IMPACT OF TRANSPORT STRATEGIES ON OPERATIONAL COSTS: CASE STUDY OF TRANSPORT SECTION AT KENYATTA UNIVERSITY

By

Sophia Irene AYOMA

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School of Business
University of Nairobi

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DECLARATION

This research project is my original work and has not been presented to any other university for academic award

Signed ---------- Date----------

Ayoma Irene Sopahia

Reg. No. D61/60493/2011

This research project has been submitted for examination with my approval as the university supervisor

Signed---------- Date----------

Prof. Wainaina Gituro

Department of Management Science

School of Business

University of Nairobi

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DEDICATION

This work is dedicated to my mother Rosemary Ambasa Ndanyi and my late father Mr. Ndanyi who laid a quality academic foundation for me and to my brothers, sisters and friends for their moral and financial support, encouragement and prayers throughout the duration of my studies.

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ABSTRACT

Transport management is a function which allows companies which rely on transportation in business to remove or minimize the risks associated with vehicle investment thus improving efficiency, productivity and reducing their overall transportation and staff costs and providing 100 percent compliance with government legislation. Transport management entails trip scheduling, vehicle repair and maintenance, fuel management and allocation of duties to drivers.

The research approach adopted is a case study of Kenyatta University (KU) transport section. The main objective of the study was to evaluate transport management with specific objective being evaluation of adopted transport strategies and determining the impact of these strategies on operational cost. The study was guided by five major strategies in the transport sector which are outsourcing of transport services, fuel management, vehicle maintenance, vehicle sharing and use of navigation assistance. The study, being a case drew its major respondents from the transport section. School administrators were also used to augment information gathered from transport section respondents. The study also used secondary data to find the actual transport operational cost.

Data collected from the questionnaires was analyzed using descriptive statistics and content analysis for the qualitative narrations. Findings of this study provided evidence that transport strategies adopted by KU transport section were the major reason for high operation costs. The specific objectives were to evaluate strategies adopted by KU and their impact on operational costs. The study showed that strategies adopted increased inefficient use of resources by increasing Kilometers (km) covered and increased irresponsible driving among drivers which increased the cost of vehicle maintenance, fuel consumption and consequently the cost of operations. This study recommends that transport section should adopt strategies that enhance efficiency and effective use of resources that considerably reduce operational costs.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Transport management is the management of a company's transportation fleet. This includes commercial motor vehicles such as cars, ships, vans and trucks, as well as rail cars. Transport management has a range of functions, such as vehicle financing, vehicle maintenance, vehicle telemetric (tracking and diagnostics), driver management, speed management, fuel management and health and safety management. Transport management is a function which allows companies which rely on transportation in business to remove or minimize the risks associated with vehicle investment thus improving efficiency, productivity and reducing their overall transportation and staff costs and providing 100 percent compliance with government legislation (Jordan, 2011).

Transport management is guided by industries best practices and vehicle manufacturers' standards. These two guides act as benchmark in evaluation of transport system. Vehicle manufactures have standards and requirements for all their models which act as guide in operation and maintenance. The most commonly used standard by vehicle manufacturers is the fuel consumption rate. This standard gives the recommended distance to be covered using a litre of fuel. The consumption rates helps gauge vehicle performance and can detect early mechanical malfunctions. Vehicle manufacturers recommend a regular service after a vehicle covers 5,000 km or after six months whichever comes first and a full service when a vehicle covers 10,000 km or 12 months. A properly-maintained vehicle is not only more fuel-efficient, but will be safer and more reliable as faults will come to light at an earlier stage and are less likely to result in a breakdown. Regular service limits the amount of wear and tear on the vehicle, which means it will hold its value at a point of sale (Kirk, 1998)

On transport industry best practice, vehicle allocation should be done on a one vehicle one driver basis. Experience in the industry shows that such allocation gives drivers a sense of vehicle ownership and therefore become more responsible in taking care of the

vehicle. There is high fuel efficiency when a vehicle is driven by the same driver and vehicle ownership has proved to increase productivity in drivers (Murray, 2010). Industry best practice on trip scheduling promotes systematic advance scheduling as it gives room for trip preparation, vehicle preparation and the driver has ample time to psychologically prepare for the trip. It has been established that a well rested driver is less likely to cause accidents. On vehicle disposal, the rule of thumb is that older vehicles require more frequent and costly maintenance than newer vehicles. An organization therefore requires a vehicle disposal policy stating how long a vehicle should be kept in service.

1.1.1 Transport Strategies

This is a management approach that gives direction on how to manage fleet effectively. There are various transport strategies that could be adopted to give transport management a competitive edge by increasing productivity and reducing waste. Among these are outsourcing of transport services, fuel management, use of pool transport (sharing), navigation and tracking of vehicles and vehicle maintenance (Antich, 2007).

Outsourcing is a situation in which an organization contracts with an external service to carryout business functions that were previously performed in- house (Foster and Muller, 1990). The practice has become common in industrialized countries because it is often less expensive and more efficient for companies to use outside expertise for non core activities like transport services. Outsourcing is not an easy solution that will end all logistic concerns and most certainly will not relieve an organization of the responsibility of managing its transportation system. The decision to outsource comes from determining whether it is more advantageous for an organization to shift from carrying out specific transportation tasks on its own to managing contracts for implementation of these tasks by an outside party. To make outsourcing successful, an organization must maintain constant involvement in the transport management and develop special skills particularly in contract management (Wat, 2010).

Advantages of outsourcing transport services are reduced costs, improved operational performance in terms of quality, timeliness and productivity of the transport management system. It allows the host organization to focus more on its core business. Outsourcing gives the organization increased flexibility to deal with the ever changing business condition. Outsourcing compensates for lack of internal expertise, capacity or technological resources or benefits for unique advantages outside providers may have in this area (Foster and Muller, 1990).

Fuel management systems are used to maintain, control and monitor fuel consumption. The systems are designed to effectively measure and manage the use of fuel within the transportation industries. They are typically used for fleets of vehicles, including railway vehicles and aircraft, as well as any vehicle that requires fuel to operate. They employ various methods and technologies to monitor and track fuel inventories, fuel purchases and fuel dispensed. The information is then stored in computerized systems and reports generated with data to inform management practices. There are several types of fuel management systems, card-based fuel management systems typically track fuel transactions based on a fueling credit card and the associated driver personal information. Reports are then generated based on fuel consumption by driver (Zipki, 2003).

Past research in vehicle sharing programs originated from social perspectives of sharing resources (Melnyk, 1999). The study reckons that the most effective way to reduce operational costs is to reduce the total number of vehicle km travelled. This action can reduce both annual fuel and maintenance costs whilst improving road safety. One way to reduce vehicle use is the use of corporate car pooling. While operational needs are likely to determine whether car pooling is a viable cost reduction strategy, increasing staff awareness of the travel plans of other employees can be a useful way to increase car sharing. One simple way to encourage car pooling is to establish an electronic vehicle booking system and then ensure that the system is readily accessible to all staff (possibly via the corporate intranet system) with such information including the proposed trip itinerary and the number of staff travelling.

Navigation assistance is another strategy that fleet managers can use to make trips more efficient. Navigation technology is now well developed and is often included as a bonus item when a new vehicle is purchased. Providing navigation assistance to users through satellite navigation units can be a cost effective way to help reduce fuel costs, particularly for longer and unfamiliar trips. Utilizing navigation technology can result in better dispatching and routing, monitoring inefficient employee practices and can potentially eliminate any unauthorized vehicle use (Melnyk, 1999). Further, navigation improves vehicle security as it monitors vehicle movement.

Regular vehicle maintenance ensures maximum car performance and also prevents costly repairs. Sometimes, even the smallest defect that seems irrelevant may lead to a major problem which may consequently increase car maintenance costs (DiNapoli, 2011). Other advantages of regular vehicle maintenance are increase safety- safe driving is directly related to the condition of the car. If the car's ability to run properly is impaired, safety risks increase for all vehicle occupants and everyone else on the road. Regular vehicle maintenance further boosts performance, improves fuel economy and extends vehicle lifespan. In addition, a well-maintained car has a higher selling value which helps one acquire a better return on investment upon resale (Richardson, 2001).

1.1.2 Transport Operational Costs

A company may make a decision to have an in-house vehicle fleet based on the needs of the company to get goods to customers as quickly as possible. However, the convenience of having a vehicle fleet to transport items at a moment notice comes at a considerable price (Foster and Muller, 1990). Some of the transport costs incurred from an in-house transport system are vehicle costs. The cost of purchasing or leasing a vehicle is very expensive, insurance cost - its primary use is to provide financial protection against physical damage and/or bodily injury resulting from traffic collisions and against liability that could also arise there from, fuel costs - this is the largest recurrent cost as vehicles require fuel to move from one place to another, vehicle maintenance cost - owning a fleet of vehicles means that those vehicles need to be maintained, transportation of employees operating a fleet means that a company must either employee drivers or use contract

drivers. Employee drivers not only have a payroll liability to the company, but there are other costs for employees such as worker's compensation insurance, taxes and health insurance. Contract drivers can provide a similar service at a lower cost, but hiring contract drivers can lead to liability problems if the contract drivers do not have the necessary insurance. Another cost is employee training - new drivers need to be trained and that is an additional cost to the company. The cost of either purchasing training or developing the courses in house have further hidden costs (Murray, 2010).

1.1.3 Transport at Kenyatta University

Kenyatta University is a public institution with a student population of 62,000 and 3,000 staff. It has an in- house transport system that provides transport services to students on educational trips and staff on official duty. The university has a fleet of 92 vehicles of varied composition that are managed centrally under the transport section. The section has a total of 74 staff of which 56 are drivers, 13 mechanics and five administrative staff. The section provides the following services, transport for students on academic field trips, transport for staff on official duties, ambulance services, transport for students with disabilities, making arrangements for valuation, insurance and inspection of the university's motor vehicles, fueling of university vehicles and generators, repairs and maintenance of university vehicles.

Currently, the university has 15 schools with several teaching and non teaching departments, directorates and sections. All units use university transport to convey staff on official duties, students on academic field trips and to transport goods from one place to another. High student population and numerous university functions place high demand for transport. This in turn puts demand on management to recruit more drivers and purchase more vehicles. For the past five years, number of vehicles has increased from 31 to 92. Consequently, the number of drivers has increased from 30 to 56.

The high demand for transport has led to adoption of strategies that help cater for the demand. With the opening of Ruiru Campus in 2006, the university used in house transport to shuttle students from Ruiru to main campus for classes and back. The exercise went on for three years but proved to be expensive. Two buses were allocated

and per day each bus covered about 300 kms. The exercise required four drivers working two shifts per day. With the rapid growth in student population, the exercise was found to be economically unsustainable. The student shuttle was outsourced to external service providers thus reducing the burden on the transport section.

For a large fleet and huge fuel expense, the section monitors fuel consumption manually using Microsoft Excel. The exercise is manual and cannot provide timely reports and alerts when need. Kenyatta University, being a public institution has its operations governed by government regulations. In 2010, Kenyan Government commissioned all government institution to install a Global Positioning System (GPS) tracking device. The device helps curb vehicle misuse and improves security as it monitors vehicle movement. In quest to comply with government requirement, the university approached a vehicle track company to provide the service on trial basis. During the period under trial, vehicle misuse could easily be identified and stopped. Drivers who were unfamiliar routes were assisted. Another government policy is on educational trips; all educational trips are to be conducted during the day and traveling past 6.00 pm is prohibited. This was introduced to reduce accidents as driving was limited to daytime when there is proper visibility.

1.2 Research Problem

Bradley (1995) in his study on outsourcing logistics underscores the importance of outsourcing. Outsourcing reduces capital investment in facilities, equipment, information technology and manpower. This allows the user firm greater flexibility in adapting to changes in the market and access to leading edge technology. The study also shows the disadvantages that come with outsourcing. Among them are loss of control to third-party provider, losing touch with important information, failure to select or manage providers properly, unreliable promises of the providers, their inability to respond to changing requirements, their lack of understanding of the buyer's business goals and difficulty of changing providers have also been cited as potential problems by their users.

Fleet management strategies that consider demand are developed for vehicle sharing system. In developing these strategies, no assumptions are made on specific operational

characteristic and demand processes of a particular system. Demand is known and determined as reservation for vehicles is done in advance. Nair and Hooks (2010) emphasize on the importance of use of this strategy as a fleet management solution in that it reduces cost of vehicle ownership without necessarily compromising on flexibility. Vehicles are viewed as a resource that spends most of its time idle and depreciating in value. More efficient use of this resource implies lower costs for organizations.

Organizations that use transport services need a transport strategy that would enable them to effectively deliver services and meet customer requirement. A good strategy if well implemented, should lead to an effective administration of a transport program and have a positive impact on the cost effectiveness of fleet operation (Murray, 2010). Implementation of strategy, however may not be the optimal solution to high operational costs. The strategy an organization chooses may improve transport effectiveness and at the same time increase costs. For example, use of navigation system and car tracking devices have a high capital investment that most organizations may not see fit to invest in. Vehicle sharing on the other hand may help reduce operational costs from reduced mileage covered per request but its inflexibility may cost organizations much more in the long run.

The KU transport section has had challenges in management of its fleet. The section has a sizable fleet of new vehicles and a considerable number of drivers. Despite of this, there has been a continuous out cry of fewer drivers and vehicles to cater for the growing student population as well as university activities. Drivers are overworked and in most cases they work for over 12 hours a day, seven days a week without a break. The problem in the section is further compounded by high vehicle breakdown and high operational costs. With a relatively new fleet it is assumed that maintenance costs would reduce, this is not the case. One year old vehicles have developed major mechanical problems, for example with the clutch system, the steering system and with the suspension system.KBJ 563U a Toyota Avanza has undergone an engine overhaul only one year after purchase. A KBG 090C Toyota Corolla has had a clutch replacement in eight months having covered less than 50,000 km. The trend is alarming, is the strategy

adopted therefore the reason for high vehicle breakdown and high operational costs? The study sought to determine the impact transport strategies have on operational costs.

1.3 Research Objectives

The main aim of this study was to evaluate the transport management system at KU. The specific objectives were to:

i. Evaluate the transport strategies adopted by KU.
ii. Determine the impact of the strategies on transport operational cost.

1.4 Value of the Study

Results of this study will be significant at theoretical, empirical and policy level. Specifically, the study will be of significant importance to KU management and policy makers because it will guide in the choice of strategy to use. Management will be guided to adopt strategies that will yield high productivity and at the same time reduce costs.

The results of this study will also be invaluable to researchers and scholars, as it will form a basis for further research in transport management. The study will be a source of reference material for future researchers on related topic. Researchers and academics will benefit from the study through additional understanding. On the basis of this knowledge, this study is will extend the frontiers of knowledge in the area of transport management.

The study will also assist other organizations especially those in the public sector to rationalize the choice of their transport strategies. Organizations will be guided on the strategies that best suits their operations and transport requirement. The study will further guide organizations on how to optimize transport operational cost while improving efficiency of their service delivery.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter covers literature review of the main issues surrounding transport management practices for example scheduling, fuel management and strategies applied within the industry.

2.2 Transport Strategies

In recent years, many companies worldwide have been focusing on their core business, downsizing and outsourcing, in order to weather adverse economic conditions. In effect, their approach to improving performance has been essentially inward-looking. However, there is a developing consensus that this tactic may have run its course. Companies, in particular those within the supply chain, must now turn to more outward-looking approaches, such as providing higher added value to customers and developing better working relationships and ultimately partnerships, if they are really to improve their performance and that of industry in general (Kirk, 1998). Nowhere is this thinking more evident than in the automotive industry. There are dramatic changes which have occurred within some of the automotive industry's major organizations. However, the component supply chain companies are of equal importance to economic interests and these companies are now being forced to cope with a much greater range of competitive pressures than ever before. Compounding the difficulties caused by successive worldwide recessions, other factors include increasing pressures from discerning customers and developing competitors, growth in Information Technology (IT) has been rapidly developing to support the complete range of business activities and help revolutionize ways of working. Demand being placed on the supply chain have made its management a major issue with the subsequent breaking of new ground in terms of performance requirements (Gould, 1990).

Companies are increasingly facing competition from unexpected sources. Supportive functions of the company are now major targets in cost reduction in order for the

company to remain competitive without compromising quality. Optimization of cost in transport management can be achieved by reducing vehicle usage. This can be achieved by encouraging corporate car pooling for staff on official duties. Cost reduction in transport management can also be achieved by use of navigation assistance for long and unfamiliar trips. This reduces the chance of getting lost and covering unnecessary mileage. Information on travel time and route selection could be provided to avoid use of congested routes that could increase fuel costs. Drivers play a key role in cost reduction and they should be trained on speed management and other good driving practices that are fuel efficient (DiNapoli, 2011).

2.3 Review of Past Studies

George (1991) in his model for fleet sizing and vehicle allocation observed that there are important interactions between decision in sizing a vehicle fleet and decisions on utilizing that fleet. Transportation systems frequently contained fleets of vehicles which circulate on networks, carrying people and/or goods. The capacity of a transportation system was directly related to the number of available vehicles invested in to meet demand. Servicing demand resulted in the re-allocation of available vehicles. The demand according to George was often imbalanced and this implied the need for re-distribution of idle vehicles over the network from location at which they had become idle to locations at which they could be re-used. Thus, the fleet of vehicles which was available for service at any given time depended upon the re-distribution strategy. The focus of the study was to investigate the interaction between fleet sizing decisions and vehicle distribution or utilization decisions and their combined effect on capacity and efficiency of transportation system. To carry out this investigation, an optimization model was formulated which included interaction between fleet size and vehicle allocations as well as the dynamic and uncertain elements of the problem. The model could achieve benefits associated with reduced operating costs but could not address long term decisions of investment in a vehicle. From the study, it was observed that there are important interactions between investment decisions on sizing a vehicle fleet and operating decisions on utilizing that fleet. An analysis of these interactions required attention to both the dynamic aspect of transportation system and uncertainty in demand and system performance.

Brandao (2009) echoed that determining the optimal size of fleet involved tactical, strategic and operational decisions. Having an optimal fleet size ensured that a company did not spend unnecessary money on vehicles which were not actually needed. For globally competitive companies, this had become increasingly important over the past decades. Brandao addressed these costs in his paper by creating a tabu-search algorithm for tackling the fleet size and mix problems. It was his opinion that fixed costs are considered in tactical decision making, where decisions needed to be taken to vehicle choice and number whereas variable costs are considered in daily planning. These two costs made up the objective function in his model, of which the objective was to minimize cost. Whereas the objective was to minimize costs the study fails to address how the variable costs can be reduced.

Waters (1990) in his study on fleet management observed that vehicle scheduling is one of the most commonly occurring problems of transport management. Traditionally, human schedulers tackled these problems but over the past 30 years, a considerable effort had been put into developing computer systems to replace or assist them. Despite this effort, very few organizations routinely used computerized vehicle scheduling. There were several reasons to this including the difficulty in dealing with real complexities and uncertainty. In the past years, interactive systems had tried to overcome these difficulties by using humans to play a part in scheduling. Unfortunately, there was considerable diversity in scheduling problems and little agreement about the facts or rules needed for knowledge base. At present, some characteristics of a general expert system for vehicle scheduling could be suggested but several practical difficulties must still be overcome. In his study, Waters developed a computer assisted vehicle scheduling model which comprised of the following stages. First was formulation of simplified problems and attempts to find optimal solutions, second was development of heuristics to automatically give good solutions to large and more complex problems and third was use of interactive procedures to allow for real circumstances and give better solutions. In the findings, it was observed that transportation industry does not make widespread use of available software, but technological development may increase the attractiveness of computer use.

It was further ascertained that there are many difficulties to be overcome before a general expert system can be designed for vehicle scheduling problems. These difficulties include the diversity of problems and lack of agreed facts and rules to form a knowledge base.

William and Oscar's (1980) study on minimum cost fleet sizing for a university motor pool was engineered by the university administration. Their aim was to investigate the possibility of cost effectiveness of the motor pools operation with a specific focus on the size and composition of the dispatch fleet. The university at that time had a fleet of 900 vehicles and the concern for the administration was motivated by a continuing budget squeeze. The university policy as it were, encouraged the use of fleet and this proved not to be an easy task for the two scholars. Seemingly, increasing the size of fleet reduced the number of unsatisfied requests. Increment of fleet capacity increased the fixed cost associated with fleet ownership and the implicit costs of opportunity foregone. To analyze the costs incurred by the university, William and Oscar came up with a four cost model which comprised of a dispatch fleet overhead that entailed a total of motor pool administrative burden allocated to the dispatch fleet. Secondly, fleet ownership which comprised of the fixed costs incurred by owning a vehicle. Thirdly, fleet vehicle operation cost, which is the variable cost incurred by operating a dispatch vehicle. Lastly, reimbursement of the cost paid to employees for travel in a personal vehicle when a university vehicle is unavailable. The findings of the study helped the university reduce the fleet size from 900 to 100 vehicles. The motor pool began implementation of an information system to better forecast fleet demands and to monitor vehicle utilization. Fleet composition policies were evaluated resulting in a shift towards smaller and more efficient vehicles. The study focused on reducing the number of vehicles and did not tackle the day to day operations which if streamlined could reduce costs considerably.

Hockaday (1960) study on motor fleet operation in the police force shows that the police administrator was unaware of the detailed operations of fleet. The administrator was simply satisfied if the personnel are equipped with relatively good automobile so that there were few or no complaints. The police administrator rationalized that patrol car was a necessary tool and that the cost had always been high. However, the cost of operation could be reduced with great efficiency. The study revealed that there was a wide variation

in fleet record system and therefore there was no available standard for comparison. The main cause for inefficiency in the police force was that unlike the industry sector, the police administrator was not forced to continually analyze the fleet operations to effect economy. The administrator only showed the need for the enforcement officers to be equipped with powerful and dependable vehicles which were costly to buy and maintain. To help solve the problem in the police force, the study pointed out that the focus of the organization should be on transportation and not automobiles. Organizations were more inclined to think of fleet as how many cars instead of the mileage covered. It was further ascertained that a common denominator in fleet management was cost per mile. In the analysis, cost per mile was made up of three factors operation, maintenance and replacement - this entails the cost of any repairs that must be made on the vehicle and the actual cost of replacing the used car. To further his argument, Hockaday recognized that the driver was the primary factor in economy of operations and maintenance. The driver was the one who could save or knock any program of economy. To improve driver efficiency, management needed to train and closely supervise drivers. The study touched on transport records but did not address how the records could be used to increase efficiency and reduce costs.

The prevailing literature has outlined various ways in which fleet composition and size affect efficiency and effectiveness in management of fleet. It shows how the use of information system improves transport operations by forecasting fleet demand and monitoring vehicle utilization. It further reveals how organization culture, like the University of Tennessee affects operations and consequently operation cost. Literature however fails to offer insights on how fuel management, outsourcing, vehicle maintenance and navigation affect transport operation costs.

Table 1 Summary of Past Studies

Topic	Objective	Results	Gaps
Fleet sizing and vehicle allocation George B. (1991)	Investigate the interaction between fleet sizing decisions and vehicle distribution on utilization decisions and their combined effect on capacity and efficiency of transportation system	From the study it was observed that there are important interactions between investment decisions on sizing a vehicle fleet and operating decisions on utilizing that fleet.	The model which included interaction between fleet size and vehicle allocation could not address long term decisions of investment in a vehicle
Study on motor fleet operation in the police force Hockaday E. I. (1960)	The aim of the study was to improve efficiency and create accountability among vehicle operators	Driver was the primary factor in economy of operations and maintenance of vehicles. To improve driver efficiency, management needed to train and closely supervise drivers	The study touches on transport records but did not address how the records could be used to increase efficiency and reduce costs.
Expert systems for vehicle scheduling C. D. Waters (1990)	Computerize scheduling	Observed that transportation industry does not make widespread use of available	The computerized vehicle scheduling model could not be accepted in totality as it still required human intervention. Scheduling

		software, but technological development may increase the attractiveness of computer use	could not be standardized
Study on minimum cost fleet sizing for a university motor pool William and Oscar's (1980)	Their aim was to investigate the possibility of cost effectiveness of the motor pools operation with a specific focus on the size and composition of the dispatch fleet.	The findings of the study helped the university reduce the fleet size from 900 to 100 vehicles. Fleet composition policies were evaluated resulting in a shift towards smaller and more efficient vehicles	The study focused on reducing number of vehicles, it did not tackle the day to day operations that could be improved to reduce operational costs.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used in the study. It highlights the strategies that were used to conduct the study. It also includes the target of the study, sampling design, sampling size, data collection, analysis and interpretation techniques.

3.2 Research Design

The research was a case study of the transport section in KU. The study took a descriptive research design approach. Descriptive research designs are those studies which are concerned with describing the characteristics of a phenomena being studied. It often uses visual aids such as graphs or charts to aid the reader in understanding the data distribution (Rugg, 2007). Descriptive design as applied in this study was used to evaluate transport strategies adopted by KU and impact of these strategies on operational costs.

3.3 Study Target and Sampling Design

The transport section in KU was the target of this study. The section was the only subject in the study since the researcher carried out a case study on the transport strategy in the university. According to Singleton et al (1998), sampling design refers to that part of research plan that indicate how cases are to be selected for observation. The study used both purposive and simple random sampling. Purposive sampling was used to select the head of section and the head of vehicle maintenance in the transport section who were the key informants to this research. These two were issued individual questionnaires specific to their duties. Simple random sampling used to select 30 drivers and 20 school administrators who were also issued with questionnaires. Table 2 below show how sampling was done.

Table 2: Sampling Summary

Number	Categories	Target Population	Sample Size	Percentage
1	Drivers	56	30	53
2	School administrators	50	20	40
3	Transport manager	1	1	100
4	Head mechanic	1	1	100
5	Total	108	52	48

According to Mugenda and Mugenda, (2003) a sample size of 30 percent is a good representation of the population. The study had a sample size of 48 percent of the target population.

3.4 Data Collection

Prior to data collection, a pilot survey was done on a sample of 10 KU members of staff, five drivers and five administrators who were not involved in the main study. Pilot survey made sure that the questionnaires were clear to respondents and helped to estimate the response rate and completion time. Piloting also assisted the study to obtain some assessment of the question's validity and the reliability of the data to be collected.

Questionnaires were issued and picked from respondents taking approximately eight days to achieve a minimum sample of 52 respondents.

The study used both primary and secondary data. Primary data was collected by use of a questionnaire. The four groups of respondent were issued with questionnaires each particular to their role. Questionnaires had both closed and open ended questions. (see Appendix 1). Secondary data in form of reports generated in the transport section were used in the study. The reports used included vehicle expenditure reports and transport management report. Examination of past records was used to corroborate information obtained through questionnaires.

3.5 Data Analysis

Considering the quantitative and qualitative nature of the study, data was analyzed both qualitatively and quantitatively. Quantitative data upon collection was coded, cleaned, thematised and then analyzed using Statistical Package for Social Sciences (SPSS). Analyzed data was presented in form of tables and graphical presentations. Content analysis was used to analyze narrative data obtained from the open ended questions.

Table 3 Summary of Research Design and Methodology

Objective	Data	Purpose	Analysis	Display
To evaluate the transport strategies adopted by KU.	Questionnaires to head of the university transport section, head of vehicle maintenance, selected school administrators and drivers.	To evaluate the effectiveness of the strategies adopted by KU transport section.	Descriptive statistics	Tables and charts
To determine the impact of the strategies on transport operational cost.	Secondary data - vehicle expenditure reports for the past three years and transport management report.	To determine the effect of the strategies adopted on operational costs.	Content analysis	Textual and tables

CHAPTER FOUR

DATA ANALYSIS RESULTS AND DISCUSSION

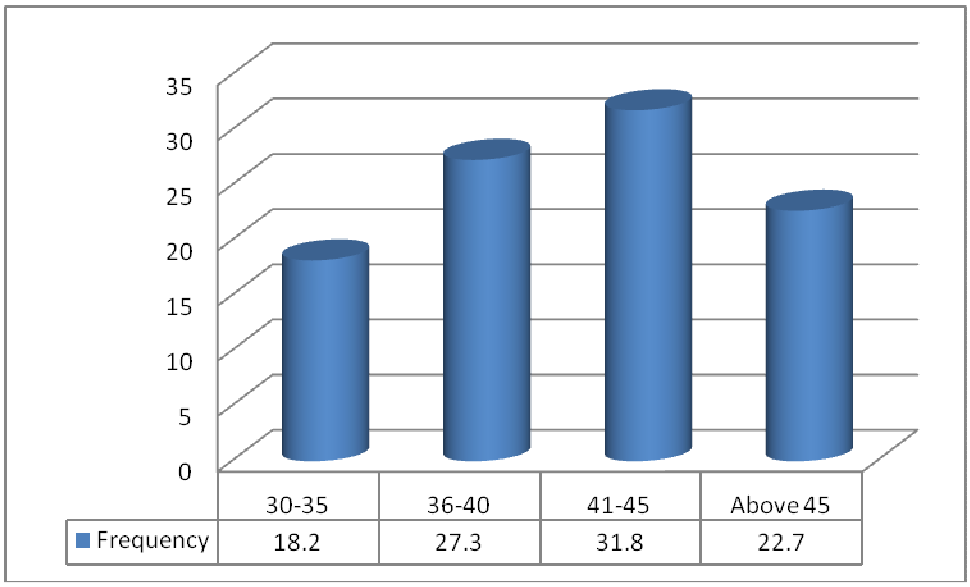
4.1 Introduction

This chapter deals with the results and analysis of data gathered from the study of evaluation of transport management system at KU. The study specifically aimed to evaluate transport strategies adopted by KU and determine the impact of the strategies on transport operational cost. Out of the 52 questionnaires distributed, 40 were filled and returned thereby recording 77percent return rate.

4.2 Respondent Characteristics

The respondents were asked to indicate their age and the results are shown in Figure 1

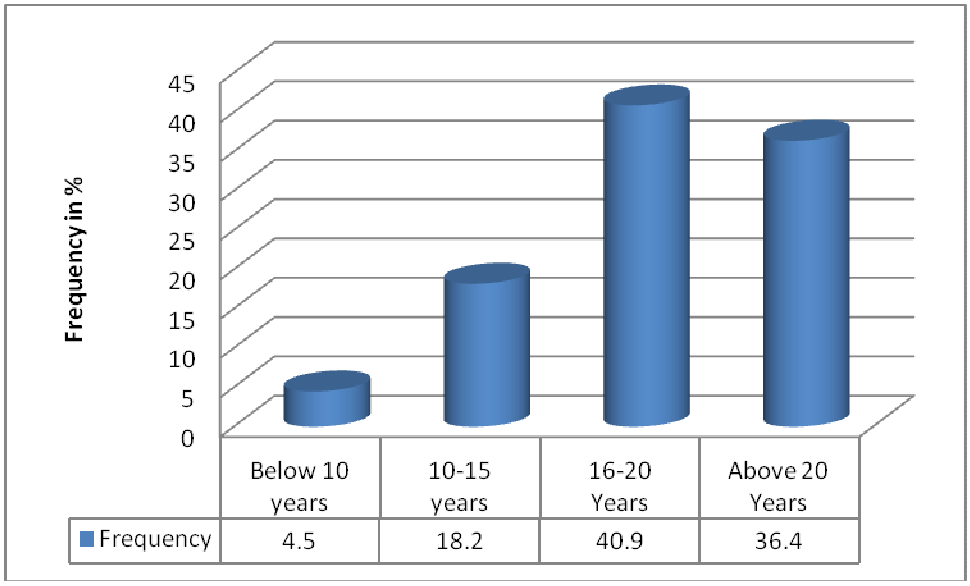
Figure 1: Age of the Respondents



As shown in Figure 1, majority 31.8 percent were aged between 41 and 45 years, 27.3 percent between 36 and 40 years and 22.7 percent above 45 years. Majority of the drivers who are the vehicle operators are at a mature age, highly responsible and therefore can be trusted with the lives of those they drive; these being students and members of staff.

The respondents were asked to indicate their level of experience and the results are shown in Figure 2.

Figure.2: Driving Experience



As shown in Figure 2, the study established that majority of the drivers 40.9 percent were between 16 and 20 years of experience, 36.4 percent above 20 years and 18.2 percent between 10 and15 years while only 4.5 percent below 10 years of experience. The study further revealed that majority 36.4 percent of the drivers have been at KU for less than 5 years and 63.6 percent for more than five years. This implies that they had stayed in the university long enough to understand its culture and therefore give information on transport strategies that can be adopted by university. Their extensive driving experience is an indication of their competence in driving.

4.3 Transport Management System at Kenyatta University

Kenyatta University transport department's mandate is to provide transport services and requirements to the entire university community. The department is charged with the responsibility of managing the university's transport fleet and ensuring an optimal number of motor vehicles and equipment.

The department has both heavy and light commercial vehicle. To better understand the drivers' driving capability, the respondents were asked to indicate the category of vehicles they were comfortable to drive. In response, 61.1 percent indicated that they were comfortable driving both light and heavy commercial vehicles, 28.6 percent heavy commercial vehicles and only 9.5 percent were comfortable to drive light commercial vehicles. This is because 61.9 percent had received a driver refresher course while in employment at KU. Table 4 presents the level of driving courses offered.

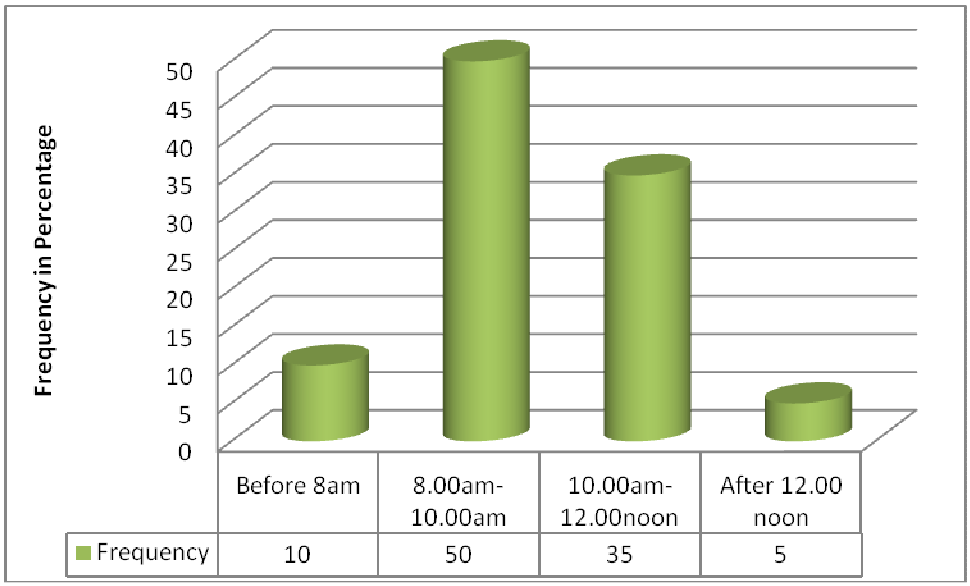
Table 4: Driving Course offered

Level	Frequency	Percentage
Foundation defensive driving course	2	9.1
Intermediate defensive driving course	2	9.1
Advanced defensive driving course	10	45.5
No course	8	36.4
Total	18	100

The study shows that majority drivers 45.5 percent had undergone an advanced driving course, and 36.4 percent did not receive any further driving course.

Further, the respondents were asked to indicate the times they begin the long distance journeys particularly those that are over 350 km. The results are shown in Figure 3.

Figure 3: Departure Time



On average 50 percent of the drivers begin their long distance journeys at between 8.00 am-10.00 am, 35 percent begin at between 10.00 am-12.00 noon. The study also revealed that 10 percent begins their journeys before 8.00 am in the morning and only 5 percent begins their journeys in the afternoon. In the management of long distance trips, 81 percent of the drivers are informed one day in advance when assigned for the trip and 9.5 percent are sometimes informed of the journey the travel day and this affects the safety of journey. Long distance trips take about eight hour and Kenyatta University being a learning institution is obliged to comply with government requirement of the six to six travel, meaning all trips should end at 6.00 pm and therefore start before 9.00 am. The study shows that majority of long distance trips begin between 10.00 am and 12.00 noon which compromises on safety.

In a bid to establish usage of university vehicles, the departmental administrators were asked to indicate how often their respective departments request for university transport. The response is shown in table 5 below.

Table 5: Number of Requests for Transport

Number of Requests	Frequency	Percentage
Once a week	7	38.9
Once in two weeks	2	11.1
Monthly	6	33.3
Never	3	16.7
Total	18	100

At KU, the study established that 38.9 percent of departments request for transport once a week; this shows the high demand for transport, while 33.3 percent showed monthly, 16.7 percent never requests for transport at all and 11.1 percent once in two weeks.

The table 6 below indicates that university transport is not only given to requesting departments on a need arise basis, but is also allocated to departments on a more permanent basis. Daily allocation coupled with the need be requests in Table 6, determines high vehicle usage.

From the table below, 60 vehicles were allocated permanently leaving 31 vehicles to be allocated on a need be basis. The same applies for drivers, 37 drivers were engaged on a permanent basis leaving only 19 for daily pool allocation.

Table 6: Daily University Transport Requirements Verses Vehicle/Driver Allocation.

Source (Transport Management Report)

Duty	Number of Vehicles	Current number of Drivers	Required Drivers	Justification
Ambulance	3	5	7	Ambulance services are required 24 hours both in the main and Ruiru campuses. This requires three drivers for each campus to work on a shift of eight hours per day. Parklands campus does not offer accommodation to students and therefore does not require ambulance services at night and it only needs one driver per day.
Hearse	2	1	1	Used by the School of Health Sciences and also hired out to the public through the KU funeral home.
Security	2	3	6	The Directorate of Security Services is assigned two vehicles, one is used for responding to emergency security alerts, while the other is for patrol and running the affairs of the directorate. The two vehicles operate on a 24 hour basis and therefore require a total of six drivers to work on an eight hour shift each.
Procurement	1	0	1	Used by the procurement section for all university procurements including purchases and supplies.
Estates - Maintenance	1	1	1	General use by estates department (allocated one pick up)
Catering	1	0	1	Used for purchases and distribution of foodstuff to kitchens and restaurants in the main, Ruiru and Parklands campuses.
Night services	3	3	6	Used for ferrying staff from the university library, catering facilities and the ICT section who work in the evening shift, seconded security officers to Parklands campus, dropping and picking up management drivers.
Grounds section	2	1	2	Used for garbage collection around the campus (one lorry). Watering and cutting grass (one tractor)
Nursing / Medicine	2	2	2	Conveys health sciences students to Kiambu District Hospital, Kenya National Hospital (KNH) and Mathare Mental Hospital for their practical sessions/classes

Engineering (bus)	1	1	1	Conveys Engineering students to Kenya Technical Training College (KTTC) and Jomo Kenyatta University of Agriculture and Technology (JKUAT) for practical classes.
Projects (shovel and tipper)	2	1	2	Used for construction of Projects around the campus
Management	10	8	8	Vice Chancellor 3 Deputy Vice Chancellors 3 Registrars 2
Parklands Campus	2	0	2	Used by the Dean, School of Law, to run campus operations (one saloon car). Used for student trips (one bus)
Tuk-Tuks	4	1	2	Used for ferrying students with disabilities to lectures halls, library and hostels
Finance	1	1	1	Used to run finance operations.
Mails and council matters	1	1	1	Used by the two sections for mails distribution around Nairobi area.
Motorbikes	5	0	0	User departments (mail services, security and general services) provide riders
Mombasa Campus	2	1	2	Used by the director to run campus operations (one saloon car) Used for student trips (one bus)
City Campus	1	1	1	Used by director to run campus operations
North Coast Beach Hotel	3	0	1	Used to run hotel errands. Noted**:** That the hotel requires a KU driver attached to it: The vehicles are poorly maintained, are misused and that no one is directly responsible for them.
Kitui Campus	3	1	2	Used by the director to run campus operations (one saloon car, one pickup) Used for student trips (one bus)
Nyeri Campus	1	0	1	Used by the director to run campus operations.
Migori	1	0	1	Used by the director to run campus operations.

Campus				
Nakuru Campus	1	0	1	Used by the director to run campus operations.
Long distance trips	5	5	10	Transport department receives at least five long distance requests per week for a normal university semester. Every long distance trip requires two drivers.
Local distance travel	31	19	20	For overall day-to-day university functions.
Total	91	56	83	

Administrators were asked to indicate reasons for requesting for transport and the results are shown in Table 7 below

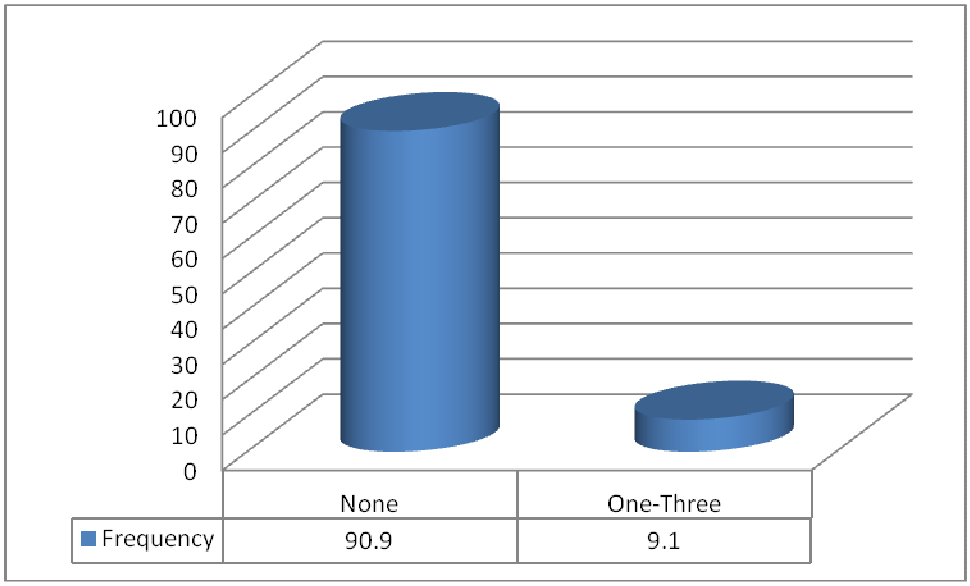
Table 7: Reasons for transport

Reasons	Frequency	Percentage
Airport pickups or drop offs	3	16.7
Departmental shopping	1	5.6
Students' academic trips	3	16.7
Convey staff on official functions	8	44.4
Others	1	5.6
Declined to respond	2	11.1
Total	18	100

The study revealed that 44.4 percent request for transport to convey staff members on official functions, 16.7 percent to either pick or drop staff to/from the airport and 16.7 percent for students' academic trips. Staffs are the highest vehicle users, meaning KU transport was not mainly geared to supporting the core university mandate which is learning but was used by staff for non core functions.

The drivers were asked to indicate the number the accidents in a year and the results are shown in figure 4 below.

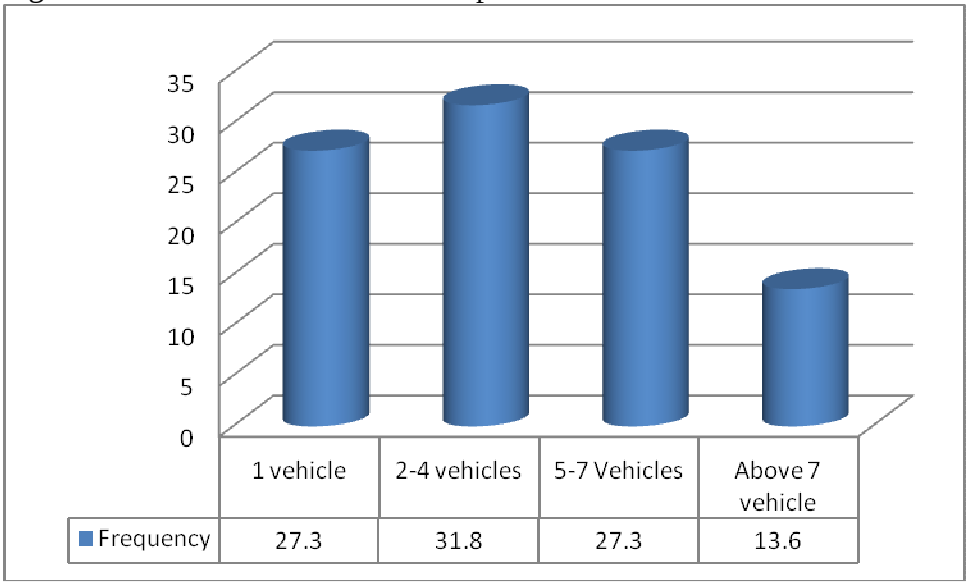
Figure 4: Numbers of Accidents



The study findings indicate that 90.1 percent of the drivers did not have any minor accidents throughout the year and only 9.1 percent had between 1 to 3 accidents within the year. From the findings, it can be ascertained that advanced defensive driving coupled with high driving experience plays a major role in reducing the number of accidents.

The drivers were asked to indicate on average number vehicle they drive per week and the results as indicated in figure 5 below indicate that, 31.8 percent drive 2 to 4 vehicles, 27.3 percent drives one vehicle and 5 to 7 vehicles. This kind of allocation has a negative impact on accountability. When a driver is allocated one vehicle over a period of time, there is a sense of ownership and vehicle is taken good care of. The opposite is true and could be the reason for high vehicle breakdown.

Figure 5: Number of vehicles driven per week



In terms of operational costs, the university allocates above KShs 20 million on purchase of new vehicles per year; it also hires between 5 to10 drivers and purchase between 5 to10 vehicles annually. The study further revealed that the university spends above KShs 10 million on vehicle repair and maintenance annually even there are cases where the expenditure exceeds the annual allocation by between KShs 2-5 million.

Table 8 below shows the annual motor vehicle expenditure from 2010 to 2012.

Table 8: Motor Vehicle Expenditure from 2010 to 2012

Year	Fuel Cost (KShs)	Spares Cost (KShs)	Lubricants Costs (KShs)	Total Cost per year (KShs)
2010	28,814,090.18	5,411,836.66	7,951,114	35,021,038.24
2011	31,531,474.86	10,162,707.11	793844.41	42487026.38
2012	33,877,656.85	9,865,803.72	1,019,069.63	46,270,797.50

The table above shows a significant increase in vehicle operational cost.

In a bid to establish the transportation costs incurred by departments, the administrators were asked to indicate the travelling allowances that are allocated for their respective departments annually. The results are shown in table 9 below.

Table 9: Transport Budgetary Allocation

Departmental Annual allocation (KShs)	Frequency	Percentage
Below 200,000	3	16.7
200,000-400,000	4	22.2
400,000-600,000	3	16.7
Above 600,000	1	5.6
Not sure	7	38.9
Total	18	100

The study revealed that 38.9 percent of the administrators were not sure about the actual amount of money allocated for their respective departments annually. About 22.2 percent indicated that their allocation were between KShs. 200,000.00 and KShs. 400,000.00 and 16.7 percent between KShs. 400,000.00 and KShs. 600,000.00. It was noted that only 5.6 percent received above KShs. 600,000.00. Lack of knowledge on the amount allocated, show that there is no much consideration on cost given when departments plan for trips.

4.4 Transport Strategies Adopted by Kenyatta University

To address transport demand, study established that 66.7 percent had to cancel or reschedule their trips because of the unavailability of either a vehicle or a driver or both. Only 33.3 percent had not cancelled their trip due to unavailability of transport.

To establish the strategy to embrace in cases when demand for transport outplays supply, 71.4 percent suggested that the best option is to create a pool where transport can be shared with other members of staff and 28.6 percent suggested that the trip can be rescheduled for another day. Another challenge indicated by 61.1 percent of the administrators and has impact on transport cost, was that there were trips where neither the driver nor the assigned officer knew the route well. This results into usage of more fuel and other logistical expenses. To mitigate this challenge, Table 10 presents recommendations suggested by the administrators.

Table 10: Solutions to Unfamiliar Routes

Challenges	Frequency	Percentage
Use of navigation assistance	7	38.9
Ask a passersby for assistance	1	5.6
Always travel with a person who knows the route	4	22.2
Declined to respond	6	33.3
Total	18	100

Table 10 above shows that majority 38.9 percent suggested that the use of navigation assistant would be a solution to unfamiliar routes, 22.2 percent indicated that the driver should always travel with a person who knows the route however 33.3 percent declined to respond. Navigation assistance as explained in the second chapter of this study reduces the chances of covering unnecessary mileage when one is lost. It also increases vehicle security as the vehicle movement is tracked.

The respondents were asked to indicate the strategies that can be adopted by KU in order to cater for the growing transport demand. Table 11 below summarizes the responses.

Table 11: Strategies to Cater for Transport Demands

Strategies	Frequency	Percentage
Sharing vehicles	6	33.3
Use of personal car then re-imbursement	8	44.4
Outsourcing transport services	9	50.0
Public transport	3	16.7
Total	18	100

About 50 percent suggested that the university should outsource transport services, 44.4 percent indicated that employees should use personal cars then seek re-imbursement, this could be because university staffs are majority users of KU transport. About 33.3 percent suggested that the available vehicles should be shared and 16.7 percent to use public transport.

The study established that for proper management, a vehicle is supposed to have minor service after covering 5,000 km or after every six months and a major service after covering 12,000 km or after every 12 months. Head of mechanic informed the study that drivers did not report on time when service was due which increased the level of breakdown.

Head of transport section informed the study that fuel consumption was monitored by use of Microsoft Excel which is quite rudimentary as it could not prompt for excessive consumption or promptly produce reports when needed. In addition, the head of transport section informed the study that shuttling of students and conveying lecturers to Kitui campus was outsourced. This was done after university realized that providing in-house transport to these two groups was very expensive and increased vehicle wear and tear.

The transport head further informed the study that navigation assistance was once installed on a few vehicles on trial basis. The tool was not fully supported by management as it was perceived to be expensive and of no economic value.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings, the conclusion and the recommendations of the study which sought to evaluate the transport management system at KU.

5.2 Summary

The main objective of this study was to evaluate transport management at Kenyatta University. Specific objectives were to evaluate strategies adopted by KU and the impact of these strategies on operational costs. This study was guided by five major strategies in the Transport section, which are Outsourcing, Fuel Management, Vehicle Maintenance, Vehicle Sharing and Use of Navigation Assistance.

From the first objective which was evaluation of strategies adopted by KU, the findings showed that KU culture did not encourage the use of pooled transport. This increased the number of transport allocations and consequently increased the number of kilometers covered. The study further indicated that there was no use of navigation assistance and this increased the number of kilometers covered by drivers on unfamiliar routes when trying to find the correct way. On vehicle maintenance, reporting of vehicle defects was not well adhered to due to inconsistent allocation of vehicles to drivers. A driver was allocated more than one vehicle per week compromising on accountability and increasing on vehicle break down. On Fuel management, the study showed that it was manually done by use of Microsoft excel which could not adequately monitor consumption and detect malpractices promptly. The study however showed that KU had adopted outsourcing of the student shuttle services which had proved expensive for the university while being conducted in-house.

The second objective which was to determine the impact of strategies on operational cost, the study used secondary data being vehicle expenditure for the last three years and collaborated with the primary data from questionnaires to ascertain the impact. The study

showed that the strategies adopted as discussed above had a negative impact on the operational cost. The cost of fuel, lubricant and spare parts had significantly increased over the three years.

5.3 Conclusion

KU management has taken strides to improve transport services based on the budget allocated to buy new vehicles per year and training of drivers. However the strategies adopted by the transport section do not support efficiency in used of the available resources. High fuel recorded for the three years is due to a number of reasons. These include lack of a proper fuel consumption monitoring system and high number of kms covered due to high vehicle usage. Also, university culture does not support vehicle sharing which means per transport request a vehicle and driver are allocated. This is unmanageable especially for a fast growing institution. Vehicle maintenance is not well supported by the strategies adopted. Vehicles are not allocated to drivers on a more permanent basis. The study showed that 72.7 percent of drivers were allocated more than one vehicle per week. Such allocation does not support responsibility and accountability among drivers. This leads to high vehicle breakdown and consequently high repair costs.

Journey preparation is key to trip safety and the study showed that majority of drivers were not informed in good time of a long distance journey and therefore they did not adequately prepare for it. Also, 40 percent of long distances started off past 10.00 am, meaning the journey would have to go into the late hours of the day and this practice compromises on safety. Strategies adopted by transport section enhance inefficient use of resources which ultimately increase the cost of operations.

5.4 Recommendations

In view of the findings, the following recommendations were made. Allocation of vehicles should be done on a more permanent basis. A vehicle per driver basis promotes accountability and increases productivity among drivers. The university management should encourage the use of pooled transport (vehicle sharing). This reduces the number of kms covered and fuel consumed.

Second, the university should comply with government requirement and install car tracking devices. This will help curb misuse of vehicles as all vehicle movement will be tracked. It will further assist drivers to navigate unfamiliar routes. The university should also computerize the fuel management system to monitor fuel consumption for all vehicles and detect any malpractice. For vehicle maintenance, the university management should computerize the vehicle maintenance system so that services and other routine maintenances can be informed in good time.

5.5 Limitations of the Study

The study was limited in several aspects among them being scope. The study was case of transport section in KU and this restricted selection of respondents to staff in the section and users of transport services in the university. The study was also limited to accounts of three years; a wider scope in form of duration could have better informed the study. Another limitation was in the area of confidentiality. Though confidentiality was assured to all and that the study was purely for academic purpose, some respondents did not feel free to give accurate information. Lastly, the questionnaire return rate was not 100 percent; higher return rate could have better informed the study.

5.6 Suggestions for Further Study

From the study, further research is necessary to accurately determine the reason behind high costs in the transport section. University culture and management practice were highlighted to influence operations in the transport section. A study on effects of organizational culture and management practice on costs should be considered.

Secondary data used in the study was a summation of fuel, spares and lubricant cost. Further study could focus on an in depth analysis of expenditure per vehicle. This would help make a clear judgment of whether the high costs are as result of vehicle usage, age of vehicle or vehicle type. Lastly, a comparative study may be done for private and public universities in Kenya. This would help establish if high transport costs are in all public and/or private universities.

REFERENCES

Ambrose, J. (1999). A Comparative Analysis of the Efficiency Level of Transport Fleet Management Systems in Kenya. Unpublished MBA Project Kenyatta University.

Antich, N. (2007) Strategies of Vehicle Fleet for Local Deliveries. Management Science Vol 30, pp 125-256.

Beaujon, G. J. (February 1991). A Model for Fleet Sizing and Vehicle Allocation. Transportation Science , pp 19-45.

Bradley, P. (1995). A Vehicle Fleet Costs More. Transportation Science, pp 59-80

Brandao, J. (2009). A Deterministic Tabu Search Algorithm for the Fleet Size and Mix Vehicle Routing Problem. European Journal of Operational Research Vol 195 , pp 716-728.

Colin, N. (1996). Transportation Fleet Planning for Multi Period Operations. Operations Research Quartely Vol 26 , pp 57-66.

Foster, E and Muller, G. (1990). Outsourcing Logistic. Transportation Science, Vol 15.

William and Oscar (1980). Minimum Cost Fleet Sizing for University Motor Pool. Decision Sciences Vol 10 , pp 21-29.

Gould, J. (1990). The Size and Composition of a Road Transport Fleet. Operational Research Quarterly Vol 26, pp 81-92.

Government, W. (2008, July). Retrieved May 12, 2013, from Welsh Department of Transport: www.frieghtbestpractice.org.uk

Gurevich, I. G. (1990). Constructing an Optimal Fleet for a Transportation Schedule. Transportation Science, 20-36.

Hancke. (2009). Intelligent Research Design. New York: Oxford University Press.

Hockaday, E. (1960). Motor Fleet Operation. The Journal of Criminal Law, Criminology and Police Science Vol. 51, No. 4, pp 476-483.

Jordan, M. (2011). Fleet Sizing Under Production Cycles and Uncertain Travel Times. Transportation Science, pp 227-236.

Kirby, D. (1987). Is Your Fleet the Right Size. Operational Research Quartely Vol 36, pp 252-296.

Kirk, C. S. (1998). Operations Research in the Company Car Fleet:When Simple is Efficient. Transportation Science, pp 713-729.

Kothari, C. (2004). Research Methodology: Methods and Techniques. India: New Age Publishers.

Richardson, N. (2011). Fleet Maintenance and Resale Value. Operational Research Quarterly Vol 29, pp 144-201.

Rugg, M. G. (2007). A Gentle Guide to Research Methods. New York: McGraw.Hill.

Murray, M. (2010). Reducing Transportation Cost. Transportation Science, pp 546-621

Melnyk, M. E. (1999). The Pool Control System. Interfaces, pp 21-36.

Mugenda, A. and Mugenda, O. (2003). Research Method: Quantitative and Qualitative Approaches. Nairobi: Africa Centre for Technology Studies.

Nair and Hooks. (2010). Dynamic Optimization of Vehicle Fleet Size. Operational Research Quarterly Vol 29, pp 144-201.

P.Dinapoli, T. (2011). Cost Saving Ideas: Establishing an Effective Fleet Management System. Transportation Science, pp 50-62.

Parikh, S. (1983). On a Fleet Sizing and Allocation Problem. Management Science Vol 23, pp 992-977.

Sheffi, W. P. (2004). The Dynamic Vehicle Allocation Problem with Uncertain Demands. Transportation and Traffic Theory, pp 357-374.

Singleton, R. A. (2009). Approcahes to Social Research. Oxford University Press.

Stern, A. C. (1997). Deficit Function Bus Scheduling with Deadheading Trip Insertions for Fleet Size Reduction. Transportation Science , pp 338-368.

Wat, S. V. (2010). Developing a Framework for Determining the Optimal Replacement Strategy for a Vehicle Fleet of a 3rd Party Logistics Service Provider (LSP) Imperial Distribution. Department of Engineering : Thesis University of Stirling.

Waters, C. D. (1990). Vehicle Schedulling Problems with Uncertainity and Omitted Customers. Transportation Science , pp 1099-1108.

Wyatt, J. (1987). Optimal Fleet Size. Management Science Vol 28 , pp 186-187.

Zipki, A. F. (2003). Allocating Scarce Resources. Transportation Science , pp 19-45.

APPENDIXES

Appendix 1 Vehicle Expenditure (2010-2012)

Vehicle expenditure for 2010-2012 (Kshs)				
		2010		
Month	Fuel	Spares	Lubricants	Total
January	1980649	256123	56023	2292795
February	2569827	546220.23	45782	3161829.23
March	3564823	78525.25	78521	3721869.25
April	2646523	987522	89752	3723797
May	2232349.74	291834.54	59965	2584149.28
June	1967856.05	93206.4	70400.9	2131463.35
July	1808506.28	171978.58	55527.5	2036012.36
August	1450730.2	203267.01	44252.5	1698249.71
September	1943164.68	482601.93	40550	2466316.61
October	3396270.04	549348.23	121062	4066680.27
November	3461655.89	1032407.36	86356	4580419.25
December	1791735.3	718802.13	46919.5	2557456.93
Annual expenditure	28814090.18	5411836.66	795111.4	35,021,038.24
		2011		
Month	Fuel	Spares	Lubricants	Total
January	1999447.41	668758.69	31037.71	2699243.81
February	3309935	598110.72	50975.9	3959021.62
March	2959078.19	196995.18	98549.5	3254622.87
April	2093685	2165032.7	47251.2	4305968.9
May	223130.75	1076273.64	31141.6	1330545.99
June	2912451.42	1037718.47	55436	4005605.89
July	2656942.2	666319.24	150674.1	3473935.54
August	2483319.43	998892.11	54401.9	3536613.44
September	2571596.09	182488.7	70213.5	2824298.29
October	4047221.6	1147762.28	53303	5248286.88
November	3639927.77	172996.36	76858	3889782.13
December	2634740	1251359.02	73002	3959101.02
Annual expenditure	31531474.86	10162707.11	792844.41	42487026.38

2012

Month	Fuel	Spares	Lubricants	Total
January	2402946.49	381129.49	95137.5	2879213.48
February	3847958.7	1117645.03	76544.1	5042147.83
March	3935328.64	1342327.11	139135.79	5416791.54
April	2649949.1	2347220.99	111974.84	5109144.93
May	2735394.48	699012.73	73171.5	3507578.71
June	2699332.72	692250.78	95898.4	3487481.9
July	3377578.37	691020.7	74858	4143457.07
August	2139588.68	928540.46	44435	3112564.14
September	2078600.95	1134403.87	57597	3270601.82
October	3780955.02	566.924.34	80454.5	3861409.52
November	3946555.7	256792.34	109483	4312831.04
December	1791735.3	275460.22	60380	2127575.52
Annual expenditure	35385924.15	9865803.72	1019069.63	46270797.5

Appendix 11 Questionnaire for Head of Section

Please tick appropriately

1. Service and Maintenance of Vehicles
   a) What is the recommended mileage after which a vehicle must be serviced
      i. For minor service
      ii. For major service
   b) How do you source for spares?
      - Tender
      - Quotation

2. Trip Scheduling and Vehicle Allocation

   a) How many drivers do you need to effectively deliver transport services?
      - 50-60 drivers
      - 60-70 drivers
      - 70-80 drivers
      - Above 80 drivers

   b) How many pool vehicles are required to effectively deliver transport services?
      - 70-80 vehicles
      - 80-90 vehicles
      - 90 – 100 vehicles
      - Above 100 vehicles

   c) Are there instances when transport requirement exceed available vehicles?
      - Yes
      - No
   d) If yes, what do you do then?

      - Hire
      - Reschedule requests
      - Others (Explain)

        ……
        ……

3. Strategies
    a) Has the university installed tracking devices in its vehicles?
        - Yes
        - No
    b) Does the university have a fuel management system?
        - Yes
        - No
    c) Has the university outsourced any function/s of the transport section?
        - Yes
        - No
    d) What function/s of the transport section are outsourced?
        - Shuttle transport for students
        - Students on educational field trips
        - Transport for staff on official duty
        - Vehicle repair (Workshop services)
    e) Does the university use vehicle sharing / pooled transport
        - Yes
        - NO
        - Sometimes
          (Specify)……
          ……

4. Expenditure and Allocation of Resources

    a) On average how much is allocated on purchase of new vehicles per year?

        - Below 5 million
        - 5 – 10 million
        - 10 – 20 million
        - Above 20 million

    b) On average how many drivers are hired in a year?

        - Below 5
        - 5 – 10
        - 10 – 15
        - Above 15

    c) How many vehicles are purchased in a year?

        - Below 5
        - 5 – 10
        - 10 – 15
        - Above 15

    d) What is the vehicles' repair and maintenance annual expenditure?

- Below 2 million
- 2 – 5 Million
- 5 - 10 Million
- Above 10 Million

e) Are there cases when the expenditure exceeded the annual allocated amount?

- Yes
- No

f) If yes, by how much?

- Below 1 million
- 1-2 million
- 2- 5 million
- Above 5million

g) In your view, do the transport strategies applied affect operational costs? Explain……
……
……
……

h) Based on your operational costs, what can be done to reduce these costs
……
……
……
……
……

i) What recommendations would you make to university management to adopt that would increase efficiency and reduce costs
……
……
……
……
……
……

Appendix 111 Questionnaire for Head of Vehicle Maintenance

Please tick appropriately

a) On average, how many vehicles turn up for repairs every month?
   - Below 5 vehicles
   - 5- 10 vehicles
   - 10 – 15 vehicles
   - Above 15

b) On average, how many vehicles undergo maintenance/servicing every month?
   - Below 5 vehicles
   - 5- 10 vehicles
   - 10 – 15 vehicles
   - Above 15

c) As a mechanic how do you know a vehicle is due for service?
   - Drivers report
   - Routine check by mechanics
   - Through service schedule

d) Are there cases when a vehicle is not serviced on time?
   - Yes
   - No

e) If Yes, what is the cause
   ……
   ……
   ……
   ……

f) On average, how long does it take from the time a new car is bought to the first time it's brought for major repairs? (mileage in km)
   - Below 40,000km
   - 40,000 – 60,000km
   - 60,000 – 80,000km
   - Above 80,000 km

g) On request how long does it take to procure a new spare part?
   - One week
   - Two weeks
   - 3 weeks
   - 4 weeks and above

h) What is the average cost of repairing each of these breakdowns in light commercial vehicles

1) Engine overhauls (kshs)
   - Below 100,000
   - 200,000-300,000
   - 300,000- 400,000
   - Above 400,000

2) Clutch system (kshs)
   - 10,000-20,000
   - 20,000-30,000
   - 30,000- 40,000
   - Above 40,000

3) Suspension system (kshs)
   - 10,000-20,000
   - 20,000-30,000
   - 30,000- 40,000
   - Above 40,000

i) What is the average cost of repairing each of these breakdowns in heavy commercial vehicles

1) Engine overhauls (kshs)
   - 300,000-400,000
   - 400,000-500,000
   - 500,000- 600,000
   - Above 600,000

2) Clutch system (kshs)
   - 30,000-40,000
   - 40,000-50,000
   - 50,000- 60,000
   - Above 60,000

3) Suspension system (kshs)
   - 30,000-40,000
   - 40,000-50,000
   - 50,000- 60,000
   - Above 60,000

j) Of the above listed breakdowns, approximately how many occurrences do you receive per year?

Breakdown	Below 5	5-10	Above 10
Engine overhaul			
Suspension system			
Clutch system			

i) What in your view is the cause for frequent vehicle breakdown…….....

……

……

……

j) What strategies should the KU transport section adopt to reduce repair costs

……

……

k) What strategies can KU transport section adopt to increase efficiency in operations?

……

……

……

Appendix IV Questionnaire for drivers

Please tick appropriately

a) Age

- Below 30 years
- 30 – 35 years
- 35 – 40 years
- 40 – 45 years
- Above 45 years

b) Driving experience

- Below 10 years
- 10 -15 years
- 15 – 20 years
- Above 20 years

c) Of (b) above, how long have you been in KU

- Below 5 years
- 5-10 years
- 10-15 years
- Above 15 years

d) Which category of vehicles are you comfortable driving?

- Light commercial vehicles
- Heavy commercial vehicles
- All of the above

e) While in employment at KU, have you received any driving refresher course?

- Yes
- No

f) If yes, in © above, which of these have you received?

- Foundation defensive driving course
- Intermediate defensive driving course
- Advanced defensive driving course

g) On average what time do you begin a long distance journey? (A journey of 350km and over)

- Before 8 am
- 8.00 am- 10.00 am
- 10.00 am – 12.00 noon
- After 12.00 noon

h) Does the time a long distance journey begins play a role in trip safety?

- Yes
- No

i) For long distance trips, when are you informed of the trip when assigned one?

- The travel day
- One day in advance
- 2-5 days in advance
- A week in advance

j) Does the period (above) affect journey preparation and trip safety?

- Yes
- No

i) How many minor accidents have you had in a year?

- None
- 1-3 accidents
- 3-5 accidents
- Above 5

j) On average, how many vehicles do you drive per week?

- 1 vehicle
- 2-4 vehicles
- 5-7 vehicles
- Above 7 vehicles

k) Which of these two allocations are you able to effectively monitor your vehicles fuel consumption?

- When driving the same vehicle over a period of time

- When driving different vehicles from time to time.

l) When a vehicle develops a mechanical problem, how does the mechanic get to know about it?

- The driver reports to the mechanic
- Mechanic discovers when conducting a routine check
- Others/explain……
  ……

Appendix V Questionnaire for School Administrators

Please tick appropriately

a) On average, how often does your school/department request for university transport?

- Once a week
- Once in two weeks
- Monthly
- Never

b) Which of the following do you request for?

- Airport pickups or drop offs
- Departmental Shopping
- Student academic trips
- Convey staff on official function
- Others/Explain……
  ……....
  .....

c) How much travelling allowance is your school/department allocated for annually?

- Below 200,000
- 200,000-400,000
- 400,000-600,000
- Above 600,000

d) Are there cases when you have had to cancel or reschedule a trip because of unavailability of a vehicle or driver?

- Yes
- No

e) If yes, in (d) above, which of these two options would you prefer as solution?

- pool (share) transport with other staff
- Reschedule the trip to another day

f) Which of these strategies should the university adopt in order to cater for the growing transport demand? (Can pick more than one)

- Vehicle sharing
- Use of personal cars and then re imbursement
- Outsourcing transport services
- Public transport

g) Are there trips when neither the driver nor the officer assigned did not know the route well?

- Yes
- No

h) If yes in (g) above, which of the following would you recommend as a solution to unfamiliar routes?

- Use of navigation assistance eg. Google map
- Ask the passersby for assistance
- Keep driving until you get to the right path
- Always travel with a person who knows the route

i) Are there instance when you have been allocated an unroad worthy vehicle?

- Yes
- No

j) If yes in (i) above, what was the fault that made the vehicle unroad worthy? State and explain

……
……
……..

k) With the faulty vehicle in (j) above, did you arrive safely at your destination?

- Yes
- No