings the following recommendations are pertinent in order to reduce those challenges facing Town based solid waste management projects.

5.3:1: Recommendation for Actions

5.3.1.1: Encourage residents to adopt the Integrated Solid Waste Management Model.

They could be encouraged to separate the waste generated into their various components before final disposal. Waste can be dis aggregated into plastic, metals, wood, cans, bottles and food waste. In this case rubber cans, bottles, metals can be reused; plastics like polythene bags and empty water sachets can also be recycled. The rest like food waste can be composted for manure, incinerate those that are combustible and landfill those that cannot be subjected to any of the above mentioned methods. Currently, this method doesn't seem so plausible. (Sheppard, 2005).

5.3.1.2: Identification of responsibilities

There must be the identification of responsibilities for all organs that are responsible for solid waste management projects like Town Council Personnel, Environmentalists, Local Government representatives, Non-Governmental Organizations that are responsible for

environmental conservation, Ward Executive Officer, Shehia Executive Officers and Community members to dutifully practice the integrated Solid waste management model in order to overcome those challenges facing Town Based Solid Waste management Projects in the areas

5.3.1.3: Introduction of Integrated Facilities System-Mini/Micro (IFS-M)

There must be the introduction of Integrated Facilities System-Mini/Micro (IFS-M) that will be responsible for recording all the necessary solid waste generation, recycling, and disposal statistics on the installation, as well as the associated finance and accounting data so as to have Integrated Solid Waste Management projects

5.3.1.4: **Promotion public education program and campaigns**

It is recommended that Government and NGOs should formulate steering committees that will ensure community involve in planning, implementing and monitoring integrated solid waste management system together with promoting public education program and campaigns, correct attitude and social values reinforcement in supporting an integrated solid waste management system for all children and citizens in the society.

5.3.1.5: **Encourage partnerships between the private, governmental, and CSO**

Encourage partnerships between the private, governmental, and civil society organizations for the purpose of establishing fostering technical and administrative capabilities in the area of implementing an integrated solid waste management model

5.3.2: Policy Recommendations

In light of the research findings it is deemed necessary for this research to consider the aspect of policy recommendation. Thus, Key policy recommendation were hereby given on the following issues: Policy framework for legal resource mobilization, networking and

mobilization of local actors supplementing conventional approach in Council service provision

5.3.2.1: Policies focus on enhancing the Integrated Solid Waste Management Model

All municipal policies, aims, objectives, and initiatives that are related to solid waste management projects should be focused on introducing and enhancing the Integrated Solid Waste Management Model that will increase the effective and efficient performance of the Integrated Solid Waste Management projects

5.3.2.2: Institutionalization of Policy Frame

It is recommended by Tukker, (2001), that, in order to have an integrated solid waste management projects our related norms, rules, regulations and by laws must be institutionalized and hence, meaningful, effective, simple, brief and linked with waste management process.

5.3.3: Recommendation for further research

This research had also identified one recommendation for further research in order to complete the implementation of an integrated solid waste management projects. The following question would need to be addressed sooner than letter

What are the challenges facing implementation of an integrated solid waste management model?

In this case, other study is needed to prove how valid is this Model in Mkoa Town Council in the aspect of its implementation geographically, financially and technically.

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APPENDIX: QUESTIONNAIRES ADMINISTERED TO ALL RESPONDENTS

Questionnaire no: ……

Questionnaires administered to all respondents on mitigation measures against challenges facing solid waste management projects in Mkoan Town Projects

I Machano M. Mgeni an OUT student currently, pursuing Master degree in Project Planning and Management. I'm conducting research on the mitigation measures against challenges facing solid waste management projects for the case study of Mkoani Town Council (Pemba Island). I would like to learn from you in this phenomenon. Please I kindly request your support by filling in the appropriate answer in response to your opinions and knowledge. The information to be gathered in this study will be confidential because they will be used for academic purposes only. I appreciate your consent and more collaboration.

Section A: Respondent Personal Characteristics

Name of respondent (Optional) ……

Name of region…… Name of District……..

Name of ward…….. Name of Shehia……

Please tick [ ] circle and, or fill where appropriate

1. What is your sex? Male [**]** female [**]**

2. What is your age in years? Below 18**[ ]** 18-30 [**]** 31-39 **[ ]** 41-50 [**]** 51-60 [**]** 61 and above **[ ]**

3. What is your marital status?

1. Single 2. Married 3.Divorced 4. Widowed [ ]

4. What is your level of education? 1. No formal education 2. Primary education 3.Secondary education 4. Certificate/Diploma 5. Adv. Diploma/Degree and above [ ]

Section B: Information on existing Scheme applied in Solid Waste Management Projects (Generation, collection, storage, transportation and final disposal)

5. What is the main type of generated solid waste in this area?

1. Vegetable and food remains 2. Leaves/ grass 3. Plastics/ bottles/cans 4.Wood [ ] 5.Others(Specify)……

…….....

.....

6. To what extent is waste generated in MkoaniTown Council?

1.0.1 ton/day 2. 0.2 ton/day 3. 0.3 ton/day 4 0.5 ton/day 5. More than 1ton/day [ ]

7. Does your Municipal council have adequate storage facility centers for storing solid waste material?

1. Yes 2. No [ ]

8. What type of storage facility does your Municipal council (or establishment) have for waste storage on your area?

1).Metal or plastic container 2). Concrete (immovable) container 3). Basket or carton container 4). Plastic bags [ ] 5).Other type of containers. (Specify)

……

……

……

9. How do you dispose wastes after collection/storage?

1). Incineration 2). Communal centers/collection points 3). Refuse pits 4). Open dumpsites [ ] 5). Other specify

……

.....

.....

10. Have you ever participated in any means/level in solid waste management activities in your ward?

1). Yes 2). No [ ]

11. If yes in the above question, what were the means/ levels of participation?

1). Participation in collection and storage of SW 2). Participation in transportation and final disposal3Participation in separation and re-use/recycling 4 Participation in campaign [ ]. Other (Please specify)

……

……

……..

12. What type of contribution do you make during the management of solid waste? (Tick as many as possible)1). Cash contribution 2). Labor contribution 3). Material contribution

4). Contribution of cash and/or in-kind (labor and material) 5). Others (Please specify)

……

……

……

13. Who has motivated you to participate in solid waste management? (Tick one)

1). Friends 2). Relatives 3). LGA staffs (Health officers) 4). Ward environmental committee

[ ] 5). Others

(specify)……

……

……

……

Section C: Challenges facing solid waste management Projects

14.(Tick where applicable)

(1=strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.)

S/N	Challenges facing solid waste management	1	2	3	4	5
i	Poor management of fund					
ii	Limited fund for SWM Project					
iii	Lack of operating and financial cost					
iv	Lack of knowledge of waste collection					
v	Lack of knowledge of waste Disposal					
vi	Poor urban structure, infrastructures and professions					
vii	Inadequate technical SWM capacity					
viii	Lack of SWM awareness raising program					
ix	Lack of household participation in SWM project					
x	Rapid urbanization					
xi	Lack of municipal skillful personnel for SWM					
xii	Poor authority rules and regulations					
xiii	Inability of municipal capacity in SWM					
xiv	Lack of strong national strategies on SWM					
xv	Inadequate and outdated statistical data and information of SWM					

Section D: Environmental and Human Impacts due to Solid Waste Materials

15. What are the environmental and human impacts of solid waste materials?

(1) Spread of Disease (2) Obstruct storm water runoff (3) Flooding and unsanitary conditions (4) Habitat Degradation [ ] (5) other (Please specify)

……

……

……

Section E: Mitigation Measures against Challenges Facing Solid Waste Management Projects

16. What are the mitigation measures against challenges facing solid waste management projects?

(1) Integrated solid waste management (2) Stakeholder involvement and institutional set-up (3) Participative SWMSs (4) Institutional reforms and new SWM designs. [ ] [ ] [ ] [ ] Other specify bellow in the provided space

Please give your opinions on mitigation measures against challenges facing solid waste management projects

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