FACTORS INFLUENCING USAGE OF RAIL TRANSPORT BY PRIVATE MOTORISTS AT PARK AND RIDE STATION: A CASE OF SYOKIMAU RAILWAY PROJECT IN NAIROBI COUNTY, KENYA

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A Research Project Report submitted in Partial Fulfilment of the Requirements for the award of the Degree of Master of Arts in Project Planning and Management of the University of Nairobi

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DECLARATION

This research project report is my original work and has not been submitted for any award in any University.

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DEDICATION

This work is dedicated to my loving wife Immaculate Kagure, my dad Simon Maina, mum Penina Muthoni and my daughter Jasmine Muthoni Ireri for their immense support and encouragement during the research work.

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ABBREVIATION AND ACRONYMS

AM	:	Ante Meridiem (before mid-day)
CBD	:	Central Business District
EU	:	European Union
HOV	:	High Occupancy Vehicle
K & R	:	Kiss and Ride
KR	:	Kenya Railways
KRC	:	Kenya Railways Corporation
NCBD	:	Nairobi Central Business District
NCR	:	Nairobi Commuter Rail
NMR	:	Nairobi Metropolitan Region
P & R	:	Park and Ride
RMMS	:	Rail Market Monitoring Scheme
SPSS	:	Statistical Package for the Social Sciences
SOV	:	Single Occupancy Vehicle
TDM	:	Transport Demand Management
TOD	:	Transit Oriented Development
UK	:	United Kingdom
US	:	United States
USA	:	United States of America

ABSTRACT

Traffic congestion in urban areas is one of the major bottleneck to free movement of people in urban areas. Transport engineers and economist have developed various strategies to address this challenge, among them is Park and Ride concept. The purpose of this study was to identify the factors that influence usage of rail transport by private motorists at Syokimau Railway Station which is located in Nairobi County in Kenya. This is the first rail based Park and Ride facility in Kenya. The research objectives were:- to determine how parking cost differential between Nairobi Central Business District and Syokimau park and ride facility influence usage of rail transport by private motorists at Syokimau park and ride station, to assess the extent to which train schedule at Syokimau railway station influences usage of rail transport by private motorists at Syokimau park and ride station, to establish how passenger comfort influences usage of rail transport by private motorists at Syokimau park and ride station and to establish how the catchment area influences usage of rail transport by private motorists at Syokimau park and ride station. The target population was 255 comprising of 250 private motorists and 5 Syokimau station managers/supervisors. This was arrived at by taking the highest number of private cars that have ever parked at Syokimau station in any single day. Krejcie and Morgan table (1970) was used to arrive at a sample size of 155. The study used descriptive survey research design. Structured questionnaire were administered to the private motorists whereas interview schedules were administered to the five managers/supervisors at Syokimau park and ride station. Pretesting of research instruments was conducted on a sample size of 16 (10 percent of respondents) comprising of 14 private motorists and 2 managers of Imara Daima railway station, which is a park and ride station within Nairobi railway commuter network. The study utilised both qualitative and quantitative data. Qualitative data was first coded so that it could be analysed quantitatively using SPSS and Microsoft excel. Tables, cross tabulations, Likert scales and percentages were used to present the research findings. 65.4 percent of respondents stated less parking charges at Syokimau station encourages them to use Syokimau Commuter train, 80.3 percent of the respondents observes that the train schedule at Syokimau station is reliable. However, 62.7 percent of the respondents claimed that Kenya Railways did not give feedback to complaints raised. 70.8 % of respondents stated comfort of Syokimau commuter train has a direct influence on their usage of Syokimau park and ride station. The study revealed that 78 percent of the respondents live within a radius of ten kilometres from Syokimau park and ride station, which is consistent with observations from most scholars that catchment area for park and ride facilities are parabolic in shape with most people living within 10 kilometres radius from the focal point. The study concludes that the major obstacles affecting usage of rail transport by private motorists at Syokimau railway station are dilapidated railway infrastructure, poor customer care services and inadequate train frequency. The study recommends that Kenya railways rehabilitate the dilapidated railway network and rolling stock in order to attract more private motorists to the train. This should be buttressed by improvement of customer care services so that there is timely handling of passenger complaints.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Noel, (1988) defines Park and ride (P &R) as an operation where passengers, travel the first part of the journey by private vehicles , then transfer to public vehicles of higher-occupancy vehicles (HOV) for the remainder of the journey. O' Cinneide and Casserly (2000) defines park and ride as the act of parking private cars at a built car park located at the periphery of the urban centre, in order to take public transport to one's destination. Simpson (1994) as quoted by Khalid and Hamsa (2013) states that park and ride facilities mainly serve two key functions namely reducing the parking demand at central business districts and also encouraging modal shift in favour of public transport. Kerchowaskas and Sen (1977) in their study argue that park and ride facility is used to extend public transport to low density areas where use of private car is high. In park and ride strategy residents start their journey by use of private cars before congregating to take public transport to their respective destinations.

CTC and Associates (2010) in their report on assessing park and ride impacts argue that management of parking within a park and ride facility is vital. They contend that an advance parking management systems is necessary in order to inform park and ride patrons in advance on availability of parking spaces. According to report by Dublin transport office (2004) success of rail based park and ride concept is enhanced when they are located at the intersection of national road network and rail network. Atkins (2006) argues that parking at park and ride facilities should not free as there is a cost incurred by the government in operating the facility and provision of land and related infrastructure. However, there is need to strike a balance in order to attract discretionary riders. RSG (2015) in their report on Vermont state-wide park and ride facilities aver that commuters are also interested in other design facilities like adequate lighting and safe crossings that are necessary to guarantee safety of commuters.

In United Kingdom (UK) the concept of park and ride originated in 1960's with pilot projects in Leicester, Nottingham and Oxford cities with a view of reducing traffic congestion, providing additional parking spaces and promoting economic development (RPS GROUP, 2009). Popularity of P & R scheme in UK had increased tremendously to 70 and 92 P & R schemes in UK in year 2000 and 2005 respectively. Park and ride schemes can be categorised either as rail based park and ride or bus based park and ride. P & R increases transit usage by encouraging commuters to use rail or high capacity buses. The schemes help to increase the

catchment area for public transport vehicles. Richards, Rickard and Faber (1996) advocated for construction of "gateway" stations in order to attract more car users on the London Underground. They stated that accessibility of gateway stations from the primary routes should be easy, other facilities that would attract car users should also be provided in the gateway stations.

In United States the first form of P & R was established in mid- 1970s although the concept started in mid-1920s informally (SMG, 2013). The first P & R in the state of California was opened in 1975 (Caltrans, 2010). According to Chan and Shaheen (2011) the concept of P & R started as ride sharing in North America during World War II. This was further entrenched during the energy crisis of 1970s to 1980. During World War II the US government promoted ride sharing with a view of conserving rubber for use in the war. During energy crisis various strategies were implemented ranging from employer based ride matching programmes, HOV lanes and P & R facilities. Promotion of remote P & R facilities in US gained popularity in mid 1960s with passage of Federal Aid Highway Act of 1965. As of April 2016, California Department of Transport had a total of 322 park and ride centres in its network. The success of P & R facilitates is governed by a number of factors among them the location of the facility, security for the parked vehicles, connectivity to the transport system and the comfort of public transport vehicles. Bolger, Colquhoun and Morall (1995) in a study carried in Canada states that time savings and convenience are major factors determining choice of park-and-ride over feeder bus travel.

Transformation of rail commuter services in South Africa started in early 1990s when the government recognised that for commuters to be attracted to metro rail, a conducive environment was necessary to guarantee passenger comfort (Joubert, Veldsman, and Toit, 1996). The South African government issued norms, guidelines and standards to guide the design of railway stations which included provision of adequate parking facilities at the railway stations. The city of Cape Town undertook major upgrade of Park and Ride facilities across the metro railway corridor for use during the Fifa World Cup that was held in South Africa in 2010. The upgrades benefited both the private motorists and pedestrians accessing the stations (Wentley and Hitge, 2013). The concept of park and ride is gaining momentum in East Africa region with Tanzania set to construct the first park and ride facility in 2018 under the phase II of bus Rapid transit system in Dar es Salaam which covers Kilwa- Kawawa south roads (Musa, Katala, Nyirubutama, Kulemeka and Ndinya, 2015). In Kenya rail based park and ride concept started in earnest in year 2012 with commissioning of three park and ride stations on the Nairobi

Commuter Rail network at Syokimau, Imara Daima and Makadara. The three stations have a combined parking spaces of 1200 cars. Construction of ten new park and ride railways stations is underway with construction expected to be completed in year 2018 (krc.co.ke, 2017). Kenyan government has developed a park and ride policy to persuade private motorists to use light rail transport within Nairobi metropolitan region, in order to reduce the traffic congestion experienced on the Kenyan roads. Redman, Friman, Garling and Hartig (2013) encourages use of policy driven tactics by governments to influence the demand of travel for a given mode. Caltrans (2010) advocates passage of relevant laws and policies to empower agencies to construct and promote park and ride schemes.

Several theories have been put forward to advocate for park and ride concept. These theories range from behavioural theories explaining what drives private motorist to use P & R, to space allocation theories advocating for prioritisation of public transport vehicles on the roads to give them competitive edge over the private cars. Park and Ride concept is in tandem with the school of thought that the government should focus on moving goods and people rather than motor vehicles. According to Seattle Urban Mobility plan of 2008, availability of free or inexpensive parking at final destination encourages usage of private cars. According to (Tseu, 2006) there should be a distinction between mobility and accessibility. When emphasis is more on mobility than accessibility the tendency is to construct more roads which eventually attracts more private cars, leading to traffic congestion. Vasconcellos (2011) defines mobility as movement from one place to another, this indicated by the average number that a person can make in any given day.

Transport planners' advocates for sustainable urban transport system which guarantees both accessibility and mobility of commuters. This requires urban planners to adopt a more effective land use planning strategy. Banister (2000) avers that sustainable transportation system addresses seven key issues namely: - congestion, air pollution, safety, traffic noise, utilisation of space by traffic, urban landscapes and global warming. Rahane and Saharkar (2014) aver that development of cities and traffic occurs simultaneously, leading to intolerable levels of traffic congestion. They suggests that for effective governance in urban areas a balance must be struck between benefits of agglomeration and the demerits of excessive congestion. Diekstra and Kroon (1997) observes there is a resistance by urban residents in changing from usage of private cars to public transport. This is because possession of private cars is perceived as a symbol of status and power. Steg (2005) as quoted by Anwar (2009) state feelings of power, freedom and superiority are some of the motivations that drives people to use private vehicles

instead of public transport. This is compounded farther by the fact that private cars are able to offer door to door service. Increase in the rate of urbanisation coupled with increase in purchasing power lead to proliferation of private cars in the cities leading to challenge in transportation as people are unable to move freely. This puts pressure on governments to provide policy and budgetary allocation to expand the transport infrastructure. In his study Drakakis-smith (2003) observes that increase in both the population and number of building in a town is a contributor to traffic congestion difficulties. Guo and Sun (2014) identifies well organised public transport as an effective tool in reduction of traffic congestion, environment conversation, energy reduction and mobility improvement.

1.2 Statement of the Problem

One of the aspirations of urban commuters is to arrive at the destination within the shortest time possible. Therefore any travel delay along the route leads to frustration of motorists. Having unreliable train schedule discourages the commuters from using rail transport. There have been frequent cases of train delay and cancellation of Syokimau commuter train due to reasons ranging from flush floods within the railway corridor, stoning of the train by residents of Mukuru slums and unavailability of locomotive to haul the passenger coaches. At times the passengers are trapped midway causing great inconveniences as they are forced to either take buses, or wait for another locomotive to rescue them. In his study Meek *et. al* (2013) avers there is an inherent time lost by P & R user in changing the transport mode. This is due to the detouring, and parking act which consumes time. This explains why it's vital for train schedule to be reliable to compensate for this lost time.

Parking charges at Syokimau Park and ride station is one hundred Kenya Shilling per day compared to three hundred Kenya Shilling in Nairobi Central Business District. According to Kenya Railways Corporation conceptual plan for Syokimau railway station, parking fee at Syokimau was to be two hundred Kenya Shillings per day and one hundred Kenya Shillings for one way trip from Syokimau to Nairobi Central Station and vice versa for the project to achieve financial viability. However, due to public demand and pressure from the government, the fees were revised downwards to sixty Kenya shillings for one way ticket and one hundred shilling for parking. The earlier proposal also faced severe hurdles due to stiff competition by mini buses and *matatus* which charge seventy Kenya Shilling from Syokimau/ Mlolongo to CBD. The reduction in parking charges increased significantly the number of private cars that are parked at the station. Critics argue that 'parking charges' should be used as a carrot to attract more people to park at Syokimau station instead of parking at the CBD. Meek *et al.*

(2009) avers that to make P & R attractive to private motorists a high level of service required. In addition to high train frequency trains should be modernised to enhance comfort of passengers who may be accustomed to the comfort of private car. In order to achieve this Kenya Railways Corporation (KRC) has refurbished the old long distance passenger coaches and fitted them with new canvas seats.

1.3 Purpose of the Study

The purpose of this study is to investigate factors influencing usage of rail transport by private motorist at park and ride facility at Syokimau railway station.

1.4 Objectives of the study

The study is guided by the following objectives:-

i. To determine how parking cost differential between the Central Business District and Syokimau Park and ride facility influences usage of rail transport by private motorists at Syokimau Park and Ride station.
ii. To assess the extent to which the train schedule influences usage of rail transport by private motorists at Syokimau Park and Ride station.
iii. To establish how passengers comfort influences usage of rail transport by private motorist at Syokimau park and ride station.
iv. To establish how the catchment area influences usage of rail transport by private motorists at Syokimau park and ride station.

1.5 Research Questions

The study seeks to answer the following research questions

i. How does parking cost differential between Central Business District and Syokimau Park and ride facility influence usage of rail transport by private motorists at Syokimau Park and Ride station?
ii. To what extent does the train schedule influence usage of rail transport by private motorists at Syokimau Park and Ride station?
iii. How does comfort of passenger on Syokimau commuter train influence usage of rail transport by private motorists at Syokimau Park and Ride station?
iv. How catchment area does influences usage of rail transport by private motorists at Syokimau park and ride station?

1.6 Significance of the study

The findings of the research are geared to providing Kenya Railways Corporation and the Government of Kenya with feedback on the level of usage of Syokimau Park and Ride station. This can inform whether there is need to replicate this kind of facility in other strategic locations within Nairobi Commuter Network or what interventions can be made to make the existing Park and Ride stations attractive to private motorists. The study is feasible as the researcher is based in Nairobi where Syokimau railway station is also located. This means less financial resources will be incurred in the course of data collection.

1.7 Assumptions of the Study

The study was conducted on the assumption that parking cost, train schedule, passenger comfort and catchment area influences usage of rail transport at Syokimau Park and Ride railway station. It's also premised on the assumption that the sample population will give honest answers and opinions in regard to their experiences and expectations at the Syokimau Park and ride station.

1.8 Limitations of the study

It was anticipated that some of the passengers will have limited time to fill the questionnaire at the station due to fear of being left by the train. To overcome this the researcher used a brief questionnaire which required a short duration of about five minutes to fill. The research questionnaire were administered to the private motorists at the parking lot as they arrived. To increase success rate the exercise was started one hour before the train departure time for three consecutive days. This was to ensure the respondents had ample time to fill the questionnaire.

1.9 Delimitation of the study

The study focused on private motorists who use Syokimau Park and ride station to board Syokimau commuter train. Syokimau railway station was chosen because it was the first P & R station to be constructed in Kenya and also the fact that it lies along Mombasa Road (A109) which is an arterial road that usually experiences huge traffic jams during the peak hours. Due to limited time available for the study, the researcher focused on four independent variables namely parking cost, train schedule, passenger comfort and catchment area of Syokimau Park and ride station.

1.10 Definitions of Significant Terms Used in the Study

Usage of rail transport by private motorist at Syokimau Park and Ride station- habitual practice of taking rail transport at Syokimau railway station by private motorists, success of which is measured by number of private cars parked and the number of tickets sold.

Parking Cost differential between Syokimau Park and Ride Facility and Central Business District - this refers to the amount by which parking charges at Syokimau Park and ride facility differs with parking charges at Nairobi Central Business District.

Passenger comfort- refers to the degree to which a rail passenger feels at ease when riding the Syokimau commuter train. This measured by way of customer feedback mechanism.

Train schedule- refers to the programmed departure and arrival time for Syokimau commuter train both at Syokimau railway station and Nairobi central station. This is measured by assessing punctuality of the train and the frequency of the train service.

Catchment area- refers to the average distance between Syokimau railway station and the residential home of the private motorists using Syokimau Commuter train. This is measured by getting the approximate distance travelled by private motorists in Kilometres.

1.11 Organization of the study

The study is organized in five chapters. Chapter one covers the background of the study, statement of the problem, purpose of the study and objectives of the study. Also included in the chapter is research questions, research hypothesis, basic assumptions in the study and limitations of the study, delimitation of the study and organization of the study. The chapter has also defined significant terms used in the study. Chapter two consists of the literature that is related to the research study. Themes covered in the chapter include concepts of park and ride on rail transport by private motorists, impact of parking cost on usage of rail transport by private motorists, effect of train schedule on usage of rail transport and impact of catchment area on patronage of park and ride station.

The chapter also contains theoretical and conceptual frameworks guiding the study. Chapter three highlights the research methodology adopted, the research design, target population, sample size and sampling criteria and research instruments employed. The chapter also enumerates the data collection methods as well as data analysis tools that have been utilized. Chapter four covers data analysis, data presentation and interpretation of the findings. Chapter five consists of summary of findings, discussions, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter contains a review of literature that is relevant to the study by analysing the findings of other studies conducted by other researchers. Each independent variable under study has been presented under its own theme clearly elaborating how it affects usage of rail transport by private motorists at park and ride facility. An in-depth analysis of empirical studies conducted by other scholars was conducted with a view of identifying any gaps. Theoretical and conceptual frameworks are also presented in this chapter.

2.2 Usage of Rail Transport by Private Motorists at Park and Ride station

Olsson (2003) in his study titled "factors that influence choice of travel mode in major urban areas" avers that there are many factors that influences a resident to choose whether to utilise a P & R facility. The factors range from: - security, number of parking slots, parking charges, and walking distance between the parking space and the passenger platform. The researcher conducted a preference survey in three P & R facilities in Sweden namely: - Vällingby, Åkeshov and Råcksta which fall within the Green line metro. According to SL Konsult (1998b) cited in Olsson (2003) the occupancy of parking spaces in Vällingby, Råcksta and Åkeshov lots is 42%, 23% and 42% respectively. The choice of these stations was purposeful as they lies along a main road experiences traffic congestion during the peak hours.

The researcher further argues that attracting private motorists to P & R facilities requires a combination of strategies like restricting parking spaces available for private cars at urban centres and an increased level of service by public transport. The study advocates for usage of carrot and stick analogy to make public transport the preferred mode of transport. The research was conducted via telephone, targeting both users and non-users of P & R station. The selected non-users had to be people who use their private cars daily and lives in the influence corridor of the selected park and ride facility. Telephone contacts for users were collected at the parking lots, while for non-users the contacts were obtained from the telephone register. A total of 158 interviews were done comprising of 71 users and 87 non users. 22 respondents opted out of the study. The researcher concluded that both the main factors that influence the shift from private cars to public transport are age at which residents started driving and availability of free parking at work place (Olsson, 2003).

Ginn (2009) in his study under the theme "application of the park and ride and TOD concepts to develop a new framework that can maximise public transport patronage" argues park and ride facilities can attract high patronage if they are part of Transit Oriented Development. The researcher conducted a study in five P & R stations in Perth, Western Australia. The researcher engaged a team of 24 surveyors to obtain data from the patrons in the station. This involved focussed group discussion with land use planners to gauge the level of rail patronage that can accrue due to adjacent and neighbouring residential land uses.

2.3 Concept of Rail transport by private motorists at park and ride facility

Due to traffic congestion in most urban centres as city resident's travel to their destination, transport planners have devised various transport demand management (TDM) strategies to ensure there is ease of movement in urban centres. A report by AUSTROADS (1991) proposed categorisation of TDM into four categories namely: - improved asset utilisation, physical restraint, pricing and urban and social changes. Under each category various techniques have been proposed as follows: Improved asset utilisation: staggered hours, flexible hours, parking cost differentials, ride sharing, HOV pools, HOV lanes, parking priority and park-and-ride schemes: Physical restraint: area licences/permits, cordon collars, access metering, signal timing and public transport priority. Pricing: area entry fees/licences, congestion pricing on roads. Urban and Social Changes: more compact cities, efficient urban development. Shiftan and Buden-Eden (2000) states that a country should develop parking policy in urban areas in order to address traffic congestion. The policy should persuade people to shift to public vehicles when making journey to central business district as opposed to private cars without reducing the attractiveness of CBD itself as a business hub.

Logi and Ritchie (2001) in their study titled "development and evaluation of a knowledge-based system for traffic congestion management and control," categorised traffic congestion into recurring or non-recurring. Recurring congestion arise due to daily or routine periodic events whereas non-recurring congestion are incidental in nature. These two categories requires different approaches to address. Noel (1988) in his study titled "Alive, Well and Expanding in the United States", identifies the following as key benefits of P & R: - Less insurance premiums due to low anticipated mileage, less fuel consumption, lower maintenance costs, less parking and toll charges , more time for social interaction as motorists are not active when using the public transport giving them more time that can be utilised to read novels and books, minimal traffic jam and reduction of air pollution by vehicles within the city.

O' Cinneide and Casserly (2000) in their study titled "modelling Park and Ride" observed that in Europe the focus is shifting to include park and ride facilities targeting shoppers in addition to daily commuters. Shopping malls, schools and entertainment centres are provided within the P & R facilities to attract more patrons to them. According to study by Reynolds, Smith and Hills (2009) for Jacksonville Transportation Authority the following conditions must be met for P & R facility to be active:- high parking costs in the urban core, long commuting times, high fuel prices and high roadway congestion. Ginn (2009) observed that due to shortage of land urban residents are moving away from the central business core to sub urban outskirts. This leads to increased travel time, more distance to be covered by cars, traffic congestion and higher fuel consumption. Vincent and Hamilton (2007) in their study themed "park and ride: characteristics and demand forecasting" avers that park and ride concept shifts the parking demand to the suburban areas which are located away from the central business district.

2.4 Parking cost differential and usage of rail transport by private motorists at park and ride facility

Stieffenhofer, Barton and Gayah (2016) conducted a study in Washington, USA under the theme "assessing park and ride efficiency and user reactions to parking management strategies" to determine the efficiency level of P & R in Central Puget Sound Region of Seattle, Washington. An onsite audit survey was conducted on a sample of nine P & R facilities using observation method whereas questionnaires were used to conduct user survey to validate the results of onsite audit survey. The study aim was to obtain person-efficiency which is defined as average number of persons served by each parking slot. The observers were stationed at the entry point to give them vantage view of vehicles entering the P & R. The number of people in each vehicle was counted. The study was conducted during the AM hours of the weekdays, which are the peak time. Another second team was stationed at drop-off locations to count the number of kiss – and –ride (K & R) drop offs. The following formula was utilised to estimate the person efficiency of parking vehicles.

$$person - Efficiency = \frac{Pin - 2K}{Cin - K}$$

Where P_{in} = Number of people entering the P & R, C_{in}= Number of vehicles entering the P & R, K= the number of kiss –and – ride drop offs. The denominator denotes vehicles parked during the study period, while the numerator constitute the number of persons who utilised the parking facility. The study assumed that each K & R vehicle had two occupants the driver and one passenger. After analysis the study revealed that the person-efficiency value are near 1, for

the nine P & R facilities selected, with the highest having 1.080 passengers per parked car as expected as the chosen P & R is a busy facility. This led to the conclusion that most of people parking at the P & R arrived at the facility using Single Occupancy Vehicle (Stieffenhofer *et al,* 2016)

A user intercept Survey was conducted in a total of seventeen facilities (including the nine where onsite audit was conducted) to assess what would be the impact of varying parking fees. The research was conducted by use of paper survey filled on site and an electronic survey by use of a card with a website linked mobile phone electronic copy. The aim being to increase the response rate. A total of 3,300 surveys were collected with paper survey accounting for 2000 responses. The penetration rate for the survey 25% despite the effort made to reach each and every user of the facility. The survey required the users to identify all the reasons why they use the P & R facilities from a given list, and the results were as follows: inadequate parking at destination (34.9%), long travel time (44.9%), environmental impacts (36.1%), financial (77.1%), relaxation during transit (59.6%). From the analysed results it was evident that biggest motivator for use of P & R was cost related and ability to relax on transit. A quarter of the respondents affirmed that they would use carpools if they were exempted from payment of parking fee. The intercept survey revealed that the P & R users are averse to the idea of introducing parking fees in the facilities where parking is free. However, a substantial number of people are willing to pay to get a reserved parking (Stieffenhofer *et al,* 2016). Gayah, Stieffenhofer and Shankar (2014) in their study titled "how can we maximize efficiency and increase person occupancy at overcrowded park and ride" aver that private motorists are willing to carpool to P & R facilities to share the parking cost.

In the study conducted by Arup, Accent and the Institute for Transport studies at University of Leeds (2012) under the theme "The effects of park and ride supply and pricing on public transport demand" commissioned by Transport Scotland it emerged that most P & R users preferred driving to the park and ride facilities as the parking charges are either free or lower in comparison to the central business district. The research was conducted in seven P & R facilities in Scotland, United Kingdom. The study revealed that on average there would be a reduction of 4.9% on park and ride usage if the parking fee was raised by one British pound. The research was conducted by use of both primary and secondary data. This involved both rail based and bus based park and ride facilities. The study concluded that an increase of one British pound in parking fee in the Rail based Park and ride facility would result in loss of revenue as rail customers would switch to other mode of transport, therefore. The targeted rail

based park and ride centres were: - Bridge of Allan, East Kilbride, Perth and Kirkcaldy. Stirling and Falkirk High were use as control stations. A steering committee ensured that the selected sample was representative. Two control stations which had not experienced additional parking in the recent past were selected. The committee ensured that the selected park and ride stations had both rural and urban characteristic. Interviews were conducted on both weekends and weekdays.

In order to refine the survey questions a pilot survey was conducted. The survey focussed on the topics of gender, age, journey purpose and parking costs. Short interviews of 15 minutes per interview were conducted, on an equal number of male and female respondents. Vincent and Hamilton (2007) in their study states that usage of park and ride centre is enhanced by lack of affordable parking lots in the central business districts. Turnbull *et.al* (2004) in their report titled park and ride/pool argue that park and ride facilities should charge discounted parking fees for those stations with strong demand. Martin and Davidson (2008) avers that municipalities should have a parking restraint policy, to favour short and medium stay users vis- a-vis long stay parking users. This encourages usage of park and ride scheme built away from the town centres. Shen, Chen, Su, Chen and Yao (2017) in their study under the theme of optimization of park and ride system argue that parking charges and location of park and ride facility have a significant impact on commuters and governments. Kalasova, Cernicky and Kubikova (2014) avers that although parking charges are used by local authorities as a source of revenue generations , moderation is necessary to ensure there is less incentive for private motorists to access the urban centres. Fontaine (2003) as quoted by Morrow (2005) states that the parking cost at the destination is a determinant in the choice of mode of transport to be taken by passenger.

The author argues that parking provided by employers is major fringe benefit to the employees, which encourages private motorists to use private cars instead of public transport. Wilson and Shoup (1990) in their study conducted in America, observed that there would be a reduction of 19 to 18 percent on usage of private cars to the work places, if the employees were to pay for the cost of parking at the work place themselves. According to a study by McCahill, Garrick, Atkinson-Palombo and Polinski (2015), provision of parking in urban areas has a direct influence in increase in usage of private motorists in urban areas, which in turn contribute to traffic congestion on the urban roads. In a study conducted at the University of Trieste, Italy by Rotaris and Danielis (2014), observed that an increase in parking charges would lead to 19 % increase in bus ridership.

2.5 Train schedule and usage of rail transport by private motorists at park and ride facility

In a study conducted in 2011 by The Gallup Organization on behalf of Directorate – General for Mobility and Transport of European Commission, punctuality and reliability was highlighted as one of key parameter that determines the level of passenger satisfaction by rail services. The study was conducted in 25 EU member states out of the 27 member states as there is no railway network in Malta and Cyprus. Interview was conducted via telephone on passengers aged 15 and above. The selected sample size was 400 in each country apart from Estonia, Latvia, Luxembourg and Slovenia where the sample size was 300. Sixty six percent of the respondents indicated they were generally satisfied by the level of service offered by the rail service in their countries. However, 56% of the respondents observed that there is inadequate communication by the railway operators in the countries whenever there is a delay or disruption of the train schedule. This indicates that passenger are concerned with reliability of train schedule and can have a direct effect on passenger patronage. (Gallup , 2011).

In the year 2016, European Union commissioned Steer Davies Gleave Company to conduct a study on prices and quality of rail passenger services in the EU members states. The researcher used both primary and secondary sources to collect the data. Reliability and punctuality data were sourced from the Rail Market Monitoring Scheme (RMMS) which holds data for rail usage in EU countries. According to EU standards a train is deemed to be on time if it is within plus or minus 5 minutes for regionals services and 15 minutes for long distance services. The study found out that time table related attributes, like service frequency ranked alongside passenger fares as key determinants of rail traffic demand. The researcher observed that the reliability of train schedule ranged from 99% to 78 % in Europe, with Estonia having the highest reliability and Hungary the lowest reliability. This explains the high ridership for trains in EU countries.

The study revealed that those EU member states with the best performing rail services had the smallest rail network for local passenger services due to sparse passenger time tables (Steer Davies Gleave, 2016). The study also found that punctuality of long- distance services was poorer than that of urban rail services. Agunloye and Oduwaye (2010) observes that train punctuality has direct correlation with the number of trips of a rail user. 5I.5% of the rail customers opined that the reliability of train services in Lagos metropolitan was not predictable. Litman (2009) as quoted by Barata, Cruz and Ferreira (2010) argue that reliability of means of transport is a key factor in persuading a passenger to use a particular transport mode, but of

more importance is the certainty of the arrival time. Monchambert and de Palma (2015) in their paper states that punctuality of public transport is key in encouraging modal shift, as commuters are averse to incurring extra-cost due to waiting time or late arrival. Wardman (2004) in his paper notes that one of the undesirable aspect of public transport is that the extent to which a person can make a journey at the desired time is dependent on the frequency of the public vehicle. In his journal, Fan (2012) under the theme "reliability analysis of stochastic park and ride network" argues that attractiveness of park and ride facility is determined by its accessibility, infrastructure facilities and availability of public vehicles serving the facility. He argues that in the modern word people are more conscious of value of time.

2.6 Passenger comfort and usage of rail transport by private motorists at park and ride facility

According to a study by Ormuz and Muftic (2004) titled "main ambient factors influencing passenger vehicle comfort", passenger comfort level is a subjective value which passengers perceive differently depending on the environment. They argue the main factors which shapes the opinion and feelings of passengers are physiological variables which are dependent of feeling of temperature, cabin air spend and vertical acceleration. According to Kelton (2012) overcrowding of people in a public vehicles greatly erodes the level of comfort. Oxford Dictionary (2010) defines comfort as a state of physical ease and freedom from pain or constrain. In their study Agunloye and Oduwaye (2010) conducted in Lagos Metropolitan in Nigeria to assess the factors influencing quality of rail transport services, they observed that 81% of the respondents rated the cleanliness of the coaches as a stumbling block to passenger comfort. Data for the study was obtained by conducting purposeful questionnaire. Questionnaires were administered to train passengers between Iddo Station which was the origin and Agbado the destination station. The research was conducted on a sample size of 220 which represented 20% of the passengers on the train. The questionnaire return rate was 95.5%. The researcher conducted inferential and descriptive analysis on the sample results. The research revealed a strong positive relationship between smoothness of ride and the arrival time of trains ($r=0.877$, $P> 0.01$) where r is Pearson's Product Moments Coefficient. The study concluded that if trains arrive on time, there would be more time for the cleaners to clean the coaches making them attractive to customers, thereby increase the comfortability (Ormuz and Muftic, 2004).

Saputra (2010) in his study conducted in Indonesia under the theme "analysis of train passenger responses on provided service" opined that satisfaction of different class of rail passengers is

determined by different quality attributes. In Indonesia there exist three passenger classes namely: - executive, business and commuter classes. For both business and executive class comfort is a major service quality attributes. The researcher collected both secondary and primary data to assist in the analysis. A sample size of 375 was selected with each passenger class represented by 125 passengers. The focus was on quality attributes of availability, convenience and comfort as identified in TRB (2003a). Saputra (2010) argues that there are key design requirements to ensure the passenger seats resist impact force without causing injuries. The coaches should also adequate lighting. Questionnaires were administered in Jakarta, Yogyakarta and Pekalonga. Litman (2017) in his guidebook "evaluating public transit benefits and costs" states that rail transport is considered more comfortable and luxurious than buses, and therefore it's likely to get more elective riders. Overcrowding is considered as one of the factors that reduce passenger comfort. Therefore for trains to attract discretionary riders, the seats should be comfortable and spacious enough.

2.7 Catchment area and usage of rail transport by private motorists at park and ride facility

In a study titled "Technical Memorandum for Park and Ride Transit service plan" by Connectics Transportation Group (2014), reference is made to an on-board survey that was conducted in the Georgia Regional Transportation Authority in USA, which states that the average catchment area for park and ride station are 10 mile diameter. Turnbull, Pratt, Evans and Levinson (2004) in their report titled "park –and –ride/pool: traveller response to transportation system changes" summarises various studies conducted in United States counties of Seattle, Texas and Oregon which conclude that catchment areas are parabolas of 2-2.5 miles towards CBD and extending back to around ten miles upstream. Turnbull (1995) as quoted by Bilal Farhan (2003) avers that sizing of park and ride centres is critical to guarantee availability of parking spaces. Hamid, Mohamad and Karim (2007) in their study themed 'parking duration of fringe park and ride users and delineation of stations catchment area', conducted in three stations in Kuala Lumpur, Malaysia observes that most catchment areas lie within 9km and are parabolic in shape. The research was conducted in the stations of Rawang, Shah Alam and Seremban by use of questionnaires. Mesa and Ortega (2001) in their paper titled "park and ride station catchment areas in metropolitan rapid transit systems" state that catchment area has a direct influence on the ridership. Bolger, Colquhoun and Morall (1995) as quoted by Mesa and Ortega (2001) suggests a modal share of 15-20% for park and ride, 15% for kiss and ride, 60-65% for buses, and 5% for pedestrians in a rail based park and ride

facility. They argue that the catchment area is not circle-shaped but bell-shaped, as users are attracted to those stations with little total travelling time and not necessary the ones that are nearest to them geographically.

Cervero, Round, Goldman and Wu (1995) in their study under the theme "rail access modes and catchment areas for the Bay Area Rapid Transit (BART) System" state that population densities and land use play are vital in determining the transport mode. The study observed the following: - creation of communities around rails station and availability of adequate parking spaces increases usage of rail. The study revealed that catchment area for sparsely populated areas is 6 to 10 times bigger than those in high density urban areas. Survey was conducted on on-board passenger, the questionnaires focussed on the origin-destination stations, fare paid and the trip purpose. The survey relied on data obtained from 1990 digital inventory compiled by the Association of Bay Area Governments for the San Francisco Bay area to obtain the land use. The study concluded that in order to maximise usage, park and ride stations should be located on the destination side of the catchment area. ArchInfo Geographic Information System package was used to generate precise estimates of the composition of land uses. According to Opus International Consultants pty ltd (2014) park and ride facilities should be located on the destination side of the catchment area in order to maximise usage as users will have direct route to the facility.

They argue that to enhance accessibility, direct access to the park and ride facilities should be via arterial roads instead of local road, as this eliminates the probability of localised traffic affecting traffic flow. Holguin-Veras, Reilly and Aros-Vera (2012) observes that many researchers and scholars have argued that catchment areas for park and ride facilities are parabolic, ellipsoidal and even cone-shaped. However, they hold that the best approximation is the parabolic one. Most scholars advocate delineation of the parabolic shape based on two distances namely: corridor break even distance and perpendicular break even distance. Corridor break even distance being the distance along the corridor linking the P & 6R station to CBD. On this distance passenger are willing to back track to get access to the P & R facility. Similarly passengers will be encouraged to drive to the P& R to use the facility from the perpendicular break even distance. Generally the perpendicular break even distance is shorter than the corridor break even distance.

2.8 Theoretical framework

Various theories have been put forward to promote use of public transport in order to discourage usage of private cars in order to reduce traffic congestion on roads.

2.8.1 Dynamic Public Transit Theory

Dynamic public transit priority adjusts space-time resources for public transit in line with the traffic volume on a given road and the level of traffic saturation on a given intersection. This includes aspects like allocation of lane to public transport cars. The aim is to ensure the speed of public vehicles is comparable to that of private cars. The theory argues that the total travel time for someone using the public transport should be comparable to the total time taken by a private motorists for any given journey. Given that public transport are unable to offer door to door service, the time taken walking to the station, away from the station, transferring and waiting for the public transport should be compensated by giving priority to the public transport vehicles on the roads (Zhu, Chen and Ma, 2014). This theory emphasis on the need to have a reliable transport network in order to attract and retain customers.

2.8.2 Transportation Game theory

Game theory was developed in the 1940s by John Von Neumann and Oskar Morgenstern as a mathematical tool (Pavlidis and Ionnis, 2016). It was later applied into various disciplines by other researchers. Under transportation discipline, the theory argues that the traffic congestion on the roads is partly created by the selfish behaviour of individual drivers. This theory avers that a method should be devised to punish individual drivers who cause pain to other motorists. Game theory is concerned with actions of two or more players who can either be cooperative or uncooperative with one another (Yu and Faldini, 2004). The key assumption in this theory is that the players are rational beings who will always reason before taking any action. Motorists are forced to co-operate on the roads when they both realize that their actions will lead to traffic congestion particularly at the intersections.

In this theory there are two distinct parties namely the road users (players) and the authority responsible for regulating traffic. The authority can use various strategies to regulate the traffic flow e.g. adjusting traffic signal timings, congestion fee, speed limits and differential pricing for public and private cars for using a given road. Some private motorists will opt to use public transport like rail transport, or bus rapid transport in order to reduce on the transportation cost. (Pavlidis and Ionnis, 2016) holds that the key element in game theory is the Nash equilibrium

which is a state in which each player's strategy is optimal against the strategies adopted by the other players. The theory avers that transportation cost is a key determinant to passengers.

2.8.3 Sustainable urban transport theory

Sustainable urban transport has been a strategic goal for urban planners, engineers and transport economist. The two major concepts used to attain this are road based transport and rail based transport. In their study Pojani and Stead (2015) argues that in urban areas both the population size and density have great impact on mobility. The study further argues that the capital cost and operation cost for rail based urban transport is very high compared with that for roads making it unattractive to investors and government unless it is backed by high population density. Thus it's prudent for the government to encourage private motorists to shift to the public transport in order to provide the traffic numbers that are required for the rail based transport to break even. Availability of free or under-priced parking facilities in CBD encourage use of private cars. This theory encourages use of co-coercive pricing mechanism to discourage use of private cars.

2.8.4 Micro-economic theory

Park and ride concept is hinged on the theory of microeconomic that the consumer is lured by behaviour utility maximization (Meyer and Miller, 2001). They hold that a passenger will choose the transportation mode that gives the greatest satisfaction utility. In transportation economics this utility is the monetary gain achieved by saving time and paying less parking fee. According to Beckmann, McGuire and Winsten (1956) as quoted by Arnott (2001) all drivers are identical and the only difference is the economic decisions they make on trip frequency and mode, based on the anticipated cost to be incurred.

2.9 Conceptual framework

This is a diagrammatic representation of independent variables, intervening variables and dependent variables. It shows how various factors influence usage of rail transport by private motorists at park and ride facility.

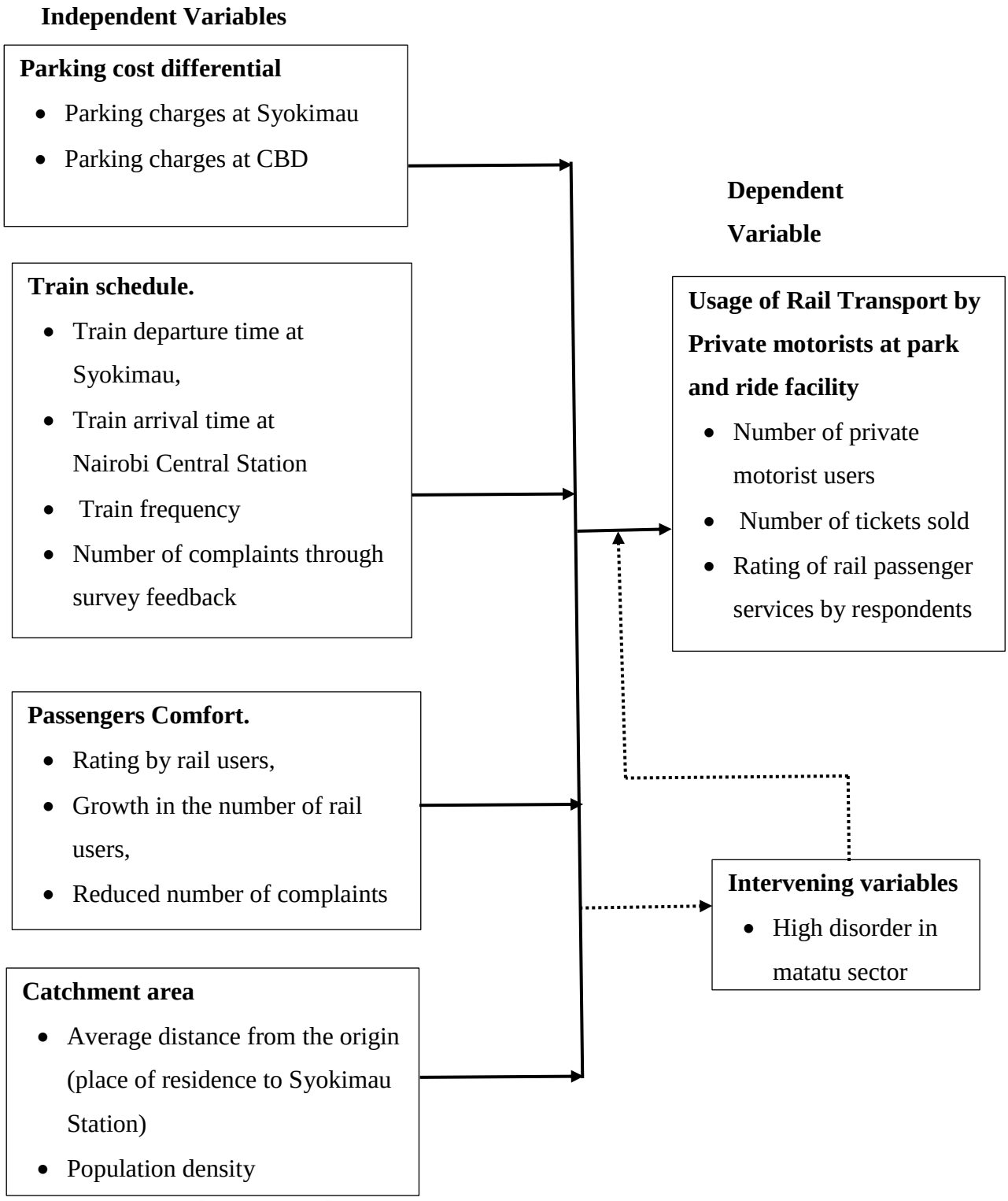

Figure 1: Conceptual Framework

2.10 Summary of literature

Table 2.1: Summary of literature Review

Author (year)	Title of the study	variable	Indicators	Findings	Knowledge gaps
Olsson (2003)	Factors that influence choice of travel mode in major urban areas: the attractiveness of Park and Ride.	Usage of rail transport	• Number of private motorist users • Number of tickets sold	P & R lots can have increased patronage if security is enhanced and if there is limited parking at the destination	The study did not reveal which segment of the P & R users consider security to be critical
Ginn S (2009)	The application of the park and ride and TOD concepts to develop a new framework that can maximise public transport patronage			Usage of P & R facilities can be enhanced by locating them in areas with high residential land use	The study did not reveal the catchment radius which is considered critical for success of P & R facility
Stieffenhofer, Barton and Gayah (2016)	Assessing Park and Ride efficiency and user reactions to parking	Parking Cost differential	• Parking charges at park and ride facility	Most vehicles had one occupant. The biggest motivator for	The study did not segregate the commuters who may not be willing to pay

Author (year)	Title of the study	variable	Indicators	Findings	Knowledge gaps
	management strategies		• Parking charges destination	use of P & R was cost related	for parking if charges increased i.e. Are they employees or business people
Arup, Accent and the Institute for Transport studies at University of Leeds (2012)	The effects of park and ride supply and pricing on public transport demand			Increase in parking charges at P & R would lead in 4.9% drop in rail usage	If parking charges at both P & R station and at destination were increased equally, what would be the effect on rail usage
The Gallup Organization , 2011	Survey on passengers' satisfaction with rail services	Train schedule.	• Train departure at park and Ride station • Train arrival time at destination Station • Train frequency • Number of complaints through	Most rail users consider train punctuality a key factor. Communication from rail company in case of disruption in train schedule is regarded highly	Which category of passengers would disregard usage of P& R due to disruptions i.e. workers or business people
Steer Davies Gleave	Study on the prices and			Reliability of train schedule	The study did not reveal the

Author (year)	Title of the study	variable	Indicators	Findings	Knowledge gaps
Company, 2016	quality of rail passenger services		survey feedback	in Europe is very high between 78% to 99%	measures taken by rail operators in Europe to make train schedule reliable
Agunloye and Oduwaye (2010)	Factors influencing the quality of rail transport services in metropolitan Lagos	Passengers Comfort.	• Rating by rail users • Growth in the number of rail users • Reduced number of complaints	There strong correlation between cleanliness of train and timely arrival of trains for cleaners to tidy the coaches	The social class with high chance of stopping usage of rail due to lack of cleanliness
Saputra (2010)	Analysis of train passenger responses on provided Service. Case Study PT. Kereta Api Indonesia			Majority of rail users in PT KAI train passengers (Indonesia) are not satisfied with the service	Need to adopt technology to receive compliant from users e.g. use of social medium platforms
Connectics Transportation Group (2014)	Technical Memorandum #4 Park and Ride Transit service plan	Catchment area	• Average distance from the origin	Effective catchment area for park and ride facility is a ten mile diameter	Stratification of the motorists in terms of social class/Age and the travel

Author (year)	Title of the study	variable	Indicators	Findings	Knowledge gaps
Turnbull, Pratt, Evans and Levinson (2004)	park –and – ride/pool: traveller response to transportation system changes			catchment areas are parabolas of around 2-2.5 miles towards CBD and extending back to around ten miles upstream	distance from the P & R
Hamid, Mohamad and Karim (2007)	parking duration of fringe park and ride users and delineation of stations catchment area			catchment area is within 9km and is parabolic in shape	

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology used in conducting the study. The chapter covers the type of research design adopted, target population, sample size and sampling procedures adopted as well as the research instruments utilized in the research. The chapter also highlights the various data collection procedures adopted, data analysis technique as well as the various ethical considerations guiding the research. The chapter ends with a matrix for operationalization of the variables.

3.2 Research Design

The research adopted descriptive survey design. Descriptive because it intends to collect the data of what exists on the ground. Kothari (2004) defines descriptive research as description of the state of affairs as it exists at present. This involves use of fact finding missions and field surveys. The study utilises both qualitative and quantitative approaches to collect the data. According to Knupfer and McLellan (1996) descriptive statistic reduces large mass of data to manageable form that can easily be visualised by the human beings. This involves utilization of tools like measures of central tendency, measures of dispersion and correlations.

3.3 Target population

The research targeted the private motorists who uses Syokimau park and ride station, to board Syokimau Commuter train as well as the managers of the Syokimau railway station. The station managers are needed to provide the historical data for the private cars parked at the station. According to Mugenda and Mugenda (2003), target population is the population which the study analysis to make inference. The targeted population in this study is 255 subjects, comprising of 250 private motorists and 5 station managers. The number of private motorists was arrived at by taking the highest number of private cars that have ever parked at Syokimau Railway station since the station was commissioned (Kenya Railways Corporation, 2016 annual report). The research assumes that each car has one occupant.

3.4 Sample size and Sampling procedure

This section describes the sample size and sampling procedure used in the study.

3.4.1 Sample Size

The sample size for this study is 155 respondents drawn from a target population of 255 using Krejcie and Morgan table (1970). See Appendix IV page 66. The accuracy of the results obtained for a given population is dependent on how representative the sample is of the target population (Alvi, 2016). Nayak (2010) argues that sometimes researchers select small sample sizes for conveniences leading to wrong and inconclusive inferences.

3.4.2 Sampling procedure

The study utilized multi stage sampling procedure, whereby purposive sampling is used first, followed by use of simple random sampling to get the actual sample. Purposive sampling as the research exclusively focussed on those passengers who access Syokimau Railway Station using private cars, the aim being to get first-hand information on the factors that influence their choice of Syokimau Park and Ride station. Secondly the research focusses on Kenya Railway (KR) personnel manning Syokimau station in order to get historical data of the number of cars parked at the Station in the past and their experience in handling the private motorists at the station. Mugenda and Mugenda (2003) asserts that purposive sampling is sometimes used as part of Multi stage sampling procedure. The research utilised Krejcie and Morgan table/formula (1970) to estimate the sample size. In this case the size of the target population is assumed to be the highest number of private cars that have ever parked at Syokimau Station in a single day plus five managers of Syokimau Railway station.

3.5 Research Instruments

The data was collected by use of questionnaire and interview schedules. Questionnaires were administered on the private motorists whereas interview schedule were used to get information from the managers of Syokimau Railway station. Gangrade (2006) avers that questionnaire and interview schedules are more or less the same, the main difference being how they are administered. He argues that for the interview schedule there is more flexibility as the interviewer can paraphrase the question to the interviewee. The researcher can also be able to appraise the validity of response as he can see how the respondents answers. Questionnaire were picked as they are easy to administer and analyse statistically while at the same time, they allow the respondent to remain anonymous. Questionnaire was divided into six sections. Section A consisting of the general information namely gender, age and education level. Sections B the dependent variable, Sections C , D, E and F focusses on the independent variables of the study namely parking cost, train schedule, passenger comfort and catchment

area for Syokimau railway station respectively. Interview schedules are divided into two sections. Section A consisting the general information whereas section B focussed on the managers observation and experience in managing the station.

3.5.1 Pilot testing of research instruments

According to Mugenda and Mugenda (2003) the pre-test sample is 1% to 10% of the sample size. The pre-test sample should be inversely proportional to the sample size. Baker (1994) state that although a pilot study does not guarantee success of the main study, it however increases the chances of success. The researcher conducted a pre-test survey at Imara Daima railway station which was also developed with the concept of park and ride just like Syokimau Railway station. The pilot test was conducted on a sample size of 16 respondents composed of 14 private motorists at Imara Daima railway station and 2 managers of the station. This represented ten percent of the sample size. The opinion of the supervisor who is an expert was used to gauge the adequacy of the instruments.

3.5.2 Validity of research instruments

Mugenda and Mugenda (2003) avers that validity is the degree to which results obtained from a given study truly reflect the phenomenon under study. If the data is a true reflection then the inferences made after the analysis will be factual. Kothari (2004) argues that validity is the extent to which an instrument measures what the researcher intended to measure. Out of the three main types of validity in data namely: - construct validity, content validity and criterion related-validity. This research focussed on content validity and construct validity. In order to effectively test content validity the researcher relied on the guidance of the supervisor who is an expert to ensure the questions were aligned to the study objectives. Kothari (2004) and Mugenda and Mugenda (2003) argue that determination of content validity is judgemental and intuitive and is usually done by a panel of experts. Construct validity was observed by ensuring the questions were simple and clear.

3.5.3 Reliability of research instruments

Kothari (2004) avers that a measuring instrument is deemed reliable if it provides consistent results after repeated trials. Many authors have argued that an instrument that yields valid data will necessarily give reliable data but the converse is not necessarily true. In order to test reliability of the measuring instrument the research utilised split half technique, and analysis was conducted by use of SPSS. The pilot test conducted at Imara Daima returned a coefficient

alpha of 0.718. Tavakol and Dennick (2011) states that Cronbach's coefficient alpha within the range of 0.70 to 0.95 is acceptable indicator of reliability of an instrument.

Table 3.1: Cronbach's reliability alpha for research instrument

Reliability Statistics	
Cronbach's Alpha	N (Number of Items)
0.718	35

3.6 Data Collection Procedures

The researcher collected the data after obtaining introduction letters from University of Nairobi and National Council for Science and Technology Innovation (NACOSTI). Permission was also obtained from KRC before collecting data from passengers at Syokimau and Imara Daima railway station. The researcher engaged five research assistants to help in distributing the questionnaires to the private motorists, however the interview with the station managers was conducted by the researcher directly.

3.7 Data Analysis Techniques

The collected data was cleaned and analysed using both qualitative and quantitative methods depending on whether it's qualitative or quantitative in nature. The researcher utilised both descriptive and inferential statistics. Percentages, tables and cross tabulations were used to analyse quantitative data. SPSS and Ms excel tools were used to analyse the data. Likert scale has been used to rank qualitative data numerically for ease of analysis, the rank was done on the basis of significance. Tables and bar charts have been used to present the data. Analysis of qualitative data is based on both content and thematic.

3.8 Ethical considerations

The research was guided by ethical principles of respect, justice and beneficence. The researcher sought participation of respondents voluntarily without use of any means of coercion and privacy of the respondents was upheld. The respondents were explained the aim of the research beforehand to enable them make informed decisions. Mugenda and Mugenda (2003) argues that given researchers concerns is about other people's quality of life then researchers must be people of integrity.

3.9 Operationalization of variables

Table 3.2: Operationalization of variables

Objectives	Variables	Indicators	Measurement	Scale of measurement	Research approach	Statistical tools of Analysis	Analysis Techniques
Usage of rail transport by private motorists at Syokimau railway station	Usage of rail transport by private motorists	• Number of private motorist users • number of tickets sold • Rating of rail passenger services	Rating by users	Ordinal	Quantitative research	Microsoft excel SPSS	Frequencies, Mean, Standard Deviation
To establish how parking cost influences usage of rail transport at Syokimau	Parking cost differential between Syokimau and	• Parking charges at Syokimau • Parking charges at CBD	• The difference in cost between parking fee at CBD and at Syokimau	Ordinal ordinal	Quantitative research	Microsoft Excel Statistical Package for Social	Frequencies, Mean, Standard Deviation

Objectives	Variables	Indicators	Measurement	Scale of measurement	Research approach	Statistical tools of Analysis	Analysis Techniques
park and ride station	Nairobi Central Business District		• No of people who would change mode of transport should current prices change			Sciences (SPSS)	
To assess extent to which the train schedule at Syokimau railway Station influences usage of rail transport	Reliability of train schedule	• Train departure at Syokimau • Train arrival time at Nairobi Central Station • train frequency	• Actual number of trains on schedule in the last three years • Actual number of trains that are late in last three years	Ordinal Ordinal	Quantitative	Microsoft Excel Statistical Package for Social Sciences (SPSS)	Frequencies, Mean, Standard Deviation

Objectives	Variables	Indicators	Measurement	Scale of measurement	Research approach	Statistical tools of Analysis	Analysis Techniques
		• Number of complaints through survey feedback	• Variation in number of complaints monthly	ordinal			
To establish how passengers comfort influences usage of rail transport by private motorists at Syokimau park station	Passengers comfort	• Rating by rail users • Growth in the number of rail users • Reduced number of complaints	• Degree of comfort	Ordinal	Descriptive research Quantitative research	Microsoft excel Statistical Package for Social Sciences (SPSS	Frequencies, Mean, Standard Deviation
To establish how the catchment area influences usage of rail	Catchment area	• Average distance from the origin	Actual distance	interval	Quantitative research	Microsoft excel Statistical Package for	Frequencies, Mean, Standard Deviation

Objectives	Variables	Indicators	Measurement	Scale of measurement	Research approach	Statistical tools of Analysis	Analysis Techniques
transport by private motorists at Syokimau park and ride station.		• Population density				Social Sciences (SPSS	

CHAPTER FOUR

DATA ANALYSIS, PRESENTATIN AND INTERPRETATION

4.1 Introduction

The chapter presents the study results as analysed in line with themes and sub themes formulated from the study objectives as follows: - (i) questionnaire return rate (ii) demographic information of respondents (iii) usage of rail transport by private motorists (iv) parking cost differential and usage of rail transport (v) train schedule and usage of rail transport (vi) catchment area and usage of rail transport.

4.2 Questionnaire Return Rate

The study issued 155 questionnaires to respondents to fill and return for analysis. Out of this 155 questionnaires 132 of them were completed, filled and returned. This constituted 85.2 % of return rate which is over and above what is recommended according to Fincham (2008) who avers that a return rate of 60% is adequate for social sciences research. Based on this the study proceeded. Mugenda and Mugenda (2003) observes that a return rate of 50% is adequate, 60% is good and above 70% is excellent.

4.3 Demographic information about respondents

The study was interested in the demographic characteristic of the respondents in terms of gender, age and education level. These characteristics determine how people make a choice, and therefore respondents were requested to give their information in these demographic.

Table 4.1: Demographic information about respondents

Variable	Category	Frequency	Percent	Cumulative Percent
Gender	Male	78	59.1	59.1
	Female	53	40.9	100.0
	Total	132	100.0	
Age	18-30 yrs	30	22.7	22.7
	31-40 yrs	79	59.8	82.6
	41-50 yrs	18	13.6	96.2
	51-60 yrs	4	3.0	99.2
	above 61 yrs	1	0.8	100.0

	Total	**132**	**100.0**	
Education Level	primary	1	0.8	0.8
	secondary	5	3.8	4.5
	college (Bachelor's Degree)	53	40.2	44.7
	University (post graduate)	71	53.8	98.5
	other (specify)	2	1.5	100.0
	Total	**132**	**100.0**	

The results are presented in table 4.1. On gender out of 132 respondents who participated in the study 78 (59.1%) were male and 53 (40.9%) were female. This can be attributed to the fact that Kenya has been a male dominated society with more employed male than the female. The 2010 constitution has attempted to address this by way of affirmative action like requiring public appointments to observe a third gender rule.

Age of 132 respondents who participated in the study were as follows: 30 (22.7%) fell within age bracket of 18-30 years, 79 (59.8%) age bracket 31-40 years, 18 (13.6%) age bracket of 40-50 years, 4(3%) age bracket of 51-60 years and 1 (0.8%) above 61 years. It can be deduced that 109 (82.6%) of the respondents fell within the age bracket of 18-40 years, this can be attributed to the fact that within this age bracket most people have less disposable income, therefore there could prefer to park at the railway stations where the parking cost is much less in comparison with parking cost in Central Business District. On education level out of 132 respondents who participated 1(0.8%) has highest education level as primary, 5 (3.8%) highest education level as Secondary, 53 (40.2%) highest education level as Bachelors and (71 (53.8%) highest education level as post graduate. 2 (1.5%) of the respondents did not indicate their education level. It's evident that most users of Syokimau railway station are degree holders. This can be attributed to the fact that by virtual of their education background they are able to make informed decisions on financial matters. Therefore they may prefer to reduce the transportation cost, so that they can have more disposable income.

4.4 Usage of rail transport by private motorist

The respondents were asked to rate the extent at which they agreed with several statements on their experiences in using Syokimau park and ride station on a Likert scale. This has been presented on table 4.2 while table 4.3 illustrates the duration the respondents have been using Syokimau park and ride facility.

Table 4.2: Rating table by private motorists on key observations

Statement	**Frequency**					**Mean Score**	**Standard Deviation**
	Scores (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)						
	1	2	3	4	5		
There are adequate signs to guide motorists within the parking area at Syokimau Railway Station	16 (12.6%)	16 (12.6%)	24 (18.9%)	54 (42.5 %)	17 (13.4 %)	1.57	0.496
There is adequate Security at the parking lot at Syokimau Railway station	7 (5.5%)	3 (2.4%)	21 (16.5%)	58 (45.6 %)	38 (30%)	3.92	1.028
I would encourage other private motorists to start using Syokimau commuter train	7 (5.5%)	6 (4.7%)	7 (5.5%)	58 (45.7 %)	49 (38.6 %)	4.07	1.063
It's easy to park at Syokimau Railway Station (the parking spaces are wide enough).	7 (5.5%)	1 (0.8%)	18 (14.2%)	55 (43.3 %)	46 (36.2 %)	4.04	1.019

Table 4.3: Duration of usage of Syokimau Park and Ride facility

Variable	Category	Frequency	Percent	Cumulative Percent
Duration of usage of Syokimau Park & Ride facility	0-12 months	35	27.6	27.6
	12-24 months	19	15.0	42.5
	24-36months	25	19.7	62.2
	36-48 months	23	18.1	80.3
	48-60months	13	10.2	90.6
	60-72 months	12	9.4	100.0
	Total	**127**	**100.0**	

Out of 127 private motorists who returned the questionnaire, 56 (44.1%) states that that there is no adequate road signs to guide private motorists to the Syokimau Park and ride station, while 71 (55.9%) state that there is adequate sign boards. In fact some motorists claimed they have never seen any road signs guiding the motorist to Syokimau railway station. The dissatisfaction with the issue of road signage is manifested by a low mean score rating of 1.57 and low value of standard deviation of 0.496. On security 31 (24.4%) of private motorists respondents argue there is no adequate security at the parking lot while 96 (75.6%) of respondents are of the view that there is adequate security at the parking lots. The confidence in the security arrangement is manifested by a high mean score rating of 3.92 and a standard deviation of 1.028.

Out of 127 private motorist who returned the questionnaire 20 (15.7%) states that they would not encourage other private motorists to use Syokimau park and ride facility whereas 107 (84.3%) states that they would encourage private motorists to use Syokimau park and ride facility. The high mean score rating of 4.07 demonstrates that the respondents are willing to encourage their friends to use Syokimau Park and ride facility. On the ease of parking at Syokimau park and ride facility 26 (20.5%) of the private motorists observes that it's not easy to park vehicles at Syokimau parking lot whereas 101 (79.5%) are of contrary opinion. The analysis returned a mean score of 4.04 meaning respondents agree with the proposition that it's easy to park vehicles at Syokimau parking lot. However, the analysis returned a high standard deviation of 1.019 meaning there is large deviations from the mean. In Summary it's evident that there is potential for growth in the number of private motorists who use Syokimau Park and ride facility as the respondents gave a positive assessment of the facility in regard to presence of road signage's, ease of parking, security and referral of new customers; with the lowest score being 55.9 %.

In regard to the duration of usage of Syokimau park and ride by private motorists, out of 127 respondents 35 (27.6%) have used the station for a period of 0-12 months, 19 (15%) period of 12-24 months, 25 (19.7%) a period of 24-36 months, 23 (18.1%) a period of 36-48 months, 13 (10.2%) a period of 48-60 months and 12 (9.4%) a period of 60-72 months. This indicates a poor retention rate for private motorists who use Syokimau Park and ride facility on a regular basis. This is an indication of an underlying problem.

4.5 Parking Cost differential between Syokimau Park and ride facility on usage of rail transport at Syokimau Park and Ride facility

This research objective was investigated by formulating research questions on the adequacy of parking lots, parking cost differential between the station and Nairobi central business district and impact of changing the current parking fee of 100 Kenya shillings at Syokimau railway station.

4.5.1 Adequacy of parking spaces at Syokimau Railway Station

This question sought to get the opinion of the private motorists on whether they felt the number of parking spaces at the station are adequate to cater for the current demand. This was relevant as this would influence potential customers on whether to use the park and ride facility or not.

4.4: **Adequacy of parking lots at Syokimau park and ride station**

Variable	Category	Frequency	Percent	Cumulative Percent
Adequacy of parking spaces at Syokimau park and ride facility	Yes	117	92.1	92.1
	No	10	7.9	100.0
Total		**127**	**100**	

From the analysis on table 4.4, 117 (92.1 %) of the private motorists respondents are confident that there is adequate parking spaces at Syokimau park and ride station. This is a remarkable confidence level by the private motorists that there is no likelihood of them missing a parking slot at the station irrespective of whatever time they arrive at the station. This is consistent with the Kenya railways corporation assertion that the parking space has never been utilised to full capacity. This shows there is potential for growth in customer if Kenya railways addresses the various bottlenecks affecting the commuters. Appendix V in page 66 is a table indicating the parking utilisation at Syokimau station in the months of September – November 2017. The highest parking utilisation was 198 against available parking lots of 328.

4.5.2 Parking cost differential between Nairobi Central Business District and Syokimau Park and ride station

This theme is in line with objective which focusses on influence of parking charges on usage of Syokimau park and ride station. A comparison was made on the parking fee at Syokimau railway station and Nairobi central district which the study has assumed to be the final destination for the private motorists. The study also sought to know whether increase in parking charges at Syokimau railway station would discourage the private motorists from using the Syokimau commuter train.

Table 4.5: parking cost at Syokimau park and ride station

Statement	**Frequency**					**Mean Score**	**Standard Deviation**
	Scores (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)						
	1	2	3	4	5		
Less parking fee at Syokimau railway station in comparison with Nairobi Central Business District encourage usage of Syokimau commuter train	12 (9.4%)	15 (11.8%)	17 (13.4%)	33 (26%)	50 (39.4 %)	3.78	1.33
The parking charges of ksh. 100 at Syokimau Station is still high	42 (33.1%)	33 (25.9%)	23 (18.1%)	18 (14.2 %)	11 (8.7%)	2.43	1.343
Increase in parking charges at Syokimau railway station discourage	14 (11%)	16 (12.6%)	10 (7.9%)	20 (15.7 %)	67 (52.8 %)	3.87	1.45

Statement	Frequency					Mean Score	Standard Deviation
	Scores (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)						
	1	2	3	4	5		
you from using rail transport							
The amount of parking charges at Nairobi Central Business District influences your decision to use rail transport	19 (15%)	18 (14.2%)	12 (9.4%)	26 (20.5 %)	52 (40.9 %)	3.58	1.504

From analysis on table 4.5, 83 (65.4 %) of the respondents states that less parking fee at Syokimau Park and ride facility influences their decision to use Syokimau commuter train whereas 44 (34.6%) are not influenced by lower parking charges at Syokimau station. The analysis returned a high mean score of 3.78 indicating agreement with the stated proposition. The standard deviation was 1.33 indicating large variation from the mean. This can be attributed to the fact that some of the employers provide free parking lots for the employees, therefore, such employees maybe motivated by reduction in fuel consumption rather than parking cost. A total of 97 (76.4%) of respondents affirmed that increase of parking fee at Syokimau station from the current one hundred Kenya shilling would discourage them from using the Syokimau commuter train. Out of 127 private motorists respondents 75 (59%) observe that the parking fee of KES 100 at Syokimau is affordable whereas 52 (41%) are of contrary view. The analysis returned a low mean score of 2.43 indicating majority of the respondents disagree with the stated proposition that the parking fee of KES 100 is still high.

4.6 Train schedule on usage of rail transport at Syokimau Park and ride facility

In this section the study sought to assess reliability of the train schedule at Syokimau station, awareness of KRC feedback mechanism to private motorists and adequacy of train frequency at the Syokimau station to meet customers demand.

Table 4.6: Train schedule on usage of rail transport at Syokimau Park and ride station

Statement	**Frequency**					**Mean Score**	**Standard Deviation**
	Scores (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)						
	1	2	3	4	5		
Train usually arrives/departs on time at Syokimau railway station	11 (8.7%)	14 (11%)	27 (21.3%)	47 (37%)	28 (22%)	3.53	1.20
Train usually arrives/departs on time at Nairobi Central Station	11 (8.7%)	12 (9.4%)	32 (25.2%)	48 (37.8 %)	24 (18.9 %)	3.49	1.16
Kenya Railways Corporation usually responds to customers complaint regarding Syokimau commuter train promptly	20 (15.7%)	28 (22%)	40 (31.5%)	32 (25.2 %)	7 (3.9%)	3.02	1.237
Syokimau commuter train rarely stalls mid-journey	16 (12.6%)	20 (15.7%)	35 (27.6%)	43 (33.9 %)	13 (10.2 %)	3.17	1.196

Based on analysis of table 4.6, out of 127 private motorists who gave their response 25 (19.7%) stated that the train does not depart/arrive on time at Syokimau railway station whereas 102 (80.3%) stated that train schedule at Syokimau station is adhered to. Equally 23 (18.1%) of the respondents observed that the departure/arrival time at Nairobi central station which is the terminal station for Syokimau train is not as per schedule, whereas 104 (81.9%) of the respondents affirmed that Syokimau train departs and arrives Nairobi Central station on time. This is illustrated by the high mean scores of 3.53 and 3.49 in regard to propositions of timely departure/arrival at Syokimau station and Nairobi Central station respectively. This shows passengers have confidence on the reliability of train schedule at both Syokimau and Nairobi central station, thus; if KR was to address the other underlying issues more private motorists would be attracted to Syokimau train.

On KR customer feedback mechanism 48 (37.7%) stated KR does not respond to queries raised by customers whereas 39 (29.1%) are of contrary opinion, 32 (25.2%) of the respondents adopted a middle ground position whereby they stated they weakly agree that KR responds to customer complaints. The analysis returned a mean score of 3.02 meaning they weakly agree with the proposition that KR usually responds to passenger complains. A high standard deviation of 1.237 indicates large variation from the mean score. This is an indication of scores that lies on the two extreme ends of strongly disagree and strongly agree. This a clear indication of perceived poor customer services.

On the issue of disruption of train services midway 36 (28.3%) of respondents stated that the issues is rampant whereas 56 (44.1%) of respondents observed that this is a rare occurrence. 35 (27.6%) adopted the middle ground position of weakly agreeing with the proposition. This is reflected by the low mean score of 3.17 and a high standard deviation of 1.196. This observation is contrary to what the same respondents had observed that Syokimau train arrives and departs the terminal station on time. This disparity can be attributed to the fact that customers are more likely to remember a bad experience where a train stalled midway exposing them to long delays than slight delays of few minutes at the terminal stations.

Table 4.7: Awareness of KRC feedback mechanism and reliability of Syokimau train Schedule

Variable	Category	Frequency	Percent	Cumulative Percent
Is Syokimau commuter train schedule reliable	Yes	86	67.7	67.7
	No	41	32.3	100.0
	Total	**127**	**100.0**	
Is the train frequency adequate to meet demand	yes	55	43.3	43.3
	No	70	55.1	98.4
	no answer	2	1.6	100.0
	Total	**127**	**100.0**	
Awareness of KRC complaint feedback mechanism	yes	44	34.6	34.6
	No	83	65.4	100.0
	Total	**127**	**100.0**	
KRC Reply to raised queries	yes	19	15.0	15.0
	No	9	7.1	22.0
	N/A	99	78.0	100.0
	Total	**127**	**100.0**	

From table 4.7, out of 127 respondents who are private motorists 86 (67.7%) stated that the train schedule at Syokimau railway station is reliable whereas 41 (32.3%) avers that the train schedule at Syokimau station is unreliable. 70 (55.1%) of private motorists respondents observes that the current train frequency is not adequate to meet the current traffic demand. This means there is need to introduce another train during the peak hours to bring the total number of trains to three. 83 (65.4%) of the respondents stated that they are not aware of any channel that can be used to give feedback to KRC on quality of the train services offered. Based on analysis on table 4.8, 47.4% of the respondents who claimed to have raised queries to KRC did not get any feedback. This is a clear indicator of poor customer service. This may explain why retention capacity for private motorist's customers have been poor.

Table 4.8: Reply for passenger complaints

		did you receive a reply			Total
		yes	No	**N/A**	
have your ever raised a	yes	19	9	0	28
complaint to Kenya	No	0	0	17	17
Railways	N/A	0	0	82	82
Total		**19**	**9**	**99**	**127**

4.7 Passenger comfort on usage of rail transport

This section focussed on the experience of the commuters on Syokimau commuter train, and whether their usage of Syokimau station is dependent on the level of comfort in the Syokimau commuter train.

Table 4.9: Passenger comfort on usage of rail transport

Statement	**Frequency**					**Total**	**Mean Score**	**Standard Deviation**
	Scores (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)							
	1	2	3	4	5			
Syokimau commuter train is Comfortable in comparison with other train within NCR	9 (7.1%)	2 (1.6%)	26 (20.5%)	46 (36.2 %)	44 (34.6 %)	127 (100%)	4.02	1.069
Syokimau commuter train is always clean	6 (4.7%)	2 (1.6%)	31 (24.4%)	48 (37.8 %)	40 (31.5 %)	127 (100%)	3.90	1.022
Passengers seats in Syokimau commuter train are well spaced	5 (3.9%)	12 (9.4%)	34 (26.8%)	42 (33.1 %)	34 (26.8 %)	127 (100%)	3.69	1.088
It is easy to board and alight from Syokimau commuter train at the platform	5 (3.9%)	4 (3.1%)	25 (19.7%)	39 (30.7 %)	54 (42.5 %)	127 (100%)	4.05	1.053

From analysis on table 4.9, out of 127 respondents who are private motorists 90 (70.8%) stated that Syokimau commuter train is more comfortable than other commuter trains operation on

Nairobi commuter network. 88 (69.3%) of the respondents stated Syokimau Commuter train is always clean. 76 (59.9%) of the respondents affirmed that passenger seat on Syokimau commuter train are adequately spaced. This confidence level is reflected in the high mean score of 4.02 and 3.90 on the stated propositions on comfort and cleanliness of Syokimau train respectively. Cleanliness and seat comfort are key attributes that makes passenger have a feeling of comfort on public transport, thus the high rating is a show of confidence with Syokimau commuter train which is likely to result in higher patronage. Out of 127 respondents 76 (59.9%) observed that passenger seats in Syokimau train are adequately spaced, whereas 93 (73.2%) stated that it easy to board and alight from the Syokimau train. This is reflected in the high mean score rating of 3.69 and 4.05 on spacing of passenger seats and ease of boarding and alighting from the train respectively.

4.8 Catchment area on usage of rail transport at Syokimau station

The study sought to establish what is the average distance covered by the private motorists from their homes to Syokimau Park and ride station, as well as the population density for the estate of residence of the private motorists. The researcher also sought to establish whether the respondents are aware of any alternative park and ride facility, which they can use to connect to Syokimau commuter train.

Table 4.10: Catchment area for Syokimau park and ride station

Variable	Category	Frequency	Percent	Cumulative Percent
Approximate distance from the residence to Syokimau park and ride station	0-2 kilometres	14	11.0	11.0
	2-5 kilometres	49	38.6	49.6
	5-10 kilometres	36	28.3	78.0
	10-15 kilometres	17	13.4	91.3
	15-20 kilometres	10	7.9	99.2
	don't know	1	0.8	100.0
	Total	**127**	**100.0**	
Is there alternative park and ride station near your residence	yes	10	7.9	7.9
	No	116	91.3	99.2
	no answer	1	0.8	100.0
	Total	**127**	**100.0**	
What's population density of your residential estate	sparsely populated	9	7.1	7.1

medium populated	77	60.6	67.7
densely populated	36	28.3	96.1
No answer	5	3.9	100.0
Total	**127**	**100.0**	

From analysis on table 4.10, out of 127 respondent who are private motorists, 99 (78%) stated that their residential estates are within a radius of 0-10 kilometres from Syokimau station. 113 (88.9%) of the respondents stated that the population density in their estate range from medium to high, whereas 9 (7.1%) stated their estates are sparsely populated. Going by the high population density within the vicinity of Syokimau railway station, there is potential for growth in the number of private motorists using the station if KR was to invest more on customer care services. 116 (91.3%) of the respondents observed that there is no alternative park and ride station near their residents. Therefore Syokimau park and ride station is strategically located within the Nairobi Commuter Network.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter summarises the study observations under the key thematic areas as guided by the research objectives for the study whose purpose was to identify the factors that influence usage of rail transport by private motorists at park Syokimau Park and ride station in Nairobi, Kenya.

5.2 Summary of Findings

The research findings displayed that 59.1 percent of the respondents were male whereas 40.9 percent were female. 109 (82.6 %) of the respondents are within the age bracket of 18-40 years, 18 (13.6%) of the respondents within age bracket of 41-50 years whereas 5 (3.8%) are 51 years and above. 94.7% of the respondents possess higher education whereas 5.3% have low education level.

5.2.1 Parking cost differential between Syokimau Park and ride facility and Nairobi Central Business District on usage of rail transport at Syokimau Park and ride facility

65.4% of the private motorists stated that less parking fee at Syokimau Park and ride facility in comparison with the charges at the CBD is key factor why they use Syokimau train. 34.6% of the private motorists are not influenced by the parking fee charges, when making a choice on the whether to use Syokimau commuter train. 62.1 percent of the respondents have used Syokimau station for a duration of less than three years. 92.1 % of the private motorists observed that there is adequate parking lots at Syokimau Railway station.

5.2.2 Train schedule on usage of rail transport at Syokimau Park and ride facility

80.3% of the respondents observed that the Syokimau train adheres to published train schedules at Syokimau railway station for both departure and arrival. 81.9% of the respondents stated that Syokimau train arrives and departs Nairobi Central station on time. 62.9% of the respondents observed that Kenya Railways does not give feedback to complaints raised by commuter train passengers. 28.3% of the respondents stated that Syokimau commuter train usually stalls mid-way the journey. 55.1% of the respondents observed that the current train frequency during the peak hours is inadequate.

5.2.3 Passenger comfort on usage of rail transport at Syokimau park and ride facility

70.8 % of the respondents observed that Syokimau Commuter train is more comfortable than other passenger coaches that are in use within Nairobi Commuter Network. 69.3% of the respondents affirmed that Syokimau Commuter train is always clean. 59.9% of the respondents stated that the passenger seats on Syokimau train are adequately spaced therefore enhancing comfort.

5.2.4 Catchment area on usage of rail transport at Syokimau Station

78% of the respondents indicated that their residential homes are within a radius of 10 kilometres from Syokimau railway station. 88.9% of the private motorists stated that the population density in their residential estates range between medium to high density.91.3% of respondents observed that there is no alternative park and ride station in the vicinity of Syokimau railway station.

5.3 Discussions

It was noted that majority of users of Syokimau park and ride facility are of middle age of between 31- 50 years, which is basically the age of the working class in Kenya. Majority of respondents also have higher education with 94.7 percent possessing college education. This usage is consistent with KRC expectations as Syokimau Commuter Services was initiated to provide premier services and targeted the middle class estates, lying along Mombasa Road.

5.3.1 Parking cost differential between Syokimau Park and ride facility and Nairobi Central Business District and usage of rail transport at Syokimau Park and ride facility

It's evident that the amount of parking fee charged to private motorists at Syokimau Park and ride station and Nairobi CBD influences the decision by private motorists to use Syokimau commuter train as indicated by 65.4% of the respondents. However, 34.6% are not influenced by less parking charges at Syokimau train. This could be attributed to the fact that some employers provide free parking to the employees whereas some of the private motorists may be financially stable thus the issue of parking cost is not a headache to them. (Morrow, 2005).

5.3.2 Train schedule and usage of rail transport at Syokimau Park and ride facility

Majority of respondents stated that Syokimau commuter train is reliable and more often it departs and arrives at the railway station on time in line with the published train schedules. This indicates a high level of confidence by passengers which if leveraged can lead to increased

railway patronage. 28.3 % of the respondents observed that sometimes the commuter train stalls midway due dilapidated railway track within Mukuru slums. Kenya Railways need to rehabilitate the railway track to eradicate this bottleneck. This can be a pointer why the retention rate for customers at the station is low as indicated by the fact that only 9.1 percent of respondents said they have used the train regularly for over five years. Meek *et. al* (2013) observes that train should be reliable and on schedule in order to compensate for the inherent time lost due to transferring act from one mode to another.

5.3.3 Passenger comfort and usage of rail transport at Syokimau park and ride facility

Majority of the respondents observed that Syokimau train is very comfortable as the seats are adequately spaced and the train is always clean. Ormuz and Muftic (2004) states that cleanliness, lighting, and spacing of passenger seats are critical elements that makes a passenger feel comfortable in a public transport vehicle.

5.3.4 Catchment area on usage of rail transport at Syokimau Station

The study revealed that most of the respondents live within a radius of 0-10 km from the Syokimau railway station, which is consistent with observation by most scholars that, the catchment area for park and ride station is parabolic in shape within a radius of approximately 10 kilometres. (Hamid, Mohamad and Karim, 2007). The study has revealed that , there exists a large untapped private motorists within Syokimau station catchment area, who can be attracted to Syokimau park and ride station, if Kenya Railways addresses the various bottlenecks that are discouraging private motorists from using Syokimau park and ride station. This is due to the fact that approximately 90% of respondents have stated that they come from residential estate with population density ranging from medium to high.

5.4 Conclusions

The major bottlenecks affecting the services of Syokimau commuter train are dilapidated railway track, poor customer care services inadequate train frequency during the peak hours. These can be addressed by undertaking major rehabilitation works for both the railway track and the passenger locomotives to ensure the passenger train does not stall midway. Kenya Railways should introduce other ancillary facilities like provision of Wi-Fi services in order to attract more passengers. The parking cost differential between parking charges at Syokimau and Central Business District has big impact on usage of Syokimau Commuter train. Reliability of train schedule at Syokimau station is key determinant in decision making by private motorists on whether to use Syokimau Park and ride facility.

5.1 Recommendations

The researcher made the following recommendations in accordance with research findings:-

i) Kenya Railways / Government of Kenya should rehabilitate the dilapidated Nairobi Commuter railway network t, in order to ensure there is adequate drainage channels to channel storm water to prevent flooding on the railway track.

ii) Kenya Railways /Government of Kenya should buy new locomotives, and ensure there is proper maintenance of the rolling stock to eliminate the incidents of engine stalling midway.

iii) There is need to sensitise Kenya Railways employees on the need to improve their customer cares services, to ensure commuters complaints are handled adequately and in a timely manner.

iv) Kenya Railways should install adequate sign boards to guide private motorists to Syokimau Park and ride railway station.

v) Adequate lighting should be provided within the parking lots, to enhance security of the patrons of the station.

vi) Kenya Railways should consider providing Wi-Fi services in the train coaches and also provide some background music to the coaches to improve the feeling of comfort by passengers.

vii) Kenya Railways should increase the number of trains from two to three during the peak hours in the morning and evening, in order to increase usage of Syokimau commuter train.

viii) The parking charges at Syokimau Park and ride facility should remain competitive in comparison with charges at Nairobi Central Business District.

ix) KR should ensure that the published Syokimau train schedules are adhered to.

5.2 Suggestions for Further Research

This study focussed on usage of rail transport by private motorists at Syokimau park and ride facility. Similar studies can be extended to other park and ride stations within the Nairobi Commuter Network like Makadara station for comparison purposes. The research can be extended to include the effect of fuel cost on private motorists, and whether private motorists would be willing to shift to public transport like rail transport as a result of high fuel costs.

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

John Ireri Maina

P.O Box 62145

Nairobi

23rd October 2017

Dear Respondent

RE: DATA COLLECTION

I am a student at University of Nairobi pursuing a Master's degree in project planning and management. I am currently doing my research project to fulfil the requirements for award of degree of Masters of Arts in Project planning and Management. The research topic is on factors influencing usage of rail transport by private motorists at park and ride station: A case of Syokimau railway project in Nairobi County, Kenya.

You have been identified as one of the respondents. Kindly participate by answering all the questions correctly and as honestly as possible. Participation in this exercise is voluntary. The information given will be treated confidentially and will not be used for any other purpose other than academic.

Yours faithfully

John Ireri Maina

APPENDIX II: QUESTIONNAIRE FOR PRIVATE MOTORISTS

Questionnaire for Private Motorists at Syokimau Park and Ride station

Instructions

Please put a mark (√) in the box provide or write in the space provided depending on the question at hand.

Confidentiality: It's the intention of the researcher to ensure that the provided responses remain confidential. No reference will be made to any respondent in the report. Therefore don't indicate your name in the booklet.

SECTION A: GENERAL INFORMATION (*mark as appropriate in the box provided*)

1. Select your appropriate gender

   Male ☐ Female ☐

2. Select your age bracket

   18 -30yrs ☐ 31-40 yrs. ☐ 41-50 yrs. ☐

   51-60yrs ☐ above 61 yrs. ☐

3. State your highest education level (√)

Never gone to school	
Primary	
Secondary	
College (Bachelor's degree)	
University (post graduate studies)	
Other (specify)	

SECTION B: USAGE OF RAIL TRANSPORT BY PRIVATE MOTORISTS

4. How long have you been using Syokimau Railway Station?

……

……

5. Are there adequate road signs directing motorists to Syokimau Railway station?

Yes ☐ No ☐

If answer is No in 5 above answer questions 6

6. What kind of road signs should be introduced and where?

……

……

……

……

7. In a scale of 1 to 5, rate the extent to which you agree with the following statement: (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)

Statement	**1**	**2**	**3**	**4**	**5**
There are adequate signs to guide motorists within the parking area at Syokimau Railway Station					
There is adequate Security at the parking lot at Syokimau Railway station					
I would encourage other private motorists to start using Syokimau commuter train					
It's easy to park at Syokimau Railway Station (the parking spaces are wide enough).					

SECTION C: PARKING COST DIFFERENTIAL

8. Is there adequate parking spaces at Syokimau Railway Station compared to Nairobi Central Business District?

   Yes ☐ No ☐

9. Is there parking cost differential between parking charges at Syokimau railway station and Nairobi Central District?

   Yes ☐ No ☐

   If answer is yes in 9 above answer questions 10

10. Which is cheaper? Parking at Syokimau railway Station or parking at Nairobi Central Business District.

    …….

11. Does parking cost differential influence your decision to use Syokimau commuter train?

    Yes ☐ No ☐

12. Using the Likert scale on a scale of 1 to 5 , rate the extent to which you agree or disagree with the following statements: (√). (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)

Statement	**1**	**2**	**3**	**4**	**5**
Less parking fee at Syokimau railway station in comparison with Nairobi Central Business District encourage usage of Syokimau commuter train					
The parking charges of ksh. 100 at Syokimau Station is still high					
Increase in parking charges at Syokimau railway station discourage you from using rail transport					
The amount of parking charges at Nairobi Central Business District influences your decision to use rail transport					

SECTION D: TRAIN SCHEDULE AT SYOKIMAU STATION

13. Is Syokimau commuter train reliable? Tick as appropriate (√)

Yes ☐ No ☐

14. In a scale of 1to 5, rate the extent to which you agree with the following statement: (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)

Statement	**1**	**2**	**3**	**4**	**5**
Train usually arrives/departs on time at Syokimau railway station					
Train usually arrives/departs on time at Nairobi Central Station					
Kenya Railways Corporation usually responds to customers complaint regarding Syokimau commuter train promptly					
Syokimau commuter train rarely stalls mid-journey					

15. Are you aware of Kenya Railways Complaints mechanism in regard to Syokimau Railway Station (e.g. suggestion Box, Facebook page etc.)

Yes ☐ No ☐

If answer is yes in 15 above answer questions 16

16. Have you ever raised a complaint in any forum in regard to Syokimau commuter train services?

Yes ☐ No ☐

If answer is yes in 16 above answer questions 17

17. Did you receive a reply?

Yes ☐ No ☐

18. Is the frequency of Syokimau commuter train adequate to meet customer demands?

Yes ☐ No ☐

19. In your opinion, if the frequency of Syokimau commuter train is increased during morning and evening hours, would it attract more private motorists?

Yes ☐ No ☐

SECTION E: PASSENGER COMFORT

20. Is passenger comfort a determinant for your usage of Syokimau commuter train?

Yes ☐ No ☐

21. In a scale of 1 to 5, rate the extent to which you agree with the following statement: (where 1=strongly Disagree 2=Disagree 3=weakly Agree 4=Agree 5= Strongly Agree)

Statement	1	2	3	4	5
Syokimau commuter train is Comfortable in comparison with other train services within Nairobi Commuter railway network.					
Syokimau commuter train is always clean					
Passengers seats in Syokimau commuter train are well spaced					
It is easy to board and alight from Syokimau commuter train at the platform					

22. In your opinion what should Kenya Railways Corporation do to make Syokimau commuter train more comfortable?

……

……

……

SECTION F: CATCHMENT AREA FOR SYOKIMAU RAILWAY STATION

23. What is the approximate distance between your residence and Syokimau railway Station. Tick as appropriate(√)

0-2 kilometres	
2-5 kilometres	
5-10 Kilometres	
10-15 kilometres	
15- 20 kilometres	
Over 20 kilometres	

24. Is there an alternative railway station that you can use instead of Syokimau railway station

Yes ☐ No ☐

If answer is yes in 24 above answer questions 25

25. Which is the alternative railway station?.....and how far is it from your residence…….

26. How far is your residence from the Mombasa road (A104 road)

0-2 kilometres	
2-5 kilometres	

5-10 Kilometres	
10-15 kilometres	
15- 20 kilometres	
Over 20 kilometres	

27. What's the name of your residence estate?

.....

.....

.....

.....

28. What is the population density in your residential estate? Tick as appropriate(√)

a) Sparsely Populated ☐

b) Medium Populated ☐

c) Densely Populated ☐

APPENDIX III: INTERVIEW SCHEDULE FOR MANAGERS OF SYOKIMAU RAILWAY STATION

SECTION A: GENERAL INFORMATION (*Mark as appropriate in the box provided*)

1. Select your appropriate gender

Male ☐ Female ☐

2. Select your age bracket

18 -30yrs ☐ 31-40 yrs. ☐ 41-50 yrs. ☐

51-60yrs ☐ above 61 yrs. ☐

3. State your highest education level. Tick (√) where appropriate

Never gone to school	
Primary	
Secondary	
College (undergraduate studies)	
University (post graduate studies)	
Other (specify)	

4. How long have you been stationed at this station?.....

SECTION B: Managers observation and experience at Syokimau Station

5. What are the main challenges affecting operations of Syokimau commuter train?

a) ……

……

b) ……

……

c) ……

……

d) ……

……

……

6. Are the two train schedules for morning hours and two for evening hours adequate?

Yes ☐ No ☐

If No how many train trips should be added and what time?

……

……

……

7. In your assessment is the number of passenger complaints increasing or deceasing……

……

……

8. What are the main sources of passenger complaints?

a) .....

.....

b) ……

……

c) ……

……

APPENDIX IV: TABLE FOR DETERMINING SAMPLE SIZE OF A KNOWN POPULATION

Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*

APPENDIX V: TABLE FOR SYOKIMAU RAILWAY STATION PARKING FOR MONTHS OF SEPTEMBER – NOVEMBER 2017

Date (September 2017)	No. of Vehicles parked	Date (October 2017)	No. of Vehicles parked	Date (November 2017)	No. of Vehicles parked
September 01, 2017	43	October 02, 2017	148	November 01, 2017	158
September 04, 2017	120	October 03, 2017	164	November 02, 2017	52
September 05, 2017	150	October 04, 2017	170	November 03, 2017	33
September 06, 2017	155	October 05, 2017	174	November 06, 2017	107
September 07, 2017	175	October 06, 2017	132	November 07, 2017	126
September 08, 2017	121	October 09, 2017	176	November 08, 2017	110
September 11, 2017	189	October 10, 2017	173	November 09, 2017	112
September 12, 2017	193	October 11, 2017	124	November 10, 2017	74
September 13, 2017	169	October 23, 2017	155	November 13, 2017	123
September 14, 2017	163	October 24, 2017	143	November 14, 2017	141
September 15, 2017	121	October 27, 2017	44	November 15, 2017	125
September 18, 2017	175	October 30, 2017	159	November 16, 2017	129
September 19, 2017	189	October 31, 2017	147	November 17, 2017	92
September 20, 2017	198	-	-	November 20, 2017	120
September 21, 2017	175	-	-	November 21, 2017	122
September 22, 2017	144	-	-	November 22, 2017	114
September 25, 2017	180	-	-	November 23, 2017	110

Date (September 2017)	No. of Vehicles parked	Date (October 2017)	No. of Vehicles parked	Date (November 2017)	No. of Vehicles parked
September 26, 2017	188	-	-	November 24, 2017	89
September 27, 2017	178	-	-	November 27, 2017	111
September 28, 2017	156	-	-	November 29, 2017	110
September 29, 2017	137	-		November 30, 2017	117
	3319	-	1909		2275
Average	**158**		**147**		**108**
Total Number of available parking spaces at Syokimau stations is 328					

APPENDIX VI: INTRODUCTION LETTER FROM UNIVERSITY

UNIVERSITY OF NAIROBI
OPEN DISTANCE AND e– LEARNING CAMPUS
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING
NAIROBI LEARNING CENTRE

Your Ref:
Our Ref:
Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
N A I R O B I

30th October, 2017

REF: UON/ODeL/NLC/27/464

RE: MAINA JOHN IRERI- REG NO.L50/82095/2015

The above named is a student at the University of Nairobi Open, Distance and e-Learning Campus, School of Open and Distance Learning, Department of Open Learning pursuing Master of Arts in Project Planning and Management.

He is proceeding for research entitled **"Factors influencing usage of Rail Transport by Private Motorists at Park and Ride station: A case of Syokimau Railway project in Nairobi Couny,Kenya."**

Any assistance given to him will be appreciated.

UNIVERSITY OF NAIROBI C.E.S.
P.O. Box 30197
31 OCT 2017
NAIROBI
NAIROBI EXTRA MURAL CENTRE

CAREN AWILLY
CENTRE ORGANIZER
NAIROBI EXTRA-MURAL CENTRE

APPENDIX VII: RESEARCH PERMIT FROM NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: 020 400 7000,
0713 788787,0735404245
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/17/50707/20026** Date: **15th November, 2017**

John Ireri Maina
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Factors influencing usage of rail transport by private motorists at park and ride station: A case of Syokimau Railway Project in Nairobi County, Kenya".*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **14th November, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

National Commission for Science, Technology and Innovation is ISO9001:2008 Certified

APPENDIX VIII: RESEARCH PERMIT FROM NAIROBI COUNTY COMMISSIONER

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: 020 400 7000,
0713 788787,0735404245
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/17/50707/20026**

Date: **15th November, 2017**

John Ireri Maina
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Factors influencing usage of rail transport by private motorists at park and ride station: A case of Syokimau Railway Project in Nairobi County, Kenya".*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **14th November, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. Box 30124-00100, NBI
TEL: 341666

The County Director of Education
Nairobi County.

APPENDIX IX: RESEARCH PERMIT FROM MINISTRY OF EDUCATION

Republic of Kenya
MINISTY OF EDUCATION
STATE DEPARTMENT OF BASIC EDUCATION

Telegrams: "SCHOOLING", Nairobi
Telephone; Nairobi 020 2453699
Email: rcenairobi@gmail.com
cdenairobi@gmail.com

When replying please quote

REGIONAL COORDINATOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 74629 – 00200
NAIROBI

Ref: **RCE/NRB/GEN/1 VOL. I**

DATE: **22nd November, 2017**

John Ireri Maina
University of Nairobi
P O Box 30197-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on "**Factors influencing usage of rail transport by private motorists at park and ride station: A case of Syokimau Railway Project**".

This office has no objection and authority is hereby granted for a period ending **14th November, 2018** as indicated in the request letter.

Kindly inform the Sub County Director of Education of the Sub County you intend to visit.

22 NOV 2017

KINOTI KIOGORA
FOR: REGIONAL COORDINATOR OF EDUCATION
NAIROBI

C.C

Director General/CEO
Nation Commission for Science, Technology and Innovation
NAIROBI

APPENDIX X: RESEARCH PERMIT FROM KENYA RAILWAYS CORPORATION

KENYA RAILWAYS
right on track

MEMO

To: Eng. John Ireri Maina **Ref:** P/00118

Thro' Ag. GM (Concession)

From: HoD -HR A **Date:** 8/11/2017

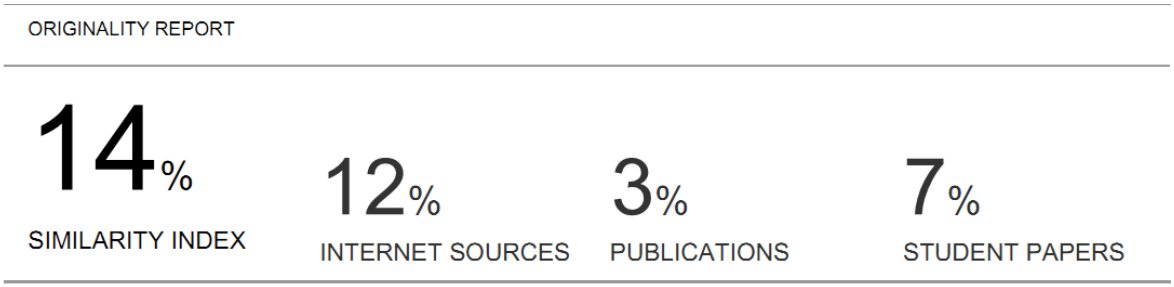
SUBJECT: PERMISSION TO COLLECT DATA AT SYOKIMAU AND IMARA DAIMA RAILWAY STATIONS

The above subject refers.

This is to inform you that we have no objection with your request to carry out your PHD Thesis data as requested.

Kindly liaise with the Business Development Manager for further assistance.

Your effort for personal development is appreciated.

Florence Kanja
Human Resources & Admin.Officer
For: HoD - HUMAN RESOURCES & ADMIN.

APPENDIX XI: PLAGIARISM REPORT