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APPLICATION OF TOTAL QUALITY MANAGEMENT (TQM) TOOLS TO SOLID WASTE MANAGEMENT: THE CASE OF MOMBASA MUNICIPAL COUNCIL

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ABSTRACT

The project seeks to identify the root causes of the garbage collection problems in Mombasa County Council using the Total Quality Management tools. Mombasa, a beautiful Port City alongside the Coast of Kenya, is riddled with litter and uncollected household wastes in its suburbia. Is it possible to solve this problem once and for all by applying Total Quality Management tools of problem identification? The research wishes to collect data from the citizens, then with tools of problem identification identify the 20% major causes (that is the critical few) which if tackled, will help to solve 80% of the waste management problems in Mombasa. The study collected data using self-administered questionnaires to 500 individuals each representing a household. The data was then manipulated to develop flowcharts, a Pareto diagram and a fishbone diagram with which it was possible to discern the root causes of the garbage management system in Mombasa town.

KEYWORDS

solid waste management, Total Quality Management, root cause analysis, Pareto diagram, flow charts.

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1. INTRODUCTION

1.1 BACKGROUND

The Municipal waste management system was established a century ago to protect public health in America's growing industrial cities. Waste managers have been proven powerless at controlling the rising tide of waste since the infrastructure designed for the waste stream of 1900 is completely not suited for the waste stream of 2000. The earliest municipal waste managers characterized municipal refuse using three categories; ashes, garbage and rubbish (Spiegelman, H. and Sheehan, B. 2006).

Solid waste from Mombasa Municipality and Lamu includes sludge from septic tanks and soakage pits, domestic rubbish and even industrial waste. This waste is disposed of at dumpsites located in the mangrove swamps. Mombasa... has separate sewage systems from domestic sewage and storm water runoff. The domestic sewage system was designed to serve about 17% of the current population (<http://www.unep.org>). Building sustainable cities, where resource consumption and environmental impacts are minimized, is a challenging task for engineers, planners and decision-makers, and the process will affect all who live within urban communities. One important aspect to consider is the relationship between urban form, municipal infrastructure and the associated environmental impacts (Di Nino, T. and Baetz, B.W. 1996).

1.2 PROBLEM STATEMENT

Mombasa would have a facelift if it employed the services of landscape management professionals who can reduce waste by grass cycling, not over-watering or over-fertilizing since a good landscape design can reduce green waste and save money. The city has resources to assist develop the landscape industry by hiring its services to reduce waste. The preferred way to reduce waste is to not make it in the first place meaning, the less waste there is in the city, the less waste that will have to be managed through recycle, compost, reuse and so on. Writing on sides of a sheet of paper, using products that last longer, using voice- or e-mail are all good methods to trim waste. Other waste reducing ideas include using a mulching lawn mower, buying products with minimal packaging, removing your name from mailing lists and replacing incandescent lighting with fluorescent lighting. These however may not be methods preferred by the population of the City however there is need to change the public opinion about their view of waste and how to respond to the increasing need to manage waste not only for the resulting good ambience but also for the long-term effect it will have on the tourism industry.

Political interference also hampers smooth running of local authorities. Vulnerability of pollution of surface and groundwater is high because local authorities rarely considered environmental impact in siting Municipal solid waste (MSW) disposal sites. Illegal dumping of MSW on riverbanks or on the roadside poses environmental and economic threats on nearby properties (Rotich, H.K. et al 2006).

Besides the terrorism threat to the tourism industry in Mombasa, there is the 'Kaya Bombo' cleansing insurrections, which are being well repressed and taken care of by the present government. Presently the city has litter dumped in every street corner, unswept streets and uncollected garbage. These are repulsive not only to tourists but to everyone else, portraying a bad image of the city and as such a place to avoid altogether. The Mombasa Airport is in the suburbs and all the way from the airport through the town to the entrance of the hotels, the tourists cannot fail to see the masses of unattended litter. The Mombasa Municipal Council Cleansing Department (MMCCD) exists, so the question is posed why it cannot get the job done of ridding the city of filth. The directive by government to clear all shanties built next to roads helped to alleviate the problem but now the shanties are up again except along Airport Road. This is evident of enactment of good policies but lack of continuous enforcement of the same especially in area deemed of little economic interest. "... high quality means pleasing consumers, not just protecting them from annoyances. Product designers, in turn, should shift their attention from prices at the time of purchase to life cycle costs that include expenditures on service and maintenance-the customer's total costs. Even consumer complaints play a new role because they provide a valuable source of product information (Garvin (1987), pp104)".

The researcher was prompted to focus on this area because the situation can be reversed upon a disciplined application of Total Quality Management (TQM). "Total quality management may be defined as "managing the entire organization so that it excels on all dimensions of products and services that are important to the customer". It has two fundamental operational goals, namely i) careful design of the product and service, ii) ensuring that the organizations system can consistently produce the design. These two goals can only be achieved if the entire organization is oriented toward them-hence the term total quality management (Chase-Jacobs and Aquilano 2004, pp 274)". Also a strong culture- a set of shared values, norms and beliefs that get everybody heading in the same direction-is common to all the companies held up as paragons in the best seller in Search Of Excellence (Higginson and Waxler, 1993).

Odero (2000) sought to establish the existence of non-quality situations in the training process at Kabete Technical Training Institute, identify the root causes of poor examination performance in diploma courses and to come up with TQM based suggested improvement for examination performance. Kinuthia (2005) documented environment management practices among manufacturing firms in Kenya to determine the relationship between environmental management and manufacturing strategy in Kenyan firms. On competitive priorities of firms Kinuthia, P.M., (2001), establishes that all firms surveyed were competing on cost, flexibility, dependability, quality and innovation and that quality was the major competitive strategy to most of the firms. Omufira (2001) sought to establish the extent of TQM implementation in the construction industry in Kenya. From the studies highlighted, it is evident that very little has been done to establish the root causes of quality problems in service delivery. Therefore, this study of the operations of the MMCCD by use of TQM tools wishes to answer the questions;

1. What are the fundamental causes of unswept roads and uncollected garbage in the city?
2. What recommendations if implemented will see to the alleviation and subsequent end to this solid waste management problem?

1.3 OBJECTIVES OF THE STUDY

The general objective of this study is that, by use of TQM tools to establish the root causes of the problem of uncollected litter in the streets of Mombasa and its environs so as to come up with quality measures, which if integrated in the MMCCD's routine operations, will solve this problem. Subject to this overall objective are the specific objectives as follows:

- i) to highlight the quality gaps in the performance by management and workers.
- ii) to recommend measures which if implemented will streamline activities in such a way as to ensure efficient and effective use of available resources.

1.4 IMPORTANCE OF THE STUDY

The results of this research project will be of significance in the following ways,

- Establishing operations with in built checks and balances, which will ensure effective and efficient garbage collection by the city council.
- Highlighting the problems of workers who stand to gain incase their wishes /woes if any, are addressed adequately resulting in an increase to their motivation to work even hard, own the processes this leading to quality performance as defined by their customers.
- Engineering a turnaround of domestic and international tourism so that the city experiences rejuvenation as a result of its sparkling streets and working sewage systems.
- Being a role model to all other cities, county councils and municipalities in the country thus creating a conducive National environment for both local and foreign investment.

2. LITERATURE REVIEW**2.1 TQM DEFINED**

Total quality management may be defined as "managing the entire organization so that it excels on all dimensions of products and services that are important to the customer". It has two fundamental operational goals, namely i) careful design of the product and service, ii) ensuring that the organizations system can consistently produce the design. These two goals can only be achieved if the entire organization is oriented toward them-hence the term total quality management' (Chase-Jacobs and Aquilano, 2004:274). By making use of employee familiarity with work problems, TQM taps into the creative capabilities of employees to find solutions to the problems. TQM focuses on people and it encourages the formation of teams and the empowerment of employees (www.webdocs.nyc council. info).

'An organization that chooses to pursue quality as the path to productivity should be cognizant of the traps that befall many well-intended productivity improvement efforts. Just as a productivity "program" has little chance of fostering lasting improvement, so any superficial attempt to improve quality will fail to ultimately boost productivity' (Belcher J.G., 1987: 153). Total Quality Management is an approach to the art of management that originated in Japanese industry in the 1950's and has become steadily more popular in the West since the early 1980's (www.johnstark.com, 2003). It is upon application of TQM philosophy and techniques when businesses undertake continuous improvement across all operations by seeking to discover the reasons for poor quality performance and customer service and implementing methods to reduce and/or eliminate the causes of poor quality (www.p2pays.org, 1994). 'Operations management is defined as the design, operation, and improvement of the systems that create and deliver the firms' primary products and services' (Chase et al., 2004: 6). Zero waste is a philosophy and a design principle for the 21st century. It includes recycling but goes beyond recycling by taking a "whole systems" approach to the vast flow of resources and waste through human society. Zero waste maximizes recycling, minimizes wastes, reduces consumption and ensures that products are made to be reused, repaired or recycled back into nature or the market place (www.webdocs.nycouncil. info).

Dale and Johnson (1986) state that at the incremental end of the spectrum lie minor improvements, waste elimination and cutting out no value -added activities such as redundant or duplicated tasks. These yield useful benefits, especially in quality and lead-time and sometimes cost but are usually limited to improvements within a department or function. They are made either top down by management controlled initiatives or bottom up by those who work in the process. If done bottom up by improvement groups, this is very much the province of total quality, involving everyone in business improvement.

A Schonberger et al (1981) state the world seems to shrink as global competition grows and jolts one solid firm after another. Informed consumers are in a position to demand the best-quality goods and services offered by global companies. Low prices, short delivery lead times, and flexibility are in demand as well. In addition, consumers prowl the landscape seeking friendly, honest and helpful services from service providers. Costin, H., (1999) also states that one of the most widely used terms and concepts in the quality literature is, of course, quality. Definitions of quality range from narrowly defined, primary operating characteristics of a manufactured product (e.g., acceleration or cruising speed for a car) to customer-defined quality. Of quality, Naylor, J. (1996), says that over the past twenty years or so, the critically significant importance of quality has been recognized as industry after industry has been challenged by innovation and international competition.

What increasingly differentiates success and failure is how well you locate, leverage and blend available explicit knowledge with internally generated tacit knowledge (Meyer, 1998).

2.2 OPERATIONAL PERFORMANCE

The operations function (system) is that part of the organization that exists primarily to generate and produce the organizations products. Ideally a process is any part of an organization that takes inputs and transforms them into outputs that, it is hoped, are of greater value to the organization than the original inputs. Understanding how processes work is essential to ensuring the competitiveness of a company. A process that does not match the needs of the firm will punish the firm every minute that the firm operates' (Chase et al., 2004:102). 'On-time delivery was also critical for Ford: the desire to keep workers and machines busy with materials flowing constantly made scheduling critical. Product, processes, material, logistics and people were well integrated and balanced in the design and operation of the plant' (Chase-Jacobs-Aquilano, 2004:15).

Information from the marketplace concerning the requirements of customers is likely to be available from the following sources i.e. feedback on the performance of current products, customer complaints, reports of market research agencies, data obtained by a firm's own marketing research department. In Oakland J. (2000), for an organization to be truly effective, each part of it must work properly together.

Operational performance in turn affects business performance measures such as market share and customer satisfaction. Production capability is the ability to operate production facilities, investment capacity is needed to upgrade the existing production facilities or establishing new production facilities and innovation capabilities is concerned with the developing technologies (Raouf, A., 1998).

They state that the first structural choice made by the operations manager is the process choice decision. The effects of this choice, are far reaching, as supporting structural choices will need to be made in the areas of facilities infrastructure and industry linkages. If these complimentary decisions are not made, the operation as a whole will not be focusing on the needs of the customer and will be vulnerable to any competitor who has targeted that same market sector for competition.

Implementation of operator process ownership ought to be a part of the MMCCD operations strategy.

2.3 TQM TOOLS

On determining what data and information to collect, 'A company's measurement system, like its entire quality system, must be driven by its customers. As you determine your customer's requirements and decide how you will meet those requirements, you will want to construct a measurement system that aligns all activities with improving customer satisfaction' (George and Weimerskirch, 1994:195). 'A high-quality health care or-Quality Organization develops data about itself and its performance for both internal and external use. Such data are an integral part of the quality improvement process, and this important idea has not gone unnoticed by the marketplace' (Enthoven and Vorhaus, 1997: 4). The following are examples of TQM tools.

2.3.1 QUALITY CIRCLES

The Japanese for quality circles means literally 'the gathering together of wisdom of the people' (Dodge et al 1996 cited by Abbot, 2000) and the term was used to describe the voluntary grassroots teamworking which operated in the workplace (Abbot, 2000). Oakland (2000), defines quality circle as a group of workers doing similar work who meet voluntarily, regularly, in normal working time' under the leadership of their "supervisor" to identify, analyze and solve work-related

problems, to recommend solutions to management. 'Once a problem situation has been recognized and before it is attacked, an inter-disciplinary problem solving or quality improvement team must be created. This team will be given the task of investigating, analyzing, and finding a solution to the problem within a specified timeframe. Sometimes called a quality circle, this problem solving team consists of people who have knowledge of the process or problem under study' (Summers, 2000:69).

Quality circles or variants of them have been found to contribute significantly to increased staff involvement in problem solving, in a variety of sectors and types of enterprise (Martin and Nichols 1987 cited by Abbot 2000). Finding appropriate ways of involving staff in decision-making and problem solving is one of the more intractable problems faced by any large institution. In a multifunctional organization with a broad mission and large numbers of staff, there is inevitably considerable distance in experience, understanding and professional priorities-between senior managers and support staff (Abbot, C.M.2000).

According to Naylor J. (1996), quality improvement relates to improving products and making them more suited to customer's needs. With all information collected the research will seek to establish those operating systems that will be able to meet the needs of the various stakeholders at the same time, while ensuring efficient and effective delivery of service.

2.3.2 BRAINSTORMING

In Oakland (2000) brainstorming is defined as a technique used to generate a large number of ideas quickly, and may be used in a variety of situations. Each member of a group, in turn, may be invited to put forward ideas concerning a problem under consideration. Wild ideas are safe to offer, as criticism or ridicule is not permitted during a brainstorming session. The people taking part do so with equal status to ensure this. The main objective is to create an atmosphere of enthusiasm and originality. All ideas offered are recorded for subsequent analysis. The process is continued until all the conceivable causes have been included.

2.3.3 PARETO ANALYSIS

Its originator was a 19th century Italian scientist who upon using it discovered that 80% of the wealth of Italy at that time was in the hands of 20% of the population. Summers (2000) states that the Pareto Chart is a graphical tool for ranking cause of problems from the most significant to the least significant. In Oakland (2000), this is an analysis of data to identify the major problems. "... a Pareto analysis can often point to significant areas to investigate" (Summers, 2000:70). It prioritizes areas of weaknesses so that effort is not wasted on what's not very important and can therefore be dealt with later. 'Joseph Juran rescued this analysis from obscurity in the 1950's and coined the phrase "the significant few vs the trivial many"...Pareto analysis is essentially based on the 80/20 principle, which states that 80% of all effects come from 20% of possible causes. It's simply a method of breaking down a quality issue into its representative parts according to their frequency or magnitude of occurrence. The purposes of the Pareto Chart include allowing an organization to identify those important few causes that tend to make the largest contribution to a given quality problem and allowing for a visual presentation of a given quality problem (Lau, M.2002).

2.3.4 HISTOGRAMS

Oakland 2000, describes them as diagrams which show in a very pictorial way, the frequency with which a certain value or group of values occurs. They can be used to display both attribute and variable data, and are an effective means of letting the people who operate the process know the results of their efforts.

2.3.5 CAUSE AND EFFECT ANALYSIS

In Oakland (2000), this is a useful way of mapping inputs that affect quality also called Ishikawa diagram (after its originator) or the fishbone diagram (after its appearance). The effect or incident being investigated is shown at the end of a horizontal arrow. Potential causes are then shown as labeled arrows entering it, as the principal factors or causes are reduced to their sub causes and sub-sub causes by brainstorming. 'A chart of this type will help identify causes for non-conforming or defective products or services. Cause-and-effect diagrams can be used after flowcharts and Pareto charts to identify the causes of the problem. This chart is useful in a brainstorming session because it organizes the ideas that are presented. Problem solvers benefit from using the chart by being able to separate a large problem into manageable parts' (Summers, 2000:83).

2.3.6 PROCESS FLOWCHARTS

"In a systematic planning or detailed examination of any process, whether that be a clerical, manufacturing or managerial activity it is necessary to record the series of events and activities, stages and decisions in a form that can easily be understood and communicated to all...The statements defining the process should lead to its understanding and will provide the basis of any critical examination necessary for the development of improvement" (Oakland, J., 2000:66). According to Summers (2000), she states that flowcharts are fairly straightforward to construct. She identifies the steps to creating a flowchart as defining the process steps by use of brainstorming. Sorting the steps into the order of their occurrence in the process, placing steps in appropriate flowchart symbols and creating the chart and finally evaluating the steps for completeness, efficiency and possible problems.

3. RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

Exploratory research design was used to learn who, what, when and how of operations in the MCCC and to highlight on the non-quality issues by use of TQM tools.

3.2 POPULATION

The target population was the management and workers of the MMCCD and members of public who fell under its jurisdiction. There were at the time approximately 500 workers and one overall manager. The number of households served by the department at the time of the research was about 100,000.

3.3 SAMPLING DESIGN

The researcher collected data from all the managers responsible for each of the available sub-sections in the department for example the managers/individuals in charge of; maintenance of equipment and machinery. Convenience sampling was used when collecting data from workers because it was an economical and time saving method for the researcher. Cluster sampling was used to identify members of the public from whom to solicit data. All of them fell under the MMCCD's jurisdiction. The research divided Mombasa into five zones, east, west, and north, south and central. From each zone data was collected data from 125 households.

3.4 DATA COLLECTION AND ANALYSIS

Primary data was used, collected by means of structured questionnaires.

Data was analyzed using descriptive statistics only. TQM tools; Pareto charts. Histograms were used to show root cause as being laxity amongst workers in the Cleansing department. Cause and effect analysis analyzed and communicated cause and effect relationships thus facilitating problem solving from symptom to cause to solution. Process flowcharts facilitated the description of existing process/es and helped design a new process as illustrated in the following pages.

4. DATA ANALYSIS AND INTERPRETATIONS

4.1 INTRODUCTION

This chapter contains summaries of data findings and their interpretations. It is divided into three sections two of which are directly linked to the objectives of the study. The first section analyses the respondent's general information. The second section analyses the operations of the MMCCD. The third section analyses quality gaps evident in the performance of management and workers.

4.1.1 RESPONSE RATE

The response rate was 100% by the management and the five workers the researcher was privileged to interview. 80% of the community members to whom questionnaires were distributed who responded. The following are some of the reasons given by those who did not fill out the questionnaires;

- They were not interested.
- They were too busy.
- They did not see anything change by participating in the exercise.
- Those who could effectively fill out the questionnaires were not home (literacy problem)

Therefore, the Manager in charge of cleansing Old Town Department (Mombasa Central), the five workers the researcher followed around the streets of Mombasa central business district and the 500 members of the public gave sufficient input that were analyzed to inform on the objectives of the research. These results are discussed in the following sections.

4.2 ANALYSIS OF GENERAL INFORMATION

The general information in the study included, number of years worked in the department, previous station and reason for transfer. The manager had been in office for two weeks. His previous department was Public Health Department. Reason for transfer was promotion. Of the workers on average, they had been on the job for 3 years. The community’s findings are as shown in the table below;

TABLE 4.1: LENGTH OF STAY

		Length of stay as resident							Total	
		Less than 5 years	6 - 10 years	11 - 15 years	16 - 20 years	21 - 25 years	More than 25 years	NA		
Male / Female	Female	Count	52	51	13	13	26	26		181
		Column %	33.5	57.3	100.0	12.9	40.6	40.0		36.2
	Male	Count	103	38		88	38	39	13	319
		Column %	66.5	42.7		87.1	59.4	60.0	100.0	63.8
Total	Count	155	89	13	101	64	65	13	500	
	Column %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source: author (2006)

The table above shows that most of the respondents had lived in the area for less than five years. This constitutes 52 females and 103 males. They make up 31% of the respondents. Males make up 63.8% of the total respondents whereas females make up 36.2% .This may have several implications, that;

1. men, as main providers of the home, they are most affected by the cleanliness problem
2. male literacy is higher than that of women
3. women are too busy with other more pressing issues
4. women have given up on the overall state of community cleanliness and have decided to concentrate on their homes.

The other group of respondents, which actively participated in the exercise, was those that had lived in the area for 16-20 years, they made up 20% of the respondents. The implication being they are the optimistic lot, that something good will come someday. Those that had lived in the area for 21years and above made up 26% of the respondents.

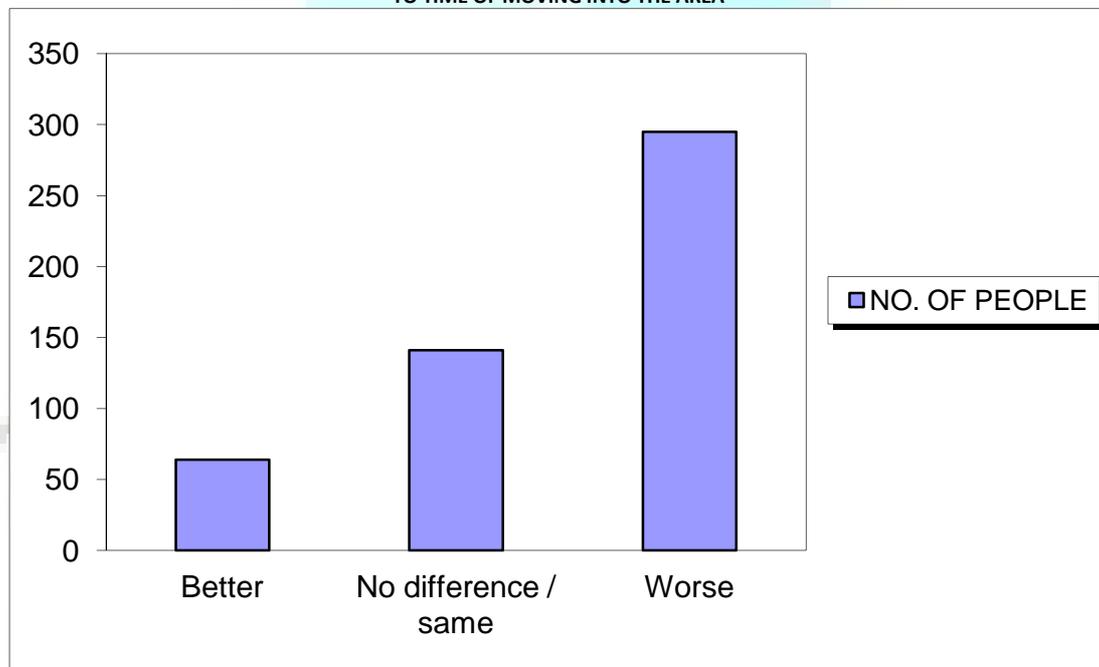
TABLE 4.2: SENTIMENTS ABOUT PRESENT CONDITION COMPARED TO TIME OF MOVING TO THE AREA

PRESENT CONDITION	NO. OF PEOPLE
BETTER	64
NO DIFFERENCE / SAME	141
WORSE	295
TOTAL	500

Source: author (2006)

As per the above table, it was the opinion of 59% of the respondents that the current state of cleanliness had deteriorated with time since moving into the area. 28% said there was no difference whereas 13% said that it had improved. The above is represented in the graph below.

FIGURE 4.1: COLUMN GRAPH SHOWING THE NUMBER OF PEOPLE WITH RESPECT TO THEIR OPINIONS ABOUT PRESENT LEVEL OF CLEANLINESS AS COMPARED TO TIME OF MOVING INTO THE AREA



Source: author (2006)

The graph in figure 4.1 above shows an observable comparison between those who say the situation has grown worse and those that say it has gotten better. The number of those that say it has got worse is 143% more than the total number of those who say there is no difference plus those who say that the situation has grown better. This is suggestive of the fact that the situation may actually have grown worse. This can only be ascertained by analyzing the operation of the MMCCD. This is discussed in the next section.

4.3 ANALYSIS OF THE OPERATIONS OF THE MMCCD

The MMCCD falls under the broad Department of Environment. It involves the following operations;

- Transport operations
- Personnel

4.3.1 TRANSPORT OPERATIONS

This constitutes central collection sites characterized by dumpsters also referred to as batteries. Three hydraulic trucks a number of side loaders, a type of vehicle used to ferry waste. Early in the morning the trucks go to dumpsters with empty batteries, they load the full one and leave behind the empty one. The loaded one is taken to the dumping site. The map of Mombasa as shown on appendix III shows two shaded areas as dump sites. Kibarani used to be the dumpsite until recently when it was changed to Mwakirunge. Kibarani is the preferred site because it is situated along the causeway not far away from the city and its environs. Mwakirunge on the other hand is 15km away from the town on a hilly place. Kibarani has been sold to private developers as a way of reclaiming the landfill.

Also, the transport unit is made up of the maintenance and repair of vehicles which constitute besides trucks, motorbikes whose task is to facilitate supervision. On visiting the offices of the MMCCD, located in the MwembeKuku area of Mombasa Central, behind the Council's fire department, the researcher counted more than 15 broken down trucks and small cars. The Officer interviewed stated that only one truck was in use servicing the town and its environs. People in the Magongo area had not had their garbage collected since the beginning of the year. The officer said that they would have to request use of a truck from Mariakani or from the Navy.

4.3.2 PERSONNEL

The bulk of personnel of the MMCCD constitute cleaners/road sweepers and garbage collectors. The Officer stated that the cleaners are to start work in the morning at 6.30 am. He said normal working hours run for eight hours. It was difficult for the researcher to trace them in the field. Generally no work is done. The officer explained that there existed a structure that established a chain of command. All workers fell under the Town's Clerk Department. He was the C.E.O in charge of all the Local Authority operations besides cleansing in the town as shown in figure 4.2.

FIGURE 4.2 THE ORGANIZATIONAL STRUCTURE OF THE MMCCD



Each senior headman is in charge of a number of cleaners/workers and is answerable to the foreman. Each foreman is answerable to a supervisor who is then answerable to the inspector. The chain of command is long. Information requiring immediate action may get lost in the chain or by the time action is taken, it is too late. The town clerk is responsible for hiring and firing workers. To hire workers is implicative of the responsibility to ensure that they are performing on the job. The researcher was informed that there was in-service training for workers to better their remunerations and other benefits.

Work, under normal circumstances, begins on a Monday morning at 7:30am, where workers report for duty, collect tools, and set off to their various working areas. Trucks are fuelled and set off to collection points, emptying dumpsters, collecting garbage from households. This is especially conveniently done when a pattern has been established that households leave their bins outside for collection on a particular day or time in the day.

4.4 ANALYSIS OF QUALITY GAPS IN THE PERFORMANCE BY MANAGEMENT AND WORKERS

4.4.1 FACTORS AFFECTING STREET CLEANSING SERVICES

The officer identified the following factors that he cited to be affecting cleansing services;

- narrow streets especially in the Old Town area
- a lot of traffic
- residential streets not up to the approved plans which restricted access to households
- unlicensed hawkers contribute to unauthorized waste
- Workers are not motivated
- high population
- lack of political goodwill
- carelessness by members of the public
- lack of enough equipment
- lack of proper supervision of workers

Workers have no way of knowing whether they have done a good job. They rarely meet with their supervisors. They report in the morning and have no tools to work with so they loiter around in the yard and leave after some time. The five the researcher interviewed, two she found on the road and three at the yard awaiting further instructions about availability of cleaning equipment. They sweep as per how they feel like. The point that was so obvious was their lack of enthusiasm for their job. Not having been paid for the last three months, it becomes very difficult not only working but having directives carried out. The procurement procedure would take long so that from the time of placing requisition for a broom and the time of actually receiving it would take very long over a month. There was general lethargy towards anger, a palpable desperation of the prevailing circumstances and a keen sense of anger at management. One would report to work because he wishes to remain in the payroll after which he goes to do other paying work. One would say that he has not been paid now for three months, what is he expected to feed on, take his children to school with.

4.4.2 RESPONSE TO COMPLAINTS

The officer interviewed mentioned the following reasons as to slow or no response to complaints made;

- lack of finances
- bureaucracy
- lack of enough equipment
- political influence
- old transport equipment

It was observed by the researcher that the office had a disconnected telephone line, making direct access to the man in charge impossible. The room was old with a fan that dated back to colonial days. On the day of the interview, everyone was seated outside; to suggest it was hot inside or that there was no work for that particular afternoon. Of all the respondents 61% had never visited the MMCCD offices. 58% of the respondents said they never had their garbage collected

10.4% never bothered to fill to suggest the question held no meaning at all.13% hardly ever visited the offices while the remaining 17.8% frequented the offices to no avail. 158 respondents never had their roads swept. 210 respondents occasionally had their roads swept. The researcher observed plenty of litter on the road fronting the offices of the MMCCD.

158 respondents making up 31.6% of the total did not respond to this question .Most roads in the area are in need of repair, especially those in the estates where the researcher sourced most of the respondents. 42% occasionally had their roads swept whereas 10.6% had theirs swept on a daily basis.15.8% had their roads swept weekly.

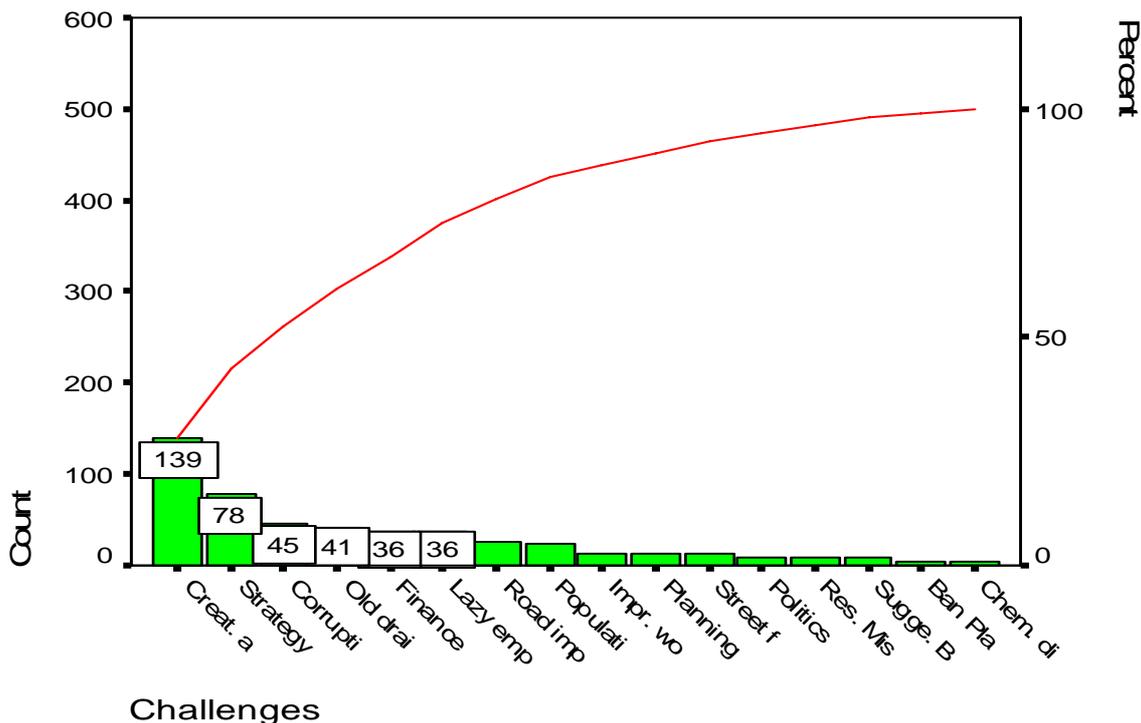
TABLE 4.6: REASONS FOR THE SOLID WASTE PROBLEM

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Pay	32	6.4	6.4	6.4
Lack of Personnel	37	7.4	7.4	13.8
Corruption	27	5.4	5.4	19.2
Increase in Refuse Due to Increase in Population	27	5.4	5.4	24.6
Laxity of Workers	96	19.2	19.2	43.8
Low Frequency of Refuse Collection	21	4.2	4.2	48.0
Lack of Proper Equipment	80	16.0	16.0	64.0
Ignorant Population	69	13.8	13.8	77.8
Poor Planning	95	19.0	19.0	96.8
Other Reasons	16	3.2	3.2	100.0
Total	500	100.0	100.0	

Source: author (2006)

Laxity by workers was cited by 19.2% of the respondents to be the reason behind the cleansing problem. Poor planning was cited by 19% of the respondents to be the other major reason behind the chaos at the MMCCD. The third major reason to be cited was lack of proper equipment by 16% of those interviewed. Respondents were asked to cite those factors that posed a challenge to the MMCCD and which had to be dealt with if at all the waste management problems were to be things of the past. These challenges were fed into the SPSS system and the following Pareto Chart extracted.

FIGURE 4.3: PARETO CHART SHOWING CHALLENGES FACING THE MMCCD



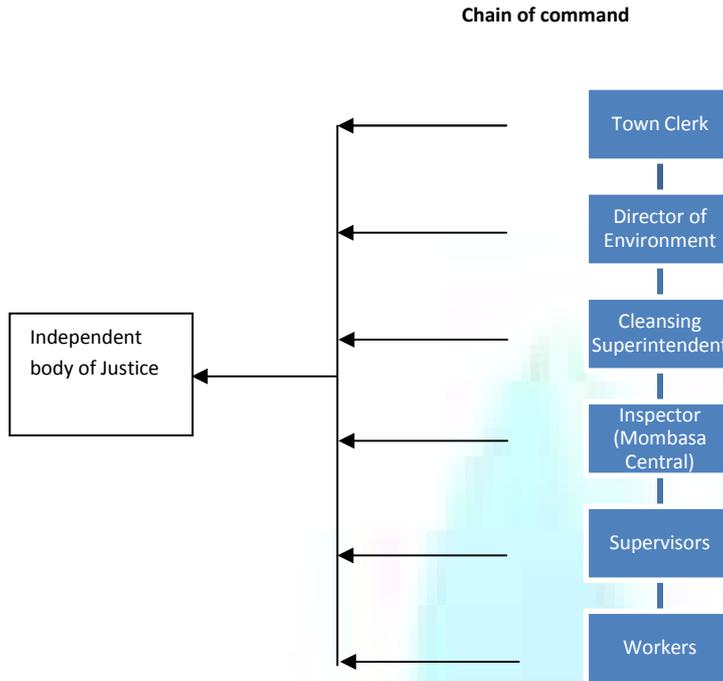
Source: author (2006)

The figure above shows 'creation of awareness' amongst all the solid waste management stakeholders emerged as the biggest challenge at 29% of all the respondents interviewed. At 15% and 9% were poor strategies and corruption. Between 7% and 8% were the following challenges

- Old drainage systems
- Inadequate finances and
- Lazy employees

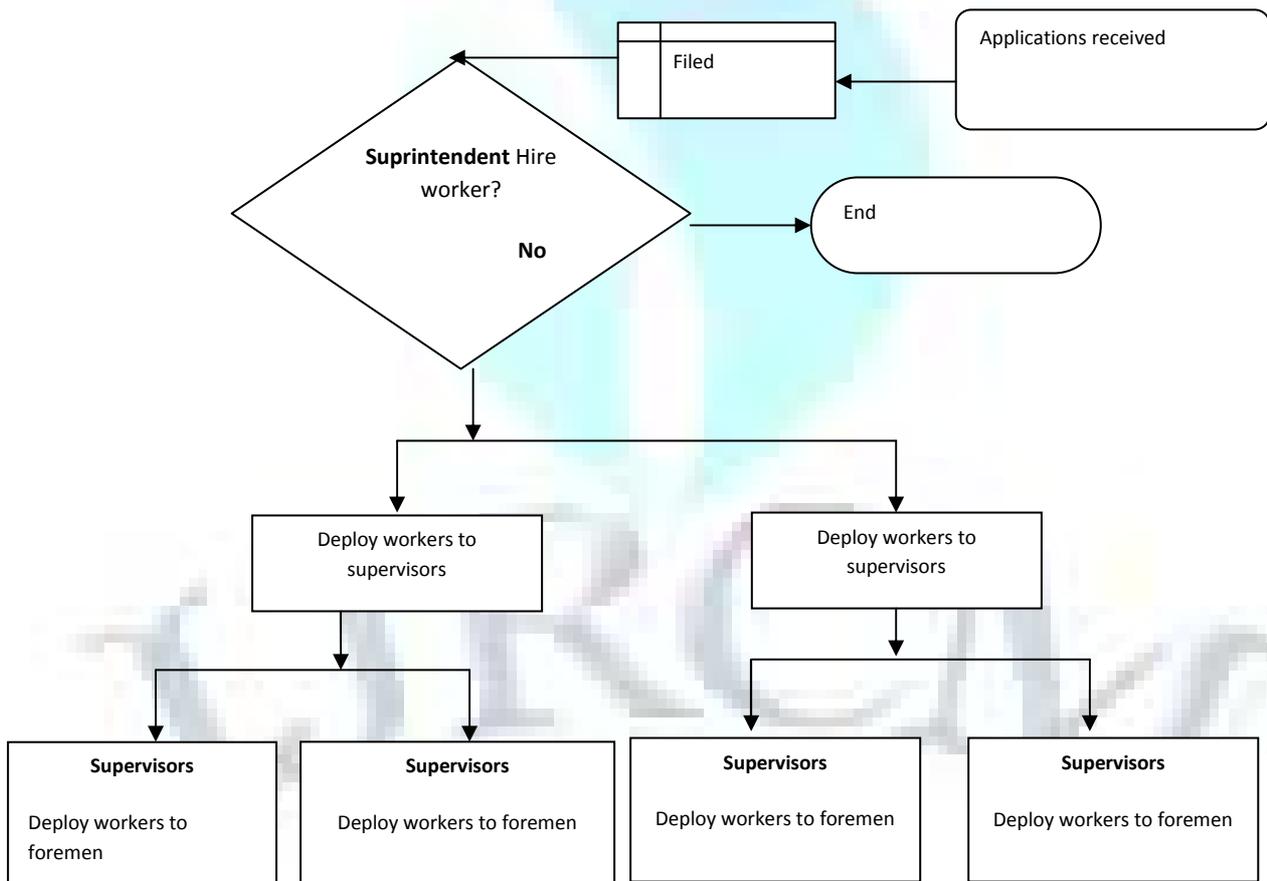
The other challenges that were mentioned but did not feature significantly amongst the respondents were road improvement, population, improving workers conditions, poor planning, street families resource mismanagement among others.

FIGURE 4.7: FLOW CHART PROCESS SHOWING THE IDEAL ORGANIZATIONAL STRUCTURE I.E. A RESTRUCTURED COUNCIL



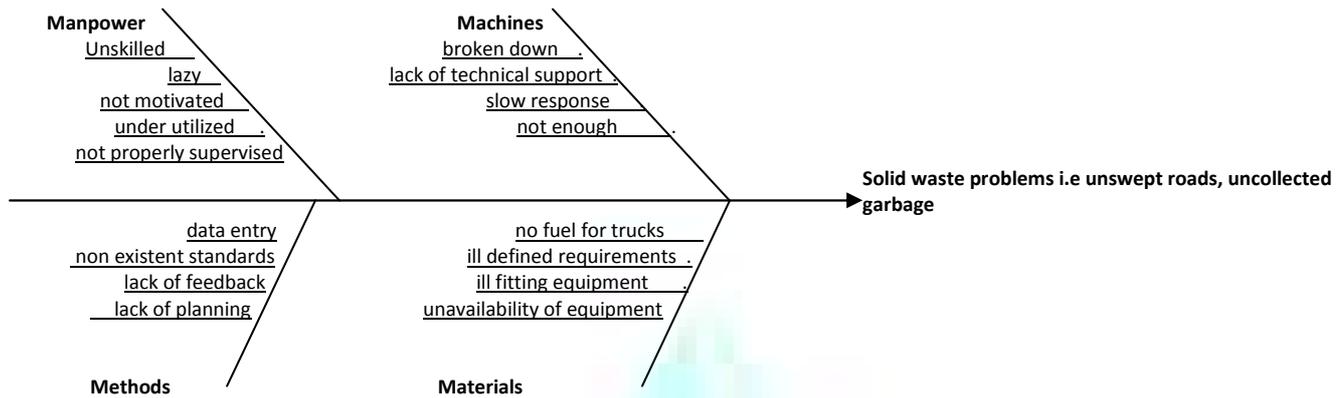
Source: author (2006)

FIGURE 4.8: FLOW CHART PROCESS SHOWING THE IDEAL PROCEDURE FOR HIRING OF WORKERS



Source: author (2006)

FIGURE 4.10: DIAGRAM SHOWING ISHIKAWA'S 4M's FISHBONE DIAGRAM



Source: author (2006)

Manpower problems result from unskilled workers. When it comes to sweeping roads and collecting garbage, there's little skill required to carry out the activities. The issue is taking instruction, commitment to the vision, and mission of the MMCCD, which is communicated to them as often as possible in quality circles organized by supervisors. The workers are underutilized and are not properly supervised. Most machines are broken down with no mechanics to repair the more than 15 that lay unused at the yard at the time of the interview. Very slow response to complaints or requests because of few trucks, or outdated ones that almost do "10km per hour". Besides the majority being almost obsolete to perform tasks at hand, they are grossly insufficient in view of the enormous work required to be performed everyday. However with proper planning, what seems enormous and hence intimidating becomes routine. Methods include need for reliable data entry methods, quality standards, commitment to encouraging and efficiently responding to feedback. Materials include lack of fuel for trucks. One of the complaints by a truck driver was that they could not go on their usual morning rounds because they lacked fuel. The presence of inefficient procurement processes that would see workers unable to work for days because of absence of tools for days on end.

5. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

This section gives summary of the findings of the exploratory research in relations to the stated objectives. The first study objective was to identify quality gaps in the performance by workers and management of the MMCCD by use of TQM tools. The second was to recommend measures which if implemented will help streamline activities in such a way as to ensure efficient and effective use of available resources.

5.1 CONCLUSIONS

Management at MMCCD have to look for ways of motivating its workers. It has to come up with systems that ensure service is delivered to the expectations of the service users.

5.2 LIMITATIONS

The main limitation of this study is long time that has elapsed between the actual research and publication time. The researcher however notes from observation that solid waste management still remains a challenge for the Mombasa County Government.

5.3 RECOMMENDATIONS

The researcher recommends that the County Government of Mombasa ensures public participation whenever it contemplates policies that affect products/ service delivery to members of the public to ensure their ownership of the processes at the time of implementation. Also to invest in educating and motivating all cadres of staff in the County.

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