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Formulation and Implementation of Operation Strategies Used in Solid Waste Management: Case Study of City Council of Nairobi

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Abstract
The major purpose of this study was to document the operations strategy used in solid waste management, alongside the challenges facing implementation. This was a case study. Data was collected from fifty- (50) members and managers from the City Council of Nairobi and analyzed using descriptive statistics. The data was then summarized and presented in the form of proportions, tables and percentages. The findings arrive at: First, the CEO and the employees do the formulation of the operations strategy as part of a planning process that coordinates operational goals with those of the larger organization. The annual objectives on solid waste management are well documented, which is inclusive of improving public health of the people; the environment; and maintain public cleanliness in order to keep public places aesthetically acceptable: by ensuring the proper storage, collection, transportation, safe treatment and disposal of solid waste. Secondly, the heads/managers feel that the current policies adequately support the institutions strategic plan. Thirdly, on the evaluation of the CCN's operations strategies used in solid waste management, it was also found that CCN has not invested on enough time and effort in analyzing environment capabilities and services to develop their operations strategy. On the other hand the CCN has not invested on enough time and effort in implementing its operations strategy. The internal strengths with the highest effect on CCN's competitive advantage, resulting from its operations strategy are: responsive employees in meeting customer needs, highly trained employees and quality control techniques. Lastly, the factors that have strongly limited sound waste management operations strategy implementation are the inability to formulate and implement sound solid waste management policies, inadequate treatment and disposal of solid waste and inadequate landfill disposal. The results have further used to come up with a model which exposes the integration of the operation strategies in solid waste management.

Keywords: Operation Strategy, Solid Waste Management and City Council

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1. Introduction

1.1Background

Many management teams invest a lot of time and effort into analyzing their environment capabilities and services to develop their strategy. Unfortunately they do not invest the same effort in implementing their strategy and as a consequence 9 out of 10 organizations fail to implement their strategy. This situation is compounded by the lack of regular strategic review process so that the organization is not only unaware of "how it is doing" in implementing its strategy hence it also misses many strategic opportunities that emerge (Slack and Lewis, 2002). Operations strategy is the "HOW" in any

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corporate and market strategy. Operations strategy is no longer a tool for continuous improvement and sustainable competitive advantage in the manufacturing sector only, since it can be now applied in the service industry and public organizations (Krajewsky and Ritzmans 2000). Thus it can be also used in solid waste management.

A fresh look at operations strategy, coupled with advances in production and information technology, global business operations and business process re-engineering techniques can provide enormous opportunities for operational efficiencies and economies. The operations strategy has three levels: first, alignment of resources with requirements (fit); secondly, developing sustainable competitive advantage (sustainability) and lastly including the impact of uncertainty (Nigel and Lewis, 2002).

The practitioners and academics alike have come to understand the role that operations strategy plays in continuous improvement and competitive advantage of both service and manufacturing organizations. To transform operations into a strategic weapon requires integrating all the major elements of operations into a coherent system that provides the specific capabilities needed for continuous improvement and competitive advantage. Creating the integrated system and the alignment with the broader strategic goals is the task of operations strategy (Lee and Ritzman, 2005).

1.2 Nairobi City and the City Council of Nairobi (CCN)

The history of Nairobi city dates back to 1899 when it was established as an inland deport for the Kenya Uganda railways. It gradually grew into a communication center and headquarters of a provincial administration. In 1905, the centre was made the capital of Kenya, and the township status elevated into a municipal centre by 1928 and later into a city by 1950 (Kibwage, 2002).

Over the years the city had a tremendous physical expansion from a geographical area of 3.84km² in 1990 to 864km² at present (Kibwage, 2002). Nairobi is experiencing a huge and relatively increase in population due to both rural-urban migration and natural development. At the moment the city has a population estimated to be about 4.5 million growing at a rate of 4 to 5 percent per annum (ITDG, 2002). With this kind of population growth, the solid waste generation is also concurrently growing and stands at 24,000 tons/day. Management of solid waste is a general problem in Kenya. In fact only 25 per cent of the estimated 1,500 tonnes of solid waste generated daily in Nairobi is collected (Ikiara et al., 2004).

The administrative system of urban centres in Kenya is a colonial relic of the British system of governance, which vests this responsibility in the hands of the local authority under supervision of the local government ministry. The administration of Nairobi city is therefore a responsibility of City Council of Nairobi which was incorporated by an ACT of parliament that came to force on 1st January 1964 (Kibwage, 2002). The growth and development of Nairobi is thereby managed by the City Council of Nairobi in accordance with the Local Government Act, Cap 265 of Laws of Kenya and is normally under the guidance and supervision of the Ministry of Local Government. The City Council of Nairobi has among other primary mandates, to care for the provision and the regulation of solid waste in the City of Nairobi. City Council of Nairobi's objectives towards solid waste management are to: improve public health of the people; improve the environment; and maintain public cleanliness in order to keep public places aesthetically acceptable; by ensuring the proper storage, collection, transportation, safe treatment and disposal of solid waste (JICA 1998).

City Council of Nairobi's main responsibilities towards SWM are: to formulate and implement solid waste management policies; to provide services for collection, transportation, treatment and disposal of solid waste; to regulate and monitor the activities of all generators of solid waste; to regulate and monitor private companies engaged in solid waste activities; to formulate and enforce laws and regulations relating to solid waste management; and to coordinate with other departments within City Council of Nairobi, donor agencies, NGOs and other government organizations involved in solid waste management (Ikiara et al., 2004).

While in the early sixties, 90 percent of the total population in Nairobi benefited from the waste collection service, in the early seventies more waste was collected than it

was in the eighties and nineties, though the residents and the waste generated had increased two-fold. The City Council of Nairobi's present capacity of waste collection and disposal cannot cope with the current situation, resulting in large amounts of uncollected solid waste, which is normally dumped along the back lanes and street corners within the city and its suburbs. In some areas of the city, there is total negligence. This situation creates hygienic, environmental as well as aesthetic problems (UNEP, 2004).

The City Council of Nairobi has been at the centre of controversies, provision of Nairobi's urban services is plagued by problems which can be traced to both local and central levels of government. Currently the capacity of City Council of Nairobi to deliver its public and statutory responsibilities to the citizens of Nairobi is severely limited. In some areas, the council has virtually ceased to deliver its services mainly because of very inadequate billing systems, generally the accounting systems are deficient and for the waste management services, the dustbin charge is very limiting and in any case, it has been abandoned. Poor collection, collection rates for all revenue sources are low due to citizens' unwillingness to pay because of poor service levels, poor collection systems and debt collection through the courts is difficult because of the cumbersome judicial system and deficient laws (Ikiara et al., 2004).

Ikiara et al. (2004) further summarized the extent and nature of solid waste management in Nairobi. First, the collection ratio, that is, the proportion of solid waste generated that is collected, is low. Second, marked inequality in the geographical service distribution characterizes the service with the western suburbs well serviced by private firms and the City Council of Nairobi while the eastern part is hardly serviced. Third, there is widespread indiscriminate dumping in illegal dumpsites and waste pickers litter the city with unusable waste materials without control. Fourth, there is only one official dumpsite (City Council Nairobi-owned and operated) and this is full and a nuisance to the adjacent residential areas. Fifth, the city has no transfer facilities. This situation holds true for almost all of the urban areas in Kenya.

There are a number of substantial deficiencies in the institutional and organizational arrangements for solid waste management in City Council of Nairobi. Because of lack of adequate and appropriate staff, the vision of the department cannot be realized. Additionally, issues of policy formulation, standard development and operational guidelines have not been developed. The few professionals who are there are mixed up in daily crisis management since there are hardly any adequate resources to meet the requirements of the department. Environmental actions cannot be implemented without a properly trained and qualified enforcement staff (Ikiara et al., 2004; JICA, 1998).

The collection methods are mainly station and door-to-door types. Station type dominates since this is the method applied by City Council of Nairobi. Areas where the private sector collects, it applies door to door. The loading method applied by City Council Nairobi in collecting waste is un-professional and time consuming. The only designated dumping site (Dandora), which is about 8km south east of the city centre about 26.5ha and is an open dumping site surrounded by residential areas. Adjacent to the Dandora dumpsite is the Dandora Housing Estate on one side and Korogocho slum on the other side where there are no facilities provided to prevent secondary pollution. There is therefore a high risk of environmental pollution, which affects the health of the residents. There are no controls from the management side to prevent toxic and even hazardous waste being dumped. Systematic operation of the dumpsite is not practiced since tipping methods and dumping areas are often decided by the drivers of the disposing vehicles. This is supported by the fact that, the statistics at Dandora hardly shows any appreciable amounts of waste disposed due to lack of aweigh bridge (UNEP, 2005).

Uncollected solid waste is one of Nairobi's most visible environmental problems. The municipal service which seems to fail most strikingly is garbage collection and disposal especially in the outskirts of the central business district and the slum areas. The lack of adequate garbage collection and disposal results in adverse psychological, negative health and environmental impact (Kibwage, 2002; UNEP 2004). There are few

heavy types of equipment to manage and to cope with the situation of waste compaction and movement to suitable tipping area. The City Council of Nairobi at the moment does not have its own fleet of vehicles for collection of waste but relies on hired vehicles which are not adequate and do not meet the minimum standards (UNEP, 2005).

These problems are exacerbated by political difficulties at the city level. Councilors are more concerned with the private accumulation of wealth than with the efficient management of urban services or the urban environment (Bubba and Lamba, 1991:42).

1.3 Municipal Solid Waste

Municipal Solid Waste (MSW) can be defined as solid waste which includes all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris. In some countries the solid wastes management system also handles human wastes such as night-soil, ashes from incinerators, septic tank sludge and sludge from sewage treatment plants. If these wastes manifest hazardous characteristics they should be treated as hazardous wastes (UN, 1992).

In recent years the volume of waste has been increasing at an alarming rate, posing a formidable challenge to governments. The complexities and enormity of the challenges become evident when considering other waste types to be managed and these include industrial solid waste, municipal wastewater, industrial wastewater, storm water and hazardous waste. Often, different government agencies are mandated to manage different waste sectors. This fragmented approach to waste management, coupled with a lack of clear definition and delineation of the different waste types, makes an assessment of current waste management practices in most countries difficult (UNEP, 2005).

MSW is thus seen as primarily coming from households but also includes wastes from offices, hotels, shopping complexes/shops, schools, institutions, and from municipal services such as street cleaning and maintenance of recreational areas. The major types of MSW are food wastes, paper, plastic, rags, metal and glass, with some hazardous household wastes such as electric light bulbs, batteries, discarded medicines and automotive parts (UNEP, 2005; UNEP, 2004).

There are many sources and types of municipal solid waste. They are generated from different settings and differ in nature, but they require some common attention and operations strategy in their management. The main sources of municipal solid waste are residential, commercial, institutions and municipal services. The waste generators range from street cleaning, landscaping, parks, beaches, recreational areas, stores, hotels, restaurants, markets, office buildings, schools, government center, hospitals, prisons, single and multifamily dwellings (UNEP, 2005; Rio, 1992).

2.0 Some Literature Review

The key areas of literature are as in the following subsections.

2.1 Operations Strategy

The concept of strategy is delimited by a firm's competitive priorities, their different areas of decisions and competitive areas of decisions. Both concepts are strongly interrelated and they fit between these variables on the operations, structure and infrastructure which must be included in the operations management process. The role of operations strategy is to provide a plan for the operations function so that it can make best use of resources (Voss, 1995).

Operations strategy specifies the policies and plans for using organizational resources to support long-term competitive strategy. The operation function is responsible for managing the resources needed to produce the company's products or services. The operations strategy is the one that specifies the plan that specifies the design and use of these resources to support business strategy. This includes the location, size and type of facilities available, worker skills and talent required, use of technology, special process needed special equipments and quality control methods. The operation strategy must be aligned with the company's business strategy and enable the company to achieve its long-term plans (Hayes et al., 1998; Hill, 1993).

Operations strategy is concerned with setting broad policies and plans for using the resources of a firm to best support its long-term performance objectives. A firm operations strategy is comprehensive through its integration with corporate strategy. The strategy involves a long-term process that must foster inevitable change. An operations strategy therefore involves decisions that relate to the design of a process and the infrastructure needed to support the process (Buyer, Hayes et al 1988 & 1998). Process design includes the selection of appropriate technology, sizing the process over time, the role of inventory in the process, and locating the process. The infrastructure decisions involve the logic associated with the planning and control systems, quality assurance and control approaches, work payment structures and the organizations of the operations function (Wheelwright, 1978; Stobaugh & Telesios 1983; Voss, 1995).

Firm's competitive priorities and their areas of diction delimit the content of operations strategy. Both concepts are strongly interrelated as operations decisions and competitive priorities must be congruent. The fit between these variable and the necessary investments in operations structure and infrastructure may justify the role of operations area as a source of sustainable competitive advantage and continuous improvement (Roth, 1989; Anderson et al., 1989). Key to success in operations strategy lies in identifying what the priority choices are in understanding the consequences of each choice and in navigating the ensuring trade offs. (Lee and Ritman, 2005).

2.2 The Competitive Priorities of the Operations Function

Operations managers must work closely with marketing in order to understand the competitive situation in the company's market before they can determine which competitive priorities are important. There are four broad categories of competitive priorities:

2.2.1 Cost

Competing based on cost means offering a product at a low price relative to the prices of competing products. The need for this type of competition emerges from the business strategy.

The role of the operations strategy is to develop a plan for the use of resources to support this type of competition. A low-cost strategy can result in a higher profit margin, even at a competitive price. Also, low cost does not imply low quality. To develop a competitive priority, the operations function must focus primarily on cutting costs in the system, such as costs of labor, materials, and facilities. Companies that compete based on cost study their operations system carefully to eliminate all waste.

They might offer extra training to employees to maximize their productivity and minimize scrap. Also, they might invest in automation in order to increase productivity. Generally, companies that compete based on cost offer a narrow range of products and product features, allow for little customization, and have an operations process that is designed to be as efficient as possible. Employees should be trained to perform many functions and use a team approach to maximize customer service.

2.2.2 Quality

Many companies claim that quality is their top priority, and many customers say that they look for quality in the products they buy. Yet quality has a subjective meaning; it depends on who is defining it. For example, to one person quality could mean that the product lasts a long time, such as with a Volvo, a car known for its longevity. To another person quality might mean high performance, such as a BMW. When companies focus on quality as a competitive priority, they are focusing on the dimensions of quality that are considered important by their customers.

Quality as a competitive priority has two dimensions. The first is high-performance design. This means that the operations function should be designed to focus on aspects of quality such as superior features, close tolerances, high durability, and excellent customer service. The second dimension is goods and services consistency, which measures how often the goods or services meet the exact design specifications. Companies that compete on quality must deliver not only high-

performance design but goods and services consistency as well.

A company that competes on this dimension needs to implement quality in every area of the organization. One of the first aspects that need to be addressed is product design quality, which involves making sure the product meets the requirements of the customer.

A second aspect is process quality, which deals with designing a process to produce error-free products. This includes focusing on equipment, workers, materials, and every other aspect of the operation to make sure it works the way it is supposed to. Companies that compete based on quality have to address both of these issues: the product must be designed to meet customer needs, and the process must produce the product exactly as it is designed (Gordon, 2003).

2.2.3 Flexibility

As a company's environment changes rapidly, including customer needs and expectations, the ability to readily accommodate these changes can be a winning strategy. This is flexibility. There are two dimensions of flexibility. One is the ability to offer a wide variety of goods or services and customize them to the unique needs of clients. This is called product flexibility. A flexible system can quickly add new products that may be important to customers or easily drop a product that is not doing well. Another aspect of flexibility is the ability to rapidly increase or decrease the amount produced in order to accommodate changes in the demand. This is called volume flexibility (Vokurka and O'Leary-Kelly, 2000).

2.2.4 Time

Time or speed is one of the most important competitive priorities today. Companies in all industries are competing to deliver high-quality products in as short a time as possible. Today's customers don't want to wait, and companies that can meet their need for fast service are becoming leaders in their industries. Making time a competitive priority means competing based on all time-related issues, such as rapid delivery and on-time delivery. Rapid delivery refers to how quickly an order is received; on-time delivery refers to the number of times deliveries are made on time. When time is a competitive priority, the job of the operation function is to critically analyze the system and combine or eliminate processes in order to save time. Often companies use technology to speed up processes, rely on a flexible workforce to meet peak demand periods, and eliminate unnecessary steps in the production process (Rondeau et al., 2000).

Companies that compete based on flexibility often cannot compete based on speed, because it generally requires more time to produce a customized product. Also, flexible companies typically do not compete based on cost, because it may take more resources to customize the product.

However, flexible companies often offer greater customer service and can meet unique customer requirements. To carry out this strategy, flexible companies tend to have more general-purpose equipment that can be used to make many different kinds of products. Also, workers in flexible companies tend to have higher skill levels and can often perform many different tasks in order to meet customer needs (Rondeau et al., 2000).

2.3The Need for Trade-Offs

As more resources are dedicated toward one priority, fewer resources are left for others. The operations function must place emphasis on those priorities that directly support the business strategy. Therefore, it needs to make trade-offs between the different priorities. For example, consider a company that competes on using the highest quality component parts in its products. Due to the high quality of parts the company may not be able to offer the final product at the lowest price. In this case, the company has made a trade-off between quality and price. Similarly, a company that competes on making each product individually based on customer specifications will likely not be able to compete on speed. Here, the trade-off has been made between flexibility and speed. It is important to know that every business must achieve a basic level of each of the priorities, even though its primary focus is only on some. For example, even though a company is not competing on low price, it still cannot offer its products at such a high price that customers would not want to pay for them. Similarly, even though a

company is not competing on time, it still has to produce its product within a reasonable amount of time; otherwise, customers will not be willing to wait for it (Ward and Duray , 2000).

One way that large facilities with multiple products can address the issue of trade-offs is using the concept of plant-within-a-plant (PWP), introduced by well-known Harvard professor Wickham Skinner. The PWP concept suggested that different areas of a facility be dedicated to different products with different competitive priorities. These areas should be physically separated from one another and should even have their own separate workforce. As the term suggests, there are multiple plants within one plant, allowing a company to produce different products that compete on different priorities. For example, department stores use PWP to isolate departments, such as the Sears auto service department versus its optometry center (Ward and Duray, 2000).

2.4 The Operations Strategy and Solid Waste Management

Operations strategy can be viewed as part of a planning process that coordinates operational goals with those of the larger organization. Since the goals of the larger organization change over time, the operations structure must be designed to anticipate future needs. The operations capabilities of a firm can be viewed as a portfolio best suited to adapt to the changing product and service needs of a firm's customers (Hill, 1993).

The costs for solid waste management are high especially for collection, transportation, treatment and disposal, which are largely borne by city councils. Methods of collection of waste are either door-to-door or using containers or communal bins. All medium and large cities have administrative structures for providing collection services but often, cities in developing countries use non-compaction trucks for daily collection, with a few cities using compaction trucks and hauling trucks. The most common municipal waste management practices include: recycling/recovery, composting, incineration and land filling/open dumping. The operations strategy is a very important tool in the solid waste management practices and processes (Peters, 1984).

MSW may contain the following materials, which are considered recyclables: ferrous and non-ferrous metals, construction debris, scrap tires, paper/cardboard, plastics, textiles (including cloth and leather), glass, wood/timber, animal bones/feathers, waste oil and grease, cinders/ashes. In the middle-to-low-income cities, there exists a long-standing practice of informal source separation and recycling of materials. This has led to the development of enterprises for the gathering, trading and reprocessing of materials. For example Mukuru Recycling project which started in 1991 to help men and women scavengers sell recyclable waste to industries. The national ministries support waste recovery and recycling activities at city level although many of these are family businesses. However, since industries would only be interested to use recycled materials when they cost less than the virgin materials, the practice of recycling is so market-driven that recycling has become selective. The disposal of those unselected recyclables remains a problem.

Informal waste separation or waste picking takes place in three ways: At source - this is in large urban areas, e.g., commercial areas or residential areas with apartments/high-rise buildings for high income earners. Here waste pickers sort out the waste before the authorized collection vehicle arrives. During collection – when the collectors segregate recyclable materials during loading and store them inside the truck or on the sides of the vehicles. At the disposal site – where the waste pickers often live on or near the dumps. However, they risk the danger of potential slides and fires. While waste picking means survival for waste pickers the methods of uncontrolled waste picking can reduce the efficiency of the formal collection system and can be detrimental to health due to exposure to biological pathogens.

Composting is not well practiced. Household organic wastes, including wastes from the restaurants, are often collected for animal feed. But these are either not working or are not operating at full capacity for a number of reasons, such as: High operating and maintenance costs, poor maintenance and operation of facilities, Incomplete separation of non-compostables, such as, plastics and glass, high cost of

compost compared to commercial fertilizers.

Another waste treatment method that is practiced is incineration where 90 percent of non-recyclable municipal solid waste is incinerated. Final disposal of waste is at landfills where 10 percent of non-recyclable municipal solid waste is deposited. Singapore has four government-owned and operated incinerators for the disposal of solid waste that is not recycled. However, controversy remains over the soundness of incineration as a waste treatment technology because of greenhouse gas emissions from incinerators. Incineration has been completely banned under the new law on solid waste management (RA, 2003). The practice of informal incineration or open burning is, however, still prevalent, not only in the rural areas where waste collection is rare but also in peri-urban and urban areas.

Landfills are generally the cheapest and most common disposal method for municipal solid waste. An exception is a large city like Singapore, which faces rising disposal costs due to exhaustion of traditional disposal sites, stricter environmental controls and greater waste quantities, thus requiring other methods like incineration to reduce the volume of waste for final disposal. In the other developing countries, open dumping is the common practice, i.e., municipal solid waste is dumped on swamplands and low-lying areas, which are eventually reclaimed for development. The problems associated with landfills, even with those that are clay-lined, include high water table, groundwater contamination and gas migration.

2.5 Success Stories in Solid Waste Management

Rapid urbanization and the associated growth of industries and services is an essential feature of economic and demographic development in most developing countries. Cities are currently absorbing two-thirds of the total population increase throughout the developing world (UNCHS, 1993). Another striking growth is the steady growth in size of cities. One of the most important environmental consequences of urbanization is the amount of solid waste that is generated. These wastes have fast outstripped the ability of natural environment to assimilate them and municipal authorities to dispose of them in a safe and efficient manner. The resulting contamination affects all environmental media and has a direct negative effect on human health and the quality of urban life.

Most governments all over the world where waste management services have successfully been done subsidize the budgets for solid waste management up-to over 60 percent. In Japan for example before privatization of solid waste management services, government subsidy to SWM used to be 80 percent while in Sweden it is 70 percent despite residents still paying an equivalent of kshs 800 per month for the solid waste management services. Accra in Ghana, residents pay up to Kshs 700 per month for the solid waste management services. Singapore has a collection rate of more than 90 percent while in Bangkok, Jakarta and Kuala Lumpur the rate is more than 80 percent. In Indonesia, collection rates have been improved through a pre-collection system at villages, which deposit their municipal solid waste at transfer or temporary storage facilities (Rio de Janeiro, 1992).

In Dar es Salaam in Tanzania, the government made a bold step in 1994 to privatize the waste collection and transportation aspects where the city was zoned and different private companies were given areas of operation while collecting waste management charges approved by the various municipalities. Different municipalities enacted their own by-laws to govern and guide the operations of the private sector. The City only manages the disposal site but this again, the city of Dar-es-salaam has partnered with a strategic investor from Germany to develop a sanitary landfill site as for a long time the city has operated with a controlled disposal site. The private companies collect waste management charges from the citizens and only approved rates by the council are applied. The city has a department for solid waste disposal, which only develops policies, rules governing the private sector operation, supervision and the management of the disposal site. The private companies contracted are locals and sometimes they get a back- up from the city council whenever they cannot deliver. In this case, the council has to have what to fall back to and therefore the council cannot afford at

any time to have no fleet of vehicles (Rio de Janeiro, 1992).

In Cairo Egypt, the Government decided to invite international bidders for the solid waste management services when the council failed to provide the required services and the city was dirty while the residents were not agreeable to pay for services, which were hardly there in 2002. The Giza region in Cairo, which has a population of 6.5 million was divided into three zones and contracted to three different companies. Jacorossi Impresse is one of the companies managing cleansing services from a population of about 1.2 million under a 15 yr period contract (Rio de Janeiro, 1992). Kenya is not any different and as long as there is political will and effort towards making the city clean, it can revert to its old status "the city in the sun".

3.0 Statement of the Problem

Operations strategy in service firms is generally inseparable from the corporate strategy. For most services, the service delivery system is the business and hence, any strategic decisions must include operations considerations. However, operations executives do not always have a voice equal to other functions of the firm. For example, a marketing decision to add a new route for an airline or to add new in-flight service may be made despite operation's protests about feasibility.

Voss (1995) identified three main "paradigms" within operations strategy context. The first one was described as "competing through manufacturing" by aligning some manufacturing capabilities (quality, delivery, cost, flexibility) to the market requirements. Some examples are included in Hill's order winners and qualifiers (Hill, 1993) and Platts and Gregory's (1992) manufacturing audit. The second paradigm derives the strategic decisions linked to the content of operations strategy. The paradigm focuses on both internal and external operation strategy consistency. Additionally, Hayes and Wheelwright (1984) expanded the list of eight structural and infrastructural elements. Hill (1993) compressed it in two areas: process and infrastructure. The third paradigm described by Voss is known as "best practices". This approach traces its roots to Hayes and Wheelwright (1984), who coined the term "world-class manufacturing", as a set of practices that would lead to superior performance. None of the above three paradigms can explains an effective deployment of operations alone.

The growth of urban population in Nairobi has resulted in a corresponding growth of urban management problems. These problems are persistent where maintenance of established infrastructure and services are a major concern. The local government finds enormous difficulties in providing proper access to public environment services and goods such as good quality of air and water, parks, green spaces and safe waste disposal. The poor in the informal settlements suffer specially from the inadequacy of public good and services. This has made the city of Nairobi to degenerate from "a city in Sun" into "City in Garbage".

Solid waste management problems in Nairobi are largely a result of lack of a waste management policy framework to guide improvement of the standards, efficiency and coverage of waste management. The City Council of Nairobi solid waste management challenges can be summarized into four typical categories: there is inadequate service coverage and operational inefficiencies of its service; limited utilization of recycling activities; inadequate landfill disposal; and inadequate management of hazardous and healthcare waste (UNEP, 2005).

There was therefore need for a well documented and implementation of sound operations strategies to reverse these changes hence the study. There was need for a new operations strategy that fosters continuous, incremental improvement; groundbreaking innovation; and competitive market advantage. Thus, there was need for a study to be carried out in an attempt to evaluate City Council of Nairobi's solid waste management measurable goal and indicate how the City Council of Nairobi may pursue them using the ten management levers; facilities, capacity, vertical integration, quality management, supply chain relationship, new products, process and technology, human resources, inventory management and production planning and scheduling.

A number of researches in the area of operations have been done both locally and

globally. Taking into account of the arguments they poses, it is clear that operations strategy can meaningfully contribute to better results (Corbett & Van Wassenbore, 1993; Lee and Ritzman, 2005). Most Governments and city councils all over the world where waste management services have successfully been done, have made use of the operations strategy coupled with subsidizes in the budgets of up-to over 60 percent for Solid Waste Management (SWM). Some of the examples include Japan with a subsidy of 80 percent, Sweden with 70 percent, Accra in Ghana and Singapore with 90 percent, Bangkok, Jakarta and Kuala Lumpur the rate is more than 80 percent (Leong et al., 1990; Marucheck et al., 1990). Then what about Kenya and the city council of Nairobi?

One local study by Nyamwange (2002) focused the concept in the Kenyan manufacturing firm and recommended the need to focus the concept to other sectors outside the manufacturing industry. Although researches have been done on operations strategy, none has focused on the CCN, solid waste management. This study therefore was an attempt to establish the CCN operations strategy used in solid waste management and secondly to establish the challenges the CCN was facing in the implementation of its operations strategy in the solid waste management.

The general objective of this study was to model the operation strategies in solid waste management. The study was aimed to achieve the following two specific objectives: First, to establish the formulation and implementation of operation strategies used in solid waste management at the city council of Nairobi. Secondly, to establish the challenges facing implementation of the operations strategy at the city council of Nairobi with respect to solid waste management.

4.0 Research Strategy

This study was conducted in form of a case study. This enabled the researcher to establish the operations strategy used by the City Council of Nairobi in solid waste management and document the challenges facing their implementation. The study only covered the City Council of Nairobi, and not any other city council. The target population was the management team in the City Council of Nairobi and all members of the Department of Environment (DOE). Other government institutions, agencies, NGOs and environmental collaborative bodies like NEMA, JICA, UNEP, and Practical Action also participated in the study.

The study comprised of a total of 50 members and managers from the City Council of Nairobi's Department of Environment (including other government institutions, agencies, NGOs and environmental collaborative bodies). The anticipated sample size was 30 from the population. Rosco (1975) proposes a rule of the thumb for determining a sample size and says that a size of 30 to 500 is appropriate for most researches. However, researcher used a sample of 50 because of the possibility of non-response. This sample was considered large enough to provide a general view of the entire population and serve as a good basis for valid and reliable conclusions. Simple random sampling was used to select the individuals to participate in the study.

This study relied on both primary and secondary data. Primary data focused on the City Council of Nairobi operations strategy used in solid waste management. Secondary data consisted of the DOE's proposals and projects with respect to the management of solid waste for the last ten years. For primary data, semi-structured questionnaire was used comprising of both closed and open-ended questions. The questionnaires were divided into the following sections: The respondents were the managers, heads of departments in the above mention bodies, with much emphasize in the Department of Environment. Other private organizations that take part in the solid waste management were also interviewed. The questionnaires was administered on a drop and pick later basis.

The data from respondents was analyzed using descriptive statistics such as means, percentages and tables. Content analysis was used to judge the relationship between the operations strategy and the effective solid waste management. Descriptive statistics were further used to determine whether the trend in solid waste management in the last 10 years has been to the expected levels so as to back any challenges that may be established.

5.0 Data Analysis and Findings

Data was collected from fifty (50) members and managers from the City Council of Nairobi's Department of Environment (including other government institutions, agencies, NGOs and environmental collaborative bodies). Of the 50 managers and heads of departments sampled, 39 responded, a reasonably high response rate of 78 percent.

5.1 Formulation of Organizational Strategy

Operations strategy can be viewed as part of a planning process that coordinates operational goals with those of the larger organization. The organizational strategy therefore has an impact on the operations strategy. The respondents were therefore asked to indicate who formulates the organizational strategy. From the research data, 100% of the respondents indicated that it is the CEO and the employees who are involved in the process of organizational strategy formulation, 52% indicated it is through selected committees, as 48% indicated it is the top management only. This affirms Hayes and Schmenner's (1978) perspective that an organizational strategy is a coherent and unifying pattern of decision making, a blue print for a whole organization defining explicit road map for the future, where all are involved.

5.2 Existence of Annual Objectives in Solid Waste Management

Operations strategy is concerned with setting broad policies and plans for using the resources of a firm to best support its long-term performance objectives. The respondents were asked to indicate whether they have annual objectives in solid waste management. From the research data, 89% 0f the respondents indicated that there are some annual solid waste management objectives and the rest believed that there wasn't any. Indeed from the establishments of JICA's (1998) report, the City Council of Nairobi's objectives towards solid waste management are to: improve public health of the people; improve the environment; and maintain public cleanliness in order to keep public places aesthetically acceptable; by ensuring the proper storage, collection, transportation, safe treatment and disposal of solid waste.

5.3 Setting of the Objectives

The annual departmental objectives need to be designed according to the department of environment's major mandates. The respondents were asked to indicate as to who sets the annual departmental objectives, and from the research data, 63% of the respondents felt it is the departmental heads who sets the objectives, as 37% felt it is the employees. The top management and committees seemed not to be involved. Therefore the departments don't consider brainstorming and team work in its short termism of objective setting.

5.4 Last Time a Major Change in Structure/Work or Function Took Place in Departments

Very many changes have taken place in Kenya but the most current is the performance contracting which has lasted for 3 years alongside the change in guard. The respondents were asked to indicate the last time a major change in structure/work or function took place in department. From the research data, 55% indicated the major changes took place less than a year ago, 32% more than 3 years ago, as 13% indicated more than 2 years ago. This is a clear indication that the city council has not experience any big/major changes.

5.5 The Managers'/Heads' Opinions on Policies, Procedures and Organizational culture

The respondents were asked to rank their extent of agreement with some aspects relating organizational policies, structure and culture at the city council. From the research data, the highest number (56%) of heads/managers felt that the current policies adequately support the institutions strategic plan: but they moderately (50%) agreed that the current departmental organizational structure support implementation of strategy as documented in the 2005-2010 strategic plans, and at the same time concurred that the procedures/regulations followed by the department supportive of change

implementation as documented in the current strategic plan.

5.6 Evaluation of the NCC's Operations Strategies Used in Solid Waste Management

5.6.1 CCN Investment on Enough Time and Effort in Analyzing Environment Capabilities and Services to Develop their Operations Strategy

Most management teams invest a lot of time and effort into analyzing their environment capabilities and services to develop their operations strategy. The respondents were asked to indicate whether the CCN has invested on enough time and effort in analyzing environment capabilities and services to develop their operations strategy. From table 4.8, 54% of the respondents indicated they don't scanning the environment before developing the solid waste management operations strategy, as 46% indicated that they do. Thus this is a clear indication that the CCN is not keen on it environment of operation.

5.6.2 CCN Investment on Time and Effort in Implementing its Operations Strategy

After the environmental scanning and formulation of operations strategy, there is need to invest in its implementation. The respondents were asked to indicate whether the CCN has invested on enough time and effort in implementing its operations strategy. From the research data, 94% of the respondents indicated they don't invest in implementation, as 6% indicated they do.

This concur with Slack and Lewis' (2002) claim that regardless of sound formulation of operations strategy, unfortunately many of them have not invested the same effort in implementing their strategy and as a consequence 9 out of 10 organizations fail to implement their operations strategy. This situation is compounded by the lack of regular strategic review process so that the organization is not only unaware of "how it is doing" in implementing its strategy hence it also misses many strategic opportunities that emerge.

5.6.3 Factors that Have Given the CCN a Fresh Look at its Operations Strategy

There are so many factors that can enable an organization to take afresh look at its operations Strategy. The respondents were asked to indicate the how different factors have impacted on the operations strategy, and from the research data, most managers felt that the emergence of aggressive and highly competent competitors, demanding and environmentally conscious customers have affected the operations strategy to a greater extent. The need for alignment of resources with requirements has a medium effect. To a small extent the following factors have also affected the operations strategy's fresh look: advances in production and information technology, global business operations, business process re-engineering techniques and the enormous opportunities for operational efficiencies and economies.

Lastly some of the factors with a small extent included the need to develop sustainable competitive advantage and the impact of uncertainty. The above scenario shows that the CCN is in its second level of coming up with a sound operations strategy, based on Nigel and Lewis's (2002) three levels of operations strategy: first, alignment of resources with requirements (fit); secondly, developing sustainable competitive advantage (sustainability) and lastly including the impact of uncertainty.

5.6.4 Existence of Setting Broad Policies and Plans to Support Long-Term Competitive Advantage

Operations strategy is concerned with setting broad policies and plans for using the resources of a firm to best support its long-term performance objectives. The respondents were asked to indicate whether they set broad policies and plans that support long-term competitive advantage. From the research data, 58% indicated they have, as 42% indicated they don't. Indeed the CCN has what Buyer Hayes et al (1998) called the decisions that relate to the design of a process and the infrastructure needed to support the process (operations strategy).

5.6.5 Existence of Well Documented Solid Waste Management Strategies at the City Council of Nairobi

There is need to document all the policies regarding an activity and as a center of reference. The respondents were asked to indicate whether these well-documented

solid waste management strategies exist in the city council of Nairobi. From the research data, 60% of the respondents indicated that indeed the solid waste management strategies are there and well documented. The rest indicated there aren't any.

5.6.6 Factors Critical In Decisions That Relate to the Design of CCN's Process and the Infrastructure to Support the Solid Waste Management Process

Process design includes the selection of appropriate technology, sizing the process over time, the role of inventory in the process, and locating the process. The respondents were asked to indicate the most critical factors in decisions that relate to the design of CCN's process and the infrastructure to support the solid waste management processes. From the research data, 68% of the respondents indicated the organizations of the operations function as a major factor, 56% gave the work payment structures, 47% indicated it is the selection of appropriate technology, and the logic associated with the planning and control systems, 41% gave the quality assurance and control approaches, 21% gave sustainable competitive advantage and continuous improvement, 18% gave sizing the process over time, as 15% gave the role of inventory in the process and locating the process.

The above scenario is in line with Voss' (1995) observation that the operations strategy decisions involve the logic associated with the planning and control systems, quality assurance and control approaches, work payment structures and the organizations of the operations function.

5.6.7 The Most Important Variables in the Solid Waste Management Operations Strategy Development Process

If a company does not have a well-defined mission it may pursue business opportunities about which it has no real knowledge or that are in conflict with its current pursuits, or it may miss opportunities altogether. The respondents were asked indicate which variables most important in the solid waste management operations strategy development process at the CCN. From the research data, the following variables were found to be very important in the process of defining the best solid waste management strategies: The external environment of the NCC"s trends in the market scored 74%, Changes in customer wants and expectations (demanding speed of delivery, high quality, and low price) scored 72%, Identifying the company's strengths (special skills of workers, such as expertise in providing customized services or knowledge of information technology) scored 71%, Understanding how its core beliefs shape its business scored 66%, Understanding who its customers are scored 61%, Understanding what business an CCN is in scored 59%, as The trends in the political environment (changes in the political climate—local, national, and international) and Forming partnerships with international firms (strategic alliances) scored 54%.

The following factors were also considered as important in the process of defining the operations strategy: The social responsibility (changes in society) scored 76%, the trends in the economic environment (recession, inflation, interest rates) scored 62%, changes in the use of technology, such as point-of-sale scanners, automation, computer-assisted processing, electronic purchasing, and electronic order tracking scored 44%, as analyzing and developing an understanding of the market scored 55%.

5.6.8 Technology that can assist the CCN in Effective Implementation of its Operations Strategy Relating to the Solid Waste Management

There are many other types of trends in the use of technology, such as point-of-sale scanners, automation, computer-assisted processing, electronic purchasing, and electronic order tracking. The respondents were asked to indicate the technology that can assist the CCN in effective implementation of its operations strategy relating to the solid waste management. From the research data, 85% indicated it is the solid waste management process technology, 32% indicated it is the solid waste management product technologies, as 18% indicated information technology as none gave sustainable competitive advantage and continuous improvement.

5.6.9 The Effects of the Internal Strengths of CCN's Operations Strategy on its Competitive Advantage

There are very many internal strengths resulting from the operations strategy of an organization. The respondents were asked to give the variables with the highest effect on CCN's competitive advantage, and from the research data, the following strengths were considered as important by the respondents with the following scores:

Responsive employees in meeting customer needs scored 85%, Highly trained employees scored 79%, Quality control techniques scored 68%, Process quality scored 68%, High-performance scored 68%, Strong technical capability of employees scored 62%, The marketing function's skill in understanding customer wants scored 50%, CCN's skill in attracting and raising capital scored 50%, Creative employees in product design scored 53%, as Goods and services consistency scored 41%.

The less important factors were found to be: CCN's technologically advanced and an efficient distribution system scored with 82%, the ability of CCN to predict market trends which scored 68%, CCN's flexibility in producing a variety of products scored with 55%, Use of latest management support technology with 53%, flexible employees in performing a variety of tasks with 50%, use of information technology which scored 42%, Rapid delivery and on-time delivery which scored 38%, as offering a product at a low price relative to the prices of competing products scored 35%. Product, Volume and Product design quality received the least weight.

5.7 Challenges on the City Council of Nairobi in the Operations Strategy Implementation With Respect to Solid Waste Management

The City Council of Nairobi has been at the center of controversies; provision of Nairobi's urban services is plagued by problems, which can be traced to both local and central levels of government. Currently the capacity of City Council of Nairobi to deliver its public and statutory responsibilities to the citizens of Nairobi is severely limited. In some areas, the council has virtually ceased to deliver its services mainly because of many challenges that influence the sound implementation of the operations strategy. The respondents were asked to indicate they factors that limit sound waste management operations strategy implementation. From the research data, the following factors were considered to have a strongly effect on the CCN's operations strategy implementation with respect to solid waste management: Inability to formulate and implement sound solid waste management policies scored 100%, Inadequate treatment and disposal of solid waste scored 82%, Inadequate landfill disposal scored 67%, Poor formulation and enforcement of laws and regulations relating to solid waste management scored 59%, Poor services for solid waste collection and Limited utilization of recycling activities scored 56%, as the Inability to regulate and monitor the activities of all generators of solid waste, and Poor transportation services provision scored 51%.

The following factors were also considered by the respondents to have a medium effect on the CCN's operations strategy implementation with respect to solid waste management: The accounting systems are deficient scored 79%, Dumping along the back lanes and street corners within the city and its suburbs scored 65%, High risk of environmental pollution scored 59%, Inadequate service coverage and operational inefficiencies of its service scored 56%, Large amounts of uncollected solid waste scored 53%, Lack of adequate and appropriate staff scored 53%, Inadequate management of hazardous and healthcare waste scored 46%, No controls from the management side to prevent toxic and even hazardous waste scored 42%, Very inadequate billing systems scored 39%. The factors with the slightest effect were Total negligence of top management were 62%, and Citizens' unwillingness to pay because ofThe factors with the slightest effect were Total negligence of top management were 62%, and Citizens' unwillingness to pay because of some of the basics challenges facing the CCN.

6.0 Summary and Conclusions

In line with the general objectives of the study, the following conclusions were arrived at which were further used to model the operation strategies used in solid waste management.

6.1 Conclusions

Based on the results from data analysis, findings and discussions above, one can safely conclude the following:

First, the CEO and the employees do the formulation of the operations strategy as part of a planning process that coordinates operational goals with those of the larger organization. The CCN sets broad policies and plans for using the resources of a firm to best support its long-term performance objectives. The annual objectives on solid waste management are well documented and they included to improve: public health of the people; the environment; and maintain public cleanliness in order to keep public places aesthetically acceptable: by ensuring the proper storage, collection, transportation, safe treatment and disposal of solid waste.

Secondly, the departmental heads set the annual departmental objectives as per the department of environment's major mandates as opposed to top management and committees. It also found out very many changes have taken place in Kenya but the most current is the performance contracting which has lasted for 3 years alongside the change in guard but the major changes in CCN took place less than a year ago. The heads/managers feel that the current policies adequately support the institutions strategic plan: but they moderately agreed that the current departmental organizational structure support implementation of strategy as documented in the 2005-2010 strategic plans, and at the same time concurred that the procedures/regulations followed by the department supportive of change implementation as documented in the current strategic plan.

Thirdly, on the evaluation of the NCC's operations strategies used in solid waste management, it was also found that CCN has not invested on enough time and effort in analyzing environment capabilities and services to develop their operations strategy. On the other hand the CCN has not invested on enough time and effort in implementing its operations strategy. On the factors that have enabled the CCN to take afresh look at its operations Strategy to a greater extent were found to be the emergence of aggressive and highly competent competitors, demanding and environmentally conscious customers. The need for alignment of resources with requirements has a medium effect. To a small extent the following factors have also affected the operations strategy's fresh look: advances in production and information technology, global business operations, business process re-engineering techniques and the enormous opportunities for operational efficiencies and economies. Lastly some of the factors with a small extent included the need to develop sustainable competitive advantage and the impact of uncertainty.

Fourthly, CCN sets broad policies and plans for using the resources to best support its long-term performance objectives (operations strategy). The council has well-documented solid waste management strategies. The most critical factors in decisions that relate to the design of CCN's process and the infrastructure to support the solid waste management processes were found to be the organizations of the operations function, the work payment structures, the selection of appropriate technology, and the logic associated with the planning and control systems, and the quality assurance and control approaches. The most important variables in the solid waste management operations strategy development process at the CCN were found to be: the external environment of the NCC"s trends in the market, changes in customer wants and expectations (demanding speed of delivery, high quality, and low price), Identifying the company's strengths (special skills of workers, such as expertise in providing customized services or knowledge of information technology), Understanding *how* its core beliefs shape its business , Understanding *who* its customers are, Understanding *what* business an CCN is in , as The trends in the political environment (changes in the political climate—local, national, and international) and Forming partnerships with international firms (*strategic alliances)* .

Fifthly, the internal strengths with the highest effect on CCN's competitive advantage, resulting from its operations strategy are: responsive employees in meeting customer needs, highly trained employees, quality control techniques, process quality, high-performance, strong technical capability of employees, the

marketing function's skill in understanding customer wants scored, CCN's skill in attracting and raising capital scored, creative employees in product design and goods and services consistency. The factors found to be less important were: CCN's technologically advanced and an efficient distribution system, the ability of CCN to predict market trends and use of latest management support technology. The technology that can assist the CCN in effective implementation of its operations strategy relating to the solid waste management was found to be the solid waste management process technology and the solid waste management product technologies, as opposed to technology for sustainable competitive advantage and continuous improvement.

Lastly, the City Council of Nairobi has been at the center of controversies; provision of Nairobi's urban services is plagued by problems, which can be traced to both local and central levels of government. Currently the capacity of City Council of Nairobi to deliver its public and statutory responsibilities to the citizens of Nairobi is severely limited. The factors that have strongly limited sound waste management operations strategy implementation were found to be: inability to formulate and implement sound solid waste management policies, inadequate treatment and disposal of solid waste, inadequate landfill disposal, poor formulation and enforcement of laws and regulations relating to solid waste management, poor services for solid waste collection and limited utilization of recycling activities, and lastly the inability to regulate and monitor the activities of all generators of solid waste, and Poor transportation services provision. The following factors with a medium effect on the CCN's operations strategy implementation with respect to solid waste management were the accounting systems are deficient, dumping along the back lanes and street corners within the city and its suburbs, high risk of environmental pollution, inadequate service coverage and operational inefficiencies of its service, large amounts of uncollected solid waste, lack of adequate and appropriate staff and inadequate management of hazardous and healthcare waste.

6.2 Modeling the Operation Strategies Used In Solid Waste Management

The operation strategies used in solid waste management can be modeled using a flow chart as follows:

From the model, the formulation of organizational strategy must be done by the CEO and the employees through selected committees. This is heavily loaded by two aspects:

First, the annual departmental objectives need to be designed according to the department of environment's major mandates. They are derived from annual departmental objectives especially by the departmental heads and the employees. This is operational Level (origination of Annual Objectives in Solid Waste Management). The second loading factor is the frequency of factoring Change in Structure/Work to Objectives in Solid Waste Management. Less than a year or more than 3 years since most city council do not experience any big/major changes in even intervals; the policies adequately support the institutions strategic plan: the departmental organizational structure support implementation of strategy; and the procedures/regulations followed by the departments are supportive of change implementation. This should be documented in the current strategic plan.

The formulation of organizational strategy should be followed by setting of Annual Objectives in Solid Waste Management. The annual objectives includes to: improve public health of the people; improve the environment; and maintain public cleanliness in order to keep public places aesthetically acceptable; by ensuring the proper storage, collection, transportation, safe treatment and disposal of solid waste. This setting of annual objectives in solid waste is also loaded with two factors:

- First, The Most Important Variables in the Solid Waste Management Operations Strategy Development Process (variables very important in the process of defining the best solid waste management strategies: The external environment of the CC"s trends in the market scored; Changes in customer wants and expectations (demanding speed of delivery, high quality, and low price); Identifying the company's strengths (special skills of workers, such as expertise in providing customized services

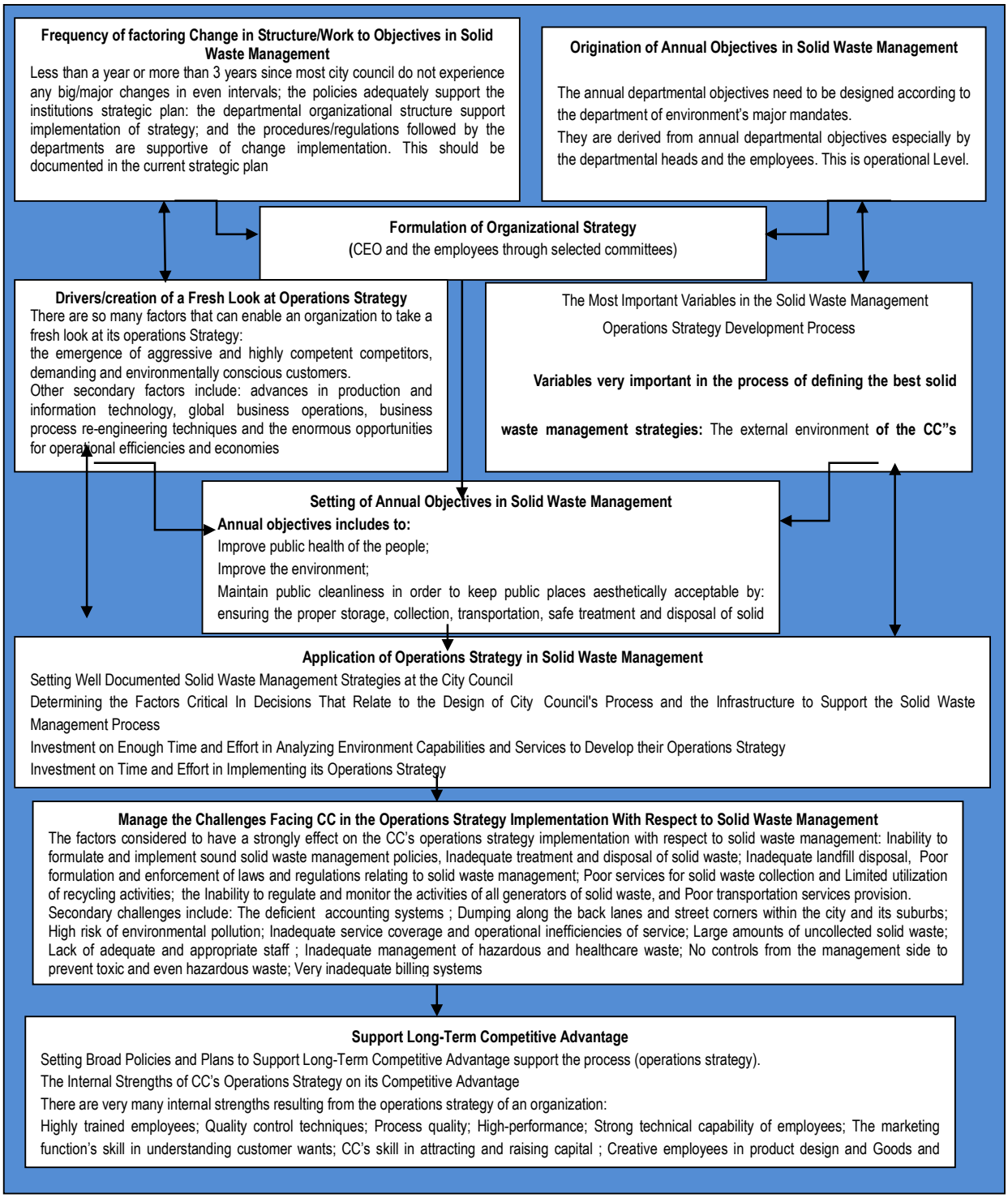
or knowledge of information technology) ; Understanding *how* its core beliefs shape its business scored; Understanding *who* its customers; Understanding *what* business an CC is in; the trends in the political environment (changes in the political climate—local, national, and international) and Forming partnerships with international firms (*strategic alliances)*.

- The second loading factor to the setting of annual objectives in solid waste management is the drivers of a Fresh Look at Operations Strategy. There are so many factors that can enable an organization to take afresh look at its operations Strategy. The different factors that impact on the operations strategy are: most managers felt that the emergence of aggressive and highly competent competitors, demanding and environmentally conscious customers. Other secondary factors include: advances in production and information technology, global business operations, business process re-engineering techniques and the enormous opportunities for operational efficiencies and economies.

The four loadings affect each other to transform the organization strategy and Annual Objectives in Solid Waste Management to an integrated system "Application of Operations Strategy in Solid Waste Management". This is achieved by:

- Setting Well Documented Solid Waste Management Strategies at the City Council. There is need to document all the policies regarding an activity and as a center of reference. There should be well documented solid waste management strategies.
- Determining the Factors Critical In Decisions That Relate to the Design of City Council's Process and the Infrastructure to Support the Solid Waste Management Process (Process design includes the selection of appropriate technology, sizing the process over time, the role of inventory in the process, and locating the process. The most critical factors in decisions that relate to the design of City Council's process and the infrastructure to support the solid waste management processes are: the organizations of the operations function; the work payment structures; the selection of appropriate technology, and the logic associated with the planning and control systems; the quality assurance and control approaches; sustainable competitive advantage and continuous improvement; sizing the process over time).
- Setting Broad Policies and Plans to Support Long-Term Competitive Advantage support the process (operations strategy). (Operations strategy is concerned with setting broad policies and plans for using the resources of a firm to best support its long-term performance objectives)
- Investment on Enough Time and Effort in Analyzing Environment Capabilities and Services to Develop their Operations Strategy (scanning the environment of operation before developing the solid waste management operations strategy).
- Investment on Time and Effort in Implementing its Operations Strategy (After the environmental scanning and formulation of operations strategy, there is need to invest in its implementation. The low investment in terms of enough time and effort in implementing might be due to the lack of regular strategic review process so that the organization is not only unaware of "how it is doing" in implementing its strategy hence it also misses many strategic opportunities that emerge).
- Establishing on technology that can assist the CC in Effective Implementation of its Operations Strategy Relating to the Solid Waste Management. Investing on technology that can assist the CC in Effective Implementation of its Operations Strategy Relating to the Solid Waste Management (There are many other types of trends in the use of technology, such the solid waste management process technology, the solid waste management product technologies, information technology)
- There are a number of challenges which needs to be managed during the Implementation of Operations Strategy With Respect to Solid Waste Management. The factors considered to have a strongly effect on the CC's operations strategy implementation with respect to solid waste management: Inability to formulate and implement sound solid waste management policies, Inadequate treatment and disposal of solid waste; Inadequate landfill disposal, Poor formulation and enforcement of laws and regulations relating to solid waste management; Poor services for solid waste collection and Limited utilization of recycling activities; the Inability to regulate and monitor the activities of all generators of solid waste, and Poor transportation services provision.

Figure 1: The Operation Strategies Used In Solid Waste Management



The secondary challenges include: The deficient accounting systems ; Dumping along the back lanes and street corners within the city and its suburbs; High risk of environmental pollution; Inadequate service coverage and operational inefficiencies of service; Large amounts of uncollected solid waste; Lack of adequate and appropriate staff ; Inadequate management of hazardous and healthcare waste; No controls from the management side to prevent toxic and even hazardous waste; Very inadequate billing systems.

This proper management of the challenges finally leads to Support Long-Term Competitive Advantage. Setting Broad Policies and Plans to Support Long-Term Competitive Advantage support the process (operations strategy). The Internal Strengths of CC's Operations Strategy on its Competitive Advantage. There are very many internal strengths resulting from the operations strategy of an organization: Highly trained employees; Quality control techniques; Process quality; High-performance; Strong technical capability of employees; The marketing function's skill in understanding customer wants; CC's skill in attracting and raising capital ; Creative employees in product design and Goods and services consistency.

6.3 Limitations and Suggestion for Further Research

There was time and financial constraint in carrying out the research. The managers/heads of departments in the CCN were actually to busy and visiting all the other agencies and NGOs required time and money. Most of the informants were reluctant to participate in the research and had to be really convinced to answer. Most of the respondents especially managers/heads of department claimed to be very busy and ignorant about the vocabulary that was used.

Operations strategy is the "HOW" in any corporate and market strategy. Operations strategy is no longer a tool for continuous improvement and sustainable competitive advantage in the manufacturing sector only, since it can be now applied in the service industry and public organizations. The researcher recommends a study to be conducted, which will evaluate the use of operations strategy in solid waste management in other city councils in the world.

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