

**PLANNING FOR THE LOCATION AND SITING OF
MOTOR VEHICLE FUEL SERVICE STATIONS IN
NAIROBI CITY, KENYA.**

BY

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B.A (HONOURS) NAIROBI, 1997.

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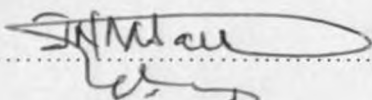
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DECLARATION

This thesis is my original work and has not been presented for any degrees in any other university.

SIGNED.......... DATE..... 16/11/2001

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(Candidate)

This thesis has been submitted for examination with my approval as a university supervisor.

SIGNED.......... DATE..... 19/12/2001

DR. ISAAC KARANJA MWANGI

DEDICATION

To my Parents, my Sisters and Brothers whose love is immeasurable. Without whose encouragement I could not have gone this far.

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Finally, any errors either of omission or commission are entirely my responsibility.

ABSTRACT

The discovery of the motor vehicle in the early 20th century opened retailing of fuel as a commercial sub-sector allied to the car industry. Individuals and trading companies organized fueling services using mobile tanks and later service stations were elected as independent business.

In Kenya the petroleum business dates back to pre-independence period with multinational companies dominating the industry. During this time the industry was controlled through policies which were formulated to guide it. In 1994, the oil industry was liberalized and it is after liberalization that Kenya has witnessed uncoordinated and haphazard construction of service stations. The industry was liberalized without putting into place the regulations to guide it.

This study was aimed to research on factors that lead to uncoordinated development of the motor vehicle fuel service stations (MVFSS) in Nairobi. The changing trend of the services provided alongside fueling and why there has been no change in motor vehicle planning, siting and development were analyzed.

The study reveals major changes on space requirements and increase in services provided and the incompatibility of the more recently licensed motor vehicle fuel service stations to their neighbouring land uses. The study concludes that liberalization of motor vehicle fuel sector has led to multi-economic effects in the entire urban economy in the City of Nairobi.

The study has noted effects of uncoordinated development of motor vehicle fuel service stations in Nairobi, the capital City of Kenya, which have a leading role in the regional, and the international scene.

Further, the study notes the effects these developments have on the transport sector as well as the environmental affects. At the end, the study makes some recommendations that include remedial measures that should be used to guide this vital industry. It recommends enhancement of the policies, which are already in place while some need to be changed to be in line with the liberalized economy. The planning policies will harmonize the location and siting of the motor vehicle fuel service stations and the city will regain its social and economic vitality in the region.

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CHAPTER ONE

INTRODUCTION

1.0 General Overview

With the discovery of the motor vehicle relying on crude oil products for propulsion, the provision of fuel became essential. Before 17th and 18th century locomotives relied on steam power and horsepower. The source of steam power was from firewood but this was used for a short time. Later the coal became the main source of the steam power.

During the first 15 years of 20th century (1900-1915), there was a revolution in the vehicular traffic arising from the revolution of manufacture of the car, which opened the crude oil retailing as commercial sub-sector of the car industry. During that short period motor vehicle fuelling services were offered at retail shops and groceries. However, with time, trading companies organized fuelling services using mobile tanks.

Later on, this developed into an independent business involving large quantities of fuel being stored in barrels. The barrels were potential source of fire and therefore they were lowered into earth pits. With time more people owned cars for leisure, business and house to work travel, leading to further expansion of the motor fuel trade.

This change led to increased demand for fuel and other petroleum products, as well as convenience where motorists could source the services. Trading companies responded by erecting roadside filling stations. In the better part of 20th Century there has been increasing number of vehicles requiring constant servicing, and hence the Motor Vehicle Fuel Service Station (MVFSS) has become an essential facility of modern transport. Today MVFSS offers a wide range of motor vehicle services as well as passenger convenient stores and restaurants, all aimed to ensure the convenience and efficiency of motor vehicle transport and passengers.

In Kenya petroleum industry is not a new commercial investment. Its history dates back to pre-independence period (Nairobi City Council, 2000). Multinational petroleum companies developed their interests in Kenya in 1920's and from then on they established MVFSS in the major towns.

1.1 Nairobi Situation

In Nairobi, the first development policy plan in the petroleum industry was formulated in 1960 (Nairobi City Council, 2000). Before that time, motor vehicle fuel service stations were located following the interests of the investor. Under this new policy, a limited number of MVFSS were allowed to locate in certain zones of the city. In every case, prospecting developers would submit their development plans after an advertisement by the City Council in the local media that such services was needed within a particular locality.

With time, other urban development planning policies were formulated to guide the industry. In 1962 the City was divided into two service stations zones to guide location of MVFSS. These zones were central and the outer areas zones. In both zones the investors had to site their stations such that they were in line with the other development requirements in the zone, such as zoning, density and provision of essential services.

In 1964, regardless of the location, an interval of not less than five miles had to be observed. In 1969, the City was divided further into three zones namely; central, peri-urban and the outer areas of the city. Under this policy investors were required to observe the special characteristics of each zone when locating their service stations. In 1976 establishment of small lock-up shops to sell fuel and other related petroleum products was allowed. The shops were to have separate external public access of not less than 15m to the nearest pump, and a 3m wide pavement guiding public access to the shop from the service station fore front space for vehicular and/or pedestrian segregation. The shops were to measure 10m² and 7m². Five car parking spaces were to be provided with the lock-up shops.

However, due to time lapse and accompanying social and economic dynamics, the situation has changed so much that the existing planning policies for the location and siting of investment in the industry are out of touch with what is actually going on the ground. There has been increased ownership of cars, which during colonial period and immediately after was seen as the preserve for a few citizens especially Europeans and Asians. Companies encouraged their employees to take car loans because the management had realized the many advantages the car has in running their business. It was during this period that the car ownership started to increase among the middle-income group. Those who were in private business also responded by buying cars so that they could offer services efficiently and effectively to their own advantage. There was a steady increase in car ownership from independence to early 1990s.

As part of liberalization in early 1990s, the motor industry took a new turn with government relaxing importation of cars. This saw many Kenyans import second hand cars from the Middle East. The cars were cheaper as compared to the ones previously imported from Japan and German and sold through franchise by local firms. This change of policy saw a sharp increase in private car ownership as shown in Table 1.1.

This increase called for increased demand for MVFSS and the investors reacted by investing more and haphazardly in motor vehicle fuel service stations. The Government however did not react to these changes in its planning policies. As the investors motive is profit maximization, when the planning approval seemed to take too long they opted to take evasive action and opened their businesses without going through the established procedures. This is a major failure of low enforcement and development control in the City. It was at this time that MVFSS were sited in inappropriate areas.

Table 1.1: New Registration of Motor Vehicles in Kenya, 1991-2000.

Type of Vehicle	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000*
Saloon Cars	4,124	4,247	4,542	7,031	6,519	8,625	8,995	11,126	8,917	6,510
Station Wagons	2,558	2,082	1,828	2,699	3,260	4,069	4,259	5,175	4,251	2,971
Panel Vans, Pick-ups etc.	3,943	3,728	2,510	3,380	5,778	7,711	7,544	7,295	6,984	4,311
Lorries/Tractors	1,272	1,105	750	1315	1,778	2,222	2,732	2,578	2,087	1,690
Buses and Coaches	762	718	519	390	743	888	931	887	866	779
Mini buses	394	447	295	427	813	946	927	874	872	596
Special Purpose Vehicles	39	37	20	19	32	38	35	25	29	23
Trailers	423	299	291	541	444	674	680	539	569	450
Rollers, graders, cranes	49	68	55	53	89	104	102	63	70	78
Wheels Tractors	700	687	474	578	977	1047	1,263	1,160	1,112	977
Crawler tractors	6	1	2	6	11	9	6	5	6	7
Motor and auto Cycles	1,246	1,364	1,133	1,488	1,778	2,328	2,415	1,986	2,127	1,841
Three Wheelers	0	2	1	1	2	3	4	5	4	3
Total	15,516	14,784	12,420	17,928	22,224	28,664	28,893	31,718	27,892	20,236

Source: Economic Surveys 1996,1997,1998,1998,1999,2000 and 2001.

* Provisional

On its part the government did not change its policies to guide the new investors on the ground. It appears that the government did not take time to consider the possible repercussion as a result of her move to liberalize the fuel sector. It could have been advisable for the government to change policies concerning operation of the industry before liberalizing the industry

Secondly, policy change would have required the government to consult widely. The process would be slow as it is only after a comprehensive study of the market that would have led to more informed policy change. Some of the officers who are responsible in changing the policies have vested interests in this lucrative industry. They would have preferred the industry to operate in a manner that favours them.

Siting of motor vehicle fuel service stations, due to market demand no longer obeys the stipulated five-mile intervals (Lock, et al: 1971). When the investors do not observe the five-mile interval the public is at a risk. There is a high possibility of occurrence of accidents in a situation where service stations are too close. Also a situation like this will lead to loss of customers from the investor who had located his investment in that locality earlier. Because this is an immovable business, one would not move from one site to another like informal business.

Furthermore, the competition in the market has led motor vehicle fuel service stations owners/dealers to introduce other services like convenient cafes, restaurants and mini-supermarkets. Therefore since 1994 when the oil industry was liberalised, the motor vehicle fuel service stations have taken other functions apart from the traditional role of refuelling and servicing of motor vehicles. Local investors operating outside the rules of established trading companies have entered the market.

There has been introduction of other services and yet the planning policies have not changed to recognize these establishments. The modern MVFSS would require more than double the land area provided under the existing policies while new safety standards are needed.

1.2 Statement of the Problem

In Nairobi, development of motor vehicle fuel service stations (MVFSS) during the recent years saw a rapid expansion in number that is almost impossible to carry out a comprehensive survey in a short time. It is even more problematic to present a coherent picture of the industry. Only a few years ago, it was considered quite adequate to have

one or two fuel pumps at designated sites particularly along the main roads. At present time, motor vehicle fuel service stations have diversified the services to include bars, cafes, restaurants and mini-supermarkets to meet diverse needs of the travellers.

It is quite evident that in Nairobi, various kinds of motor vehicle fuel service stations are now common. They range from the simple pump operated as a one-man business without any specialized building, requisite space standards and site including locational considerations to account for safety, environmental pollution and convenience.

On the other hand, there are more complex capital-intensive service stations. In these stations infrastructure are specific; land areas, site and locational criteria are taken into account. The staffs is well trained before deployment and there are ancillary services such as restaurants, bars and shopping facilities that are incorporated in deciding on site, location and the layout plan of the site.

These developments reflect a major change in planning policies for motor vehicle fuel service stations as commercial enterprises. It is also an indicator of the changing expectations of the users of the services. The change is a major shift from self-regulating industry to one characterized by severe competition in the market (P.I.E.A. 1997). This shift is reinforced by apparent relaxing of the previous strict policies on control on location and siting of motor vehicle fuel service stations by concerned government ministries and local authorities.

Unfortunately the relaxation of control seems not to be matched with other means of ensuring that new motor vehicle fuel service stations do not create problems in areas they are located. Resulting from the deregulation of the oil industry in 1994, the petroleum industry in Kenya in general and Nairobi in particular is characterized by uncontrolled and uncoordinated location and siting of the business.

The deregulation has also led to new entry of local investors/dealers in the market. Before, then the industry was dominated by multinational oil companies. The local investors/dealers in some cases have established motor vehicle fuel service stations near highly inflammable premises because of the activities which take place there such as *Jua*

Kali garages, residential houses and furniture shops. Others are established in very small plots, some as small as 50m² against the minimum established size of 400m² (0.04 ha) (Lock, et al, 1971). This is of reduction of space standard to 12.5%.

Yet still, some motor vehicle fuel service stations are located on sites where they interfere with traffic flow in the neighborhood. While some station sites are such that the adjoining road is used as the fueling bay and as such bring the traffic flow to a complete halt. Motor vehicle fuel service stations are also found to obstruct access to houses and other public utilities and spaces.

Following these changes, and lack of new planning policies to guide investment, location and siting therefore has resulted to haphazard mushrooming of motor vehicle fuel service stations throughout the City. The result is a variety of mixed development types of incompatible land uses. Safety, public health and environmental threats are compromised to the extent that, the benefits of liberalisation might be far too few compared with the threats.

The study investigates the factors, which have led to the emergence of haphazard and uncoordinated development location and siting of motor vehicle fuel service stations in City.

1.3 Research Questions

The study intends to answer the following questions:

- i. What factors are taken into account in planning for the location and siting of motor vehicle fuel service stations?
- ii. Are the factors taken into account to ensure public safety and convenient harmonized with those of optimal location for the investing dealer?

- iii. Are there dominant criteria used consistently in deciding the location and siting of motor vehicle fuel service stations; if there were, what is their emphasis or bias?

1.4 Broad Study Objective.

The study focuses on the planning considerations taken into account in the location and siting of motor vehicle fuel service stations in Nairobi. Hence the general objectives of the study is to analyze the factors that are considered in locating and siting of motor vehicle fuel service stations and their implications on different land uses. In order to achieve this broad objective the four specific objectives were formulated.

1.4.1 Specific Objectives

- (i) To identify and to evaluate technical and planning factors considered in deciding the location and siting of motor vehicle fuel service stations in Nairobi. The objective helped to assess the compatibility of each motor vehicle fuel service station with the neighbouring land uses. The objective was achieved by use of primary data and review of planning policies from concerned ministries and Nairobi City Council. The analyzed data for this objective was used to establish the extent to which compatibility of land uses, accessibility of motor vehicle fuel service stations, intervals between motor vehicle fuel service stations and other related planning regulations that should be observed in location and siting of motor fuel service stations.
- (ii) To analyze types of services and space provided at various motor vehicle fuel service stations versus the established space (land area) requirements. The objective was meant to give insight into the services offered and their level of importance. It helped to assess the services that are offered but are not compatible with motor vehicle fuel service stations. This objective was achieved by use of primary data mostly from observations and measurements.

- (iii) To appraise Nairobi City Council land-use planning policies on motor vehicle fuel service stations in relation to rules and regulations of licensing of petroleum products retailing. This objective was achieved by assessing what is stimulated in the planning policies and what is actually happening on the ground. Primary and secondary data were used to achieve this objective.
- iv) To recommend planning approaches that can be used to harmonise the location and siting of motor vehicle fuel service stations. This objective was achieved by use of findings in objective (i), (ii) and (iii).

1.5 Study Assumptions

The study makes three assumptions. First, the study assumes that motor vehicle fuel service stations investors site their investments in locations they perceive they would operate efficiently and independently in order to maximize on profit by offering the best price of fuel and other services; all to increase the chances of surviving the competition in the market. This assumption is based on the observation that, only locations with potential business will attract investors to the oil industry.

Secondly, it assumes that all the existing motor vehicle fuel service stations in Nairobi City have gone through the same planning and development application and approval procedures. This assumption is based on observation that, for an investor to erect a service station he has to go through the laid down regulatory framework and licensing hence all the stations are approved.

Finally the study assumes that the uncontrolled and uncoordinated nature in location and siting of motor vehicle fuel service stations now prevalent in Nairobi is due to the inability of the Nairobi City Council other concerned planning and licensing agencies to plan for integrated development of service stations with other development schemes. The current trend of motor vehicle fuel service station developments will continue if planning interventions are not put in place. This assumption is based on the observation that the

existing planning policies concerning motor vehicle fuel service stations are not harmonized by the agencies concerned. In some cases there are overlapping of roles for the agencies concerned.

1.6 Significance of the Study

This study has been stimulated by two fundamental observations. First, it is notable that the deregulation of the motor vehicle fuel retailing has led to an increase in the number of motor vehicle fuel stations that no longer use the conventional location and siting logic, including the accompanying retailing infrastructures. Deregulation has opened the sector to more players who are providing increased range of services besides motor vehicle fuelling. It has also brought about more safety and environmental questions that are manifested by poor land use planning and allocation.

In many cases, the infrastructures where retailing is done are seen as a continuing threat to the public safety and convenience, the environment and also the sustainability of the adjoining physical investments, recreation spaces and residential properties.

The study is of significance to the public policy makers' in charge of liberalisation of the economy and intends to demonstrate how specific policy decisions impacts on urban planning, and the management of urban growth and development of towns in general.

1.7 Justifications of the Study

In a broader perspective, the motor vehicle sector plays an important role in the economic set-up of the City. Motor vehicles increase the mobility of people and goods where traffic is well managed. People spend less travel time between their residence and place of work. Manufactured goods are delivered to wholesale and retail outlets in shorter time and in larger quantities for consumers to access them at lower prices and when they are still within consumption period. Health, security and recreation are easily accessible where there is

motor vehicle usage. Vehicles shorten the distance and reduce costs of access. This is not the case currently in Nairobi because some of the motor vehicle fuel service stations are unplanned for and they bring a lot of inconveniences to the motorists and the public in general.

Motor vehicle fuel service station is lucrative business and if investors are let to provide these vital services without planning intervention, there will be conflict in land use. These conflicts will in turn compromise the public safety and the environment. The end result will be undesired urban form, which will also affect the economic functions of the city. Against the foregoing discussion, this is the unfolding situation due to ongoing of mushrooming of motor vehicle fuel service stations in Nairobi compared to other towns. Since 1994 when motor vehicle fuel service stations business was deregulated, service stations have continued to change the built forms in Nairobi.

Nairobi City being the capital City of Kenya and a City with regional and international importance, gives it a priority as no other study had addressed this issue in this region. Because of its centrality Nairobi is a Business capital that serves the population from all over Kenya and East Africa. It has high accessibility because of the road and railway network connecting it locally and regionally. It is also a major population centre with a population of 2.5 million out of 28 million in Kenya as per 1999 population census (Kenya, 2000). The city functions as the economic hub in Kenya and East Africa, hosting headquarters of national, regional and international corporations. At the international level the city hosts United Nations Centre For Human Settlements (Habitat) and United Nations Environment Programmes (UNEP) which are located in Gigiri.

It is against this background of the importance of Nairobi that qualifies it to be studied. It has a leading role in the region cannot be ignored. Uncoordinated development in Nairobi, as noted will be detrimental to the city as well as its function regionally and locally. Hence an urgent intervention is needed. The study gives insight into implication of motor vehicle fuel stations on land use planning and development.

1.8 Operational Definitions

Location: The total urban environment in which a specific urban land use interacts at a specific time. Total urban environment can be conceived of as including the economy, the social and institutional structure, the physical setting and design of the urban areas, and the psychological reaction of the population to these variables.

Firms, enterprises and business: These words will be used interchangeably to denote premises where trade (interchanging of goods and services) takes place.

Entrepreneur or proprietor: Person(s) who own premises with the aim of trading to make profit.

Investor or developer: Person(s) who has intention of establishing his/her venture in space with aim of getting returns (profits) in future.

Site: A position available for physical development, and is in a given zone. In this study the position has to be enough for development of a service station.

Planning permission: The official permission required to carry out a particular development in the city.

Multinational oil companies: Companies operating oil retailing (distribution) in a number of countries through interested dealers.

Local investors: These are business people from within (Kenya) who have entered in the oil industry using their own resources and they operate their business independently.

Dealer/operators: These are persons who have been contracted by the multinational companies to sell fuel on their behave using the rented service station premises.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is about literature review. It explores the existing literature on the subject in much more broader sense and aims to provide a theoretical framework for the study. The main focus in the chapter is the location of economic activity in general. It also deals with the location of retail activity and the factors that are considered in the location of different economic activities in urban areas. It incorporates location and siting issues of the motor vehicle fuel service stations. It is acknowledgeable from the start that literature on location of urban activity is broad and the study borrows from the broad concept of industrial location. This concept is treated well to give the theoretical framework of the study a broad perspective.

2.1 Theoretical Framework.

In this section, the first part is devoted to discussion on theories concerning location of economic activities in general while the second part deals with theories on retail location. This is more so because this study is more based on a number of interrelated basic concepts that form its theoretical framework.

2.1.1. Location Theory

Traditionally economic theory ignored spatial aspects. Classical economists assumed economic activities took place in static, spaceless world. Isaard has called it a wonderland of no dimensions (Isaard, 1956). The classical economists explicitly recognized significance of time element in economic analysis, but their acknowledgement of space and distance factors was implicit. For decades the spatial phenomena was neglected and the implication of space appeared secondary relative to time in evaluating how the economy worked and its performance (Richardson, 1969).

Given the importance of location in economic analysis, some scholars have come up with theories to integrate location into the main body of economic theory, in particular the

theory of the firm (Okoth, 1991). Failure of economists to incorporate the spatial dimension has consequently created an opportunity for geographers and regional planners to contribute towards the location of the firms.

2.1.1.1 Von Thünen Theory

One of the earliest attempts to incorporate a theory of location into the general framework of economic system and development process was by John Heinrich von Thünen in 1826 (Greenhut, 1956). von Thünen in his scheme of concentric circles around a town visualized a land surface homogeneous in all respects save distance from the consuming centre (Greenhut, 1956). To him the consuming centre or city is situated in the middle of coal and iron mines while its inhabitants are in the outlying districts. Inhabitants are in continuous exchange with the manufacturers. Farm produces (food and raw materials) are sold in each outlying region at the city price less the difference in the cost of transport to that region and the city. von Thünen's formulations revolve on the cost of transportation and the rent of land, which explain why a particular agricultural product is grown on a given plot of land.

In his formulations, he emphasizes on the non-institutional factors of location. Capital factor has no place in von Thünen analysis because he assumes a homogenous land surface and complete mobility of capital. His formulation of concentric circles is not applicable to all economic activities, as it is restricted to agriculture. However, his theory can be converted into analysis of site selections of manufacturing plants (Greenhut, 1956). All that is required for this goal is a change of purpose. This modification does not distort the theory. The cost of transportation of raw materials and the rent of the land remain the basis for both explanations. In his theory, labour is said to be equal in skill and cost everywhere.

For service stations the labour source is given minimum attention as running a service station does not require highly specialized skills. The factor of transport of goods from the farm to the centre seems to play a major role in von Thünen theory.

However for a service station, the distance between the source (service station) and point of consumption is not considered. This is because fuel is not a take-home good like other goods. Land rent is the only factor which is applicable in location of service stations from his theory. From his theory, land rent remains an important consideration when locating a service station. The further away from the centre (CBD) a service station is, the lower the rent.

Industrial location theory may be disaggregated into three categories, the *least cost* approach which attempts to explain location in terms of factor cost, the *market area* analysis which places more emphasis on the demand side or market factors, and the *profit maximization approach* that is a synthesis of these other two approaches.

2.1.1.2 Weberian Industrial Location

The least cost theory is associated with Weber and sometimes referred to as *Weberian theory*. According to Weber, the primary factor influencing industrial location is transportation cost (Collins, et al 1975). Weber constructed a theory of manufacturing location. The theory begins by identifying a minimum transportation cost of raw material to the manufacturing site and then by using isodapanes¹, seeks to derive a better location either due to savings in labour cost or agglomeration economics. Where these savings exceed the additional transport costs, a critical isodapane is defined and a new optimum location identified (Norcliffe, 1975).

Transportation of raw materials and labour costs are considered the two general factors in urban areas, and agglomeration economies as the only regional factor. To him the location objective of a businessman involves substitution between these two factors in selecting an optimal site. Hoover (1937) and Smith (1966) share their views with Weber on least cost theory and hence has made subsequent improvements and modification on the least cost theory. Weber has been criticized for some of his unrealistic assumptions. In particular his assumption of constant demand and omission of institutional factors such as interests, insurance and taxes.

¹ Lines connecting points of equal total transport costs

Hand in hand with the above criticism, the recent development of automobile transportation counteracts some of the factors discussed that influence the limiting special location. Hence in location decision-making entrepreneurs (in some cases) tend to neglect the transportation aspect.

2.1.1.3 Lösch Theory of Location

Lösch (1954) on his contribution to location theory sought a theory of partial spatial equilibrium based on distribution efficiency. The essence of Lösch's theory of *market area analysis* lies in the apportioning of demand on a uniform continuous surface to the point of supply. He postulates a broad, homogeneous plain with uniform transportation features in all directions and with an even scatter of industrial raw materials in sufficient quality for production; a uniform distribution of agricultural population with a uniform set of tastes and homestead and preferences.

He further postulated that each homestead at the start being self-sufficient and the technical knowledge is disseminated throughout the plain and production opportunities is available to all. In all respects, too extra-economic forces are excluded. If in this situation an individual finds it profitable to produce a commodity over and above ones homestead, the market would assume a circular form. However, if one farmer finds it profitable to produce over and above his needs, so will others. Here the forces of competition will move by eliminating all excess profits and will not only transform the circular shape of the original producer but also will transform the circular shape of the market into a hexagon. For each commodity, then the plain is dissected into a honeycomb (a net of hexagons) of market areas. Lösch next groups these honeycombs according to the size of their respective market units.

Lösch's assumption of a uniform and unbounded plane is difficult to accept (Norcliffe, 1970). Isaard (1956) considers the assumption of uniform demand surface in Lösch theory to be inconsistency as in real world rarely would entrepreneurs stretch their market areas until they reach the zone where demand is zero.

Losch's theory seems to work satisfactorily for retail and other service activities, but it is useful for a few market-oriented activities in manufacturing sector. His theory cannot conform to operation of the motor vehicle fuel service stations. This is so because, first the fuel is not a take-home commodity as assumed by L6sch. The motorists fuel when they are in their activities and do not make a decision *per se* to fuel. Secondly, the fuel is a preserve for those who have vehicles. In his theory L6sch assumes the goods consumed are needed by all the population in a hexagon. In motor vehicle retailing business, it is impractical to draw a hexagon showing the extent of the area of supply, as the decision of fuelling is not necessarily determined by the residential area of the motorists.

A synthesis of the former two approaches, that is, the *least cost* and the *market area* approaches gives rise to *profit maximization* approach. According to this approach, both costs and revenues vary with location and the optimum location is the point that yields the greatest profit. It is the work of Greenhut (1956) that an expression of profit maximization is found. Greenhut argues that firms seek a minimax location considering both the demand and supply factors.

Gosh and McLafferty as quoted in Nyabuti (1991) carried a study where they considered two grocery stores that sell identical products at identical prices which means that consumer do not have any special preference for either store and under normal circumstances they would patronize the one that is closer. However, one of the grocery store is located in a shopping mall along with other types of retail stores while the second store is freestanding. The store located near the shopping mall benefits from multi-purpose shopping. Multi-purpose shopping occur when customers bypass the closest store and patronize an agglomerated store in order to purchase grocery items along with other items on a single trip.

Many scholars agree that consumers will engage in some amount of multi-purpose in order to minimize their shopping costs (Bacon, 1971). The optimal rate of multi-purpose shopping usually varies with consumer's location relative to the stores. Agglomeration leads to higher revenues because of a firm's ability to sell to consumers outside its normal market areas.

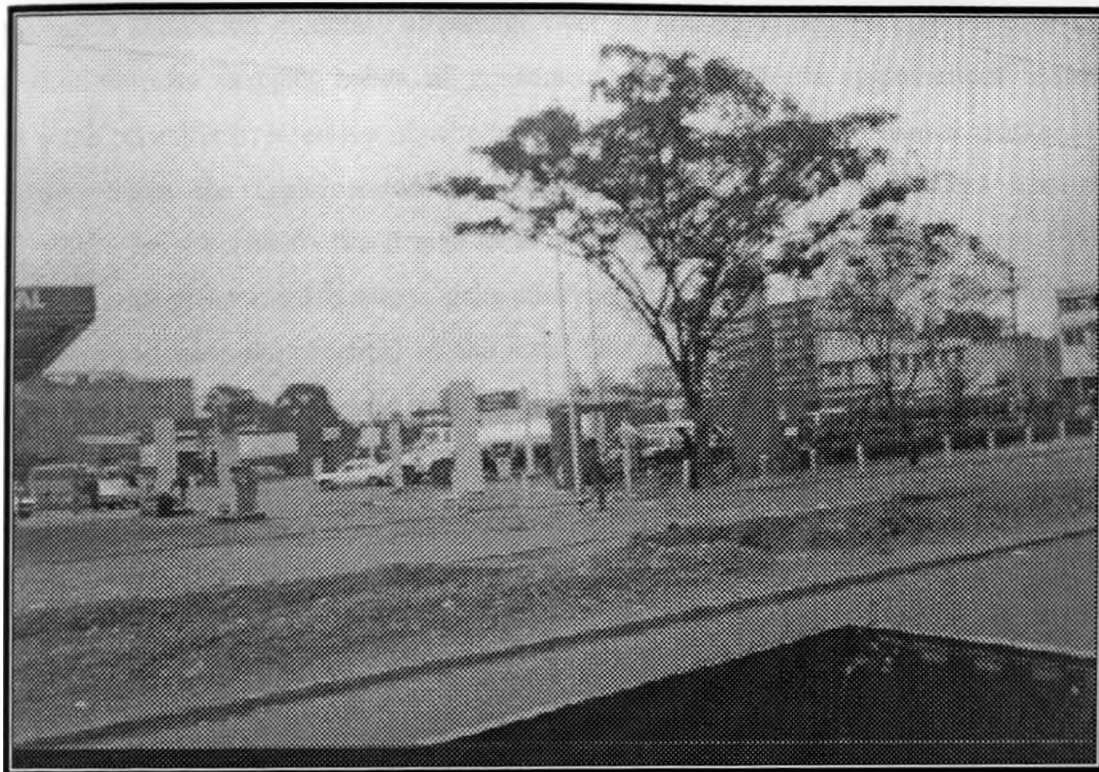
Consumers usually seek to minimize total costs that is the sum cost of the goods travel costs and the cost of holding inventory (Nyabuti, 1991). It is not the interaction between transport and inventory costs that determine the optimal shopping itinerary. Nyabuti continues and assesses that the revenue associated with a particular site depends on two main factors. First, the site of the firm in relation to the number of customers or consumers who patronize the store business investment on single purpose trips and secondly, the rate at which those customers make multi-purpose trips.

In this case the investor, by moving away from the centre of the market, he can increase the accessibility of his business to customers and thus decrease multi-purpose-shopping rates. This will make his firm to be an unagglomerated firm. The agglomerated firm's revenue accrued from single purpose trips will decrease. Therefore moving outward might be the advantage of the firm. This tendency reduces the proximal market area to the other business and hence some customers are lost to the agglomerated store. These finding are very relevant to this study, as it will be revealed later at the data analysis stage. In case of motor vehicle fuel service station, the issue of agglomeration tendencies raises a lot of questions.

2.1.1.4 Theory of Agglomeration and Location Theory

Nourse (1968) contribution to agglomeration shows that firms can profit by locating adjacent to each other. Agglomeration economies are divided into three classifications. These are transfer economics, internal economics of scale to the firm and external economics of scale to the firm that are internal to the industry. Plate 2.1 shows agglomeration of service stations.

Plate 2.1: Agglomeration of Motor Vehicle Service Stations on one Road



Transfer economies are the savings in transportation cost of each firm from locating adjacent to others. However, this will only be realized if a given firm is using products from the adjacent firms as its raw materials. These savings are also realized when consumers come to buy goods as they spend less time when buying variety of products. In this study, this explains the provision of convenient services such as supermarkets, cafes and restaurants in a service station.

Internal economies of scale are the lower average cost of production that results from an increased rate of production that in turn results from an increased rate of production (Nourse, 1968). The total operation of the firm however can be separated into four main functions. These are technical production, management, marketing and finance. In the service stations of multinational companies they only have the management and market function. This is because there is need to monitor the service station operations from time to time.

Eaton and Lipsey (1982) on the other hand have argued that agglomeration gives a business a significant monetary advantage over its non-agglomerated counterparts. Due to multi-purpose shopping habits, all consumers will patronize the agglomerated business on some occasion irrespective of whether they are in the business proximal market area or not. Since the agglomerated firms are patronized only by consumers from the immediate neighborhood, the firm's location has little effects on their revenues. With time the unagglomerated business gain customers until such a time that other business investors will note the potential of the area. This will lead to entry of new firms in the area, which will consequently lead to decrease on market share of the firm which originally established itself.

In many cases, the trend continues until some of the firms start making losses due to the competition and they close down leaving few firms in the market area. When there is this scenario most of the firms move to other sites and start as unagglomerated firms.

When firms adopt a short-term view and ignore the entry of competitors in future there is locational instability of business (Nyabuti, 1991). In many cases the form of equilibrium arrived at is usually unsatisfactory. Given the case of a service station, which involves huge capital investment relocating could be a financial burden. This makes the investor more cautious, requiring that the investment decision on locational choice be arrived at with a clear and well-calculated foresight. The choice of a site should therefore take into consideration the future anticipation of the competitor(s).

Beckmann (1968) observes that space enters into economic relationship into two ways. First, the effects of economic activities on other activities carried out in adjacent locations otherwise referred to as neighbourhood effects. Secondly the cost incurred in moving factor (persons) or good referred to as transportation costs.

In the case of location of a service station, transport cost is given minimum consideration. A lot of emphasis is instead placed on the neighbourhood effects. This is largely because neighbours are at higher fire risks. Therefore, this is why when planning for a service

station the planner should have in consideration the compatibility of the service station with the neighbourhood.

Though Beckmann emphasizes on the two factors, economic activities rarely occur in predetermined places but they are generally subject to locational choice. Technical constraints usually rule out vast areas of any region for a particular activity. These constraints include topography, infrastructural services available and government land use regulations. All the locations where an economic activity is technically possible are called *feasible locations*. If some technical requirement dominates all others, that economic activity is said to be oriented towards it. In this case, service stations are oriented towards a highway. However, it should be noted that not all service stations are located on highways but some are located inside industries though these in most cases are for private use.

Among all the feasible locations for an economic activity, some locations will offer optimal location. Optimality for production activity means that profit is maximized. Beckmann further observes that the optimality of a firm will depend on proximity to potential customers, similar and competing plants and facilities and economic activities in general.

An understanding of the variables that influence the choice of location for any economic activity has been a major focus for regional and urban planners. The costs of assembling inputs and distributing outputs depend upon location relative to sources of supply and markets respectively. According to Chapman (1991) location, relative to the markets, also influence the level of sales and therefore improve the revenue side of the balance sheet.

When locating an enterprise, there are eight major principles, which apply in site selection. First, the existing potential for successful trading in an area is the most crucial. Nelson (1958) ascertains that one has to find how much the people in a locality are willing to spend for the type of goods an enterprise will place in the market. The

investor assumes that it is possible to secure all the business available. Then the investor scales down to determine how much his own outlet can capture. If he perceives the business is viable despite there being competitors already in the market, he should reassess other factors.

Secondly, the accessibility to the site is a major factor to consider. One major reason for choosing particular site is maximum accessibility by the potential costumers and thereby to have available as much of the business potential as possible (Nelson, 1958). The enterprise should be in such locations along travel ways or paths of costumers. This factor is more pronounced in suscipient business¹ such as motor vehicle fuel service station business which costumers tend to seek services due to personal rather than pure business preference.

However, there are generative enterprises², which attract people from their residents. But it is notable that there is no pure suscipient or generative enterprises hence we have most enterprises as shared business. The third principle considered is the growth potential. Entrepreneurs will tend to locate their business in area, which are anticipated to experience growth in income and population. The entrepreneurs tend to establish their businesses in advance such that those who will move into that area will automatically become customers. This is well illustrated in residential estates which are being built (Guy, 1980).

The fourth principle is that of the business interception, which states that one can intercept a customer from his habitual source of goods by locating his enterprise between market (the people on the trading area) and the market place (source of goods). Although tending to follow the ingrained habits, customs and circulation patterns which revolve around older stores in established business districts, people will rarely go through a business district or pass by a shopping centre or a store to get the same product farther on

¹ Businesses which do not necessarily attract customers from their residential areas

² Businesses which attract customers from their residential areas

(Nelson, 1958). It is much easier to stop them *en route*, as it were, than pull them off or away from the traditional source of goods.

The fifth principle is that of cumulative attraction into the business. Complementary units available near the site will generate high incidence of customer interchange. In the case of service station more business will be generated where a station location has other motor related business. The sixth principle is that of compatibility, which requires that there is no interruption in shopper traffic and that the customer interchange be at maximum (Nelson, 1958). The rules of compatibility indicate that maximum business potential is available in such a location.

Nelson (1958) as shown in Table 2.1 has analysed the compatibility of activities in an urban area. It is observed that the scenario has changed due to the advanced technology which has been invented. For instance, new and more effective measures to combat fire have been developed. As such, activities such as supermarkets are now compatible with service stations. The table indicates that service stations are not compatible with many land uses as in the 1950's. However the situation has changed a lot.

The seventh principle is that of minimization of competitive hazard. This principle takes into account the location, character, size and type of existing competitive units and possible business potential should of course be considered. According to Guy (1980) the principle of minimizing competitive hazard should lead the entrepreneur, other things equal, to select a location, which has three characteristics. The first is to select a location near which there are as few competitive sites as possible. Second, consider the feasibility of controlling and earmarking the future use of sites for non-competitive purposes; and thirdly select a location in which the competitive sites are in non-intercepting positions.

However, after application of all the above principles and coming up with an ideal site, the eighth and final step involves analysis of the site in terms of its cost in relation to its productivity. The efficiency of the site, its size, shape, topography, load-bearing qualities, adjacent amenities like street lighting, availability of utilities, conditions of sidewalks and

Table 2.2: Compatibility of Various Activities in urban Areas

	<u>Convenience Goods</u>						<u>Shopper Goods</u>				<u>Services</u>				<u>Auto Sales Services</u>					<u>Miscellaneous</u>		
	Chemists	Supermarket	Bakery	Grocery	Butchery	Hardware	Shoes	Application (electronics)	Eating places	Barber/beautician	Laundry	Medical clinic	Commercial offices	Car dealers	Auto repair	Service station	Farm implements	Auto parts, accessories	Bank, financial	Institutions (school, churches, hospital)		
Convenience Goods																						
Chemist		1	1	1	1	1	2	3	2	1	3	1	3	3	5	5	5	3	2	2		
Supermarket	1		1	1	1	2	3	3	3	3	3	3	3	3	5	5	5	3	3	2		
Bakery	1	1		1	1	2	3	3	3	3	4	3	4	5	5	5	3	3	2	2		
Grocery	1	1	1		1	3	3	3	3	3	3	3	3	3	5	5	3	3	2	2		
Butchery	1	1	1	1		3	3	3	3	3	4	3	3	5	5	5	3	3	2	2		
Hardware	1	1	1	1	1		3	3	3	3	3	3	3	3	5	5	3	3	2	2		
Shoppers Goods																						
Shoes	2	3	3	3	3	3		3	3	3	3	3	3	4	5	5	4	3	3	2		
Appliances (electronics)	2	3	3	3	3	3	3		3	3	3	3	3	3	5	5	4	3	3	2		
Eating places	2	3	3	3	3	3	2	3		3	3	3	3	4	5	5	4	3	2	1		
Services																						
Barber/beautician	1	3	3	3	3	3	3	3			2	2	2	4	5	5	5	3	3	2		
Laundry	3	3	3	3	3	3	4	3	4	2				4	5	5	5	4	3	3		
Medical clinic	3	3	3	3	3	3	3	3	3	3	2		3	3	4	5	5	3	3	2		
Commercial offices	2	3	3	3	3	3	3	3	3	3	3			4	5	5	4	2	3	3		
Auto Sales, Services																						
Car dealer	3	3	4	4	4	3	4	5	4	4	4	4	4		5	1	1	1	3	3		
Auto repair	5	5	5	5	5	5	5	5	5	5	5	5	5	1		1	1	1	5	5		
Service station	5	5	5	5	5	5	5	5	5	5	5	5	5	1	1		1	1	5	5		
Farm implements	5	5	5	5	5	5	5	3	5	5	4	5	5	1	1	1		1	5	5		
Auto parts, accessories	3	5	3	3	3	3	4		4	3	4	4	4	1	1	1	5		3	3		
Miscellaneous																						
Bank, financial institution (school, churches, hospitals, etc)	2	3	3	3	3	3	3	3	3	3	3	1	1	5	5	5	3			3		
	2	2	2	2	2	2	2	2	2	2	3	2	3	1	5	5	2	3	3			

Key

1-Highly Compatible
2- Moderately Compatible

3-Slightly Compatible
4- Deleterious

5-Incompatible

Source: Modified by author from Nelson R.I. (1958:177-178)

street and other immediate off-site factors which affect its cost and desirability must be examined in detail.

Location decision is of great importance to both the entrepreneur and the community at large. The pattern of land use determines its economic efficiency and social amenity. The way the city has been geographically shaped and the stability of that shape are questions that bear greatly upon the functioning of each urban unit and the whole. Yet, the pattern is formed through a complex multiplicity of individual and community decision, each decision bearing directly or indirectly on many others.

In a market economy, which is competitive throughout, the location of firms will generate friction and little care for public safety, convenience and health. Hence the need for government intervention through the laid down procedures. Usually in pursuing profits, firms seek technical efficient in production processes. With time the logic of profit maximization induces a pronounced process of land-use intensification at location where land rents are already high. These are site at accessible, centralized and polarized locations (Cox, 1978). However as intensification proceeds, so the location become progressively more congested and overloaded. This calls for reactive planning by the municipal or regional government, which intervenes by putting collective measures in place.

The state intervenes through use of legal restrictions on land uses that include planning devices such as official plan provision, zoning, subdivision control and building codes. These also include legal transfer on development rights. Okoth (1990) observes that it is only in limited circumstances that entrepreneurs are given a free hand to determine the location of economic activity. Businessmen also do not take location decisions in isolation but some are borne by the community in general. In Kenya, for instance, it is the practice of the government to participate in development of infrastructure facilities including roads, railway, power installation and water provision. These services will be needed by the various economic activities.

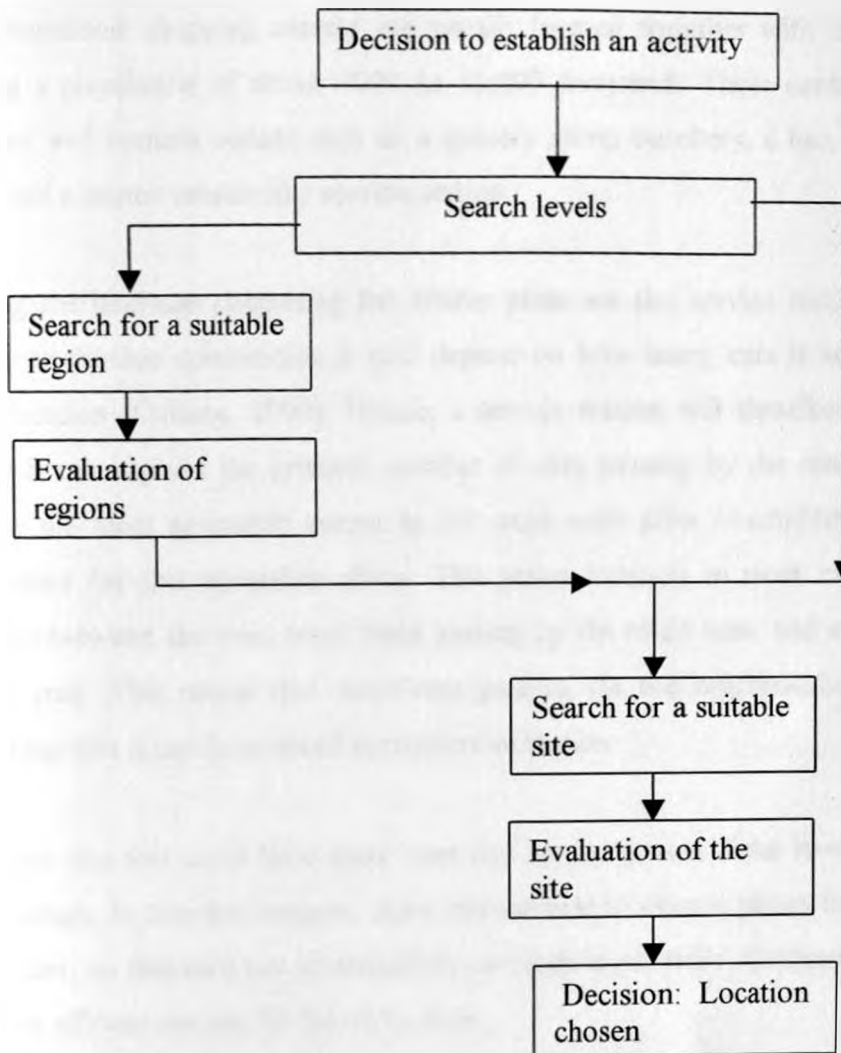
The government is also known to offer incentives such as tax rebates or increased profit margins to industrialists willing to locate away from major industrial centres. From the perspectives of location decisions do not lend much to the search for the economic optimal location. Such considerations have led to a gradual demise of the concept of *economic man* with underlying assumptions that entrepreneurs mainly seek to maximize profit or minimize costs in an environment of perfect knowledge. This has indeed led to alternative approaches on how firms actually determine their location.

From studies of entrepreneurs and organizational behaviour carried out mainly in Sweden (Hagarstedt, 1952 and Tornquist, 1962), it is pointed out that personal contacts and information linkages are key to understanding locational decisions. One major constraint to personal contacts and information flows is timing which leads to problems. Managers therefore decide to locate their offices in close proximity to achieve contact-intensive personnel. While supporting the Swedish effort in identifying the information and contact dimension, Wood has stressed the importance of understanding the way the organization act and how their decisions are made (Wood, 1969).

Pred (1967) shares the view expressed by Tornquist and Wood, although his approach differs in so far as he works out a scheme on the basis that spatial behaviour of companies may be classified. His behavioural matrix interprets locational action as dependent upon two factors. These are quantity and the quality of information available to each manager or entrepreneur. Consequently the success of a particular company in selecting viable location depends on its position in the behavioural matrix. Companies with higher level of information at their disposal and with well-developed ability to use information are likely to make more useful selections.

From the foregoing discussion, a number of factors would determine the location of a firm. Some of the factors revealed include the need to locate near market, near source of raw materials, source of labour, transport facilities as well as government policy. A synthesis of steps considered when locating an economic activity is illustrated in Figure 2.1.

Figure 2.1: The Search and Selection of a Location of an Economic Activity in Space.



Source: After North, D: 1973; 237

2.1 Location of Retail Activities

Motor vehicle fuel service stations are retail outlets where fuel is resold to the public for gain, consequently they are expected to follow the locational patterns of retail centres. Retail land use is normally dominated by a four level hierarchy of shopping centres (Kingoriah, 1980). The first is neighbourhood shopping centre, the second is suburban

shopping centre, and the third and the fourth are regional shopping centre and Central Business District respectively

Neighbourhood shopping centres are usually located together with three to five shops serving a population of about 7000 to 10,000 thousand. These centres sell goods and services, and contain outlets such as a grocery store, butchery, a bar, shoe and tailoring sheds and a motor vehicle fuel service station

Among the land-use competing for corner plots are the service stations. For a service station to survive competition it will depend on how many cars it services per a given time duration (Ochang, 1990). Hence, a service station will therefore locate in a place where it can capture the greatest number of cars passing by the retail node. They will occupy the most accessible corner in the retail node after overbidding all the potential contenders for this accessible place. This prime location in most cases will be at the junction between the main trunk road passing by the retail area, and a major feeder road in the area. This means that most cars passing via the neighbourhood retail node or branching into it can be serviced in the service station.

A centre like this could have more than one service station if the level of fuel demand is high enough. In case this happens, these stations tend to occupy places farther removed from each other, so that each can command its own individual traffic. Competition may result and the most efficient one may be forced to close.

The suburb shopping centre is in the second order in the hierarchy serving a population about 20,000 residents. It includes all the services found in the first order retail. The activities found there include cinemas, supermarkets, chemists and service stations, and the activity that can afford the highest rent will compete for prime location (Kingoriah, 1980). Service stations may occupy these prime corner plots, or such other high turnover retail outlets like supermarkets and fast food joints.

Regional shopping centre is the highest in the retail centre hierarchy of urban centres, and ranks below the highest node overall-the central business district. Such a centre would

occupy several hectares of land, just like a small township. It would be occupied by major supermarkets, clothing shops and bookshops. The centre would be patronized by people who would ordinarily want to go to the CBD but are hindered by high transportation costs or time.

The CBD is the highest in the hierarchy of urban retail outlets. This centre offers goods available in all lower nodes. Top order commercial and business activities are situated here. The local and central governments offices for the urban and surrounding countryside are also usually situated in the CBD. Land values are highest in this area because of the acute competition for land caused by its high accessibility from the entire city and its complementary area.

2.2.1. Zone of location

Within the urban area there exist zones of land use, which shows relatively homogenous land use patterns. Location of fuel service stations will occur within these particular zones, and the characteristics of these zones will have a profound effect on anticipated volume sales.

Central business district is a zone described as commercial and administrative centre of the urban area. It is characterized by offices, wholesale shops and supermarkets, commercial and financial institutions, theatres, restaurants, hotels, and sports grounds. This characteristic portrays a picture of being centre of active urban life, providing a suitable attraction for a fuel service station to serve the urban residents.

However, the question remains if the returns for a fuel service station will be able to meet the rent cost of the plot and if it will be compatible with other land uses. Due to high demand of space in the central business district the investors usually erect multi-storey buildings such that they will be able to pay rent. The fuel service station is constrained by the policy that it should not be located in a storey building hence it has to occupy the space alone.

Residential areas are the zones of the city which are dominated by houses and scattered shops. They may be classified as a high, middle and low-income residences. Here classification is important in view of fuel service stations in this land use zone. Income levels indicate car ownership or define areas relying on commuter service vehicles. Number of cars anticipated is the very essence of selecting a particular site.

Industrial zone is an area dominated by manufacturing activities, warehousing and marshalling yards. Type of traffic in each zone has a relation with the ongoing activities.

2.2.2 Road Systems

Motor vehicle fuel service stations are businesses oriented towards road systems, as the fuelling vehicles will have to come from a road. The volume of traffic captured by a given service station will greatly rely on the class of road it is located. However this is not always true. The following is a review of the road network system.

In a large urban area like Nairobi, the four-tier system exists and the service stations are located on each of them. Primary distributors are roads, which distribute traffic from the primary network to a local district. Volume of traffic is less than that on primary road but composition is basically the same. Local distributors are roads that carry local traffic into zone areas from the district distributors, they enable such traffic to move about within the area and to gain access to buildings and subsidiary road (Thomson, 1977). Access roads are roads which give direct access to buildings within an estate. In many cases there are no fuel service stations located on these roads.

Having classified roads in urban areas, the type of road is important in determining the capacity of traffic it holds. Sedgwick (1969) observes that double or multiple lane roads hold more traffic with less congestion as opposed to single lane roads. While dual carriage roads with central reservations (median) exclude traffic travelling in the opposite direction from accessibility to development areas in the opposite direction. From the above, it is notable that class and types of road is particularly important on how a given fuel service station will perform.

2.2.3 Influence of Competition

The location of particular industry or firm will influence the decision of other firms for cause to avoid competition. This concept disagrees with Isaard's (1974) concept of agglomeration where industries and firms cluster together in a particular location to benefit in way of saved transport costs by locating in the vicinity of the industries it has linkages with. However, the linkages occur where one firm utilizes the final product of the other firms as input but this is not the case for a service station.

2.3 Choice of a Site

Having settled upon a suitable locality for a business, it becomes necessary to select a particular piece of land where development is proposed. The site selection will be determined from the point of view of health, accessibility, cost of acquisition and economy of development.

2.3.1 Area Required

Before, however, considering the relative merits of the individual sites, first there is need to determine the area of land required. This will depend on the size of business and the future expectations. In one way, a large trunk of land than the one required will mean that some land will be left idle and hence the site will be costly. However, for future expansion a large site is ideal. On the other hand a small parcel of land will depend on the type and size of business that one will need to develop.

2.3.2 Conditions Requisite For Health

Everyone will agree that a site should be health both to the developer and the neighbouring environments. Whatever advantages a site may pose in other directions it should not be allowed to comprise this condition (Thompson, 1923).

The circumstances, which make for healthiness in a building site are largely relative in character, and it must not be assumed that qualifications, which would be regarded as essential in one case, are necessary in all cases.

In development, special attention should be given to certain conditions affecting the healthiness of a site, the complete fulfilment of which is not always practicable. However it is desirable to emphasize the necessity for insisting that a site should satisfy at least one requirements, namely, that they should not be risk of dampness either from the seasonal variation in the level of subsoil water, or from inundation by rivers or streams in time of flood (Thompson, 1923).

2.3.3 Topographical Considerations

This factor is not strictly a matter of health, but it is closely allied thereto. It is a question of amenity. The general amenity of the location (neighbourhood) is referred to as one of the factors influencing choice, but it will often happen that with a location the available sites vary considerably in natural advantages. Sites which possess well-grown trees and hedges, or ponds and streams will be preferred depending on the type of business. The trees and flowers if already there will increase the attractiveness of the business. For a site of a service station a flat terrain is preferred while a land falling sleepy is considered unsuitable for a service station development.

Although not a very important factor, fertility of the soils is a matter which ought not to be overlooked, particular where considerable importance is attached to the provision of gardens, while at the time nature of the immediate surroundings should receive careful attention in order to avoid proximity to buildings or works of detrimental character.

2.3.4 Accessibility

Accessibility to a location of a business (firm) in a town is a requisite of the zone in which a development is proposed to fall. But accessibility to shops, chemists, service stations and places of entertainment is very important. However, their accessibility will depend on organization of the existing facilities. It is desirable that the actual approach to the site should be of reasonable width and directness. The business site should not be abstracted by other facilities, as they will inhibit sales maximization.

2.3.5 Infrastructure Supply

The position of a site in regard to the existing sewers, sewage disposal works, water, and electricity is an important consideration. Unless these services are reasonably accessible, the enormous cost of extending them even for a short distance may discourage the development of such site. The question of water and electricity has to be addressed for industries. In the case of service stations they require electricity for operation and water and of course the sewer line to dispose the used oils.

2.3.6 Economy of Development

Among sites that are suitably placed in other respects, those that would naturally be selected are those that can be developed more economically. Many factors help to determine the cost of development. Sites, which are, low lying and quite level usually entail extra expense in provision of deep sewers and possibly of a pumping plant. On the other hand, steep, hilly land, especially where there are many local physical irregularities of surface, involves additional expenditure in road making, in sewing and lying the foundation of a building. A site which is sufficiently indulated to admit convenient drainage and not too rugged for economy in road making may be considered to approach the ideal site.

The shape of the site is also another factor, which affects the cost of development. If the boundaries are very irregular, it is usually impossible to lay out the land to the best advantage. It is therefore advisable to secure a reasonably compact area.

Consideration also should be given to the question of subsoil, as part from its effect upon healthiness of the site; it influences the cost of development. With reasonably firm subsoil such as gravel, the minimum of expense is incurred in the foundation of buildings and in the construction of roads and sewers. Clay subsoil on the other hand, increases the cost of development in many directions. The foundations of buildings vesting on it are liable to give way owing to the shrinkage of the clay in dry weather and its expansion in wet weather, and its necessary in some cases to carry the foundation to a considerable depth in order to secure the necessary stability.

2.3.7 Partially Developed Sites

A further consideration in a given zone where land has already been partially developed is of prime importance. Where facilities such as road, sewers and electricity exist and do not preclude the economic development of the remainder of the site, much time and expense can be saved by incorporating them with a proposed development.

2.3.8 Cost of Land

The cost of land and the ease of acquisition are both important factors in the choice of a site. While it is desirable to secure land as cheaply as possible, it is more economical to pay a higher price for really suitable land than buy cheap land, which fails to satisfy the foregoing requirements to any market extent (Thompson, 1923). In practice after identifying all the possible sites, none of these possess all the ideal attributes, and that the selection must finally be made on comparison to their relative advantages and disadvantages.

2.4 The Siting of Motor Vehicle Fuel Service Stations

Potential sales in a fuel service station vary and depend on positions where a service station is located. If a station is to achieve maximum potential it must be easy for motorists to see it and enter it. The farther away a station can be seen the better and access points must be related to the forecourt: if access is indirect, for example by way of a service road, a good deal of trade will be lost because the motorist has to find his own way in.

The forecourt should be large enough to hold vehicles waiting to be served. This will prevent waiting vehicles from obstructing the passing vehicles on the road. As noted earlier in an urban centre the best position for a station is on the main road on the edge of a town, and on the correct side of the road to serve traffic leaving the town. In Kenya, this means service stations have to be sited on the left hand side as you move from the town, at a such point maximum trade can be anticipated.

In planning for a service station, two main factors have to be taken into account: the volume of traffic using the road and the position on it. If the volume is large and the station is sited on a part of the road where traffic is travelling fairly slowly but without congestion, the station will be a good one (Sedgwick, 1969).

A site on a main road is better beyond a roundabout or major intersection than before it. Paired and staggered stations should be avoided due to the side of the danger of vehicles crossing to the off side of the road, but are only justified if the trade available is sufficient for both. In major towns, bypasses are common phenomena. In the case of by-passes the best positions are probably beyond the ends of the by-passes such that the local traffic is caught as well as the long distant elevation.

2.5 Design Standards of a Motor Vehicle Fuel Service Station

2.5.1 Forecourt

The larger the site available for a construction, the better it is as the design can be manipulated to suit the needs of an individual station. In the minutes of Nairobi city council dated 19th May 2000 it was declared that a service station could be classified according to the service provided which would determine the plot size.

- (a) A service station with only pumps should have a minimum of 0.08 hectares plot size
- (b) A service station with pumps and service bay should have a minimum of 0.15 hectares plot size.
- (c) A service station with convenient stores /shops should have a minimum of 0.2 hectares plot size.

However to have ample parking for customers, a service station with convenient stores/shops should have a car parking space for every 4m² floor space of the store/shop. A fuel service station should preferably have a frontage of about 45 m and a depth of about 30m (Ochang, 1990). However if the sales potential is very high a frontage of 60m is ideal.

2.5.2 Access

As noted earlier service stations should not be sited opposite each other along a two-way traffic corridor. This will avoid friction with other road users and reduce accidents because of the slowing vehicles.

The acceleration and deceleration lanes should have a minimum of 100m long each for a dual carriage way and a minimum of 30 meters long each of two –way roads. [Nairobi City Council minutes. (19th May 2000)]. There should be extended public access of not less than 15m to the nearest pump and 3m wide pavement for public access from service front for vehicles /pedestrian segregation.

2.6 Urban Planning and Planning for Service Stations

Motor vehicle fuel service station owners/dealers would like a service station at almost any point on almost any busy road, so a clear planning policy in regard to their location is always needed. The planning authorities should consider, first what effect would a service station have on traffic flow and road safety? Secondly, is the proposal in variance with development and in particular, is the neighbouring land uses compatible with a service station? Thirdly, what would be its effect on amenity? And finally are the location, layout and design of the station satisfactory?

Planning is thus more concerned with road safety and harm to amenity, than the need for service station, which is difficult to assess. Most motor vehicles usually cover considerable distance without need of fuel and it is only in exceptional cases where need to plan for a service station is needed. In practice, planning consent is difficult to obtain. Though service stations are necessary in towns' centres and near neighbourhood shopping centre, they should be fitted in to what is already there, and they should be accessible and reasonably conspicuous and should not create traffic hazard.

The best place for a new service station is on the main roads entering a town at the edge of built-up area, and in large towns near the junction of major roads particular radial and ring roads. To erect a service station consent is not normally given on fast open stretches

of road, nor on by-passes which are less than 19km long (Gresswell, 1971), nor for instance opposite breaks in central reservation in a dual carriage, or “too close” to a side road connection junction or roundabout. On the other hand service stations should not be on the opposite of each other on the same road but where traffic is slowing up, this might be allowed if other elements are met. Despite going by the planning standards the design and layout of service station is of particular importance to the appearance of the built up environment.

2.6.1 Traffic Flow and Road Safety

The primary function of a road is to carry traffic wishing to use it at maximum speed consistent with safety. The capacity of road varies with its width and the average speed of traffic using it. The speed of traffic depends largely on the road alignment and the amount of interference from cross traffic junctions, turning and maneuvering at junctions and accesses and traffic signals. Service stations should be visible to drivers from both directions for not less than 100 meters within 40mph speed and 65 meters where the legal speed is 30mph, this being the accepted minimum stopping distances for respective speeds (Sedgwick, 1969)

2.6.2 Provision of Amenities

If a site is pleasant it should be the object of planning authorities to cause it to remain so, and thereby ensure that only appropriate development(s) take place. If at all a service station development would be incongruous in a given site it should not be allowed to take place. It is a question of whether a given development is appropriate and harmonious. It should be noted that in zoning of urban land use no land is demarcated purposely for fuel service station use and as such service stations rely on change of use from other land uses especially residential and commercial. However, in some special cases a planner may demarcate a site for a service station.

Service stations are development in area of mixed development with other land uses hence they should be carefully designed and sited to accord with their surroundings (Ochang, 1990).

2.7 Conceptual Framework

As noted earlier from theories of location the landowners and investors tend to seek a location that maximizes their returns. Unlike land in rural areas, urban land is serviced land and as such the land users usually locate where they can access these services easily. As they try to maximize their utility, a conflict arises and often calls for an intervention by public agencies. However, Rowe in Cox (1978:48) says that:

Let the market mechanism work as long as possible, assist the market, or stimulate it through public intervention, if, and only if it fails.

In a market economy the compelling force of competition turns every entrepreneur's technical potential for improved productivity into an actuality. Firms are usually forced to seek out their best possible (profit maximizing) set of production relations. Under this, allocation of urban land uses in market economy arises tendencies, which undermine the social cost.

The interest of the investor is sales maximization or at least a satisfactory level of profit for his firm (Cooper, 1975). The investor would care least about the public safety, environmental threat and neighbourhood communities. When selecting a site his emphasis is based on plant economics, market of the product, accessibility of raw materials, labour, industrial linkages, personal values and goals, which are close to him in maximization of profit or produce with the least cost.

In this case were motor vehicle fuel service stations investors left to make their investment decision freely, this would lead to conflict in land use as the service station will often not be compatible with many adjoining land uses. With this incompatibility the service stations that are closely associated with transportation will lead to interference with traffic flow. Incompatible land use also increases potential for fire and community health hazard. Due to uncontrolled provision of service stations more entrants are expected to open new firms in order to provide services without adhering to the set standards, which might lead to decline in profit for the existing service stations.

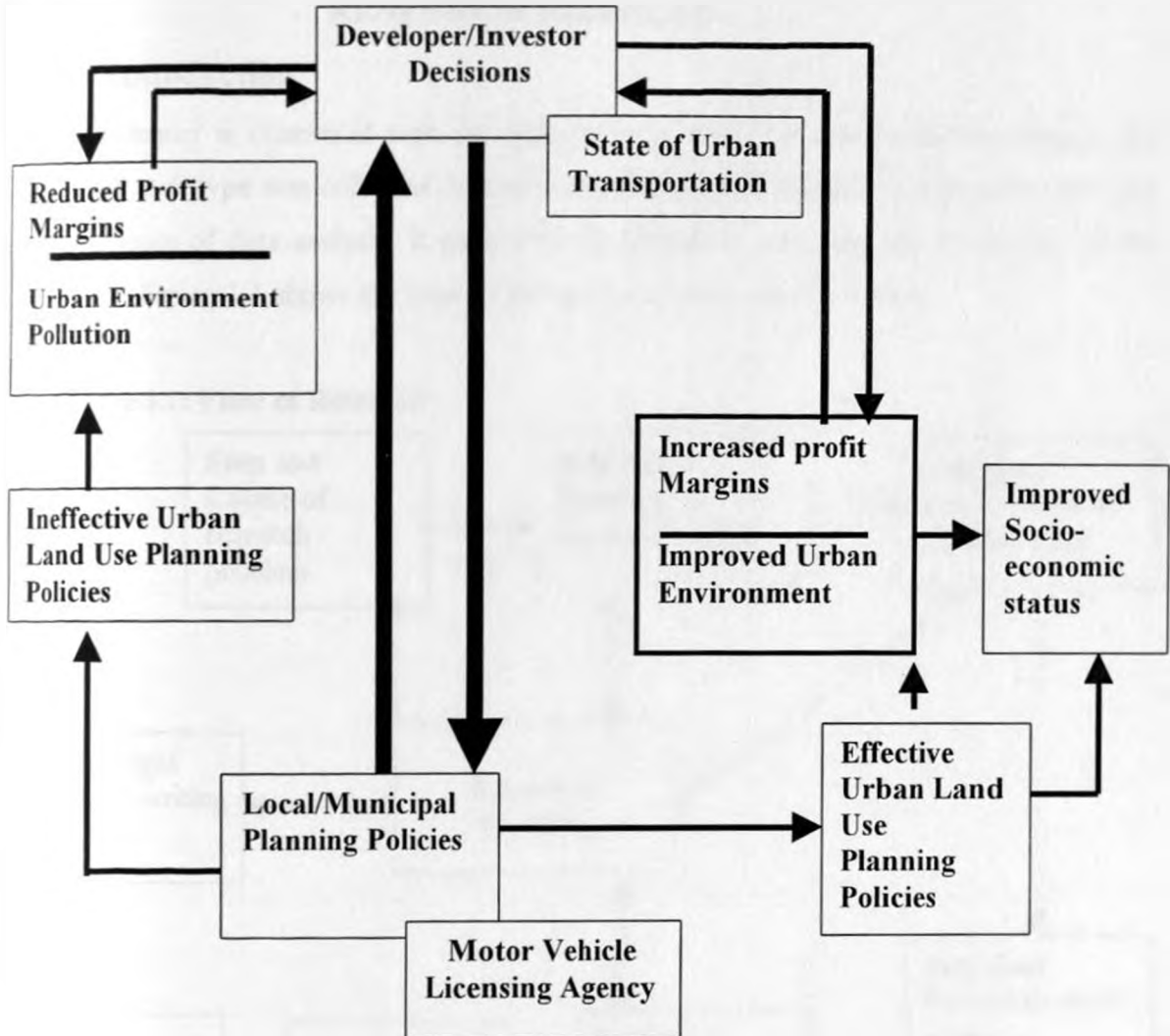
However the state should not allow this to happen but intervene through various planning tools. Usually planning decisions are strong but vertically, centralized and central vested interests are very strong. There are a few mechanisms for shaping, correcting or influencing those decisions outside the central authorities (Hamilton, 1974). The planners on their part reject or accept the plans for development without consulting the developer. When a development plan is rejected without explanation the developer is demoralized in his venture even if it may be accepted after an appeal. The state usually overlooks the viability of economic activities and appears to be rigid without considering the dynamic economic system existing in the city. As regards broad planning strategies, the local authorities appear convinced that containment is the best solution and the preventive side of policy are therefore stressed.

Greater weight has been given to land use control but little is made towards changing social and economic conditions. As the planner deals with land alone, he considers land use in idealized terms and largely disregard factors such as ownership and tenure. Inevitably there is potential for conflict where a private definition of the optimum solution is opposed to the planner's notion of public interest.

In the local authorities such as Nairobi City Council there is a problem as the decision-makers are non-professional elected representatives, who may or may not accept a planner's decision on the merits of a particular planning application, especially if they can see how a development would benefit some interest with which they are in sympathy. In such circumstances, financial pressures or political considerations may affect land use decisions leading to conflict.

Planned and coordinated development will result to minimum land use conflict. When there is minimum land use conflict the urban form will be improved and the economic vitality of the city will be regained. This study traces the causes of land use conflict, the nature of conflicts and possible solutions to the conflicts using the case of service stations. Figure 2.2 shows the conceptual model diagrammatically.

Figure 2.2: Conceptual Model



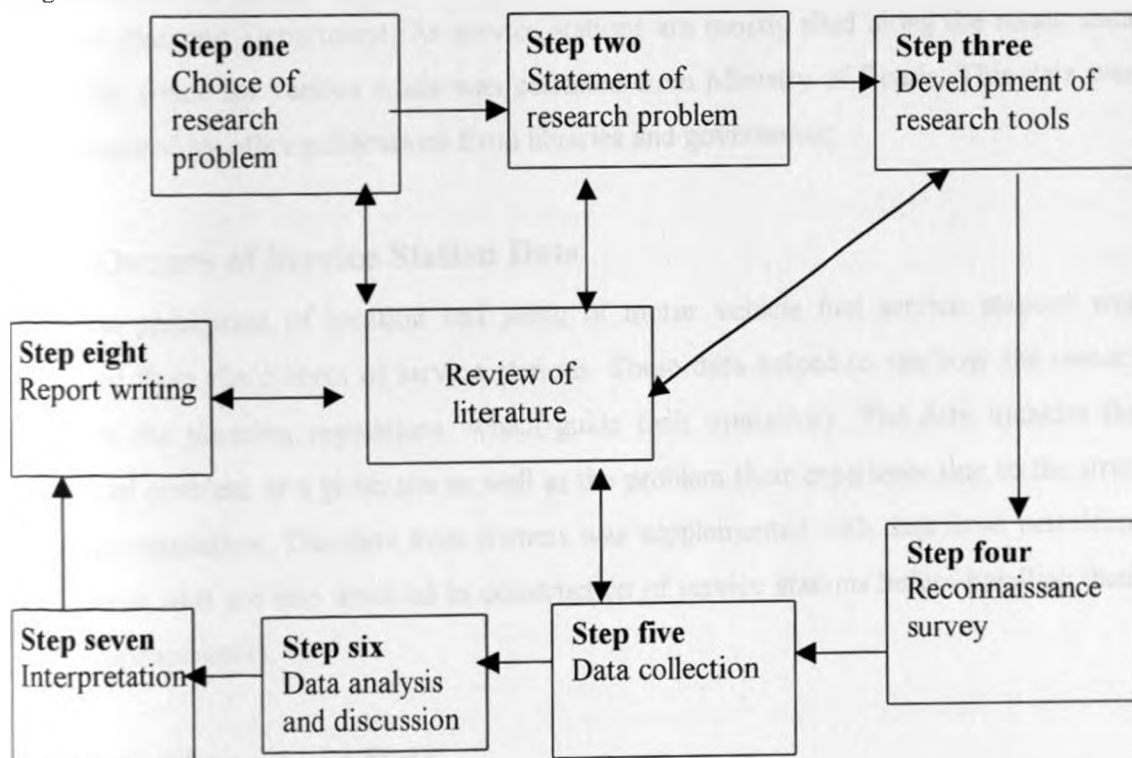
CHAPTER THREE

RESEARCH METHODS

3.0 Introduction

This chapter is concerned with the types of data used in the study and the purpose for which each type was collected. It also contains the methods used to collect the data and techniques of data analysis. It ends with the limitations encountered in carrying out the study. Figure 3.1 shows the steps of the methods, which were followed.

Figure 3.1: Flow of Research



3.1 Data Types and Sources

Various data types were required for the study. Some of these were already available from various sources and were accessed as secondary data. Other data types were not readily available and had to be got from the field as primary data. The various data types and their sources are given below.

3.1.1 Planning Regulations Data

Data on planning regulations on location and siting of motor vehicle fuel service station was sourced from NCC Architecture and Planning Department and Ministry of Lands, Physical Planning Department. As service stations are mostly sited along the roads, data on traffic count for various roads was collected from Ministry of Roads. This data was supplemented by other publications from libraries and government.

3.1.2 Owners of Service Station Data

Data on perception of location and siting of motor vehicle fuel service stations was collected from the owners of service stations. These data helped to see how the owners perceive the planning regulations, which guide their operations. The data includes the locational problem of a given site as well as the problem their experience due to the strict planning regulation. This data from owners was supplemented with data from petroleum companies who are also involved in construction of service stations before handing them to dealers/operators.

3.1.3 Neighbourhood Data

As a part of the study it was necessary to gather information on how the neighbours are affected by the investment. It is also from these data that, the study was able to enquire about the environmental effects the service station have to its neighbourhood. This data was collected by interviewing the occupants of the immediate neighbourhood of the service station.

3.1.4 Motorists Data

The motorists are the clients of service stations. It is from motorists that the study was able to gather information on the factors that motorists take into consideration to arrive at the decision on where to fuel. Data on the extra facilities such as cafes and car wash that they would like to be incorporated in a service station was also gathered.

3.2 Data Collection

3.2.1 Reconnaissance Field Survey

As a preliminary exercise, it was necessary for the researcher to have an overview survey of Nairobi City. This was necessary in order for the researcher to get insight of the field situation in relation to the research problem.

The reconnaissance survey included pre-interview survey with Nairobi City Council – Planning and Architecture Department officials to get the spatial distribution of the service station. It was at a later stage that the researcher embarked on field survey on different parts of the city. It was during the overview that it was possible to map the service stations in the development corridors (Map 1). It was also during this survey that the researcher was able to verify on the ground the information provided by the Nairobi City Council officials initially.

3.2.2 Field Sample

The sample was chosen from a true representation of the entire population. During the time of the study Nairobi has approximately 206 service stations, 164 belonging to multinational petroleum companies and 42 to local (small-scale) investors. According to Ministry of Energy the service stations are distributed in regions of the city as shown in Table 3.1. Six development corridors were selected and a sample of service stations identified as the unit of data collection and detailed studies (Table 3.2).

Table 3.1: Spatial Distribution of Motor Vehicle Service Stations in Nairobi

REGION	NO. OF SERVICE STATIONS REGISTERED WITH MINISTRY OF ENERGY	PERCENTAGE (%)
City Centre	20	9.7
Ngong Road	22	10.7
Jogoo Road/Eastlands	25	12.1
Muranga Road/Thika Road	20	9.7
Nairobi West/Bagathii/Magadi Road	19	9.2
Park Road/Ngara/Eastleigh/Juja Road	29	14.1
Industrial Area/Mombasa Road	22	10.7
Westlands/Waiyaki Way/Uthiru	19	9.2
Parkland/Limuru Road	16	7.8
Hurligam/Lavington	14	6.8
TOTAL	206	100

Source: Ministry of Energy, Petroleum Monitoring Unit

Table 3.2: Number of Sampled Service Stations in the Development Corridor

DEVELOPMENT CORRIDOR	POPULATION OF THE SERVICE STATIONS	NUMBER OF SAMPLED SERVICE STATION	PERCENTAGE (%)
Jogoo Road	10	5	50
Juja Road	9	4	40
Thika Road	15	8	50
Mombasa Road	7	4	60
Waiyaki way	14	7	50
Ngong Road	13	7	50
Central Business District (CBD)	20	3	10
TOTAL	88	38	43.2

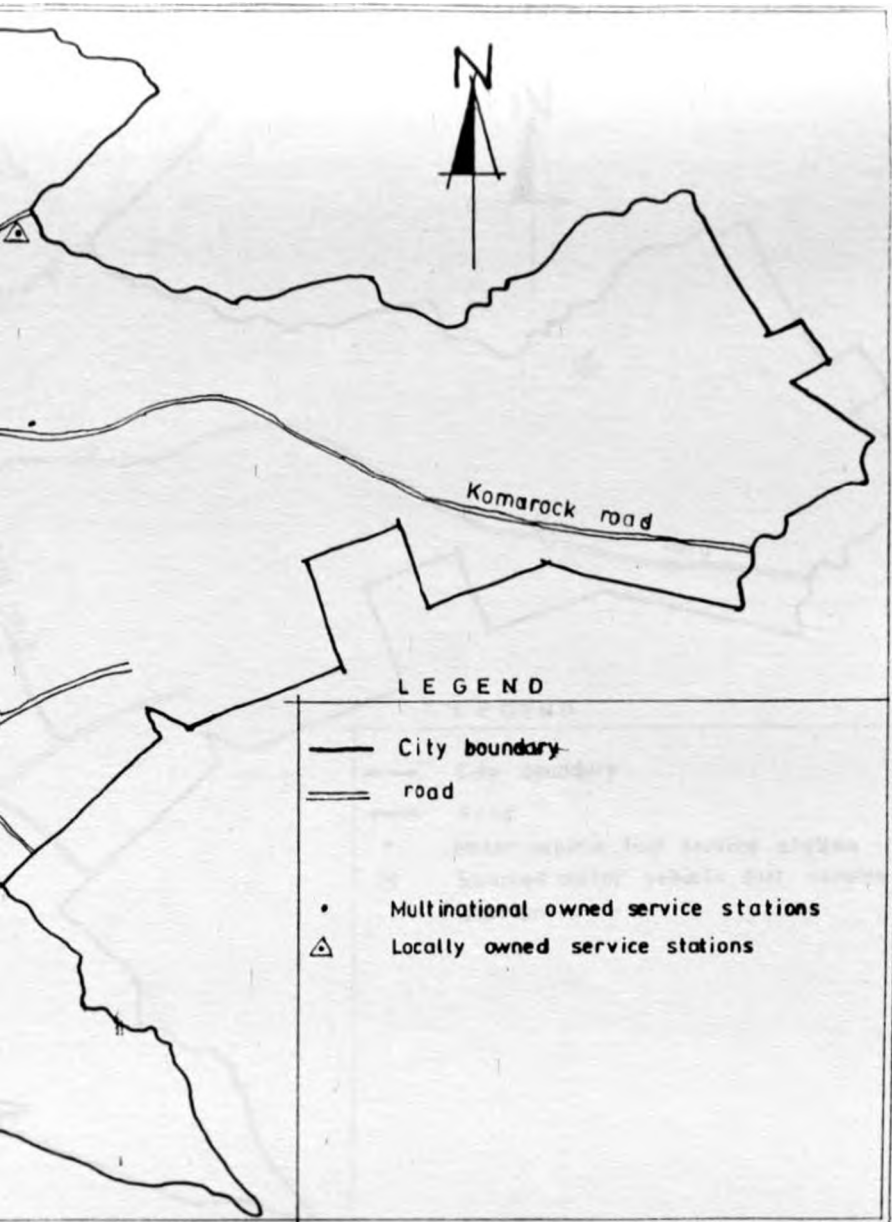
To supplement the information gathered from service stations owners/dealers, questionnaires were also administered to neighbours and motorists. Hence the administration of questionnaires was three phase, 38 service station owners/dealers, 97 motorists and 69 occupants of land uses neighbouring service stations were interviewed.

After the reconnaissance survey all the service stations in the selected development corridor were mapped (Map 1). In every corridor, the second service station from the Central Business District was selected and then every other second service station was selected to arrive at the total sample in each development corridor as shown in Map 2. Since most of service stations are arranged in linear form, sampling was not difficult.

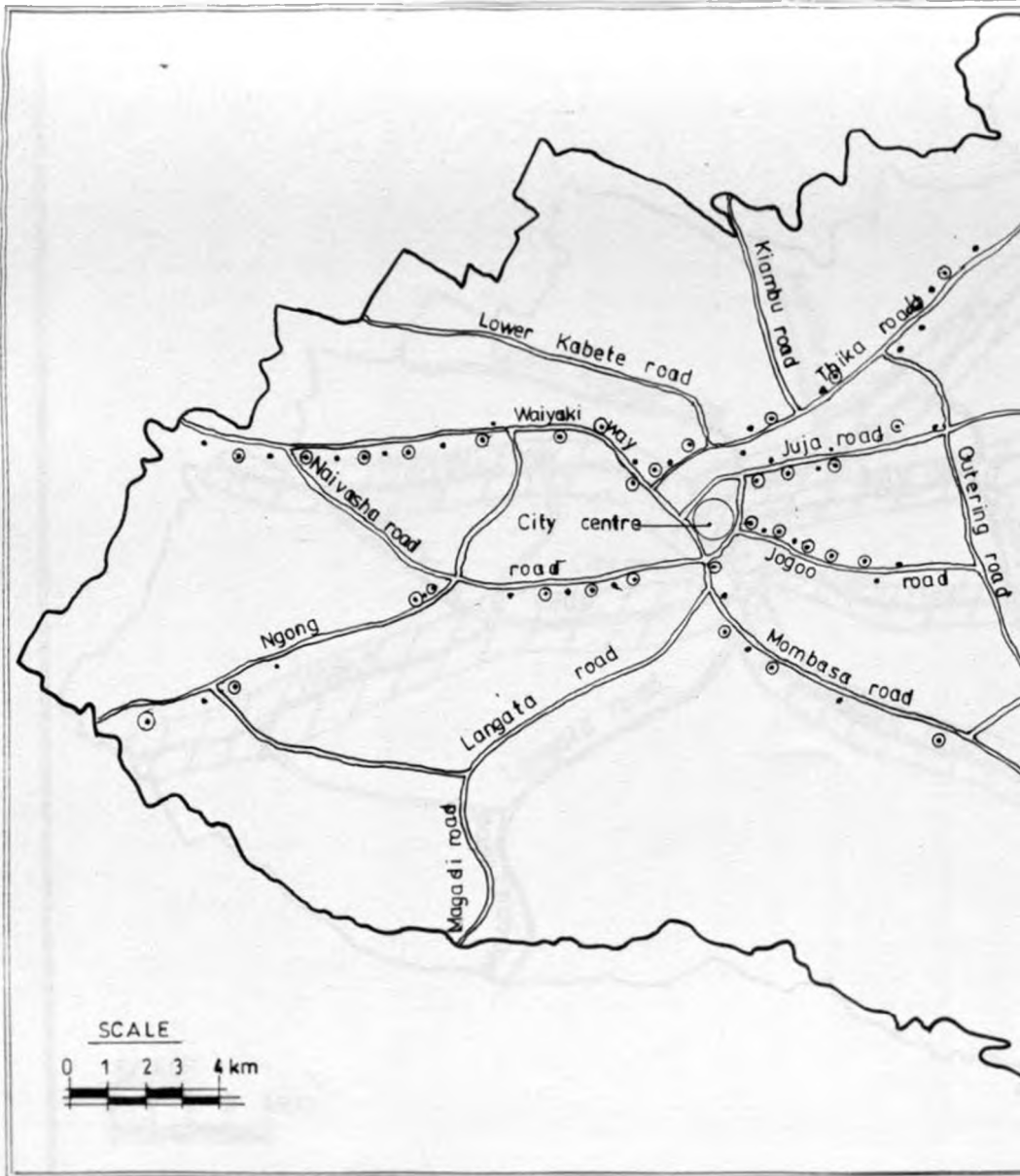
Where the service station owner/dealer was not available for interview, any reliable person in the business was interviewed. However, in case they (owners/dealers) were not willing to be interviewed, the next service station was taken to replace it and the same process continued. On part of motorists, the first 3 motorists were interviewed; one in each category of private cars, passenger vehicles to include matatus, buses, minibuses taxis and passenger hirer vehicles and the last category was transporters which included lorries, trucks and pick-ups. When a potential motorist in the series did not respond the next motorist was approached. Only the neighbours who were the immediate to the service stations were interviewed, as the researcher perceived that they could be the ones mostly affected both directly and indirectly by the service stations.

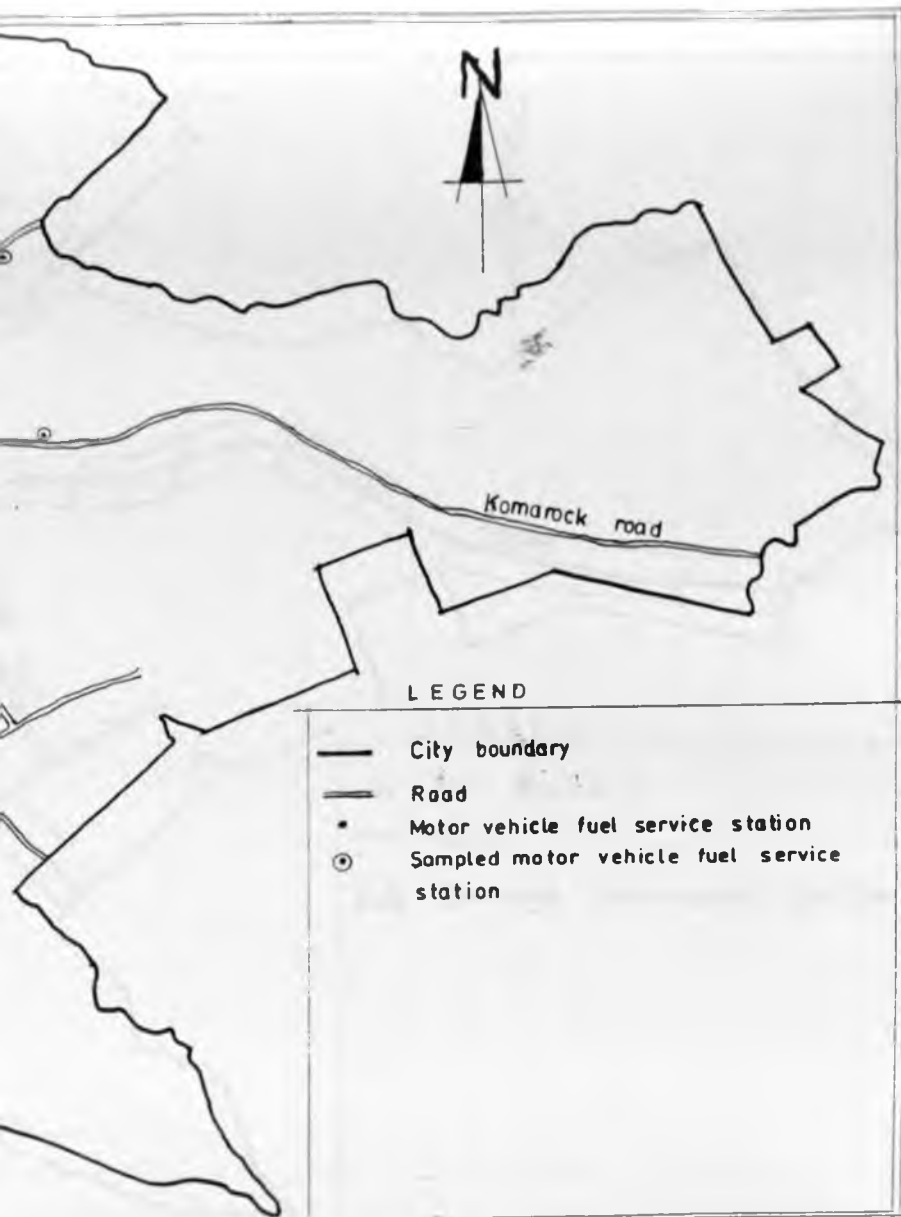
3.2.3 Sampling of Development Corridors

A base map of Nairobi City was used to zone the city into development corridors as shown in Map 3. The six development corridors selected were differentiated by identical factors of density and types of developments.

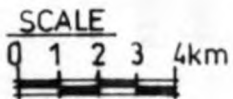
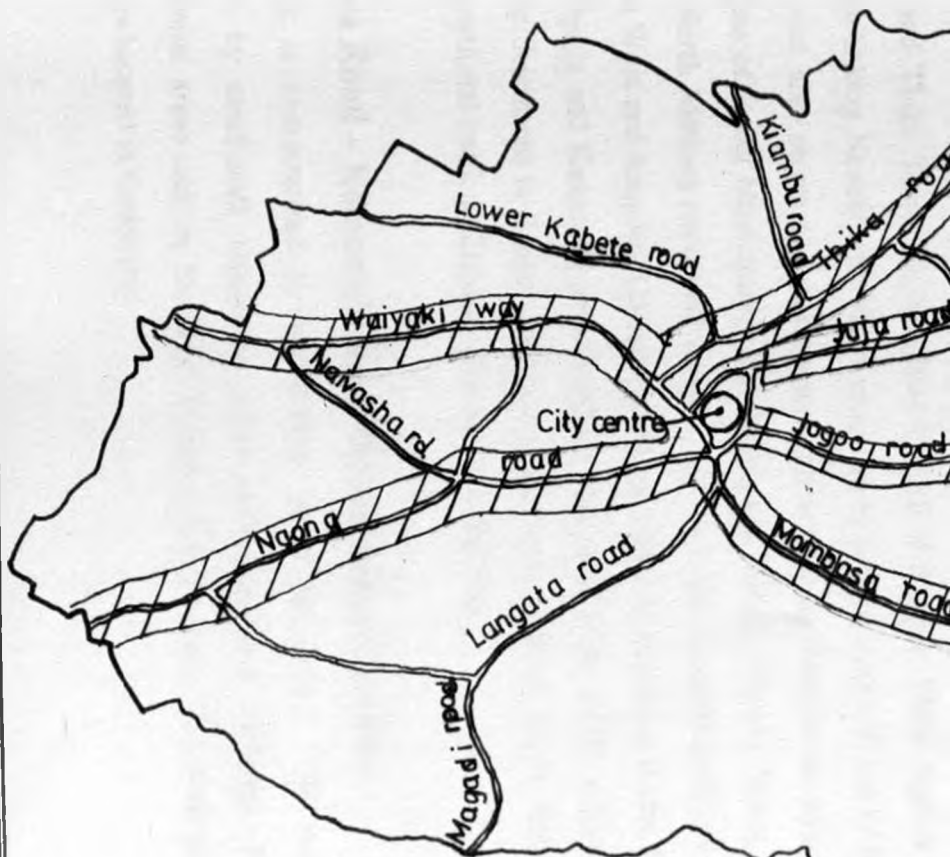


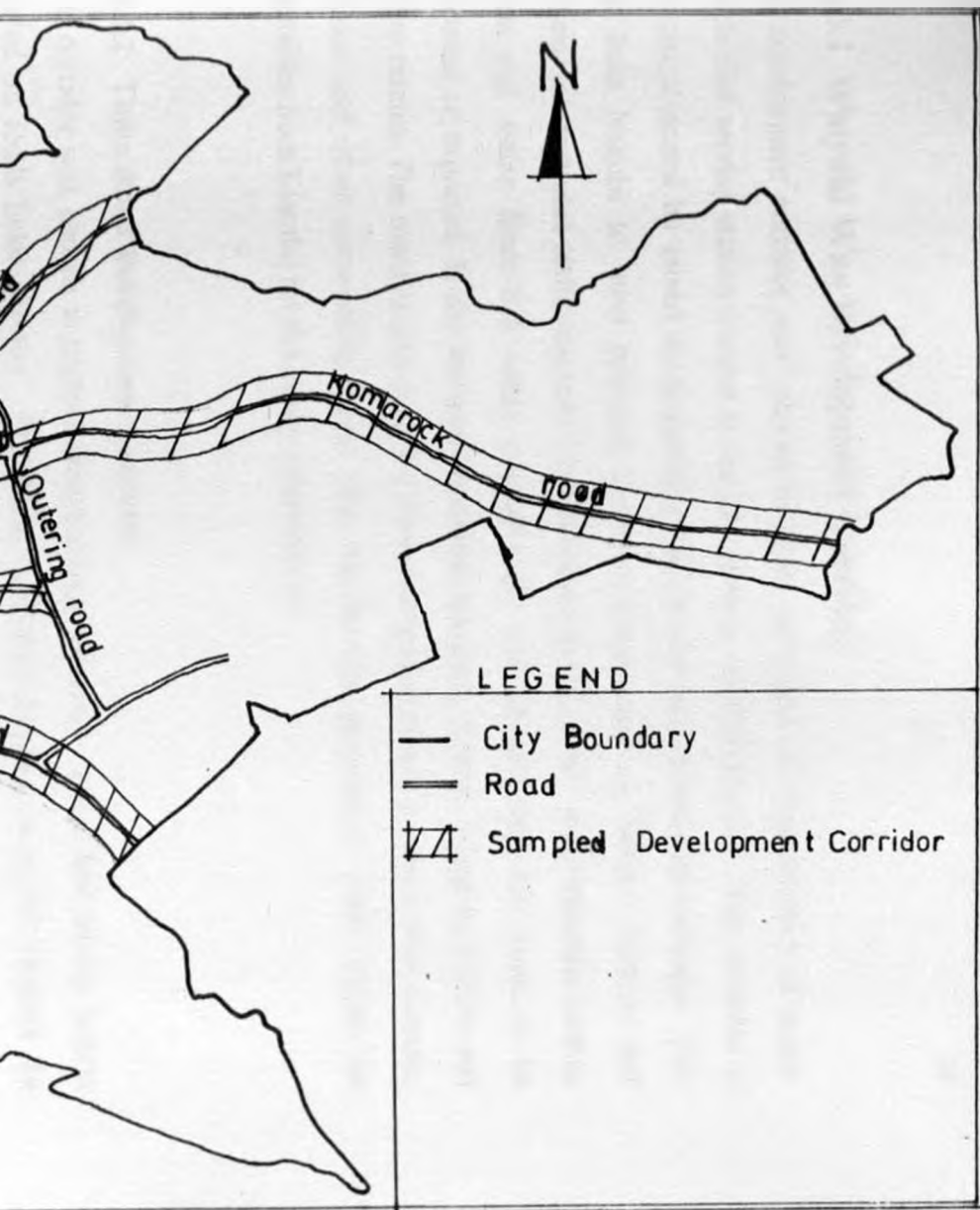
Map 2: Sampled Motor Vehicle Fuel Service Stations.





Map 3: Sampled Development Corridor.





3.2.3.1 Waiyaki Way Development Corridor

This development corridor was chosen to give an insight of characteristics of motor vehicle fuel service station located in the low-density residential areas. This corridor is also characterized by mixed development of residential and commercial buildings. This road links Nairobi to other principal towns in Kenya such as Nakuru, Eldoret and Kisumu. International traffic towards Tanzania also use this route. Raw materials such as wheat and maize from Rift valley province are transported using this route to be processed or exported. It also services Westlands Shopping Centre, Kangemi, Kabete and Uthiru estates. The route is also used for transporting agricultural products from Limuru, Kiambu and other surrounding areas. The Nairobi City population relies mainly on vegetables from Kiambu for their daily consumption.

3.2.3.2 Thika Road Development Corridor

This corridor was chosen to capture characteristics of motor vehicle fuel service station located on roads linking towns. The Thika road main function is to link Nairobi the Capital City and Thika Town the industrial Capital of Kenya. Thika road is a heavy traffic highway linking Nairobi with Thika municipality located about 40 km to the North East. Thika road also serves major population areas such as Zimmerman and southern residential areas of Ruiru Municipality namely Kahawa Sukari, Mwana Mukia, Githurai and most of North Mathare residential estates. The road also channels traffic to outer road, Kahawa West and Kenyatta University. All the traffic to Muranga, Embu, Maragua, Mbeere, Kirinyaga and Kangundo pass through Thika road. Other traffic which uses this road are those destined to Eastern province towns such as Meru, Isiolo, Marsabit and Garrisa. International traffic to Ethiopia also uses this highway.

3.2.3.3 Juja Road – Komarock Road Development Corridor

This corridor is characterized by high-density residential areas. This corridor is characterized by small-scale businesses mixed with residential buildings. This road serves residential areas such as Eastliegh, Huruma and Dandora. This road also serves light industries located in Kariobangi.

3.2.3.4 Landies Road – Jogoo Road Development Corridor

This corridor was chosen to capture location characteristics of motor vehicle service stations located in medium density residential areas. This corridor has the oldest African settlement as stipulated in 1948 Master Plan. The road serves middle-income estates such as Umoja, Komarock, Embakasi and Buruburu. On the other hand it also serves Kaloleni, Jericho, Jerusalem, Shauri and Makongeni which were constructed by NCC to house Africans working in the industrial area which is a walking distance. The road also serves Kayole, Njiru, Ruai and Saika, which are among the estates, which have come up as the City grows to a metropolitan City. Traffic towards Kangundo also uses this route. This road also serves as an alternative route from Jomo Kenyatta International Airport.

3.2.3.5 Mombasa Road Development Corridor

Mombasa Road development corridor was chosen to capture characteristics of service stations located on international road. This corridor is characterized by expansive developments especially industries and warehouses. This road serves the industrial area and residential area such as Imara Daima and Pipeline Estates. It is used mainly by traffic designated for Mombasa. The road also links Nairobi to Tanzania via Namanga town at the boarder. Machakos, Athi River and Kitui are other towns served by this road. This road also links the City with Jomo Kenyatta International Airport.

3.2.3.6 Ngong Road Development Corridor

This road is a dual carriage, which links the City centre and the residential areas. The residential areas are both medium and low density. As the city experiences expansion this corridor is being converted to commercial use as it is accessible from the city centre without a lot of difficulties. Ngong road serves Kibera and Kawangware which are low-income residential. It also serves Dagoretti and Kikuyu towns. Among other uses, it also serves Kenyatta National hospital.

3.2.3.7 Centre Business District (CBD)

The CBD zone was chosen to give insight on location factors of stations in the CBD, which is mostly commercial oriented. This zone is chosen to act as a control for other areas. The CBD is mostly commercial and currently is experiencing redevelopment as the land rates are high and to cope with the situation the investors have opted for storey buildings. Offices and business such as supermarkets, cafes, hotels and textiles shops dominate the CBD.

The choice of these development corridors was based on the rationale that they have the most number of motor vehicle fuel service stations. Further more the researcher was restrained by time and financial resources, hence the researcher cannot be able to study all the stations in Nairobi, but a sample was drawn from the corridors.

3.3 Methods of Data Collection

3.3.1 Primary Data

Collection of primary data involved administering questionnaires and scheduled interviews. Most of the data obtained here helped to answer objective (i) and (ii).

3.3.1.1 Questionnaire Method

Questions were designed so as to gather an in-depth understanding of location requirements of motor vehicle fuel service stations. The questionnaires were used to gather information on location expectations of service station owners, motorists and neighboring land users. The first type of questionnaire was addressed to the owners of motor vehicle fuel service stations in the sampled corridors. This questionnaire is designed in such a way that the researcher was able to fulfill objective (i) and (ii).

Questions relating to location factors considered in locating service stations were collected. Information on types of neighbouring land uses was also collected to perceive how they are compatible with service stations. Taking into account the aim of business is to make profit, questions about site in relation to profit were asked to the owners in relation to their preference of one location in relation to another.

Location and siting of motor vehicle fuel service station affect motorists. The second type of questionnaire was designed for the motorists fuelling at the motor vehicle fuel service stations. This was to help in finding out their opinion in connection to the location and siting of motor vehicle fuel service stations. These questions were designed to find out whether motorists considered accessibility of the service stations important in their choice of where to fuel. The third type of questionnaire was addressed to the occupants of neighbouring land users. This was to identify compatibility of the motor vehicle fuel service stations with the neighbouring land uses. Information on effects of the service stations regarding the whole neighbourhood was collected. This information included environmental health hazard, fire risks, and interference with traffic flow and road accidents. A detailed view of the questionnaires is attached to the Appendix.

3.3.1.2 Interview Schedule

In order to establish the opinion regarding the location and siting of motor vehicle fuel service stations of government ministries and local authorities a number of interviews were carried out with various officers. These officers were from Ministry of Land and Settlement-Physical Planning Department, Ministry of Energy, Ministry of Trade and Nairobi City Council –Planning and Architecture Department.

The head oil companies of the sampled service stations were also interviewed to give information to supplement the information that was already provided by the investor/dealer. Opinions from these officers were taken to give an insight of the location desire for motor vehicle fuel service stations in space.

3.3.1.3 Other Primary Data Collection Methods

Observation Method

Not all information could be collected through the above approaches hence observation approach was used to collect observable information. Some of the information included facilities offered, area occupied by the station and neighbouring land uses, among others.

Photography was used to complement other methods of data collection. In the course of field survey, photographs were taken to illustrate various scenarios in the field. Information on environment pollution, accessibility and compatibility of neighbouring land uses are some, which will be illustrated.

3.3. 2 Secondary Data

Most of secondary data was obtained from the Ministry of Lands and Settlement-Physical Planning Department, Ministry of Energy, Ministry of Trade, Nairobi City Council-Architecture and Planning Department, Petroleum Institute of East Africa (PIEA) and Oil Company headquarters. For instance, most of the information about the procedure of locating of motor vehicle fuel service stations was got from the Nairobi City Council-City Planning and Architecture Department. This information was supplemented by information from the Physical Planning Department and Ministry of Energy. Data on traffic count on various development corridors sampled was sourced from the Ministry of Roads and Public Works.

However it should be noted that there is very little work done in Kenya about motor vehicle fuel service stations and as such this is a pioneer study. Nonetheless, the researcher utilized other literature on location analysis on different economic activities such as the informal sector and industries, which are quite unrelated to service stations.

3.4 Techniques of Data Analysis and Presentation

Mugenda (1999) observes that data obtained from the field is in raw form and is difficult to interpret. Hence the data should be analyzed so as to build up a sort of intellectual model where relationship involved between various variables are carefully brought out so that meaningful inferences can be drawn where facts and figures are to be seen in perceptive of objectivity.

In order to harmonize data collected from the field, coding of close-ended questionnaires was necessary. After coding, all the questionnaires were then put into Statistical Package for Social Scientists (SPSS). Qualitative data, which could not be coded, was summarized and presented in descriptive form in tables, pie-charts and plates. It is from SPSS package that frequencies and percentages were gotten from. Mean, smallest and highest values of various variables were also drawn from the package.

3.4.1 Specific Analysis on Compatibility

Some businesses are compatible while others are not. The measure on compatibility lies in the answer to the questions. "Does business A next door help business B? Does it harm business B? Or does it apparently have no effect on business B?" In the analysis, to measure how compatible the service stations under study are, service stations, which neighbour land uses, which are inflammable, are considered to be deleterious. While those neighbouring businesses, which are motor related are considered highly compatible.

3.5 Limitations of the Study

In order to evaluate fully the factors that influence location and siting for motor vehicle service stations a field survey was necessary. The field survey took one and a half months. However, there was a major constraint, as the researcher had to cover all the sampled service station, which were distributed all over Nairobi City. Apart from time constraint the research was also constrained by finance.

Due to the nature of the research, the researcher could not employ many research assistants but only one was employed who was always at close supervision of the researcher to ensure that the data collected was the right data. The measurements mostly were from estimation as the owners of the service stations lacked the layout plans of the service stations. The study also lacked the input of a multi-disciplinary team whose contribution would have been important in addressing the study objective more comprehensively and effectively.

The owners of service stations would not allow an intensive survey of their business, as they were very suspicious. The researcher was not able to get in-depth information such as interviewing the motorists independently without the presence of the owners of the service stations.

Interview method was a very successful in gaining insight into the phenomena under study. The method was reliable in gathering information on criteria used in locating service stations. It also helped to gather information on environmental and socio-economic effects of service stations. Questionnaires were designed taking into consideration cost and time that was available for both the researcher and the respondents. Hence, the information was gotten without much pressure where the respondents were willing to be interviewed.

Another drawback was absenteeism of would be respondents since some of the sampled service stations owner/dealers were not around. In other cases, given that these are businesses people they could not spare time for an interview and hence delegated to their juniors. On the same line there was a lot of suspicion, as they saw the researcher as an employee from a rival company or a government employee out to check standards hence there was a lot of hostility towards the researcher.

On motorist's interviews, the researcher had to wait sometimes for long before encountering one who could spare some minutes for an interview. However despite the drawbacks highlighted the researcher through questionnaire method, scheduled interviews and observation methods, the collected data is quite reliable.

CHAPTER FOUR

NAIROBI AND THE STUDY AREAS

4.0 Introduction

The city offers an ideal climatic and accessibility conditions conducive to settlement, commerce and trading. It lies at an attitude of 1,670 m above sea level. It is located on longitude of 36°50' (3 hours ahead of GMT) and on latitude of 1°17' South, just 140 km south of equator. It is strategically located in central Kenya with port of Mombasa on Indian Ocean at 494 km in South East; Kisumu at 338Km on Lake Victoria and Tanzania boarder town of Namanga is 170 km to the South. The City is at the intersection of two Trans- Africa Highways. The first is Great Northern Road from Cairo to Cape Town and the second is Mombasa –Lagos Highway that passes through Kampala and Kigali in Eastern Africa Great Lakes region.

4.1 Historical Development of Nairobi City

Nairobi owns its foundation to the construction of the railway. When the line reached on the site where Nairobi now stands on June 1889, it was no more than a bear plain (Obudho, 1976). The engineers who were laying rails across the Athi River plains found their process checked at small declivity from which the Nairobi River left the forested foothills of the Kenya Highlands. Because the engineers were anticipating difficulties in getting permanent way into and across the Great Rift Valley, they decided to establish a mid-point depot. This later became their headquarters, which was formally in Mombasa

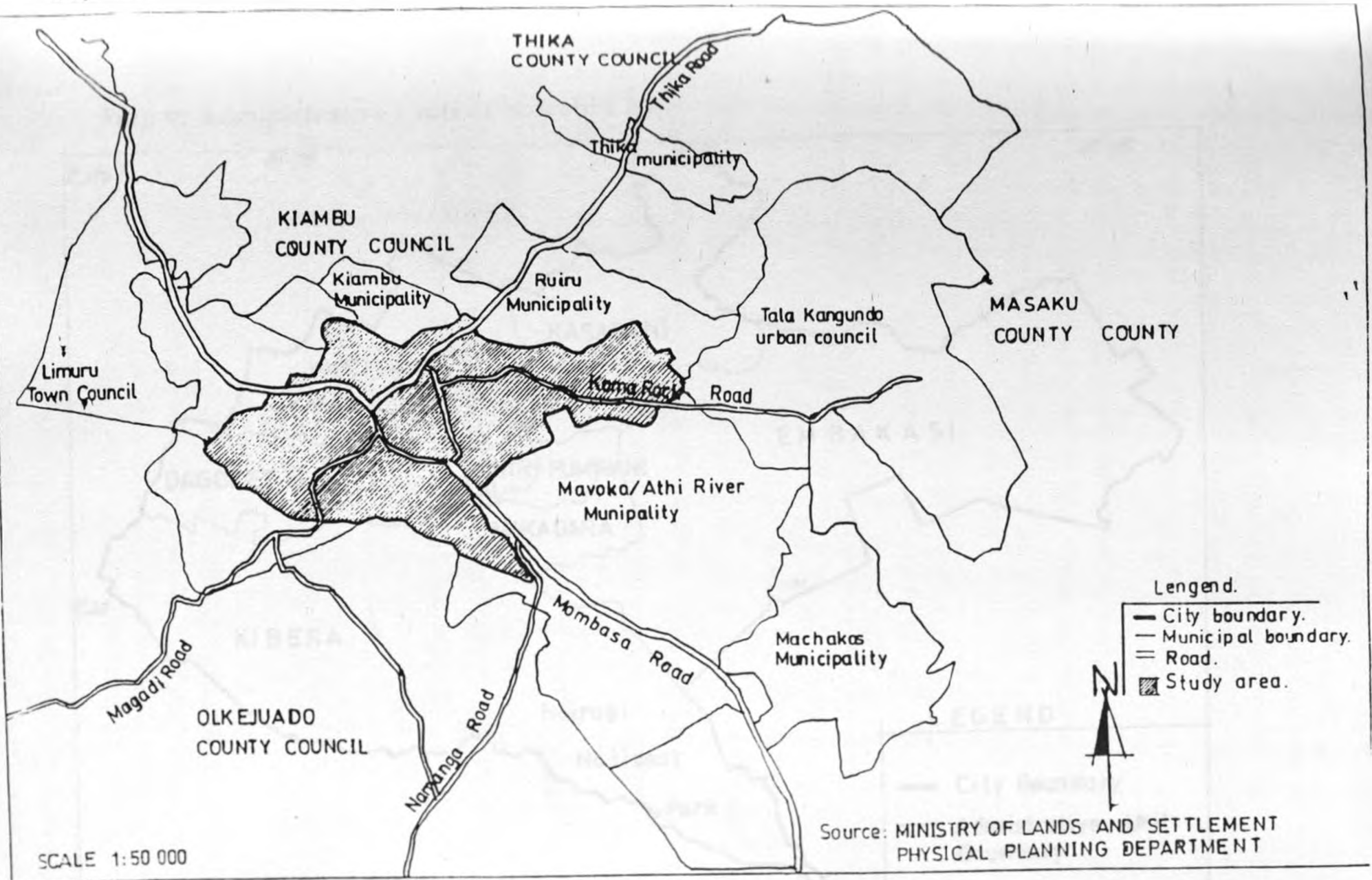
The government administration of Ukambani province, in which Nairobi lay, was at the time at Machakos. In august 1899, the government administration was also transferred to Nairobi. The site was chosen as upstream in the Nairobi River there was a supply of water, which was adequate, if not abundant for a small settlement. Further to the south beyond Mbagathi, there were streams, which were seasonal. Secondly, the topographical nature of the site also offered certain advantages; there was ample level land and on the edge of the plains for tracks and sidings. This was also apparently deserted nature of terrain and it seemed that friction over the appropriation of land would be minimal.

MAP 4: GEOGRAPHICAL LOCATION OF NAIROBI CITY



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Map 5: Nairobi in Regional Context



Map 6: Administrative Units of Nairobi City



37° 05'

EMBAKASI

LEGEND

- City Boundary
- Admistrative Unit Boundary

Thus it was that the physical characteristics of the site and its relationship with the surrounding country combined that make Nairobi an excellent choice for the purpose for which it was intended. The new settlement was named after the Masai name "Enkare Nairobi" which means a "place of cold water".

In terms of physical area, Nairobi has expanded from 3.84 km² in 1910 to 25 km² in 1919 and further to the current area of 680 km² in 1963. Nairobi has undergone major transformation due to population influx resulting from high birth rate and rural urban migration. Table 4.1 shows population increase from 1948.

Table 4.1: Population Projection in the City Of Nairobi

YEAR	POPULATION	GROWTH RATE (%)
1948	118,976	—
1963	350,000	7.46
1969	509,286	6.45
1979	827,800	4.98
1989	1,346,000	4.98
1999	2,500,000	6.39
2001	2,829,807 *	6.39
2009	4,644,598 *	6.39
2019	8,862,915 *	6.39

Source: *Kenya Population Census 1948, 1969, 1979, 1989 and 1999.*

* Projected population using the formulae

$$P_n = P_o(1+r)^n$$

Where

P_n = future population

P_o = present population

r = rate of population growth

n = number of years

4.2 Status and Function of Nairobi

Nairobi is a major town in East Africa with a population of about 3 million people according to 1999 census (Kenya, 2000). From the 1900 when the city came into being, it has grown to metropolitan city with its influence going beyond borders of Kenya. The city has four major attributes.

4.2.1 Administration

Nairobi has principal administrative status and is one of the eight administrative units in Kenya. It is the smallest province yet the most important in terms of activities and functions it performs. Apart from being the Capital City, it serves as the seat of government. All ministries headquarters and other government functions are centralized in Nairobi. It hosts parliament, high court, and other government offices. State house is also located in the City and hence its function cannot be ignored. The city has eight administrative units. They are central, Makadara, Kasarani, Embakasi, Pumwani, Westlands, Dagoreti and Kibera as shown in Map 6.

4.2.2 Local Government

In Kenya, Nairobi is the only municipality with City status. Nairobi City Council provides infrastructure and services to the residents. The social services range from education, health and recreation parks among others. While the physical infrastructure include sewerage systems, water, garbage collection, road, and firefighting facilities. Compared to other municipalities, Nairobi tops the lists in terms of the quantity of these services. NCC also provides more employment as compared to other municipalities. Other services provided included housing though, the trend has declaimed towards zero. Map 5 shows Nairobi in regional context.

All the other local authorities are administered centrally from Nairobi where the headquarters of Ministry of Local Government is located.

4.2.3 International City

Apart from being the Capital City of Kenya it is the centre of several local, national and international organizations. It has more than 80 foreign diplomatic missions, which take care of other countries interests as well as regional interests (Murage in Sunday Nation, 2001). It also hosts missions to the United Nations including the United Nations Environmental Programme (UNEP) and United National centres for Human Settlements (HABITAT). Nairobi is the only city in the developing countries to host a United Nations centre like New York or Vienna.

4.2.4 National and Regional Commercial Centre

Nairobi remains the hub of internal trade and communication in eastern and central Africa. It is the centre of majority of the African based multinational and transnational corporation (Obudho, 1984). It is linked by major international airlines and as such it serves as an exchange point for travelers destined for other cities in East and Central Africa. This sets a lot of foreign exchange for Kenya.

4.3 Climate

Located close to the equator but almost 1700 metres above sea level, Nairobi temperatures are altitudes modified but not torrid. The month of July and August are distinctly cool as are the hours of the darkness throughout the year. The mean annual temperature is 17 degrees centigrade and the daily maximum and minimum are 23 degree centigrade and 12 degree centigrade respectively. Despite these mean temperatures one experiences the urban heat when travelling in and around the City centre from the suburbs. The city centre is considerably warm than the surrounding peripheries. This is due to increased absorption of solar radiation by built mass and hard surfaces in conjunction with black tops due to their excessive heat storage capacity, lack of vegetation with its potential of utilizing incoming energy for evapo-transpiration, and the increased air pollution of different kinds leading to additional heat absorption by the atmosphere (Rukunga, 1990). Currently, the heat islands

are on the increase as more and more open green land "Green belts" are taken up by buildings thereby increasing the overall surface absorption of solar radiation coupled with increasing automobiles and the consequent traffic gain. Due to change in technology, the buildings in the CBD have been renovated using glass and this has also increased the heat. This is witnessed in the upper part of the CBD which is characterised by multi-storey glass buildings.

The mean annual rainfall is 1080 millimetres following in two distinct seasons: the long rains from March to May and short rains from mid-October to December. The city experiences heavy floods during long rains due to its inefficient and incapacitated storm drainage system. The floods are a threat to both human as well as physical infrastructure.

4.4 Evolution of Urban Planning for the City of Nairobi

Urban planning in the city of Nairobi has undergone many changes over the years. One year after Nairobi was elevated to a town in 1919, Nairobi Township Committee (NTC) was formed. The committee was responsible for the administration in the city. By 1907 the population of Nairobi had reached 13,700 and the first attempt to consciously guide the growth of the City were introduced. By this time definite land use zones appeared as an expression of choices of places where inhabitants wished to live, rather than as a result of planning. The pattern of these zones still underlies the present day Nairobi (Obudho 1976). Since that time, City administration began to take specific decisions on various land uses in the City and planning policies were from then taken series as part of requisite urban development guidelines.

The role of NTC was advisory while the actual management of growth and development remained with the central government. In 1919 the NTC was upgraded to a corporation status with municipal council status. Consequently the boundary of Nairobi was expanded to include the outlying residential areas in Parklands area. By 1925 of the existence of Nairobi as Municipal Council, racial segregated zones were dominant phenomena (White et al, 1948). Towards the end of the 1920's, local government commission was appointed to

investigate all aspects of Nairobi Municipality. This coincided with the transplanting of The Town Planning Ordinance into Kenya in 1937. This law remained a Kenya legislative up to, and after 1963. It was then that Nairobi had its plans and zoning arrangements put in place. Boundary extensions that were to mark the jurisdiction of the City as a colonial City up to 1963. These boundary extensions had been recommended in Feedham Report that also suggested the enactment of Municipalities Ordinance in 1928. Under the Ordinance, Nairobi Municipal Council was of greater importance because there was no other City government in Kenya. All this period Nairobi lacked an overall City plan.

4.4.1 Nairobi Master Plan of 1948

The Master Plan was projected to guide urban growth and development of the City for 22 years, 1948-1970. The initiative to prepare the plan was first recommended in 1946 in a report entitled *Colonial Capital: Nairobi Town Planning 1946 Scheme*. The Plan reinforced objectives of Feedham Report and led to the appointment of a planning team Nairobi as a Colonial Capital City. The Plan was to help implement building By-laws and reinforce racial segregation in City growth and development including residential, commercial, industrial and recreational land uses.

These building and planning by-laws laid out in detail the planning zones, land and building densities over the entire Nairobi Municipality. One of the programme, which the Master Plan set out to fulfil, and of much interest to this study was its article 8. In this context the obligation of the Master Plan was to relate social and physical objection, by attempting to conserve land and prevent urban sprawl and at the same time promote stabilization of the African population and reduce horizontal spread.

It can be observed that the Master Plan of 1948 intended to entrench the pattern of land use and grouping introduced by the 1927 planning regulations. In effect the Master Plan had a planning strategy that depicts its certainty about how people ought to live and how the City

ought to look. This plan advice focused on a static plan of a population of 250,000. Apart from the above shortcoming, on public transport, the Master Plan cautiously concluded that,

the detail of working out of a motor bus transport is beyond the scope of a Master Plan report.

The 1948 Master Plan was planning tailored for a colonial capital. It was a plan for the colonists and not the colonized. In the plan it is observed that Europeans were sited in wooded ridge of fertile red soils to the North and West and were well served by transport facilities. In contrast to these European areas, the residential areas of the African were left to develop towards the East, away from the major trunk road. Although this area accommodated the vast majority of city's population it was characterized by poor transport access both to the city's transport network and within the area itself (Adolwa, 1988). The Master Plan in its zoning policies did not foresee the bulk of the majority of African visiting the central business district. Under this premise its main objectives ensured that as little disruption as possible was to take place of the existing activities in the area.

In 1963, during independence there was a major influx of Africans to the city. African elites assimilated into the roles and functions left vacant by the colonialists, Europeans and Asians. There soon emerged elite groups, which developed values and aspiration to do similar things as those of colonial masters. They for instance, aspired to own vehicles, which was before the reserve of colonial masters. Hand in hand with car ownership, others changed residence and moved to the former colonial residential areas.

The post-independence Nairobi was therefore characterized by more wide spread movement patterns, which ignored previous socio-economic and cultural divisions within the city. It saw a further increase in car ownership with a growth rate of 6.8 per annum during the period 1960-70 (Mburu, 1990).

The post-independence movement pattern of high rural-urban migration exerted pressure on the urban form and its infrastructure were ill equipped to serve them. Hence within a few years of independence much of the more formalized land use and urban patterns, previously superimposed was eroded tremendously. Since 1970, the city has expanded tremendously and new population distribution and land use patterns have emerged.

4.4.2 Nairobi Metropolitan Growth Strategy (1973)

The 1948 Master Plan was not viable and tenable as the city faced rapid population growth primarily due to population migration in Nairobi after 1963. Among the Africans in the City there was high level of poverty and inequality fostered by colonial economic system within a context of inadequate infrastructure and urban services as well as complicated land tenure systems among other development constraints (Odongo, 2000).

To accommodate these challenges Nairobi Metropolitan Growth Strategy (NMGS) was put in place in 1973. It laid emphasis on urban expansion to accommodate rapid urban growth thus deviating from the earlier typology of city planning which emphasis development containment. Unlike 1948 Master Plan, NMGS plan was a multi-sectoral development plan. The plan laid a strategy for integrated urban development with emphasis on expansion to accommodate growth. The plan assumed greater administrative, political and financial support by central government and this meant that urban expansion involved infrastructure and service development in the city.

4.4.3 Single Issues Plans

As Nairobi Metropolitan Growth Strategy implementation became confined to provision of spatial development framework after 1979 rationalization, new typologies of planning and a new wave of fragmentation permeated urban development management in the City. Single-issue plans were introduced to face the new challenges in City development management. At present the city has several single-issue plans. The plans include, Water Supply Master Plan, Sewer and Drainage Master Plan, Solid Waster Management Master Plan and Nairobi Urban Transportation Plan.

It is observed that in all of the above strategies, which were applied to control development in the City there has been little compliance and hence a new thinking and approach to urban planning is required.

4.5 Infrastructure in the City

Since 1948, when the first official plan '1948 Master Plan' was laid the importance of infrastructure in the economic and social development of Nairobi has been emphasized. This is because without proper infrastructure the city will fail to advance economically. However, due to limited resources coupled with mismanagement the development of infrastructure has not been satisfactory as stimulated in the plans. Motor vehicle fuel service stations are businesses, which operate mostly by the roadside. Hence it is important as part of the study to know how the roads are in the city. Like other businesses their operation require water electricity and sewage. These infrastructure and services thus have a vital role for the operation of the service stations.

4.5.1 Roads

Nairobi City is well served by good tarmac roads of different classes. The responsibility of building and maintenance of the roads falls in the hand of Nairobi City Council and Ministry of Roads and Public Works. It can be observed that the condition of roads has deteriorated especially towards the East side of the City. This has been due to lack of proper storm water drainage system. Another contribution is that when the roads are built, this is not done to the required standards.

Roads in Nairobi are also characterized by encroachment by private developers. The developers usually elect permanent and semi-permanent structures in the road reserve. One of the predominant investments has been motor vehicle service station. The developers are usually allocated public land on the basis on Temporary Occupation License (TOL) but at the end of the day they elect permanent structure such as service stations.

Erection of structures on the road reserve has resulted to the roads not to be optimally utilized by the road users. In many cases, they cause obstruction and this has resulted to accidents. When there is need for expansion of a given road a controversy usually

surrounds the issue of destruction of the investments and their compensation. Currently the City is served by tarmac roads on which runs bus and matatu service serving the public transport and also the private cars.

4.5.2 Electricity

The City has had electricity supply since 1908 (Kingoriah, 1980). For long time electricity supply has been the responsibility of Kenya Power and Lighting Company (KPLC) (which was formed from former East African Power Company in 1922). The company has been supplying power to the City as well as other parts of the country. Hydroelectricity has been availed from Kindaruma dam as well as importing from Uganda's Owen falls. Of late the power sector was restructured and there are private power generators but the KPLC remains the sole supplier of electricity. The country have been experiencing power problems due to lack of rain coupled with increase in demand due to population increase.

Sectors relying on electricity mainly the industries have been adversely affected. Service stations are usually operated using electricity and hence have also been experiencing the problem. When there is power problem, they are usually operated mutually which is a slow process and results to a longer waiting time.

4.5.3 Water Supply

The important of water in the City's daily life cannot be overlooked. Many are the activities that depend on water. Nairobi's water supply has been obtained from various sources since the city was founded. The founding fathers of the City drank water from the Nairobi River near Chiromo (Kingoriah, 1980). However, due to population increase the supply became inadequate and contaminated by the population, which was living upstream.

Later Ondiri swamp in Kikuyu became the new water supply with its treatment works at Kangemi, but this was only for a short time. Then a new dam was constructed on Ruiru

River. As the population increased the City managers have been coming up with new schemes on how to supply water. Currently, the City is supplied with water from Ndaka-ini Dam in Maragua district. Even after having invested heavily in water supply, City managers are having difficulty to cope with the demand and management of this vital resource.

4.5.4 Storm Water Drainage System

Storm water drains have been provided hand in hand with the roads. To avoid flooding the authorities responsible for construction usually provide the drains by the roadside. In the Central Business District (CBD), storm water is combined with foul water system but in other areas they are separate. The storm water is directed into the major rivers in the city to avoid destruction of physical infrastructure.

4.5.5 Sewerage

The central business district and major residential areas are connected to the sewer. Many of the residential areas in the lower part of Nairobi are served as well as the industrial area. Slums remain uncatered for while the high-income residential areas in the upper part of Nairobi use septic tanks. However, due to pressure on land, efforts are being made to connect them to the sewer to allow more subdivision. The sewerage treatment was relocated to Ruai from Dandora due to the fast expansion of the city.

CHAPTER FIVE

LOCATION AND SITING OF MOTOR VEHICLE SERVICE STATIONS IN NAIROBI.

5.0 Introduction

This chapter aim is to give an insight of how motor vehicle fuel service station sites and locations are integrated in the urban land use. As noted in chapter one, liberalization of oil industry has created conflicts in land use in Nairobi City. The study identified four client groups involved in the process of allocating land use for motor vehicle fuel service stations in urban areas. The four category of actors in the industry are owner/investors of service stations, motorists, residents in the neighborhood where service stations are located, and the urban planners responsible in organizing land use activities through planning. The analysis of locational desire of all the four groups was necessary to reveal the optimum service station locational solution outcome. The analysis first tackles other findings before analyzing the actors in the industry.

5.1 Ownership and Operations of the Service Stations

5.1.1 Ownership of Assets

As noted earlier in chapter multinational oil companies dominated one, in Kenya the oil industry. Since 1994 the trend changed as local investors were allowed entry into the industry. In the analysis 87% (33) service stations are owned by the multinational companies while 14% (5) are owned by local investors (Figure 5.1). This shows that after liberalization the multinational companies continued to dominate the oil industry. In fact additional multinational companies have entered the market in Kenya. Plate 5.1 shows one of the multinational service stations in Nairobi.

Plate 5.1 A Multinational Service Station Without a Clearly Defined Deceleration Lane.

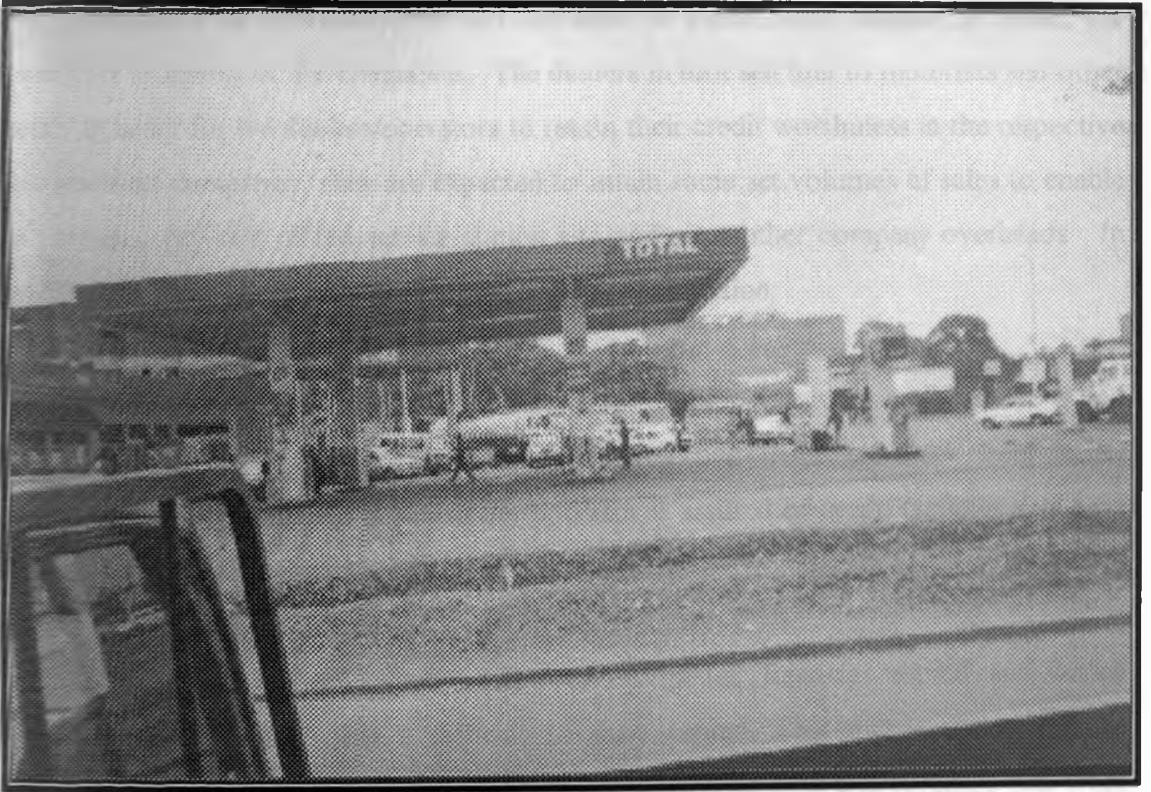
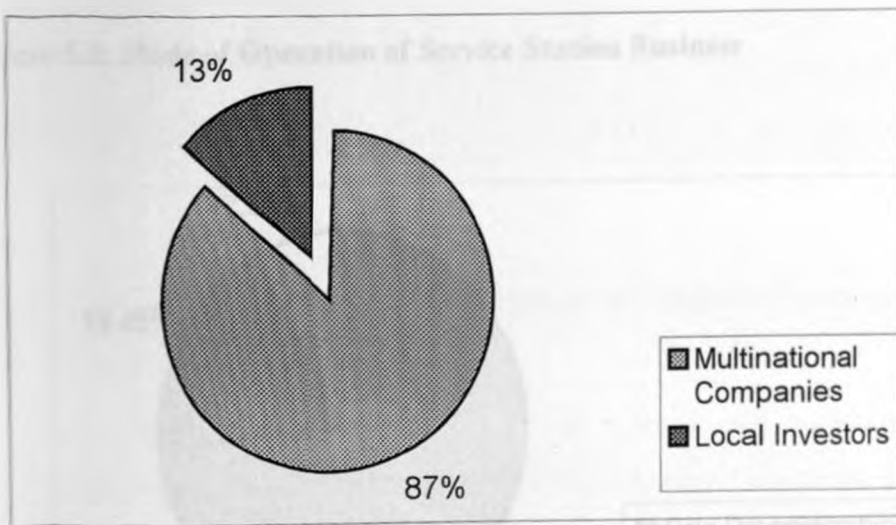


Figure 5.1: Ownership of Assets by Investor Type (2001)



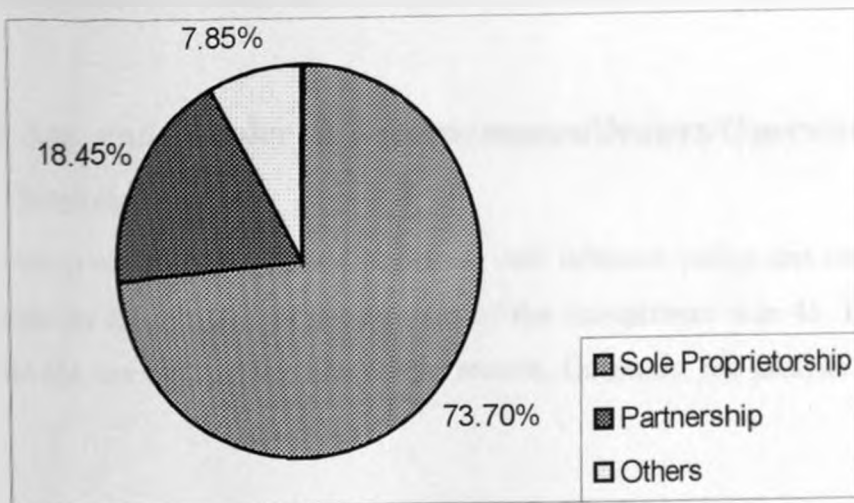
5.1.2. Mode of Operation of Service Station Business

Multinational companies usually make arrangements to enable large commercial users of petrol and diesel to purchase their fuel for cash or credit from dealers. In effect the dealers act as agents of the companies. The dealers in turn sell fuel to motorists and other users. In order for the dealers/operators to retain their credit worthiness in the respective multi-national companies, they are expected to attain some set volumes of sales to enable the company pay rent of the service station site and meet other company overheads. In this case the company will have constructed the service station.

After construction the service station is leased to a dealer/operator who becomes a tied service station tenant, restrained from purchasing petroleum products from other competing oil companies. In return dealer/operator is assured of credit facilities and pays rent normally below the market rate.

Running a service station therefore requires substantial financial capital and hence potential investors often find it difficult to raise capital. This makes them to form partnership. While locally, the investors construct service stations and purchase fuel from multinational companies, which they sell on cash basis. In the analysis, 73.7% of the service stations were under sole proprietor, 18.45% were under partnership, and 5.3% were company managed (Figure 5.2).

Figure 5.2: Mode of Operation of Service Station Business



The liberalization of the oil industry has led to high competition that has pushed some service station dealers/operators to pull out of the industry as in many cases they cannot attain target sales. Rather than the heavy investments of multinational companies to lie idle, the companies have opted to employ their own managers as they wait for potential dealers to approach them. Most of the service stations for local investors are however operated in partnership, which is of 2 or more people. Plate 5.2 shows one of the service stations owned by local investors in Nairobi.

Plate 5.2 Local Investors Service Station Without any Special Facilities



5.1.3 Age and Gender of Entrepreneurs/Dealers/Operators of Service Stations

In an enterprise the age of the entrepreneur will influence policy and management of an enterprise. In the analysis the average age of the entrepreneur was 46. The entrepreneur oversees the smooth running of a service station. On gender the analysis shows that only

21.1% entrepreneur are women. Table 5.1 presents a summary of gender of entrepreneurs in different development corridors.

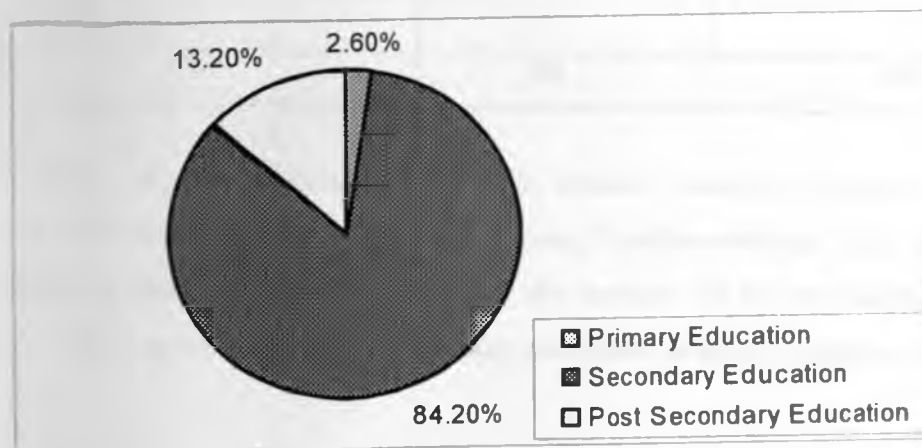
Table 5.1: Entrepreneurs Gender in Different Development Corridors

DEVELOPMENT CORRIDOR	ENTREPRENEUR		
	Male	Female	Total
Jogoo Road	3	2	5
Juja Road	4	-	4
Thika/Murang'a Road	6	2	8
Mombasa Road	1	3	4
Ngong Road	7	-	7
CBD	2	1	3
TOTAL	30	8	38

5.1.3 Education level and Experience of Entrepreneurs in the Oil Industry

The level of formal education of the entrepreneurs affects the performance and productivity of an enterprise. Good entrepreneur (usually) have comparatively attained higher education level. As summarized in Figure 5.3, the analysis shows that only one entrepreneur (2.6%) had only primary education, 32 (84.2%) had attained secondary education, and 5 (13.2%) had post secondary education. Further analysis reveals that only one entrepreneur had attained University education.

Figure 5.3: Level of Education of Entrepreneurs



Regarding experience, only 6 investors/dealers comprising 15.8% who did not have prior experience in the oil industry. Out of 38 investors/dealers, 32 had worked with multinational companies in different capacities only to pull out later to venture into their own business. Most had served as managers, drivers and loaders before investing in their own service stations. Two out six people who did not have prior experience in oil industry had business related to motor industry. Another factor that was found to be vital besides prior experience is formal education. All dealers/operators had primary level of education or more beside on the job training in technical aspects of management, finance and administration.

5.1.5 Source and Amount of Capital for Investment

Unlike most of other businesses that may not have limit in terms of capital required to start, investing in oil industry require a least 0.5 Million for a service station with one or two pumps. From the analysis 76.3% (28) investors got capital from personal savings, 5.3% (2) investors from friends and relatives, and 15.8% (6) got capital in form of bank loans. However 2.6 % did not reveal their source of capital. Table 5.2 gives a summary of the main source of capital for initial establishment of the business.

Table 5.2: Sources of Capital for Business

SOURCE	FREQUENCY	PERCENTAGE (%)
Own Savings	20	53.3
Borrowing from friends and relatives	2	5.3
Own savings/bank loans	9	2.3
Bank loans	6	15.8
Other sources	1	2.6
TOTAL	38	100

As noted earlier, further analysis show that the smallest financial invested in a service station was 0.5 million shillings. The highest was 10 million shillings. The average level of investment is Kshs. 5.5 million, which is the amount set by the multinational oil companies. This can be explained by the heavy investment in assets, purchase of bulk fuel

to start a service station, and the site as well as the locational needs of a plot for a service station facility.

5.1.6 Workforce in Service Stations.

Like other urban centres in developing countries, Nairobi faces mass unemployment. It is vital for enterprises establishment in the City to provide employment to ease the situation. The employment size in this study influence the pace at which motorists are attended. The analysis show that some stations are run by one person with some assistance from family members. This is especially so in service stations of local investors. Some stations that are characterized by heavy investment have as many as 40 employees. However the number of employees averaged at 10 people reflecting how service stations create employment in the City.

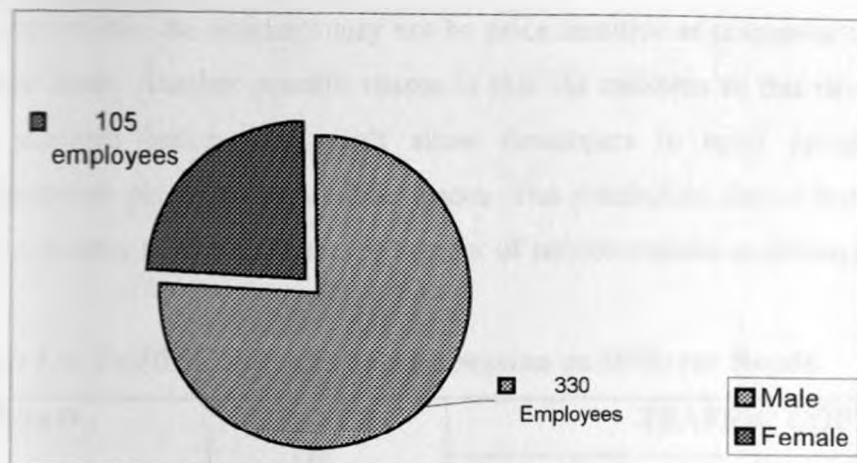
As indicated in Table 5.3 service stations create a lot of employment, having in mind that there is trickle down effect of those employed there.

Table 5.3: Employment Size in the Service Stations

NUMBER OF EMPLOYEES	FREQUENCY	PERCENTAGE (%)
1 – 10	21	55.6
11 – 20	8	21.5
21 – 30	4	10.5
31 - 40	5	13.4
TOTAL	38	100

It is estimated that motor vehicle fuel service stations employ 6500 people both directly and indirectly with 25,000 dependants in 1999 (P.I.E.A, 1999). Hence the service stations are vital source of livelihood in the city. The 38 service stations in this study had a total number of 435 employees with male employees accounting for 76% as illustrated in Figure 5.4.

Figure 5.4: Employment Size by Gender



Further analysis show that out of the 38 service stations, 7 did not have a single female employee while the one with most female employees had 12 compared to the maximum 38 employees in the case of males.

5.2 Spatial Distribution of Service Stations in Nairobi.

As noted in chapter four service stations are concentrated in the major urban outlets. From the CBD, most of the service stations are located along left-hand lanes. This explains that most motorists prefer to fuel when leaving the city. The analysis show that 68% accounting for 26 of the service stations are located along the left hand lanes of the roads.

Another aspect of distribution is that more new service stations are being built in the Eastlands where the city is experiencing growth of residential areas compared to Westlands. The local investors have ventured in the Eastlands occupying prime plots and road reserves sites allocated through Temporary Occupation License (T O L) basis. Among the six sampled development corridors where the data was collected Thika Road development corridor had the highest number of service stations followed by Waiyaki way. The corridor had 14, while Waiyaki Way had 13 service stations. However as for the number of service stations for local investors, Thika road was leading with 4 while Mombassa Road had none (See Table 5.5). This can be explained by availability of plots at affordable rates. In the development corridors characterized by high-income residential

areas, locally owned service stations are rarely there. This may be explained by the assumption that the residents may not be price sensitive as compared to those in middle-income areas. Another possible reason is that the residents in this development corridor are informed hence they won't allow developers to erect private investments in inappropriate places such as public spaces. The distribution shows that more traffic does not necessarily reflect an increased number of service stations as shown in Table 5.4.

Table 5.4: Traffic Count and Service Station on Different Roads.

ROAD	NUMBER OF SERVICE STATIONS	TRAFFIC COUNT			
		PEAK		OFF-PEAK	
		IN	OUT	IN	OUT
Jogoo Road	10	3600	2700	1680	1800
Juja Road	9	3420	2820	1620	1740
Thika Road	15	3120	4120	3180	1860
Waiyaki Way	14	4320	3120	2880	3300
Mombasa Road	7	4080	3660	2880	1980
Ngong Road	13	3120	2880	1980	2040

More service stations are being built to capture the traffic generated from upcoming new residential areas like Komarock, Saika, Kayole and Ruai among others. As Nairobi City grows to a metropolitan city, many people operate from other towns to Nairobi and this has led to increase of traffic moving to and from Nairobi. Hence the many service stations in Thika/Murang'a Road development corridor can be explained by the strong link that exists between these two towns.

Table 5.5: Service Station Ownership in Sampled Corridors

DEVELOPMENT CORRIDOR	NO. OF SERVICE STATIONS BY OWNERSHIP		PERCENTAGE	
	Multinational	Local investors	Multinational	Local Investors
Jogoo Road	7	3	13.2	23.1
Juja Road	6	3	11.2	23.1
Thika/Murang'a Road	10	4	18.9	30.8
Waiyaki Way	10	3	18.9	23.1
Mombasa Road	7	-	13.2	0
Ngong Road	13	-	25.6	0
TOTAL	53	13	100	100

5.3 Nearest Neighbour Analysis

The site selection and projections of the volume of business takes into considerations the location, character, size and type of competitive units. The principle of minimizing competitive hazard should lead the prospective investor other things equal to select a site near which there are few (or none) competitive sites as possible and consider the feasibility of controlling or earmarking the use of such sites for non competitive purposes.

In the study, the planning standards stipulates that the distance between service stations to be determined by the traffic flow although a minimum of 200 meters should be observed. The analysis show that some service stations are next to each other (wall to wall) as shown in Plate 5.3. Hence one questions how planning permission was given in the first place. This kind of scenario inhibits traffic entering or leaving either of the stations. The deceleration of one service station consequently becomes the acceleration lane of the other and this may lead to accidents on the roads where these stations are located. Table 5.6 summarizes analysis of distance between service stations located on the same side of the road.

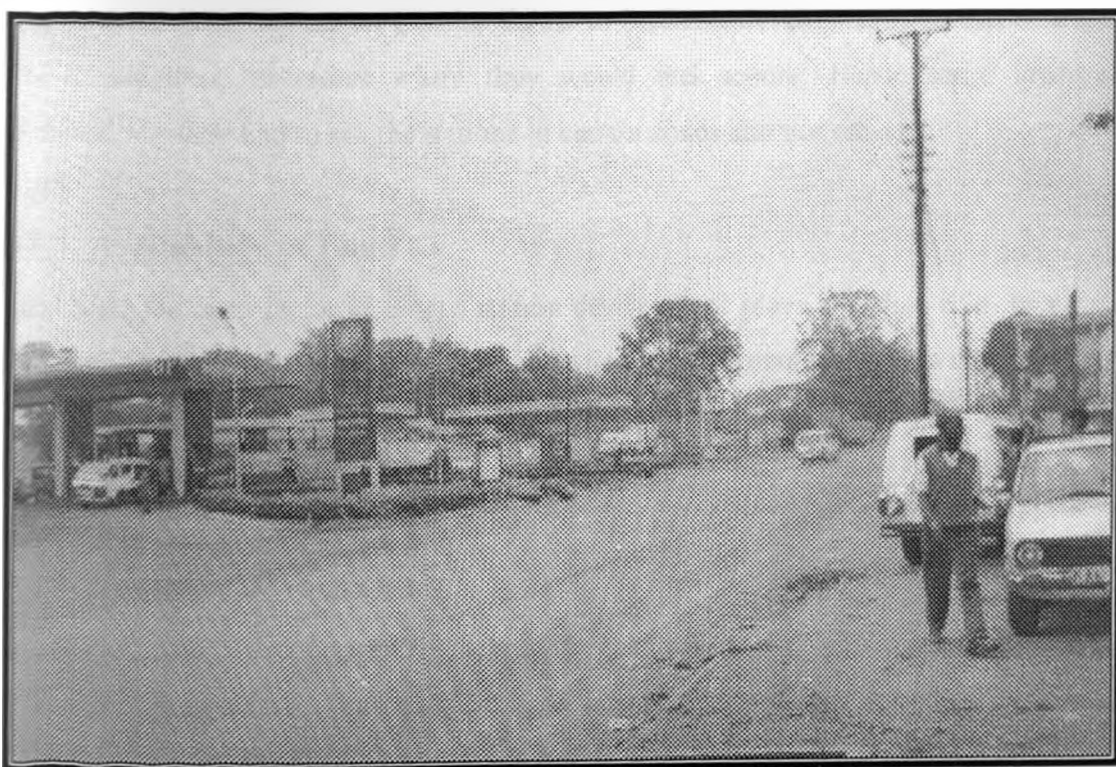
Table 5.6: Distance Between Service Station on Different Development Corridors

DEVELOPMENT CORRIDOR	AVERAGE DISTANCE BETWEEN SERVICE STATIONS ON THE SAME SIDE OF THE ROAD
Jogoo Road	400
Juja Road	300
Thika/Murang'a Road	400
Waiyaki Way	500
Mombasa Road	600
Ngong Road	500
CBD	*

* In the CBD one street (road) does not have more than one service station

Although paired service station are not allowed in 2-way roads, analysis show that 2 service stations are opposite each other. This may cause traffic to flow on both sides of the road.

Plate 5.3 Two Service Stations Built Next to Each Other



5.4 Factors Influencing Site Selection

The decision to locate a business in a given site was found to be influenced by six factors.

5.4.1. Volume of Traffic

The volume of sales anticipated would depend on the traffic volume of a given road where the service station will be located. The traffic which is already there and which in a near future will be using that road is a factor, which the investors were found to consider.

5.4.2 Availability of Quality and Reliable Infrastructure

To function well a service station will require power, water, and sewerage. If a site cannot get connected easily to this infrastructure services the site will be costly to develop. Hence a site may be suitable but one can be constrained by lack of these infrastructures.

5.4.3 Security

Insecurity has been sighted as a major threat to business development. Investors would like to site their businesses where they would feel secure. Hence some investors explained why they had to site the stations in certain zones and not others

5.4.4 Availability of Land

Land being the main factor in service station development plays a leading role. Investors with their own land suitable for service station find it convenient to develop their plot to a service station. Others, who buy land, usually settle for a site whose price is recoverable in the investment.

5.4.5 Existence of Businesses

Investors who had other business(es) are constrained to search for sites, which are not far from the already existing business. Siting a business in proximal to other businesses allow the owner to monitor (manage) them easily.

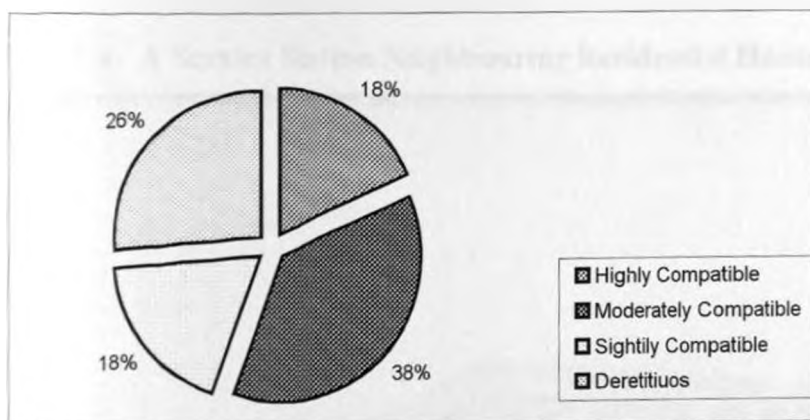
5.4.6 Topography and Site Conditions

A steep landscape may require levelling to suit a service station. Hand in hand with this, the site condition such as a site with gravel characteristics will be costly to develop. Investor when developing a site, depending on site condition may be required to do blasting which is very costly.

5.5 Service Stations and their Neighbourhood

Service stations are unique businesses. The products are highly inflammable and therefore compatible with very few activities. Analysis shows that out of 38 service stations 18.4% (7) were highly compatible, 36.8% (14) were moderately compatible while 26.4% (10) were deleterious as summarized in figure 5.5. People residing next to a service stations, which were deleterious felt insecure as the service station, are not well built. For instance, some lacked perimeter wall. In this case compatibility is measured on how a service station affects the general neighbourhood.

Figure 5.5: Level of Compatibility of Service Stations



Further analysis show that 14.5% of the occupants of neighbourhood expressed the willingness to relocate due to negative effects or risks anticipated. Plate 5.4 shows a service station neighbouring residential houses and plate 5.5 shows a highly incompatible service station with a nightclub.

When initiating any development in the city where the plot involves change of user, a notice should be placed in the local newspaper and on the site (Physical Planning Act,

1996) To this extent the neighbours who may have any objection have a chance to raise it and the concerned local authority will address it. From the analysis, only 18% of the neighbours were aware about development of service station in their neighbourhood. The other 82% learnt about a service station locating in their neighbourhood when the construction works has already started. Hence they could not raise objection since the plans for the site were already approved and the developer allowed to implement it accordingly. This shows poor public participation in planning.

5.6 Nature of Services and Space Requirement for Service Stations

The selection of a site for a service station is considered very carefully from the point of view of traffic in the surrounding streets and from the view of advertising advantages, as it is essential to be able to see a station sometime before reaching it in order to have sufficient time to make a decision on question of stopping. The best sites for a service station may be too expensive, consequently less satisfactory ones at low costs may have to be used. Each site however should be considered on its own merits.

Plate 5.4: A Service Station Neighbouring Residential Houses

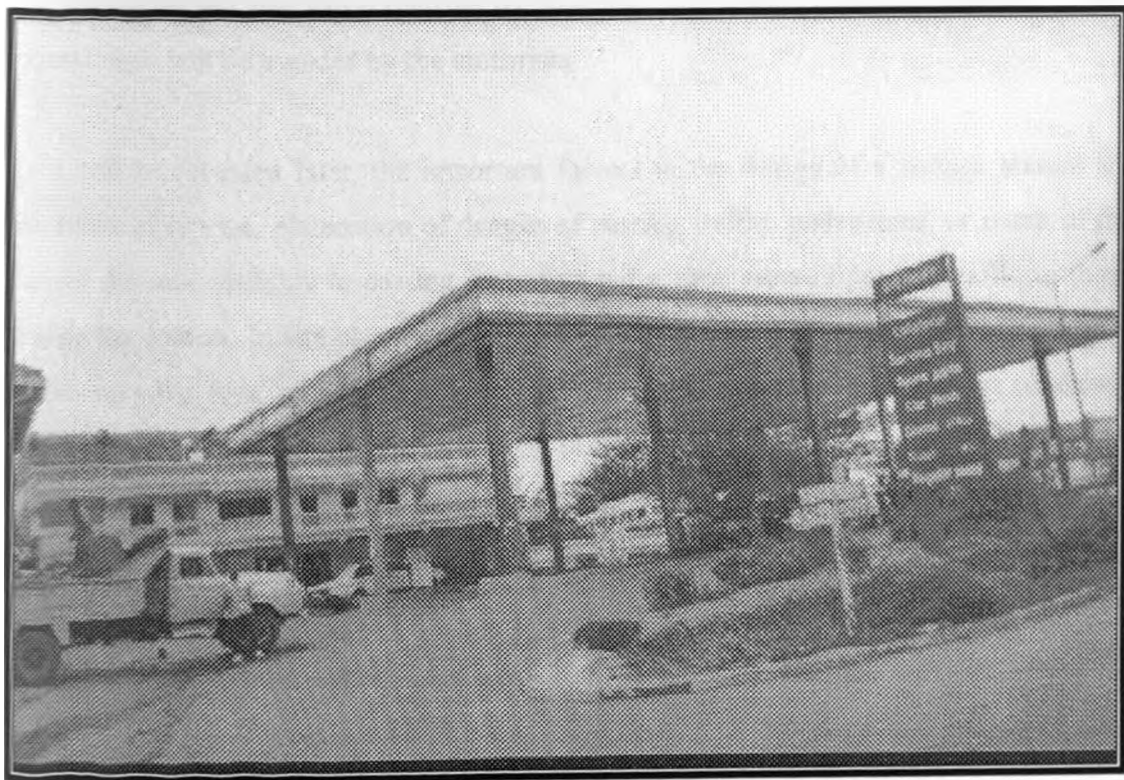


Plate 5.5: Highly Incompatible Service Station with a Night Club.



The station should not cause damage to amenities and create traffic congestion, as this consequently will be avoided by the motorists.

As it will be revealed later, the important factors in the design of a service station are quickness of service, elimination of danger of passing traffic, pedestrians, or users of the station, distance visibility to passing motorists and a clear view of passing traffic to those leaving the station. In site planning for a service station, the traffic in the adjoining streets should take the first consideration. Secondly the circulation and the layout of roadways and buildings on the site together with the placing of fuel pumps. Thirdly, whether any sales such as shops and supermarkets are to be made in additional to fuelling services.

5.6.1 Forecourt Sizes

Service stations are strongly connected with modern life. In Nairobi, many investors are not aware of the impact service stations have on the environment and transportation.

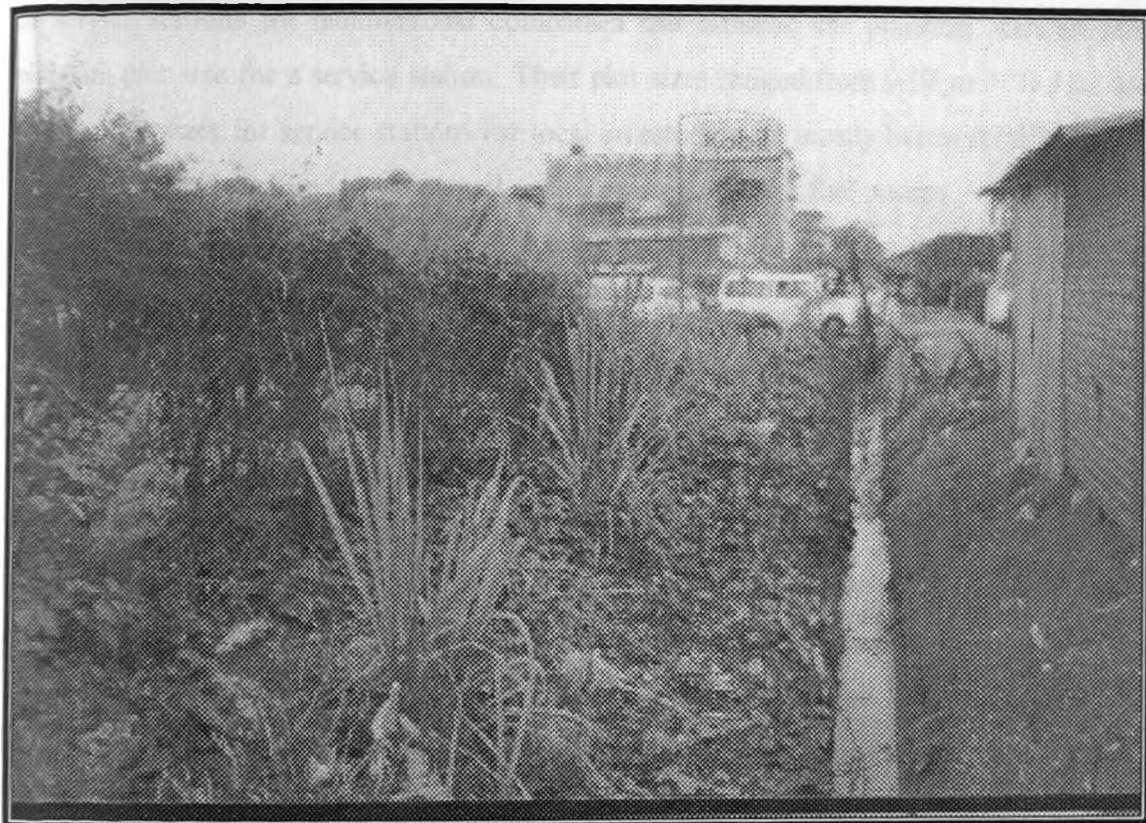
When building a service station usually the landscape is distorted and very few investors make an effort in improving the landscape. Because of uncontrolled development of service stations since 1994, Nairobi has experienced destruction of landscape where these investments are located.

It is observed that there are very few local investors who have made efforts to landscape and probably plant flowers where they have invested. Many of multinational owned stations are well landscaped and well incorporated in the urban built-up environment. The drainage provision in many of local investors service stations is poor and the discharge flow directly to the public drainage system, which is harmful. As a requirement the effluents should not be released directly but each station should have an interceptor, however, many local investors did not have. It is observed that although the Physical Planning Department has set clearly parameters, which should be considered when locating a service station in relation to the environmental issues, many are the service stations, which do not comply with the standards. Plate 5.6 shows environmental pollution resulting from spillage of used oils.

To minimize accidents, the site of a service station should be in areas clear of bends and crests so as not to inhibit visibility. The analysis however shows a different scenario. Some stations are located as near as 10 meters from a junction and as neighbouring residents explained in cases like this, there are accidents which may be attributed to the undesired siting of service station and this raises the question of how the planning permission was obtained in the first place.

Although planning standards stipulates that a service station with fuel pumps only should be of a minimum size of 0.08 Ha, and that with other services other than convenient shops should be of minimum size of 0.15 Ha while a service station with convenient shops/stores should be of a minimum area of 0.2 Ha, the situation revealed by the analysis is quite different.

Plate 5.6: Environmental Pollution Resulting From Spillage of Used Oils.



The minimum plot size was found to be as small as 0.1 Ha for a service station without extra services. This is against what is provided for in the planning standards. Out of 38 service stations, 8 had less than 0.08 Ha which is the minimum size. Further analysis shows that all the service stations, which were below the minimum, plot size were owned by local investors.

On the other extreme multinational service stations are located in plots as large as 3.75 Ha and in this case some space is left unoccupied. The service stations, which are smaller than 0.08 Ha, are unsuitable for large vehicles (especially trucks) as they cannot be able to negotiate corners because of the limited space. In other cases such service stations use the road (or road reserve) as the fuelling bay. This scenario creates obstruction, which may result to accidents. The size of the plot of a service station depends on services offered, hence, those stations, which are not strategically located to allow shopping, are of the minimum size. The service stations with large plots are usually located on

highway. In this case, Waiyaki Way and Thika Road had most of such stations. Many of the service stations for multinational companies had satisfied the planning standard on minimum plot size for a service station. Their plot sizes ranged from 0.08 to 3.75 Ha. As noted earlier sizes for service stations for local investors were mostly below 0.08 hectares while others were enclosed in very small rooms only enough for fuel pumps

5.6.2 Rent of the Forecourt

Analysis shows that the rent of the forecourt is determined by the size, zone of location, and how far a service station is from the central business district. The analysis reveals different rents for different sites. However, for comparison a forecourt of 0.1 ha is chosen from each development corridor as summarized in Table 5.7.

Central Business District had the highest rent and as such if a service station is not able to sell high volumes of fuel, it may not be able to pay the high rent. Plate 5.7 shows a congested situation in CBD while plate 5.8 shows a service station in the same locality with a rooftop packing to maximize use of space. It is also well reflected that rent is higher in the high-income residential areas as compared to other areas. Comparing Jogoo Road and Waiyaki Way show this illustration precisely.

Table 5.7: Rent for a Forecourt of 0.1 Ha in Different Development Corridors

DEVELOPMENT CORRIDOR	MONTHLY RENT FOR 0.1 HA FORECOURT (KSHS)
Jogoo Road	25,000
Juja Road	20,000
Waiyaki Way	80,000
Mombasa Road	80,000
Ngong Road	80,000
CBD	125,000
Average	68,333

Plate 5.7: A Service Station in the CBD

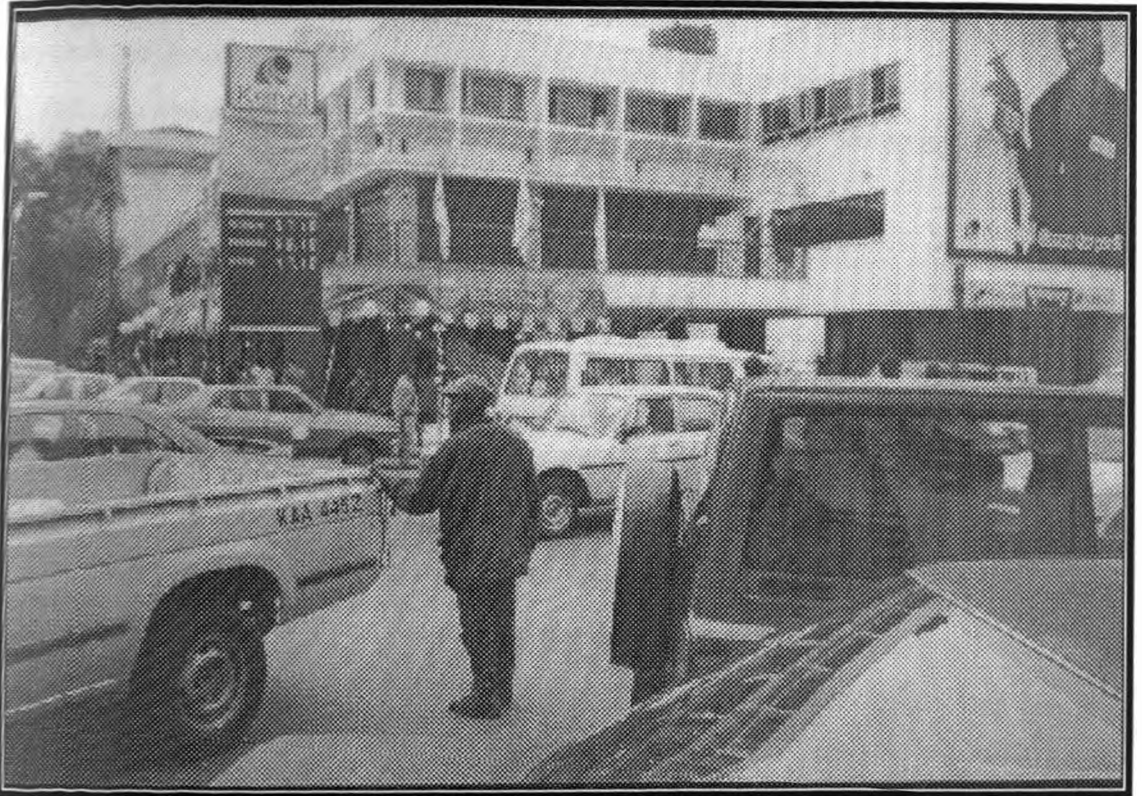
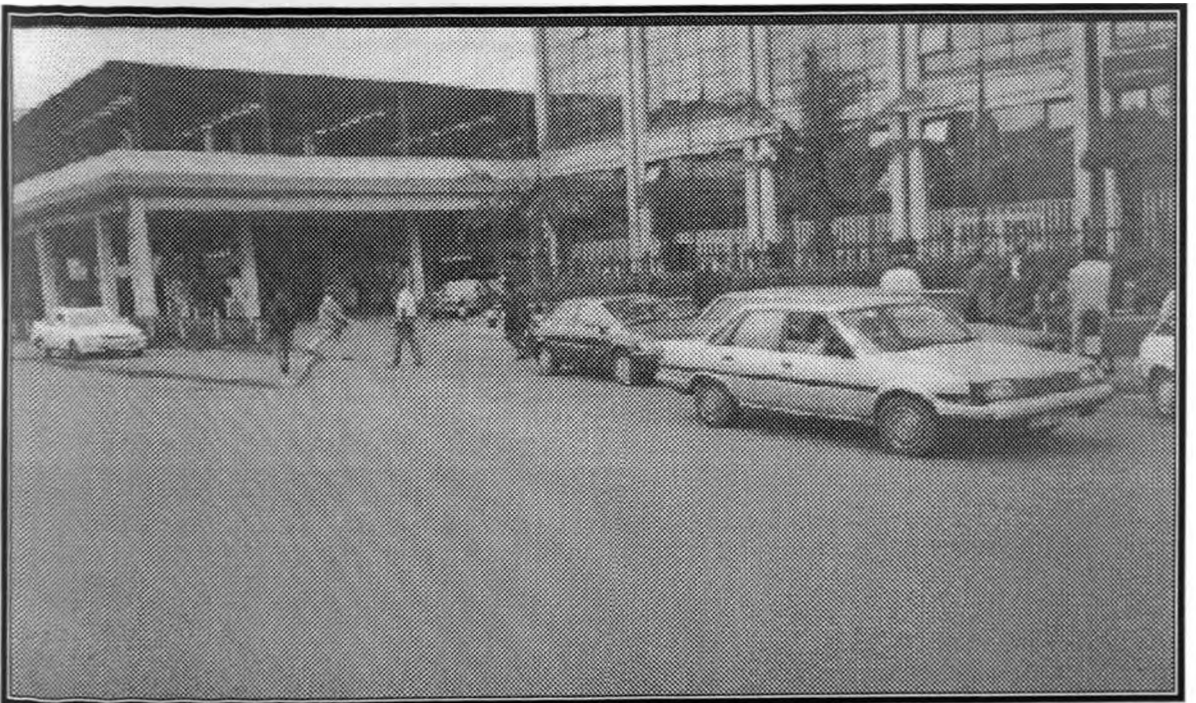


Plate 5.8: A Service Station in the CBD with Rooftop Parking



5.6.3 Accessibility to the Service Station

One of the chief reasons for choosing a particular site is to secure the maximum accessibility and thereby to have available as much of the potential business as possible. In this case, the accessibility is determined by the service station design and the length of both acceleration and deceleration lanes.

5.6.3.1 Acceleration and Deceleration Lanes

For easy accessibility, the acceleration lane should be a minimum of 100 meters long for dual carriageways and 30 meters long for two-way roads. This length if adhered to, will enable vehicles to access the station and also prevent accidents from occurring near the site due to slowing down of traffic. However the analysis revealed that stations with the shortest lane are 4 meters in two-way road while for a dual carriageway is 10 meters. Furthermore some activities block the acceleration and deceleration lanes even when they are well provided as shown in plate 5.9 and plate 5.10. Others service stations provide acceleration and deceleration lanes which are not well defined such that they can cause accidents to motorists using the road as well as those using the service station. Plate 5.11 shows a service station without a well-defined deceleration lane.

Plate 5.9: Vehicles Parked along Deceleration Lane



Plate 5.10: Informal Businesses Blocking a Deceleration Lane

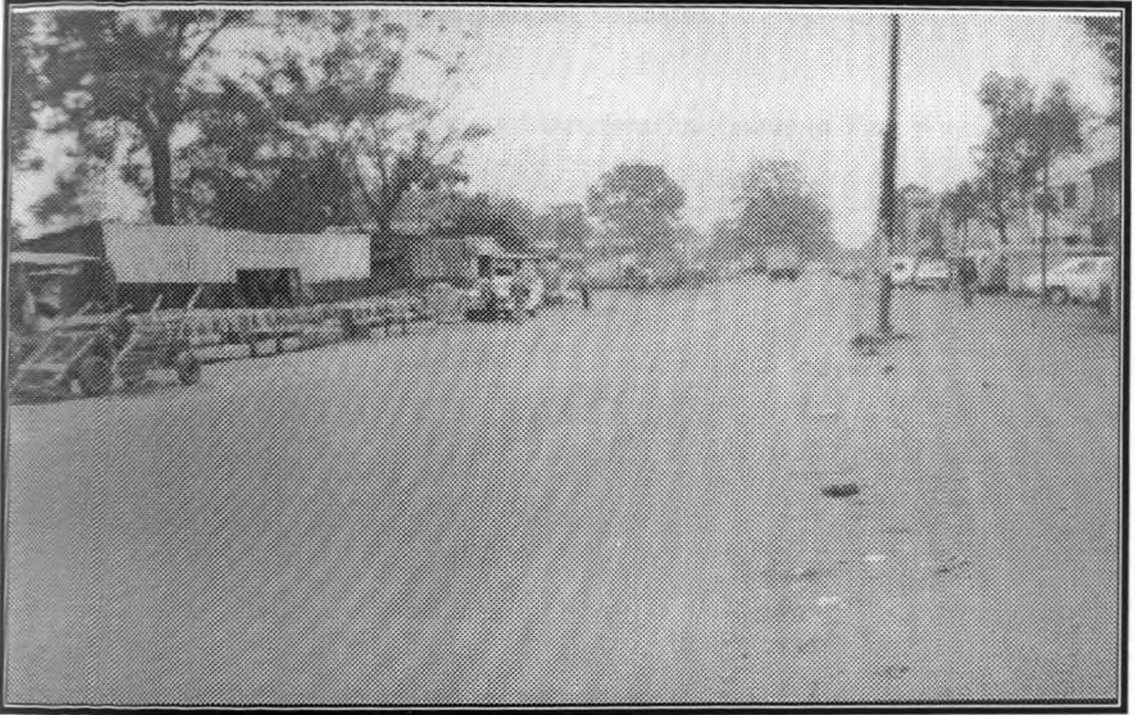
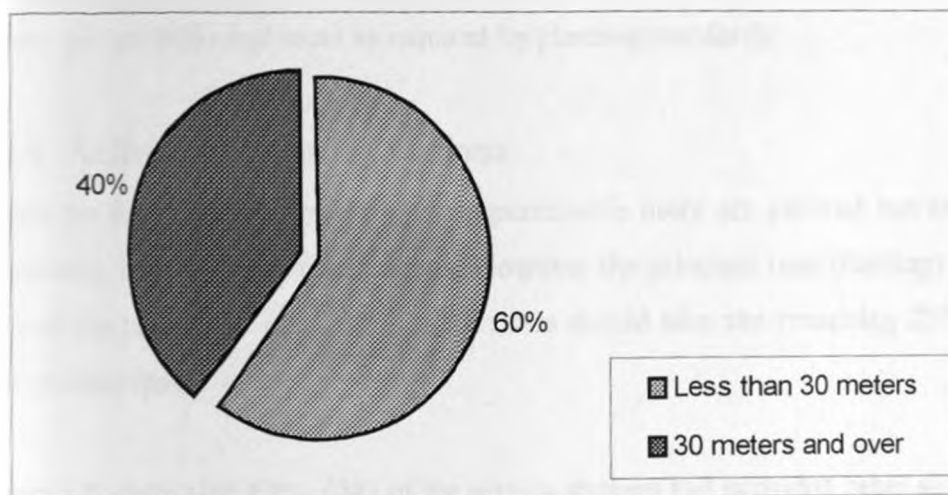


Plate 5.11: A Service Station Without a Well Deceleration Lane



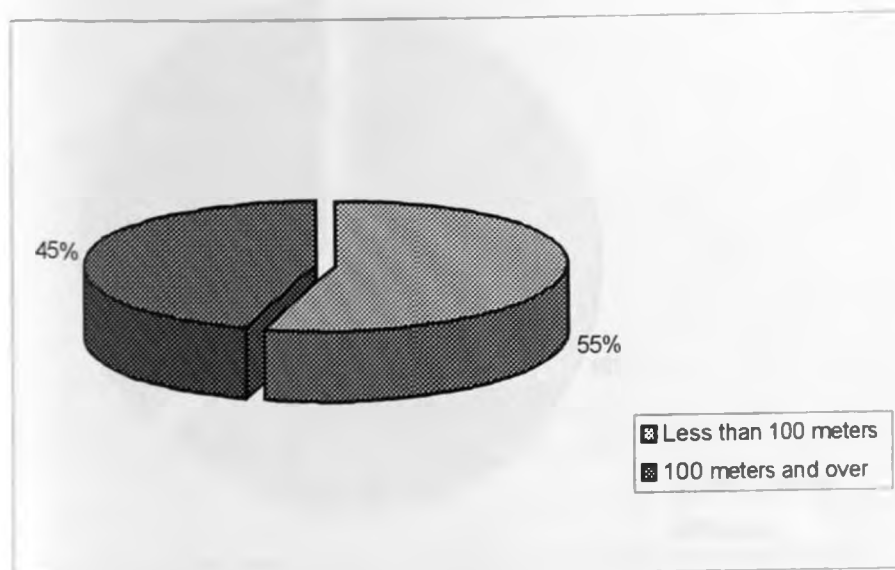
Figure 5.6 show that 60% of the service stations in two-way roads have their acceleration lanes less than what is stipulated in the planning standards.

Figure 5.6: Provision of Acceleration and Deceleration Lanes in Two Way Roads



On the other hand, the service station located on a dual carriageway show a case, which is more or less the same as shown in figure 5.7.

Figure 5.7: Length of Acceleration and Deceleration in Dual Carriageway



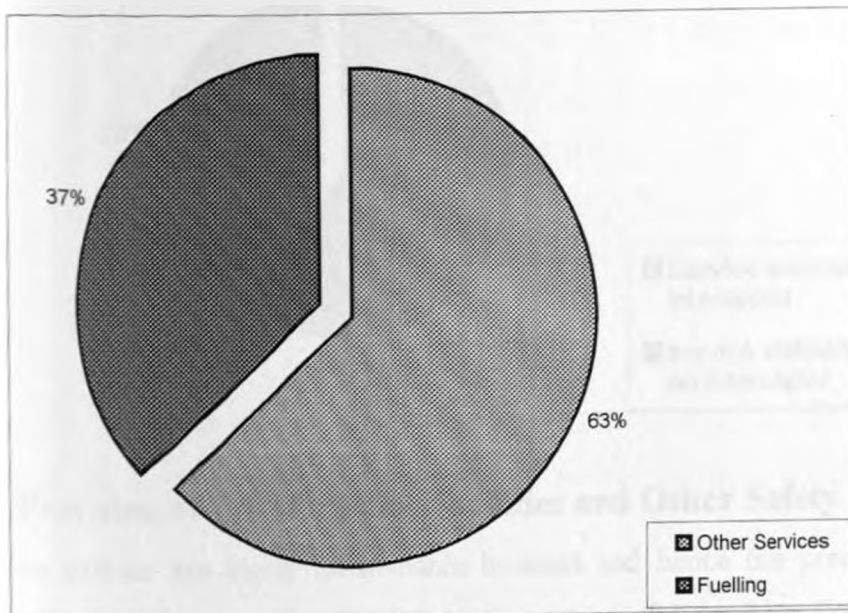
Although the planning standards emphasize on provision of both acceleration and deceleration lanes, 9% of the service station under study have not provided them clearly. This may result to accidents involving vehicles coming from the station and those on the road. Further analysis show that for local investors owned service stations, only 25% had lanes as stipulated in the planning standards. Most of the multinational owned service station (about 60%) had lanes as required by planning standards.

5.6.4 Activities in Service Stations

Within the fuel retailing precincts, other permissible users are allowed but are limited to restaurants, bars and convenient shops. However the principal user (fuelling) should take 75% of the plot while other permissible users should take the remaining 25% excluding their parking space.

Figure 5.8 show that 63% (24) of the service stations had provided other services, while 37% were in fuelling business only.

Figure 5.8: Provision of Other Services

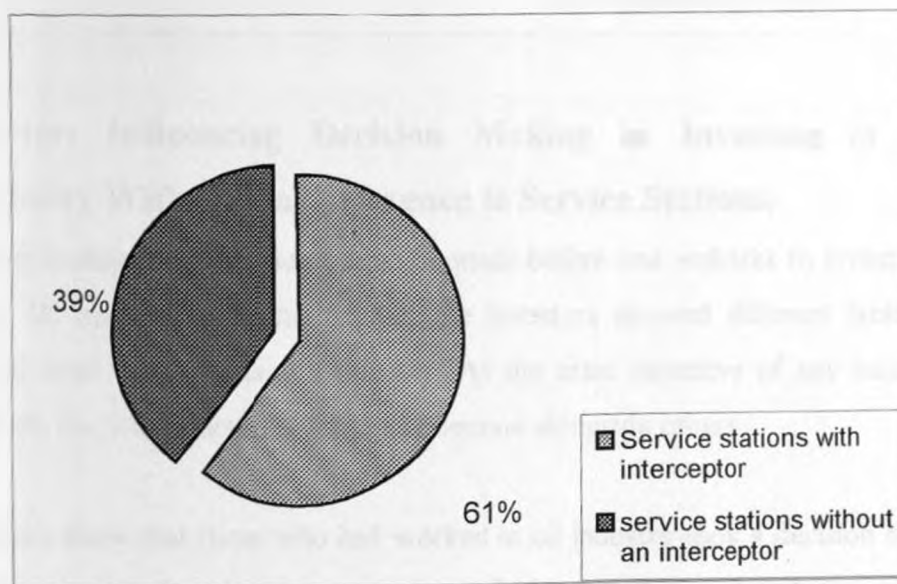


One of the dominant permissible user were restaurant, of 65% of those station with other services. 50% had restaurants. A unique permissible service was banking automated teller machine, which is only in one service station.

5.7 Types of Wastes and Disposal Methods

To maintain high environmental standards to safeguard safety and health, wastes generated in a service station should be disposed off properly. In the analysis, contaminated oils, used oilcans and worn out tyres and tubes were the main wastes. For proper disposal each service station should have an interceptor where waste water and contaminated oils will pass through, prior to discharge into the public drain. 60% (23) of the service stations had interceptors while the rest disposed used oils directly to the public drain (Figure 5.9)

Figure 5.9: Mode of Disposal of Contaminated Oils

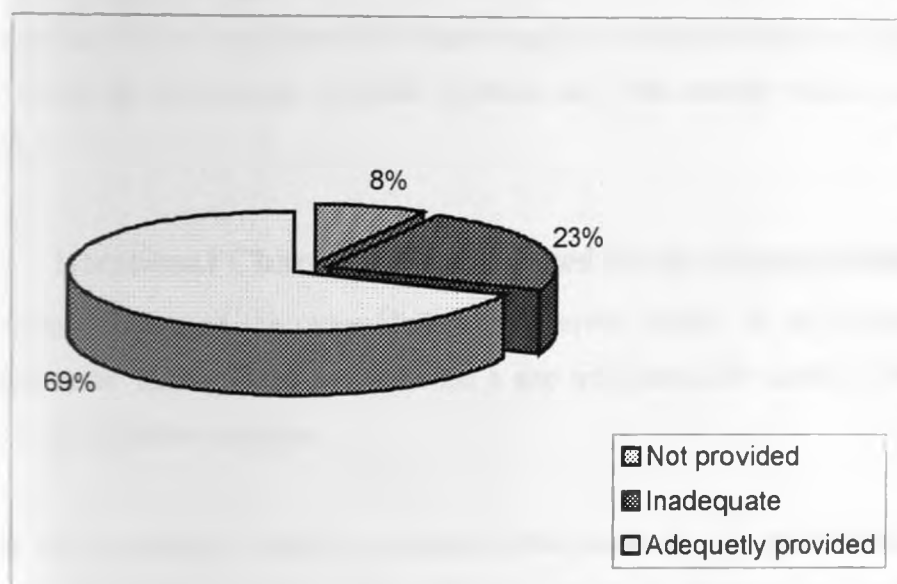


5.8 Provision of Fire Fighting Facilities and Other Safety Measures.

Service stations are highly inflammable business and hence fire precautions should be taken. Figure 5.10 show that 8% (3) service stations did not have fire-fighting facilities.

On the other hand some service stations even lacked the conspicuous “ No smoking signs” which is mandatory in a service station.

Figure 5.10: Provision of Fire Fighting Facilities



5.9 Factors Influencing Decision Making in Investing in the Oil Industry With Special Reference to Service Stations.

Like other businesses, a decision has to be made before one embarks to invest in a given industry. Oil industry being no unique, the investors showed different factors, which influenced them to invest in the industry. As the main objective of any business is to make profit, this was a factor, which was common alongside others.

The analysis show that those who had worked in oil industry took a decision to invest in the same. As noted earlier most investors had worked in oil industry in different capacities, while others had worked in oil related industry. Another factor, which contributed to invest in oil industry especially for the local investors, is having a plot, which is potential for a service station. In search for a business suitable for a given plot one arrives at the decision that it is only a service station that can serve best. Business people, who have money equivalent to that, which can run a service station, also found it

unsuitable for them to enter in the oil industry. The huge amount of capital required to run a service station cannot be overlooked as there are people who has the urge to invest into this business but they are constrained by capital.

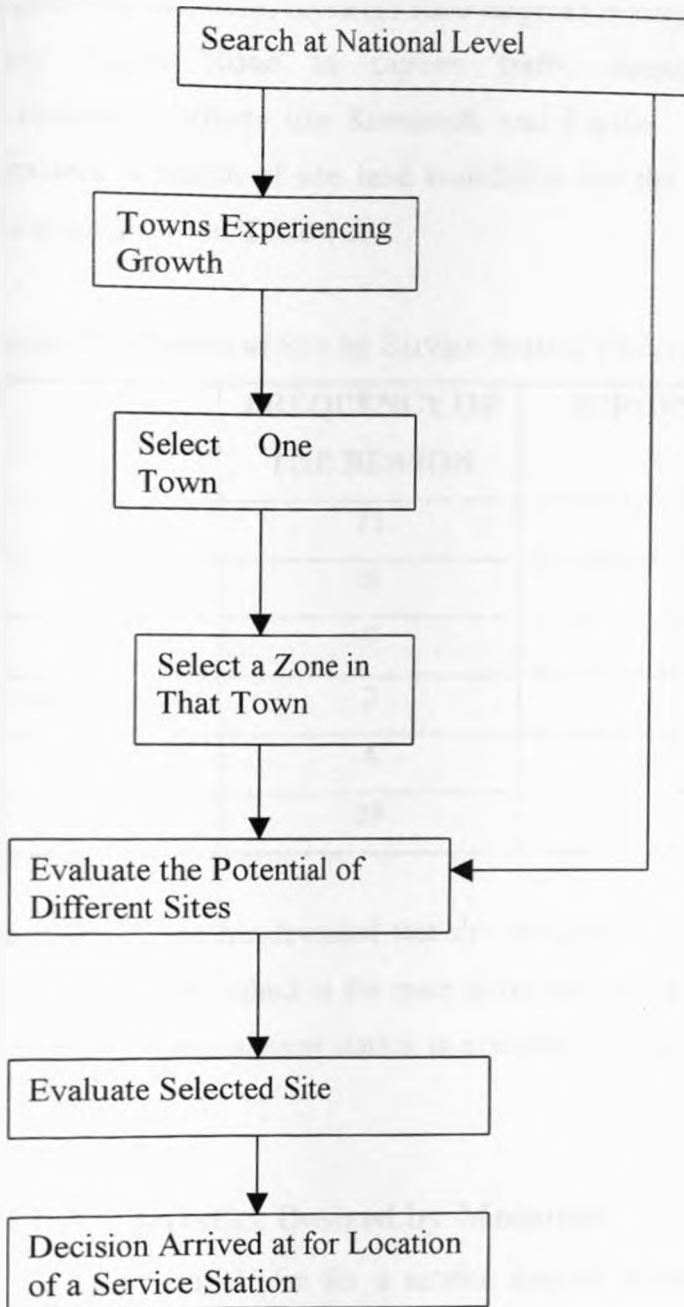
The other factor though rare is a felt need by investors who are especially motorists. From experience, as one drives one feels a need for a service station in a given zone and later on he/she may decide in future to invest in a fuel service station business in that locality.

5.10 Locational Characteristics Desired by the Entrepreneurs

The major motive of the owner/dealer of a service station is an economic one-profit maximization. Hence, he/she will choose a site with particular qualities, which will help him, achieve his/her objective.

When one is making a decision to invest in fuel business, one goes through a search at national level (this applies to multinational companies). He evaluates the towns, which are experiencing growth. Then he scales down to that particular town and evaluates the zones, which are expanding. After that he starts to search for a site, which will capture the traffic, generated. Figure 5.11 shows the logic sequence, which the investor undergoes to arrive at his decision site.

Figure 5.11: Decision Making for Site Selection



The investors seek locations that they are anticipating will generate enough profits. Hence they may settle for an ideal site rather than the rational one. Some sites are too expensive such as the CBD to be developed for a service station and the investors will avoid them.

Zones, which are anticipated, to grow in population, which has potential to own cars, are the ones which are targeted. In this case, investors have targeted mostly Kangundo road, Outer-Ring Road and Jogoo Road to capture traffic coming from newly developed/developing residential effects like Komarock and Kayole. In ranking the factors an investor considers in search of site, land availability was the major reason for selecting a given site as summarized in Table 5.8.

Table 5.8: Major Reason for Choice of Site by Service Station Owners/investors

REASON	FREQUENCY OF THE REASON	PERCENTAGE (%)
Availability of land	15	40
Cheap rent	8	21
Easy access to plot	9	23
Near similar enterprises(Business)	2	5
Others	4	11
TOTAL	38	100

Unlike other businesses the analysis has revealed that the location of a service station is not influenced by the source of fuel, which is the main good sold at the service stations. This is because fuel transport to the service station is provided by the transporters at a minimum charge.

5.11 Locational Characteristics Desired by Motorists

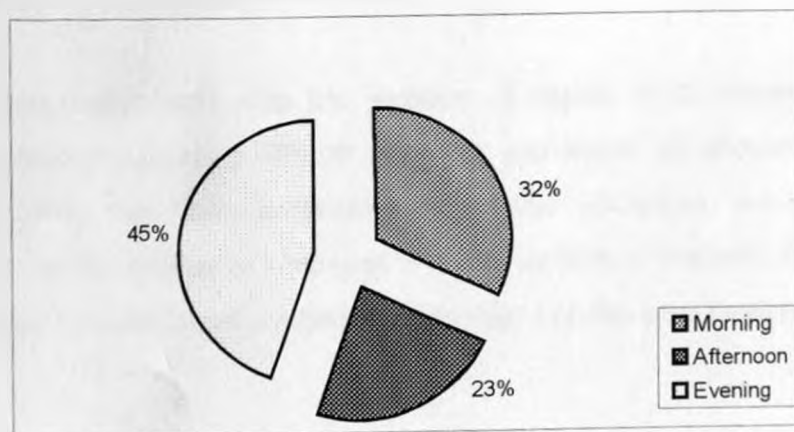
This study considers that a locational plan for a service stations would be incomplete without getting opinions of the motorists who fuel (use services) from the service stations. The study, therefore, set out to establish the motorists' desire as it pertains service stations location and siting.

Unlike other consumption goods, fuel do not rely much on price (in a given station) but rather the time (and where) when one realizes he does not have enough fuel. Table 5.9 summarizes reason(s) why motorists choose to fuel at a given station.

Table 5.9: Major Reason for Motorists Fueling at any One Service Station

MAJOR REASON	FREQUENCY	PERCENTAGE (%)
Proximity	20	21
Quick service	14	14
Accessibility	16	16
Goodwill Customer	13	13
Cheap price	15	16
Unadulterated fuel	13	13
Others	6	7
TOTAL	97	100

Fuelling time preferred is also vital because it will guide us to know which side of the road to build service stations to capture maximum traffic. With the assumption that vehicles go to Nairobi as a destination rather than a by-pass, the motorists indicated that the time preferred for fuelling is as summarized in Figure 5.12. This may explain why most of the service stations are on the left-hand lane as one leaves the city. Most of those people who work in the town fuel in the evening as they go home.

Figure 5.12: Time Preferred for Fueling

5.1.6 The Locational Characteristics Desired by Planners

The study found it necessary to establish the views of planners who are charged with responsibility of organizing activities in space in relation to the location and siting of fuel service stations. The study enquiry involved planners at Nairobi City Council and Physical Planning Department of Ministry of Lands and Settlements

The views of the planners at City hall and those at the Physical Planning Departments were found to agree and were largely a reflection of what is contained in the official city and local government by-laws which govern the organization of all land use activities in the urban space. The planner has a role of judging the demand for space (for business and other activities) using non-commercial criteria while the entrepreneur seeks only to maximize his profits. It is necessary for others to judge whether in doing so he (the planner) serves the community best. The planners' role is to analyze and show the repercussion of different economic activities over space.

The weapons, which the planner wields appear formidable. He asks whether a proposed development is aesthetically pleasing, harmful to the environment and other adjacent infrastructural facilities. He tests whether proposed development conforms to the current plan(s) and whether it will have a damaging effect to the already existing economic and social infrastructures. In cases where the answer to any of these questions is no, he calls for the refusal of permission to develop.

The planner also deals with the question of impact of development. The impact of development is extremely difficult to predict and hence, the planner may have to make decision with help from professions from other disciplines. As a result of this the authority of the planner is weakened and the question of planning for economic activity over space becomes more a political debate than a professional pronouncement

CHAPTER SIX

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

In this chapter, a brief summary of what the research established is discussed in relation to the objectives of the study. Finally, a general conclusion is made and a set of recommendations is given.

6.1 Summary of Findings

The field survey found different scenarios, which are of interest to a planner. A higher number of local owned service stations and, relatively more concentration of multinational owned service stations are concentrated in the Eastlands. This could be explained by the nearly and increasing traffic circulation servicing the neighbourhoods which have comparatively, higher population with increasing motorization of private transport.

The Eastlands has more pronounced problems particularly with the local investors. For instance, several stations are located along the road reserves while others are too close to very inflammable premises like furniture shops and residential houses. Hand in hand with this, other service stations are enclosed in small rooms, which does not meet the minimum planning standards. Multinational companies have invested along main roads occupying prime land especially along Thika road, Waiyaki way and Mombasa road. Categorically service stations of different investors had the following characteristics

6.1.1 Local Owned Service Stations

The study found that these service stations were characterized by inflammable materials. More to this, as a matter of precaution few had adequate fire fighting facilities. Hence, in case of fire, the neighbouring land occupants are at risk. There were also, incompatible land uses like furniture workshops, welding workshops, institutions such as schools and residential houses. The incompatibility leads to the endangered persons to relocate due to the risks involved. There was also evident of traffic congestion especially in the entrances

and exits of service stations. This was mainly due to none provision of well-defined acceleration and deceleration lands. Some stations were using the road as fuelling bay and this also resulted to traffic congestion on the road.

The smaller plot sizes less than the required standards in the service stations lead to congestion of vehicles within the service stations. In some cases, vehicles waiting to fuel have to wait on the road and this interferes with flow of vehicles on the road. The local owned service stations were found not to have clear environmental considerations especially on handling of wastes. Very few had inceptors as required. Lack of proper disposal of wastes lead to environmental pollution. These investors are not keen on levelling and landscaping of the sites of the service station hence they (service stations) do not look attractive.

Many of the local investors owned service stations were smaller investment compared to those of multinational companies. These service stations are run by one or two persons. Considering that there is no land that is zoned purposely for service station and a service station is developed in a change of user land, most of the local investors had little concern over adjoining private properties. In considering investing they consider availability of land rather than comprehensive requirements one needs to consider when locating a service station. The local investors also tend to locate their service stations on road reserves on Temporary Occupation License (TOL) basis, and they interfere with the flow of vehicles or other uses, which the road reserve may be used such as provision of infrastructure.

6.1.2 Multinational Owned Service Stations

Given the large capital needed for their investments, the multinational service stations are usually large investments characterized by huge capital investments. They also occupy prime land in major roads in the City. Many of the multinational service stations were found to have met the required minimum space standards and also provision of other services apart from fuelling.

Unlike the locally owned service stations the multinational have provided clear parking space for their clients. The waiting space is convenient to both the fuelling motorists and other road user as the service station does not in any way interfere with the traffic flow. These service stations are also characterized by landscaping efforts and flower gardening. The service station sites look attractive because of these efforts of beautification. However, in some cases these stations had possible traffic obstruction and more consideration should be put in place to enhance their siting. In some cases they were build next (wall to wall) to each other and thereby creating a scenario where accidents could occur. These service stations were also found to have been sited on road junctions and hence, posing danger to the motorists coming from the service station and those using the road. Although many of the multinational service stations have provided acceleration and deceleration lanes, the lanes are inadequate in some cases.

6.2 Recommendations

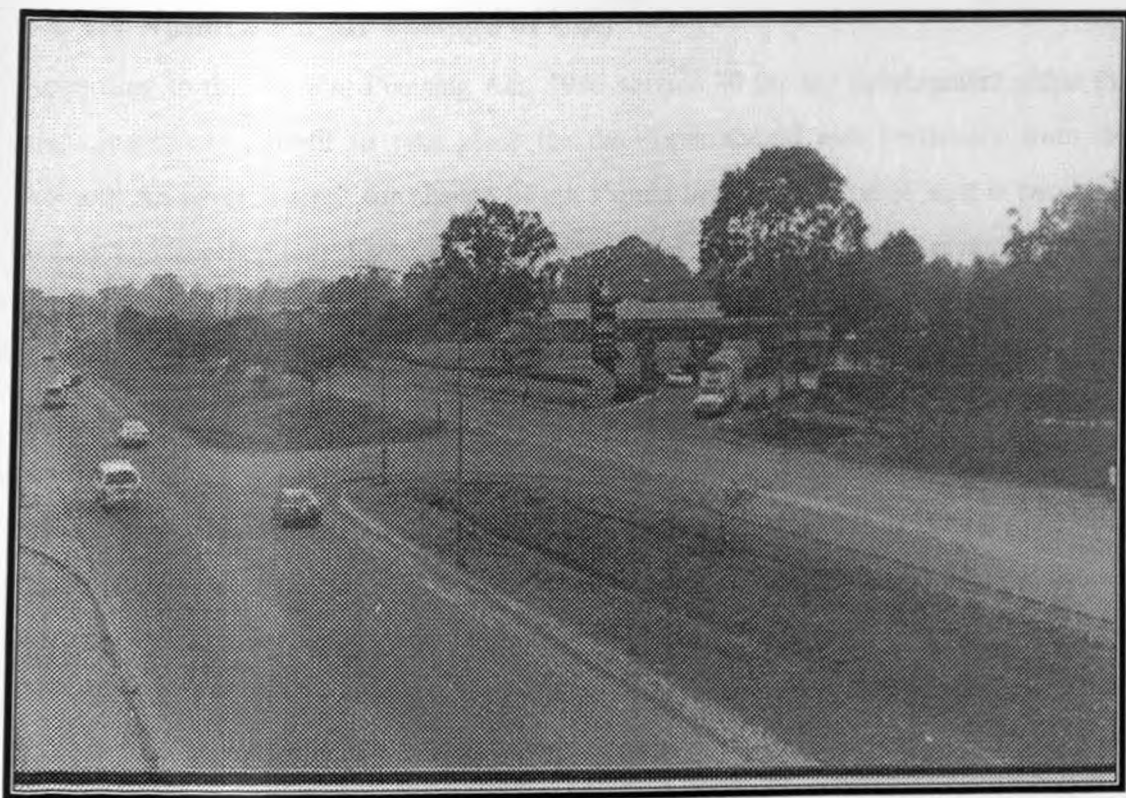
Motor vehicle fuel service stations as noted from the previous chapters are an important aspect in our daily economic life. However, they are highly inflammable businesses and as such their operations should not be left to the private developer alone but should be regulated to ensure that public interest is catered for. As it has been revealed the optimal site may not be the ideal one, hence the regulatory mechanism should restrict in development of optimal sites, which may tamper with the public health and environment. Plate 6.1 shows a well-planned multinational service station on a dual carriageway.

A service station should be compatible with the general environment where it is proposed to the developed. It should not be hazardous to the already existing development. It should be noted that a service station is usually a change of use development and not a zoned development like others. Its location should further not interfere with the traffic flow on the road where it is located and also interfere with traffic from another service station in that vicinity. This means that a minimum distance of 200 metres should be observed consistently. On siting, the service stations should be of a size that allows convenient movement of vehicles within the service station. The site should depend on the activities that are anticipated to be incorporated together with the fuelling. However,

if the parcel of land is small only fuelling should take place and this will ease congestion which could be there if other activities are in place

The site where a service station is should be one where there is no possibility of flooding. However, for easy drainage the site should be sloppy. A sloppy site will allow rainwater to drain to the public drain without a lot of difficult. Like other businesses the site should be visible from far such that one can make a decision if to fuel or not to fuel some minutes before reaching the service station. This will ensure maximum business is achieved. Where the service station is not visible from far it is advisable to erect signs to notify motorists as they approach the site.

Plate 6.1: A Well Planned Multinational Service Station on a Duo Carriage Way



To minimize cost, a site that has water, electricity and sewer line should be given priority. Extending these infrastructures where a service station is to be located will be costly. Where the City/Municipal Council is to provide infrastructure, they may take time and

hence delay the time of initiating such a development. As the study revealed the cost of land cannot be ignored in site selection. A zone that has high rent (land value) and will guarantee maximum returns should be settled for. A site, which has a low land cost and cannot attain the break-even point, should be avoided. Hence, analysis of traffic count verses the site cost should be considered before embarking on a given site development.

6.2.1 Specific Recommendations

Service station is a viable business and many businesspersons would like to venture into it. However, due to the existing situation revealed by this study some measures need to be put in place for purposes of creating an efficient, functioning and co-ordination of the oil industry. They include;

6.2.1.1 Application for Change of User

According to the Physical Planning Act, 1996 section 30 for any development within the municipality/city council to take place the developer should seek permission from the council. An advertisement for change of use should be advertised on at least in two local dailies and another one displayed at the site for at least 60 days. However, this study revealed that rarely do the developers display the advertisements on the site. The neighbourhood occupants rarely do have a chance to note the advertisement. This is mostly because the advertisements have the plot number only. Given that the land, which is converted, to a service station use interferes with the neighbourhood, the Council should ensure that the advertisement is placed on site as stipulated in the Act. More to that, it is here recommended that the advertisements on the dailies should have a map showing the location and the site of the development. To get more public attention the advertisements should appear in the dailies in 2 or 3 days. The Act is silent about the number days, which the advertisement should appear.

6.2.1.2 Minimum Plot Sizes

The current planning standards are tailored for the multinational oil companies, which have enough money to invest. With liberalization, the standards should be reviewed to encourage the local investors to enter this industry. The minimum size of service station

should be determined by the number of pumps rather than stating the minimum size without investigating the activities to take place. As per the current standards the minimum 0.08 Ha plot may be too large for a service station with only one pump. Hence, it is on this basis that the study recommends the minimum size for a service station with one pump to be of minimum 0.04 Ha.

6.2.1.3 Mixed Development

From the study, it has been observed that a new concept whereby a service station has other land uses has emerged. Other development in a service station should be compatible and should not be restricted to bar and restaurants but other land uses such as banking automatic teller machines should be there so as to capture more business. The mixed development creates more employment to the public. Hence, should be encouraged if it does not harm the public interest. The auxiliary development should be of inflammable materials.

Although the study recommends mixed development, it should not however compromise the dominant user. Thus the principle use should occupy 75% of the plot while other development should take 25% including the parking space. For convenience of both the staff and the customers (motorists) separate sanitary facilities should be provided.

6.2.1.4 Accessibility

It has been observed that some service stations are sited opposite each other and this scenario tampers with traffic flow especially along two-way roads. The station should not be opposite each other but on dual-carriageways this should be allowed. For ease accessibility to the service station the pumps should be 15 metres from the perimeter wall. This will allow for good public access from the service front and for vehicular movement. The current planning standards stipulates that a minimum of 100 metres and 30 metres for acceleration and deceleration lanes for both dual-carriage ways and two-way roads should be observed. The study has revealed that in many cases this is not possible as the lanes affect the neighbouring properties. In dual carriage a minimum of 50

metres should be observed while on two-way roads a minimum of 20 metres should be observed. This will have little effect on accessing the adjoining properties.

6.2.1.5 Submission of Plans

For development of service stations, the development plans should be submitted to the City Council; however, this is not the case always. Some developers take evasive moves and erect service stations without approval. On other cases, the planners approve the plans without site inspection. After approving the plans, the planners should make a follow-up to ensure that what they approved is what actually was developed. The study has revealed weakness in implementation of plans after they have been approved. This has been attributed to the few number of planners who are there and as such the council should employ more planners to monitor implementation of plans. The service station should be restricted to the ground floor and where other floors are allowed they should be used for parking purposes. This has been in practice in the CBD where the land values are high and the developers cannot afford to limit themselves to the ground floor.

6.2.1.6 Environmental Standards

High environmental standards should be observed and an Environmental Impact Assessment (EIA) should be conducted before establishment of a service station. The EIA is an indication of environmental vulnerability of a site with respect to economic activities on the site. From the analysis, two observations can be made

- (i) Service station has higher environmental degradation effects than other economic activities. Once a site has been changed to use of a service station rarely will the site be used again for another economic activity.
- (ii) Once established, the site requires efforts of degradation so as to be in harmony with the surrounding. The service station may distort the landscape.

Indeed, from this two observation the environmental impact is a concern which should be strengthened in the Physical Planning Act, 1996 as well as in the Environmental Act 1999. The main wastes from service station bays should be passed through an interceptor prior to discharge them into the public drain. This will ensure high standards of

cleanliness within the premises as well as the surroundings. Plate 6.2 shows service station, which has been well integrated in built up area. It is hereby then recommended that an inspection of service station from time to time is necessary to verify their methods

Plate 6.2: A Multinational Service station Where Beautification has been done



of waste disposal. Disposing of contaminated oils to the public drain will have negative impact on the environment.

6.2.1.7 Safety and Public Health.

Due to the high risks involved in a service station the Public Health Department should ensure that the premises are safe for both the public and the staff. A perimeter wall for the service station, which is adjacent to other premises, should be erected. The perimeter wall will prevent fire from spreading in case there is a break up. Hand in hand with perimeter wall, fire-fighting facilities should be readily available and should be placed in strategic position. In the field survey, some of the facilities were in the offices where there would

be out of reach in case of firebreak up. The erection of the perimeter wall will make the service station to be more compatible with its adjacent premises.

6.2.1.8 Siting of Service on Temporary Occupation License (TOL)

Basis

In the field survey, some service stations were found to be located on TOLS. Because of permanency of this investments, when the city council may need the land for expansion or provision of infrastructure, there may be a problem as displacing the huge investment will mean loss of capital as well as employment. The City Council should not approve any service station, which is proposed to be developed on a TOL. This will increase efficiency in delivery of services such as expansion of road. Only temporarily business therefore those, which do not require fixed premises, should be allocated land on the basis of TOLS.

6.2.1.9 Interval between Service Station

The current planning standards do not have a precise interval that should be observed between the existing service stations and the proposed one. The interval should be at least 200 metres, as this will allow accessibility to the stations. An interval of 200 metres will not abstract traffic entering or leaving any of the service stations neighbouring each other

6.2.1.10 Distance from the Junction

Service stations have been found to interfere with the traffic flow because of slowing down. They should be sited at least 200 metres from junctions and roundabouts. This will ensure that motorists can see them from far and make a decision of fuelling or not

6.3 Future Research Areas

This study on location and siting of motor vehicle service station is not conclusive is not conclusive and hence further studies are required in other supplementary areas. First, is a study on the contribution to the economy of the establishment of locally owned service

stations with a view of creating employment and hence alleviating poverty. Secondly, there is a need for comparative studies of Kenya and another country where the economy has been liberalized for a long time. This will help to know how the policies on liberalization of oil industry can be of maximum benefits with minimum costs. Finally, a detailed study on environment effects is required. This study will address how the negative environmental effects can be dealt with.

6.4 Conclusion

The study set out to investigate the factors at planning level that has resulted to the uncoordinated and haphazard development of service station in Nairobi City. The city has experienced major policy changes to guide the industry. However, in 1994 when the industry was liberalized, the policies in place were not tailored to suit the smooth operation of the industry. It is important to note that it is not only Nairobi City that is affected but even other towns are experiencing similar problems but the situation is more pronounced in Nairobi.

As Kenya pursues economic reform programmes that move the economy from a regulated one to a more market dominated system, checks and measures have to be put in place. The drastic effects and impacts of economic reforms on development call for new national urban development strategies that are more suited to the new economic and social situation. The planning philosophies, approaches, methodologies and mechanisms for dealing with urbanization under market condition are grossly underdeveloped in Kenya. Of special concern are the policies and mechanism for urban management and governance that are needed not only to ensure continued economic growth but also to maintain the built environment and reduce health hazards.

Liberalization of the economy is the key notion of the current government policies. Thus, the government emphasis on uncontrolled economy whereby it will be only a regulator. The oil industry was not been left behind and it was liberalized in 1994. The effects of the liberalization as highlighted by the study have led to negative effects, which

outweighs the presumed benefits. The study has revealed the negative implications the liberalization has on the economy and the environment of the city. The study has also revealed the change of policies that the various actors in the industry would like to be put in place. This will ensure that service stations, as vital elements in the city are located in optimal sites without jeopardizing the welfare of the public. At the end, the study gives some recommendations, which are drawn from the entire study. As no other study has been carried in this vital industry, the study has set a step towards that end.

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APPENDIX I

UNIVERSITY OF NAIROBI
Department of Urban and Regional Planning.

TOPIC: Planning for motor vehicle fuel service stations in Nairobi city.

Questionnaire for motor vehicle fuel service station Owners/Dealers.

This information is confidential and will be used for academic purposes only. Your co-operation will be highly appreciated.

Questionnaire No:

Date of Interview:

I GENERAL INFORMATION

1. Name of the respondent.....
2. Position of the respondent
 - a) Owner /Dealer
 - b) Employee
 - c) Relative
 - d) Others (specify)
3. Name of the service station
4. (a) Location (Area)
- (b) Type of road where located

II CHARACTERISTIC OF THE SERVICE STATION.

1. When it was the service station opened.....
2. Ownership of assets at the service station.
 - (i) Multinational
 - (ii) Local Investors.....
3. If local investors what is the mode of ownership?
 - i. Sole
 - ii. Partnership
 - iii. Others (specify)

4. Source of capital

Source	Amount
1. Own savings	
2. Borrowing from friends and relatives	
3. Commercial banks	
4. Others	

5. Type of land tenure where the service station is located

- a) Leasehold/Freehold
- b) Temporary occupancy license (TOL)
- c) Others (specify)

6. No of employees

Male	Female	Total

7. List of activities at the service station in order of space utilization.

- (i)
- (ii)
- (iii)
- (iv)
- (v)
- (vi)

8. Services/ facilities available in the service station.

- (i) Water
- (ii) Air
- (iii) Mini supermarket
- (iv) Cafes
- (v) Toilets
- (vi) Service bay
- (vii) Fire fighting facilities
- (viii) Others (specify)

9. Fuel sold

Type	Price per litre	Approximate sales per month	Approximate volume. Per month	Volume By %
1. Premium				
2. Regular				
3 Diesel				
4. Others				

10. Who are the most frequent number of customers in your service station in Order of fuel consumed on average per month?

	Saloon cars	Mini buses (mutates)	Transporters (lorries)
Number			
%			

11. What made you invest in the oil industry?

.....

.....

.....

.....

.....

12. List type of waste and how you dispose them

Type of waste	Method of disposal

III SITE INFORMATION

1. Why did you choose this specific site for your business? (Give reasons)

.....

.....

.....

.....

.....

2. Measurement of the area occupied by the service station

Frontage (m)	
Depth (m)	
Area (Ha)	

3. Approximately how much do you/would you pay for the rent of this land per month?

.....

4 Length of the access lanes to and from the service station

Accelerating lane (m)	
Decelerating lane (m)	

5. Distance to the nearest service station?

Same side of the roadmetres

Opposite side of the roadmetres

6. What are the bordering land uses?

Side 1:

Side 2:

Rear side:

IV SOCIAL-ECONOMIC INFORMATION

1. Age

2. Sex Male=1 Female=2

3. Highest education level.....
Primary=1 Secondary=2 Tertiary and above=3 none=4

4. (a) Did you have any prior experience in the oil industry before you decided to venture in the industry? Yes=1 no=2

(b) If yes explain:

.....

.....

.....

.....

.....

.....

5. What problems do you face in your business due to where it is located?

.....

.....

.....

.....

6 List problems faced as a result of deregulation in 1994

.....

.....

.....

.....

.....

7. What are your views on deregulation of oil industry in Kenya?

.....

.....

.....

.....

.....

8. Rank the three most important difficulties, which one must overcome before establishing service station (Arrange in order of importance).

- (i) Lack of or inadequate capital or credit
- (ii) Technical know how/skilled workers
- (iii) Finding suitable premises
- (iv) High license fees
- (v) Strict regulatory framework
- (vi) Others (specify).

9. a) Do you belong to any petroleum business association which caters for businesspersons in petroleum industry?

YES =1

NO=2

b) If Yes, which one

c) What is its role?

.....

.....

.....

.....

(d) What are its problems?

.....

.....

.....

.....

.....

10. Due to the competition, which is quite evident in the oil industry, what are you doing to improve your business?

.....

.....

.....

.....

11. What would you propose the government to do in order to improve performance of the oil industry in general and specifically your enterprise?

.....

.....

.....

.....

.....

.....

Thank you

APPENDIX II

UNIVERSITY OF NAIROBI

Department of urban and Regional Planning

TOPIC: Planning for motor vehicle fuel service station in Nairobi city.**Questionnaire for motorists.**

This information is confidential and will be used for academic purposes only Your co-operation will be highly appreciated.

Questionnaire No:

Date of interview:

1. Name of respondent

2. Type of vehicle

3. Service station name

3. Area

4. Why have you chosen to fuel your vehicle in this service station?

- (i) Cheap Price
- (ii) Quick service
- (iii) The management is friendly
- (iv) Convenience as they accept cards
- (v) The nearest service station
- (vi) Ease access
- (vii) Goodwill customer
- (viii) Pure fuel available (Unadulterated fuel)
- (ix) Others (specify)

5. (a)What time of the day do you prefer fuelling your vehicle?

.....

(b)Why?.....

.....

6. Fuel consumed in litres..... Ksh.....

7. What is your view on deregulation of oil industry in Kenya?

.....
.....
.....
.....
.....
.....
.....

8. In your view what facilities should an ideal service station have?

- i. Water
- ii. Air
- iii. Mini supermarket
- iv. Cafes
- v. Toilets
- vi. Service bay
- vii. Car wash
- viii. Fire fighting facilities
- ix. Others (specify)

Thank you

APPENDIX III

UNIVERSITY OF NAIROBI
Department of Urban and Regional Planning.

TOPIC: Planning for motor vehicle fuel service station in Nairobi city

Questionnaire for Enterprises/Households Neighboring the motor fuel service station

This information is confidential and will be used for academic purposes only. Your co-operation will be highly appreciated.

Questionnaire No:

Date of Interview:

1. When did you start living /doing business here?.....

2.(a) During establishment of this service station did the investor and / or the City

Council officials consult you.

Yes=1

No=2

(b) If yes, explain.....

.....
.....
.....
.....

3. What do you think should be considered in the neighborhood when one is establishing a motor fuel service station?

.....
.....
.....
.....

4. (a)Do you at any one time utilize the services offered by this service station?

Yes=1

No=2

(b) If yes what services /products does the service station offer you?

- I.
- II.
- III.
- IV.
- V.
- VI.
- VII.

5. (a)How does this service station affect you positively?

.....

.....

.....

(b) How does the station affect you negatively?

.....

.....

.....

.....

.....

6. (a)Do you wish to relocate due to the negative effects of the station?

Yes =1

No=2

(b) If yes why?

.....

.....

.....

.....

7. How can the station be improved to serve you and the entire neighbourhood better?

.....

.....

.....

.....

8 How has the service station affected the value of your property (e.g. land, houses e.t.c)?

.....
.....
.....
.....

9 What is the value of your land in HA?

10 What are the environments effects of the station to the neighbourhood in general?

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.....
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.....
.....
.....
.....

Thank you