

**EFFECTS OF INTEGRATED NATIONAL TRANSPORT POLICY ON TRANSPORT
SERVICE DELIVERY IN NAIROBI CITY COUNTY, KENYA**

MOSES OMONDI OKEYO

B63/64192/2010

A RESEARCH PROJECT SUBMITTED IN PART FULFILMENT OF THE REQUIREMENT
FOR THE DEGREE OF MASTER OF ARTS IN PLANNING

DEPARTMENT OF URBAN AND REGIONAL PLANNING

SCHOOL OF BUILT ENVIRONMENT

UNIVERSITY OF NAIROBI

July, 2016

DECLARATION

I do hereby declare that this Research Project is my original work and has not been presented for a degree in any other university.

Signature..... Date.....

Moses Omondi Okeyo.

B63/64192/2010

This Research Project has been submitted for examination with my approval as the university supervisor.

Signature: Date:

Dr. Samuel Obiero,

Senior Lecturer, Department of Urban and Regional Planning.

University of Nairobi

DEDICATION

This work is dedicated to my family and parents who have been supportive in immeasurable ways despite the challenges. Whenever they are, the study is dedicated to those who seek to serve vulnerable segments of the society and humanity at large.

ACKNOWLEDGEMENT

I am greatly indebted to my supervisor Dr. Samuel Obiero following his immense and tireless contribution to my research work. Dr. F. Mugo deserves a mention because of her great input as well as academic fraternity of the Department of Urban and Regional Planning, University of Nairobi whom I interacted with directly or indirectly.

I would like to appreciate Engineer Karen of Kenya Urban Roads Authority, Engineer Kayoti Head of Design Kenya National Highways Authority; Engineer Kimani of Nairobi City County, Mr. Kibe of Kenya Rural Roads Authority, Mr. John Kiarie in-charge of National Transport and Safety Authority Licensing Department and Superintendent Swaleh Lutukzi Traffic Manager Nairobi City County.

The seven matatu SACCOs/Company representatives who were interviewed in the study and allowed me to use their organisation are worth mentioning. They are Fleet Director Ms. Jackline Mwangi of Kenya Bus Service, Fleet Director Mr. Alex of KASBOWA, Fleet manager Mr. Njagi of West-Madaraka, Mr. Hillary Kamau Manager of Double M, Fleet manager Mr. Onesmus Karakacha of Moonlight Coach Company, Fleet manager Mr. Dishon Kamau of PEJA Travellers Limited and Fleet Manager Mr. Charles Kamau of Matatu Owners Association.

I owe gratitude to NACOSTI for granting research permit for the study, Traffic Department, NTSA, all household respondents and the twenty Research Assistants led by Sixtus Odumbe and Bernard Nyikuli.

ABSTRACT

Kenya has been grappling with numerous problems associated with informal privatised public transport service. The County City of Nairobi public transit and other urban areas are marred with a lot of negative challenges which are not the desired traits of mass urban public transit. In response, the Ministry of Transport formulated the Legal notice No. 161 of 2003 that gave birth to Integrated National Transport Policy which aimed at streamlined Public Service Vehicle operations such as internal control, efficiency, affordable and safe transport service. This study investigates the effects of introduction of the policy and regulation on customer service in public transport sector by seeking to establish the extent that Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and National Transport and Safety Authority Regulations 2013 have been implemented; characteristics of PSV industry operations; consumer satisfaction with PSV service quality offered after formulation of the policy and how the current regulatory structure be combined with other approaches for improved transport system. The research used non experimental study design to get primary data from a sample of 208 household respondents and 12 key informants. Data was collected using questionnaires and analysed quantitatively using SPSS to yield descriptive and inferential test statistics. Findings were presented in table, figures and charts. The results showed that; first, participants were indifferent as to the extent of implementation. There were exhibition of compliance and at the same time deficiencies in implementing the same. In regard to operational level, the study established organisation level of the PSV industry ranks as low to medium. Half of participants agreed that PSV service quality has improved with the implementation of the requirement for the formation of PSV SACCOs. On how the current regulation can be structured with other approaches for transport reform, most of respondents indicated that there are enough laws and regulations to manage the commuter transport sector and thus called for stringency in the implementation of these regulations. Other proposals from the field included construction of more feeder roads. This was followed by those who said there is need to regulate fare charged. However, from dispatch bus per route survey and field experience, the priority areas would be improvement of junction to enhance traffic flow; embed Transit Oriented Development in transportation planning and streamline weaknesses evident in the current policies. The research hypothesis established that implementation of the Policy has led to improvement in service delivery. In overall, there is some improvement in service delivery/ service quality. However, these improvements do not massively stands out as certain aspects are not yet achieved. It is only the third research question that returned a clear negative verdict of non-improvement. First and second research question had both negative and positive response of nearly equal weighting. Therefore, the INTP and NTSA 2013 have made tremendous contribution but still leaves a lot to be desired as it only addresses issues of licensing and speed regulations while ignoring other pertinent issues such as flow control, physical bottlenecks, formalisation of the sector, reduction in conflict, passenger comfort, routing issues and passenger safety that would give birth to a holistic integrative approach.

Key words: Integrated Transport Policy, urban public transport, Nairobi, Performance Evaluation and Service Delivery.

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF MAPS	xi
LIST OF EQUATIONS	xi
LIST OF PLATES	xi
LIST OF ACRONYMS	xii
CHAPTER 1: INTRODUCTION	1
1.1 Background to the Study	1
1.2 Problem Statement	4
1.3 Research Questions	6
1.4 Study Objective	6
1.4.1 Overall Objective	6
1.4.2 Specific Objective	7
1.5 Hypothesis	7
1.6 Purpose and Scope of the Study	7
1.6.1 Purpose	7
1.6.2 Scope	8
1.7 Justification	12
1.8 Assumption of the Study	12
1.9 Limitations of the Study	12
1.10 Operational Definition of Terms	13
1.10.1 Public Transport	13
1.10.2 Paratransit	13
1.10.3 Public Transit Service Delivery	13
1.10.4 Policy	13
1.11: Organisational Structure of the Study Report	14
CHAPTER 2: LITERATURE REVIEW	15
2.1 Introduction	15
2.2 Urbanisation and Urban Transport	15
2.2.1 Urbanisation Trends	15
2.2.2 Problems of Urbanisation	15
2.3 Urban Public Transit	16
2.3.1 Perspectives on Transport Policy	16
2.3.2 Urban Transport and Infrastructure System	17
2.3.2.1 Modes and Network Connectivity	17
2.3.2.2 Means	17
2.3.2.3 Nodes	17
2.3.3 Market Space Organisation and Management of Urban Transport	18
2.3.3.1 Ownership and Operation Structure	18
2.3.3.2 Travel Demand Management (TDM)	19
2.3.3.3 Modal Split	20

2.3.3.4 Flow control.....	21
2.4 Analytical Framework	21
2.4.1 Performance Evaluation of Public Transit.....	21
2.4.1.1 TTI and TRL Model.....	21
2.4.1.2 Vuchic Model.....	23
2.4.1.3 Recommended scenario	25
2.4.2 Assessment of Public Transport Route Network	25
2.4.3 Public Transport Capacity	26
2.6 Conceptual Framework	28
CHAPTER 3: URBANISATION AND TRANSPORT SYSTEM IN KENYA.....	30
3.1 Introduction.....	30
3.2 Challenges of Urbanisation	30
3.3 Urban Public Transport	31
3.3.1 Market Space Organisation and Management Scheme	31
3.4 Policy and Legal Framework	32
3.4.1 Legal notice No. 161 of 2003.....	32
3.4.2 Traffic Act	33
3.4.3 Sessional Paper No. 2 of 2012 on Integrated National Transport Policy	33
3.4.4 National Transport and Safety Authority Act, 2012	34
3.4.5 National Transport and Safety Authority (Operation of Public Service Vehicles) Regulations 2013	35
3.5 Institutional Framework and Stakeholders Analysis	35
3.5.1 Policy and Regulatory institutions.....	35
3.5.2 Financing, development and maintenance institutions	36
3.5.3 Regulatory, registration and enforcement bodies.....	36
3.5.4 Operators.....	36
3.5.5 Commuters	36
3.5.6 Employees	37
3.5.7 Hierarchy of the stakeholders	38
3.5.8 Emerging issues	39
3.6 Operational Organisation Strategy.....	39
3.7 Network and Infrastructure in Kenya.....	40
3.8 Status and Classification of Roads in Kenya	41
3.9 Emerging issues	42
3.10 Salient Realizations on Transportation in Kenya	43
3.11 Related Works and Information Gap.....	45
CHAPTER 4: STUDY AREA	48
4.1 Introduction.....	48
4.2 Location, Size and Administrative Units	48
4.3 Demographics.....	48
4.3.1 Emerging issues	49
4.4 Livelihoods and Socio-economic Dynamics.....	49
4.4.1 Emerging Realisations	50
4.5 Land Use Pattern, Urban Structure and Its Role in Travel Bottlenecks.....	50
4.5.1 Emerging realisations.....	51
4.6 Urban Public Transport in Nairobi	52

4.6.1 Current status.....	52
4.6.2 Transport Demand vs Road Transport Network.....	53
4.6.3 Emerging Issues.....	54
4.6.4 Current Interventions.....	55
4.7 Legal and Policy Framework in Nairobi.....	56
4.7.1 Existing Development Plans.....	56
4.7.2 Policies and Bylaws on transport in Nairobi.....	57
4.7.3 Emerging issues.....	57
CHAPTER 5: STUDY METHODOLOGY.....	58
5.1 Introduction.....	58
5.2 Research Design.....	58
5.3 Target Population.....	58
5.4 Sampling Procedure and Sample Size.....	58
5.4.1 Sampling Procedure.....	58
5.4.2 Sample size.....	59
5.4.3 Sampling Method.....	61
5.5 Sources of Data and Data Collection Instruments.....	61
5.5.1 Sources of Data.....	61
5.5.2 Data Collection Instruments.....	62
5.6 Data Collection Procedure.....	62
5.6.1 Introduction.....	62
5.6.2 Pre-fieldwork Phase.....	62
5.6.2 Fieldwork Phase.....	63
5.7 Methodology Framework.....	65
5.8 Data Collection Tools Design.....	66
5.9 Data Analysis.....	66
5.9.1 Qualitative Data Analysis.....	67
5.9.2 Quantitative Data Analysis.....	67
5.9.3 Inferential Statistics.....	67
5.10 Presentation of Data.....	68
5.11 Validity and reliability.....	68
5.12 Ethical Considerations.....	68
CHAPTER 6: DATA ANALYSIS AND PRESENTATION OF FINDINGS.....	69
6.1 Introduction.....	69
6.2 Demographic Information.....	69
6.2.1 Emerging realisations and Discussion on demographics and policy implications.....	69
6.3 Trip, Trip Generation, Preferences and Network Analysis of Matatus.....	70
6.3.1 Trip Generation and Preference.....	70
6.3.2 Network Analysis of Matatus.....	72
6.3.3 Emerging realisations and Discussion on Trip, Trip Generation, Preferences and Network Analysis.....	73
6.4 Dispatched Bus per Route Survey.....	74
6.4.1 Emerging realisations and Discussion on Dispatched Bus per Route Survey.....	77
6.5 Route performance evaluation at network level.....	81
6.5.1 Average Bus Stop Spacing (ASD).....	81
6.5.2 Emerging realisations and Discussion on ASD.....	84

6.5.3 Route Overlapping (R.O.).....	84
6.5.4 Emerging realisations and Discussion on R.O	85
6.6 Service capacity measurement	86
6.6.1 Observed frequency.....	86
6.6.2 Emerging realisations on observed frequency.....	86
6.6.3 Seat capacity	87
6.6.3 Emerging realisations on seat capacity and policy implications	87
6.7 The extent that Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy has been implemented	87
6.7.1 Introduction.....	87
6.7.2 Corporate Bodies and HoV	88
6.7.3 Punctuality	89
6.7.4 Fare Charged	89
6.7.5 Crew Behaviour.....	89
6.7.6 Travel Time and Speed.....	90
6.7.7 Noise Levels.....	91
6.7.8 Service Hours.....	91
6.7.9 Waiting Time	91
6.7.10 Operational Information.....	92
6.7.11 On-board Security	93
6.7.12 Bus Stop Location/Number.....	93
6.7.13 On Board Comfort	94
6.7.14 Emerging realisations and policy implications	95
6.8 Characteristics of PSV Operations and Organisation	96
6.8.1 Introduction.....	96
6.8.2 Analysis Narrative	96
6.8.3 Emerging realisations and implication on policy	98
6.9 Consumer Satisfaction	98
6.9.1 Introduction.....	98
6.9.2 Personal Perception on Quality.....	98
6.9.3 PSV Regulations and their role in Improving Quality	100
6.9.4 Emerging realisations and policy implications.....	102
6.10 Inferential Statistical Tests.....	104
6.11 How to Combine Current Regulatory Structures with other Appropriate Approaches	105
6.11.1 Introduction.....	105
6.11.2 Synoptic View of Issues and Plausible Solutions	108
6.11.2 Infrastructure Perspective: Junction Improvement.....	112
6.11.3 Land Use Planning Perspective: Transit oriented development	115
6.11.4 Policy specific issues	119
CHAPTER 7: CONCLUSION AND RECOMMENDATIONS	124
7.1 Conclusion	124
7.2 Recommendations	126
7.2.1 Policy Makers	126
7.2.2 Policy Implementers	126
7.2.3 Operators.....	128
7.2.4 Users	128

7.3 Prioritised Recommendation	128
7.3.1 Quick Wins	128
7.3.2 Medium Term	129
7.3.3 Long Term	130
7.4 Areas for Further Research	130
REFERENCES.....	132
ANNEXES.....	138
Annex 1: Road Classification in Kenya	138
Annex 2: Road Inventory in Kenya.....	138
Annex 3: Strategy and Organisation of Matatu Business	138
Annex 4: Registered Matatu SACCOs and Companies Originating and Terminating within Nairobi	139
Annex 5: University Introduction Letter.....	141
Annex 6: National Commission for Science, Technology and Innovation (NACOSTI) Permit.....	141
Annex 7: Dispatched Bus per Route Survey	142
Annex 8: Mathematical operations	142
Annex 9: Work Plan, Budget and Contacts.....	143
Annex 10: Household Questionnaire.....	146
Annex 11: Dispatched Bus per Route Survey	148
Annex 12: SACCOs and Company Questionnaire	149
Annex 13: NTSA Key Informant Interview Schedule	150
Annex 14: KURA/KeNHA/KeRRA Key Informant Interview Schedule	150
Annex 15: Results for Dispatched Bus per Route Survey.....	152
Annex 16: Key Informant Respondents	157
Annex 17: Trip Origin and Destinations	157
Annex 18: Improvement Suggestions	159
Annex 19: Data needs Matrix	160

LIST OF FIGURES

Figure 1: Purpose of the Study.....	8
Figure 2: Scope of the Study	9
Figure 3: Performance Evaluation of Public Transport	24
Figure 4: Analytical Framework	28
Figure 5: Conceptual Framework on Sustainable and Effective MRT Policy	29
Figure 6: Hierarchy of Stakeholders.....	38
Figure 7: Data Acquisition Strategy.....	63
Figure 8: Information outcome of dispatched bus per route survey	65
Figure 9: Research Variables Relationship.....	66
Figure 10: Staff Behaviour.....	90
Figure 11: Significance of Reducing Travel Time.....	91
Figure 12: waiting time	92
Figure 13: Significance on Reducing Waiting Time.....	92
Figure 14: Significance on Improving Information Levels.....	93
Figure 15: On Board Comfort.....	94

Figure 16: Standard Seat Spacing Dimensions..... 94
 Figure 17: preferred mode of transport 105
 Figure 18: preferred alternative mode of transport..... 105
 Figure 19: Reason for choosing PSV as mode of transport..... 106
 Figure 20: Improving public service vehicles services through reduction of travel time 107
 Figure 21: significance of providing bus priority lane 107
 Figure 22: Importance of state of art transit system 108

LIST OF TABLES

Table 1: Characteristics of Market Environments for Public Transport Operations..... 19
 Table 2: Measuring Improved Service 23
 Table 3: Public Transport Evaluation from Traveller Perspective..... 24
 Table 4: public transport evaluation from operator perspective 25
 Table 5: Route Performance Evaluation at Network Level..... 26
 Table 6: Service Capacity Measurement..... 27
 Table 7: summary of institutions and stakeholders in road transport 37
 Table 8: Classified Road Network in Kenya..... 41
 Table 9: Unclassified Road Network in Kenya..... 41
 Table 10: summary of road conditions in Kenya 41
 Table 11: Future Total Trip Production by Trip..... 53
 Table 12: Sample Size Calculation using Published Tables 60
 Table 13: Key Informants in Public and Private Sector 61
 Table 14: data collected from secondary sources 62
 Table 15: Dispatched Bus per Route Survey Schedule 65
 Table 16: Headway Limits 66
 Table 17: Summary of Information Captured by Survey Tools..... 67
 Table 18: fare paid per one way travel 70
 Table 19: Trip Frequency 71
 Table 20: age group-purpose of the trip cross tabulation 72
 Table 21: Summary of Dispatched Bus per Route Survey..... 77
 Table 22: service capacity performance indicator threshold 79
 Table 23: Consumer Perception on Service Quality 99
 Table 24: PSV Regulation and their Role in Improving Quality..... 100
 Table 25: Summary of Issues and Solutions..... 109
 Table 26: Rural roads 138
 Table 27: Urban Roads..... 138
 Table 28: Summary of Road Inventory 138
 Table 29: measuring operational level..... 138
 Table 30: Registered Matatu SACCOs and Companies 139
 Table 31: Route performance evaluation at network level 142
 Table 32: Service capacity measurement 142
 Table 33: Data Collection Work Plan 143
 Table 34: Field Work Budget..... 144
 Table 35: Key Informants in Public and Private Organisations Contacts..... 145

Table 36: Institution Contact Person (s)	145
Table 37: Research Assistants Contacts	146
Table 38: Day one results for Riruta	152
Table 39: Day two results for Riruta	152
Table 40: Day one results for Maringo	153
Table 41: Day two results for Maringo	154
Table 42: Day one results for Mathare North.....	155
Table 43: Day two results for Mathare North.....	156
Table 44: Start point (origin) of respondents’ journey	157
Table 45: End point of respondents’ journey	158
Table 46: how to improve public transport services in Kenya.....	159

LIST OF MAPS

Map 1: Study Area in National and Regional Context	10
Map 2: Study Area and Sampled Nodes	11
Map 3: Convergence of Nairobi’s Road Networks into CBD	51
Map 4: Sampled Wards.....	59
Map 5: Riruta-CBD Route.....	75
Map 6: Maringo-CBD Route	75
Map 7: Mathare North - CBD Route	76
Map 8: total length of bus route network for Mathare-CBD.....	85
Map 9: total length of bus route network for Maringo-CBD	85

LIST OF EQUATIONS

Equation 1: Published Table	60
-----------------------------------	----

LIST OF PLATES

Plate 1: Bus Stops Along Maringo-CBD Route	83
Plate 2: Landhies/ Haile Selassie Avenue/ Pumwani Road/ Ring Road Pumwani and River Road Roundabout	113
Plate 3: Kenyatta Avenue/ Uhuru Highway Roundabout	113
Plate 4: Makadara Neighborhood.....	117
Plate 5: Kiambio Informal Settlement.....	118

LIST OF ACRONYMS

CBD – Central Business District
FDOT - Florida Department of Transportation
GDP – Gross Domestic Product
GoK – Government of Kenya
HOV – High Occupancy Vehicle
IEBC – Independent Electoral and Boundary Commission
INTP – Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy
JICA – Japan International Corporation Agency
KBS – Kenya Bureau of Statistics
KBS - Kenya Bus Service
KeNHA - Kenya National Highways Authority
KeRRA - Kenya Rural Roads Authority
KIPPRA – Kenya Institute of Public Policy Research and Analysis
KRB – Kenya Roads Board
KRC – Kenya Railways Corporation
KURA - Kenya Urban Roads Authority
KWS - Kenya Wildlife Services
LRT – Light Rail Transit
LT – Light Train
MOA – Matatu Owners Association
MoT – Ministry Of Transport
MRT – Mass Rapid Transit
MWA – Matatu Welfare Association
NCC – Nairobi City Council
NCC - Nairobi City County
NIUPLAN – Nairobi Integrated Urban Plan
NMIMT - Non-Motorised and Intermediate Means of Transport
NMT – Non Motorised Transport
NRSAP - National Road Safety Action Plan
NTSA – National Transport and Safety Authority
PSV – Public Transport Vehicle
RBT – Rapid Bus Transit
RoW – Right of Way
RVR - Rift Valley Railways
SACCO – Savings and Credit Cooperative Societies
SPSS – Statistical Package for Social Scientists
TDM – Travel Demand Management
TOD – Travel Oriented Development
UN – United Nations

CHAPTER 1: INTRODUCTION

1.1 Background to the Study

Transportation system plays a critical role in any economy as it ensures spatial interaction between two or more nodes. Road transport in Kenya account for about 93% of all freight and passenger traffic (Ministry of Roads, 2012). Kenya's mass public transit system is chaotic, exploitative and inefficient. The industry display minimal characteristics of normative expectation of a public transit system owing to the small carrying capacity of most of the vehicle, high cost per head, non-timed schedules and compromise on road safety/etiquette resulting into accidents and traffic jams. Aduwo (1972: 123) noted that from 1934, Kenya Bus Service which was owned by the Overseas Trading Company (75%) and the Nairobi City Council 25% existed as the sole legal provider of public transport services in Nairobi by then, offering a well organised public transit within Nairobi. However, thereafter it was not able to cope with the influx of informal paratransit as the Government neglected and ceded ground to the private sector (Lee-Smith, 1989).

The informality of the sector gained footing in 1973 when the then President Kenyatta, responding to lobbying from matatu operators declared matatus as legal mode of transport and could ferry fare paying passengers without obtaining special licenses to do so but had to comply with existing insurance and traffic regulations. For instance, Mutongi (2006), Aduwo *et al.* (1992: 125) observed that in the early 1960s, the total number of Matatus operating in the country was less than 400 and did so in the form of taxis. However, presently, Kenya's public transport has been dominated by Matatu vehicles as they control 80% of public transit services (Gicheru *et al.*, 2011: 15).

In Kenya, entrepreneurs have operated an informal public transport system, employing cheaper vans and minibuses to ferry people along much less regulated routes. Historically, paratransit operators have no strict travel schedules, travel faster on both designated and non-designated routes, pick up and drop passengers at designated and non-designated stop points, and operate nearest to where majority of the low income population lives. They are, therefore, popular modes of transport, particularly in the urban and peri-urban areas, where they serve low income earners (Orero *et al.*, 2010). To sanitize the sector and allow it play its meaningful role within the economy, GoK has initiated a raft of measures over the years owing to the realisation that the regulatory framework (Traffic Act Cap 403 instituted in 1954) for the industry has over the time had some performance gap.

The first attempt came in 2003 through Legal Notice No. 161 of 2003 which amended Traffic Act Cap 403. The proposals of the regulation were that:

- All motor vehicles seats be fitted with seat belts;
- All vehicles with tare weight exceeding 3, 048 kilogrammes be fitted with speed limiters;
- PSVs be painted with a 150 millimetre width yellow band on both sides and on rear;
- Owners to indicate their names and address on the vehicle's body;
- All matatu crew to wear uniform accompanied by badges issued by registrar of motor vehicles and
- Conductor and driver are to be employed on permanent basis.

Asingo *et al.* (2007) observes the weakness in this regulation was that it only focused on mechanical safety of the vehicle, identification and employment terms while neglecting other critical areas of public transit service delivery such as carrying capacity, design of vehicles, infrastructure, orderly use of termini, route allocation and so on. Secondly, it had the weakness that the implementation of the regulation was spread across various institutions such as Transport Licensing Board (TLB) and Traffic Department. Thus, it neglected structural functional linkage perspective of road transport.

To strengthen the previous regulation and limit any lacuna on road transport, the GoK initiated Legal Notice No. 65 of 2005 also known as Traffic (Amendment) Rules so as to give detailed description of Legal Notice No. 161 of 2003 which had earlier been declared illegal by amending various sections of Traffic Act Cap 403. The amendments were that:

- In rule 5 a new paragraph 4 was inserted. The paragraph 4 states that the badge referred in section 98 (5) of the Act shall be in the form set out in the Third Schedule;
- It deleted the old section 22A rule. 22A (1) prohibits driving of any vehicle unless it is fitted with seat belts. Subsection (1) describes the manner in which the seat belt is to be fitted while subsection (2) to (6) describes repercussions failure to observe the same;
- It deleted the initial section 41A (1) by stating in (a) and (b) that every PSV, except taxi cab and every commercial vehicle with a tare weight exceeding 3048 has to be fitted with proper speed governor;
- 41A (2) makes it mandatory for those vehicles described 41A (a) and (b) to exhibit the certificate of compliance. Further, 41A (2) in (d) amend rule 57 by inserting the word

‘matatu’ immediately after omnibus; (e) and (f) amends rule 58 and 59 respectively by inserting the word ‘and every matatu’ immediately after the omnibus;

- 41A (2) in (g) inserts new rule 55A after rule 55. Rule 55A (1) directs that every matatu shall have painted on both sides and on rear, a broken horizontal yellow band having a width of 150 millimetres. (2) to (5) of the section gives detailed description of what is to be done in relation the colour between the yellow band which has to be the one described in log book, the spacing between two yellow colours which has to be a maximum of 10 centimetres, to body is the matatu is so coloured and the ability for individuals to view the band at least at a distance of 275 metres during the day and
- 41A (6) deals with prominent exhibition of recent photograph of the head and shoulders of the driver for the time being has charge of the matatu.

As much as the regulation gave in-depth description of the previous Legal notice, it still further failed to appreciate functional structural linkage perspective in road transport sector by focusing on mechanical safety and identification while ignoring networks, nodes, signalling/ flow control and other specifications for flow entities/ vehicles.

The two regulations greatly informed Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy – specifically section 89 to 102. The sessional paper themed “Transport for Prosperity” was expected to address challenges inhibiting transport sector through:

- Integration of transport infrastructure and operations;
- Enhancement of transport services and quality;
- Consumer protection;
- Catering for consumers with special needs;
- Ensuring fair competition;
- Integration of information and communication technologies in transport development and operations;
- The need to eliminate impediments to development;
- Use of non-motorized and intermediate means of transport;
- Incorporation of safe and secure transport system;
- Sustainable utilization of the environment and
- Development of the requisite human capacity.

To actualise the above, in 2013, the Transport and Infrastructure Minister gazetted National Transport and Safety Authority (Operation of Public Service Vehicles) Regulations 2013. These measures were supposed to improve services by ensuring safe and secure public transport system and consumer protection.

The purpose of this study was to evaluate effects of Integrated National Transport Policy particularly section on Road Passenger Transport Services on urban public transport service delivery in Nairobi City County. The evaluation was to establish the effectiveness to improved service delivery in regard to enhancement of transport services and quality; consumer protection; efficient operations structure; need to eliminate impediments to development; incorporation of safe and secure transport system; and development of the requisite human capacity.

1.2 Problem Statement

Ministry of Transport (2013), opined that para-transit sector significantly flourishes in economies where the government have limited investment or at worse zero investment in the development and management of public transit. Subsequently, the unfilled gap driven by forces of demand and supply offers an opportunity for private sector to venture in the same on demand based approach/ profit driven approach. The bottom-line is that the para-transit operates in a situation which makes it hard to police them, and more prone to unreliable and unpredictable time management, unpredictable fare charges and thus, making travelling costly, inefficient and unsafe. Ultimately, the realisation is that these negate proper and effective service delivery. Kadi *et al.*, (2012: 98) corroborates the same by noting that “improper transport policy adversely affects traffic congestion and also causes significant disruption of business and commercial activities”.

Padam *et al.* (2004: 4) argues that transport being a derived activity, its conceptualization and articulation is a function of a variety of social and economic issues and longer term goals. However, that has not been the case since transport system in developing economies are a victim of ignorance, neglect and confusion owing to the realisation that majority of the urban population were relatively recent migrants and have yet to develop a sense of belonging in order to influence policies. The same is corroborated by Ministry of Transport (2007) who indicates that Kenyan government has inadequate framework for solving road transport problems owing to poor road transport regulatory and management regime, poor enforcement regiment. This has resulted into bad motoring attitude by para-transit sector, which has rippled into negative experiences such as

congestion, accidents, foul language and non-observance of various traffic regulations as stipulated in Traffic Act of Kenya Cap 403 (2012). The emerging dysfunctional operation results into a lacuna which makes the para-transit more profit oriented but being insensitive to social justice and social equity. The result is low level of service.

Among the issues associated with para-transit sector/ matatu is the low capacity carrier they invest in. For instance, over the time 14 seat- mini buses outcompeted the big buses and formal companies such as Akamba, Overseas Transport Company, Nyayo Bus & Kenya Bus Service. The same phenomenon is replicating at a smaller scale as Proboxes are edging out mini buses while in some areas motor cycles are locking out proboxes. In addition, it is common knowledge that 14 seat - mini buses are presenting huge unfair competition to buses. This has led to collapse of formal public transport operations as the informal sector takes advantage of illegalities within their space of operation which the highly regulated formal public transit operators cannot venture in as the law expect them to internalise their externalities and failure to do so can be met by severe punishment according to the established law.

Cameron *et al.* (2012) notes that in 2002, it is estimated that 50 million vehicle hours were lost owing to peak time congestion. The said congestion accounted for 63 million litres of wasted fuel that amounted to \$25 million. At the same time, the vehicular exhaust fumes have been mentioned as one of the principal contributors to high levels of suspended particulates in the atmosphere that varies from 10.7 micrograms per cubic metre at the periphery of the city to 98.1 micrograms per cubic metre in the core of the city.

Ministry of Transport (2012: 29) summarises the negativity associated with public passenger transport services as follows:

- Over-crowding of passengers in PSVs and long queues of commuters at “termini” during peak hours;
- Irregular operating schedules offered by public transport operators;
- Vehicular congestion arising from poor road space usage by private vehicles, PSVs and Non-Motorised and Intermediate Means of Transport (NMIMT);
- Use of low occupancy vehicles by public service vehicle operators and insufficient supply and use of NMIMT as well as lack of standards in the design and manufacture of PSV vehicles and NMIMT and

- Poor road design such as inadequate drop and pick points, joining of secondary and primary roads.

Nevertheless, despite the inadequacies of para-transit such as congestion, low carrier capacity, source of onslaught & fall of formal companies and buses, pollution, corruption, unpredictable time management, fare hikes, gangstarism, the reality is that they are here to stay. As most criminology literature (Board, 2013; Deschenes, 2006; Maltz, 1984), the solution to social disorder and crimes does not rest on stringent penalties and hefty fines, but on a well-informed, comprehensive and integrated reforms.

It is based on this realisation that sessional paper No. 2 of 2012 on Integrated National Transport Policy was formulated. The ultimate normative expectation of any public policy is to offer a sustainable solution to challenges and tap opportunities of a given sector. Taking cognisance of the goals and objectives of Legal Notice No. 161 of 2003, Legal Notice No. 65 of 2005, and Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and as refocused in NTSA regulations 2013 this study went out to evaluate the effects the Integrated National Transport Policy on Public Transport Service Delivery in Nairobi City County.

1.3 Research Questions

1. To what extent have Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and National Transport and Safety Authority Regulations 2013 have been implemented?
2. What are the characteristics of PSV industry operations?
3. Are consumer satisfied with PSV service quality offered after formulation of Section 95 (b), (c), (d) & (f) of Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and section 5, 7 & 9 of National Transport and Safety Authority Regulations 2013?
4. How can the current regulatory structure be combined with other approaches for improved transport system in Nairobi?

1.4 Study Objective

1.4.1 Overall Objective

To evaluate the effectiveness of Integrated National Transport Policy on public transport service delivery using a case study of Nairobi City County.

1.4.2 Specific Objective

1. To examine the extent of implementation of Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and National Transport and Safety Authority Regulations 2013.
2. To assess the characteristics of PSV industry operations.
3. To examine the current regulatory structure and how it can be combined with appropriate approaches which would lead to an improved transport system.

1.5 Hypothesis

Null hypothesis

H₀: Implementation of the INTP has not been effective in service delivery

Alternative/research hypothesis

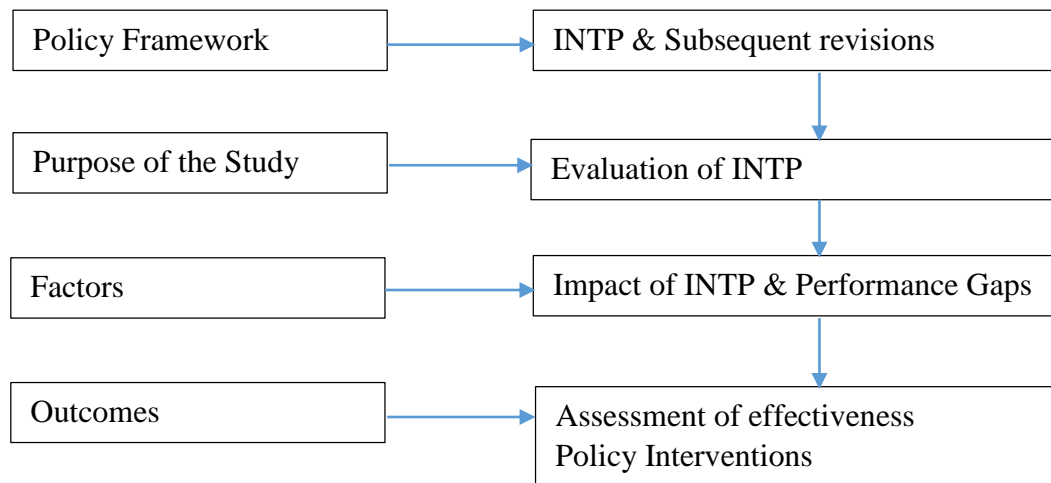
H_a: Implementation of INTP has been effective in service delivery

1.6 Purpose and Scope of the Study

1.6.1 Purpose

Owing to the inadequacies in regulatory and institutional framework a matatu culture that blossom on illegalities has thrived. The ministry responsible for transport has over the years responded by various regulatory interventions to curb the negative externalities within the road transport system and specifically para-transit/matatu sector. The response include Legal Notice No. 161 of 2003, Legal Notice No. 65 of 2005, Traffic Act of Kenya Cap 403 (2012), Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and National Transport and Safety Authority Regulations 2013. This was a transport policy review study as already indicated in section 1.1 and 1.2. As such the purpose of this study was to examine the impact and gaps of Integrated National Transport Policy specifically section 89 – 102 that deals with road passenger transport services in regard to sanitizing the public transport for improved service as shown in *figure 1*.

Figure 1: Purpose of the Study



Source: Compiled by Author

1.6.2 Scope

Overall

- The scope of the study is limited to section 89 – 102 of the INTP with a particular focus on Urban Area Road Passenger Transport Services.

Specific

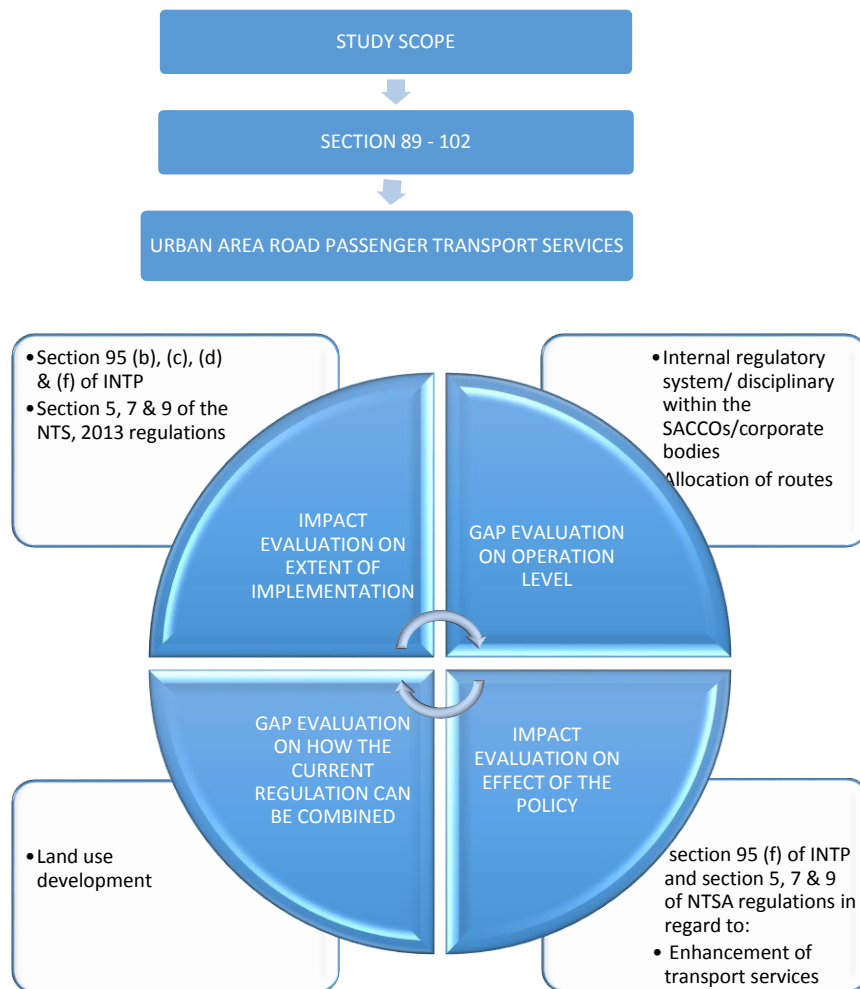
To analyse the impacts and performance gap, the study is limited into four themes:

- Extent of implementation. This examine statistical figures in relation to addressing INTP and adherence to section 5, 7 & 9 of the NTSA, 2013 regulations;
- Assessing operation level in regard to parameters such as internal regulatory system/ disciplinary within the SACCOs/corporate bodies, allocation of routes, time management/scheduling, pricing and control over design of vehicles within the SACCO;
- Effect of the policy in regard to enhancement of transport services and quality; consumer protection; incorporation of safe and secure transport system; and development of the requisite human capacity and how they are achieved or not achieved and
- How the current regulation can be combined with other approaches for transport reform as shown in *figure 2*.

Spatial Scope

The study covered geographical area referred to us as Nairobi City County with an approximate area of 696 square kilometre. This area is bounded by nine (9) sub-counties which are: Kikuyu, Kabete, Kiambaa, Kiambu, Ruiru, Matungulu, Mavoko, Kajiado East and Kajiado North as shown in *map 1*. The study narrowed down to four (4) wards namely: Waithaka/ Riruta, Mathare North, Maringo/Hamza and Nairobi West as shown in *map 2*.

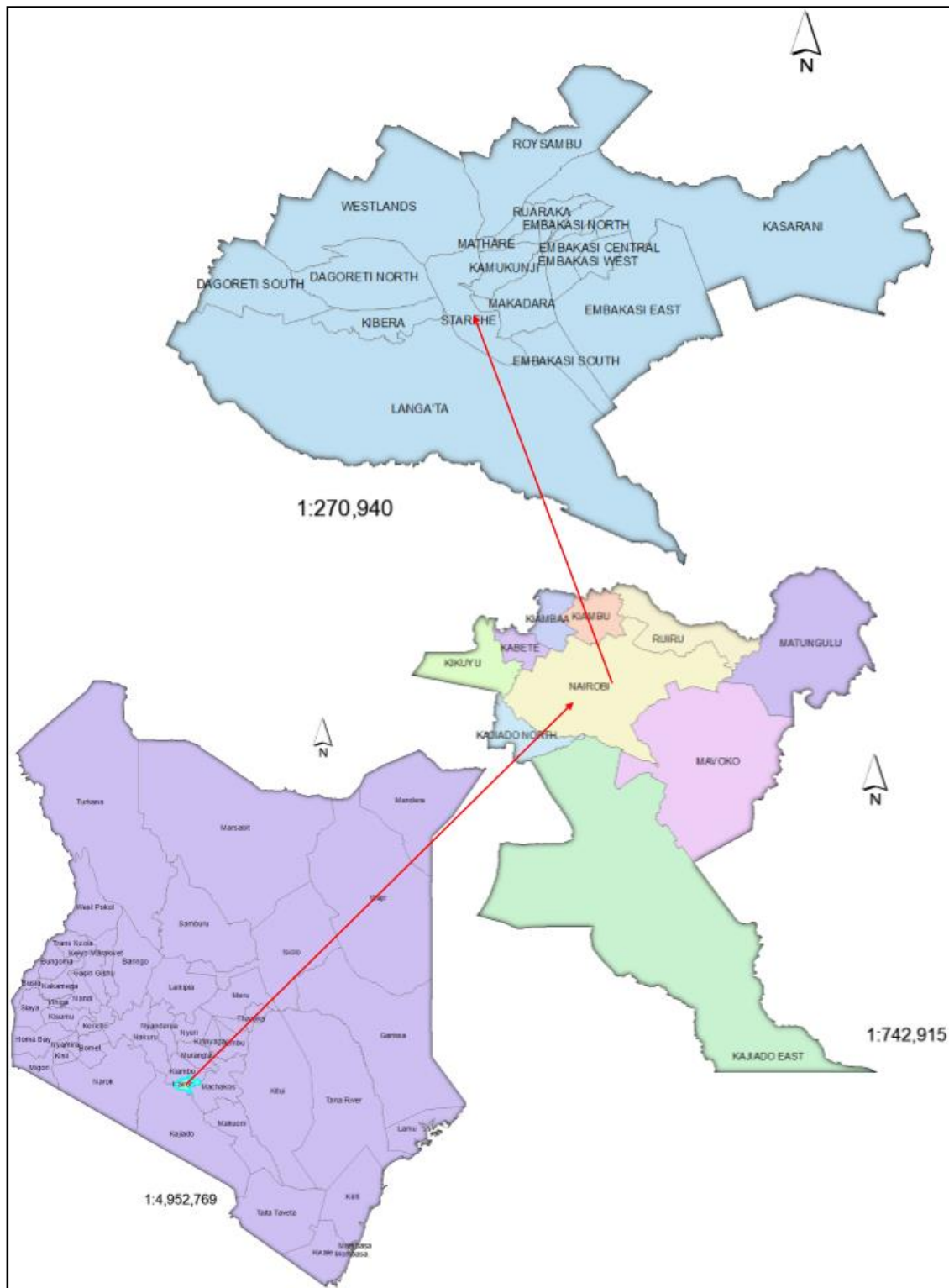
Figure 2: Scope of the Study



Source: Compiled by Author

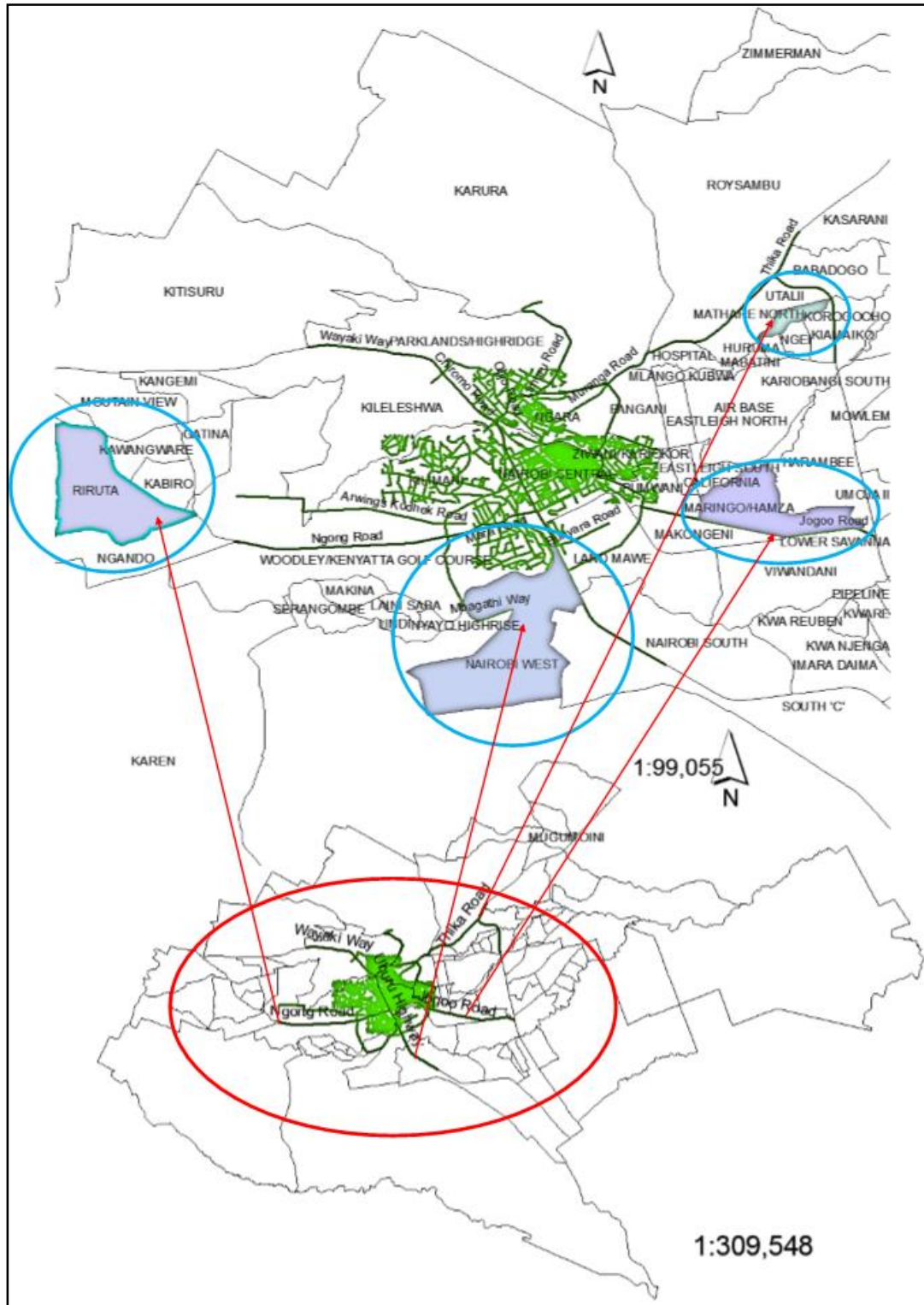
ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Map 1: Study Area in National and Regional Context



Source: IEBC

Map 2: Study Area and Sampled Nodes



Source: Author's Overlay of IEBC Wards and JICA Study Team

1.7 Justification

Kadi *et al.* (2012: 98) sets the tone for this study by noting that “improper transport policy adversely affects traffic congestion and also causes significant disruption of business and commercial activities”. The greatest characteristic that should mark any public transport system is reliability, predictability, high carrying capacity, comfort, safety, preferential treatment and affordability. This can then be used by anyone to justify shift from private means to public means so as to decongest urban roads in Nairobi. However, these desired traits of a public transport are the exact opposite exhibited by Kenya’s public transport system (Hinamen *et al.*, 1975: 10, 140 and 155). It is worth noting that the most affected are poor who are not able to afford and own their private motorised transport. Hence, any regulation and policies developed such as the current Integrated National Transport Policy should strive to attain the above desired traits.

Thus this analytical study was aiming to bridge the knowledge gap on section 89-102 of Integrated National Transport Policy so as to show if the policy is achieving its desired outcome of sanitising the sector. The findings of this study could be used by the Ministry of Transport, NTSA, NCC and PSV SACCOs to review the existing transport operation structure or develop new improved transport planning strategies and programme to harness opportunity in the sector, spur economic development and enhance quality of livelihood by easing transit. Besides, the study could be replicated in other areas with such problems and thereby contribute to the achievement of the Vision 2030 and the New Constitution. Equally, the study could also be a point of reference and knowledge on the subject under study.

1.8 Assumption of the Study

Within the larger perspective of transport system, Kenya has over focused on road network expansion and reduction of physical bottlenecks with minimal effort on policies and regulations regulating public transit vehicles (Asingo & Mitullah, 2007: 15; KIPPRA, 2006). Therefore, the assumption of this study is premised on Mukabanah (2013: 1) observation that despite Government investment to a greater degree in road infrastructure, it has not duplicated the same in road transport, particularly in regard to public transport yet transport constitute a core element that makes road infrastructure to operate efficiently.

1.9 Limitations of the Study

Matatu industry is one of the opaque organisation where outsiders are treated with suspicion. Mukabanah (2013: 2) corroborates the same by noting that matatu operators survives on illegalities

and enjoy the externalities associated with illegality and as such any attempt to seek information on approaches that would probably reverse the said trend is not easily availed. As such gaining access and trust from the owners, operators and cartels was not an easy engagement. Most of the respondents either as owners or users of the system are not easily willing to be interviewed in a city “where everyone is busy and minds their businesses”. The research was carried out within a limited resources and time.

1.10 Operational Definition of Terms

1.10.1 Public Transport

Public transport also known as transit is the systems and services available for public general use on payment of fare or any other agreed term of travel. The chief goal of this transport system is to move large number of people at a go (TRL, 2004).

1.10.2 Paratransit

Paratransit is mostly found in developing countries. This type of transit operates on non-fixed routes and non-scheduled programme. Moreover it is not standardised, with varying sizes and informal. Paratransit is a mode of transport that operates parallel to an organized, usually large scale government or government subsidized transport system (Gicheru *et al.*, 2011: 7).

1.10.3 Public Transit Service Delivery

In this case the study defines service delivery as desirable public service transport system desired traits or the lack of undesired traits like traffic congestion, travel demand management, poor quality services such as unpredictability and unreliability, high bus fare/ lack of defined bus fare for every destination, low carrying capacity vessels, monopolistic tendencies, gang controls, disobedience to traffic rules like making of u turns, illegal parking, illegal picking of passengers and carrying beyond prescribed carrying capacity (HLB, 2000: 13, and 14; Litman, 2007).

1.10.4 Policy

Nabutotala (2012: 3) observes that a policy can be described as principles or rule initiated to direct and attain rational outcome that be either objective or subjective. It can also be understood as ‘statement of intent’. On the other hand, policy a policy is not a compelling document that restricts behaviours but a guideline. While formulating policies, there are intended effects which are mostly positive outcomes. On the other hand, while aspiring for positive outcomes, there might be unintended negative impacts.

1.11: Organisational Structure of the Study Report

The study was organised into seven (7) chapters.

Chapter One contains introduction, background to the study, study problem, objectives, research questions, justification, definition of terms and conceptual framework.

Chapter Two examines global perspectives on urbanisation and its role in travel issues and explores theoretical and analytical thoughts of urban public transport service delivery indicators and possible measurements. As informed by the literature review explored, findings of other significant and pertinent researches are discussed and information gaps identified as is summarised by the conceptual framework.

Chapter Three reviews transport in Kenya.

Chapter Four analyses the study area by giving a succinct outline on historical background, location, size and administrative units, demographics, socio-economic dynamics, land use patterns.

Chapter Five states survey techniques employed in collecting primary and secondary data.

Chapter Six entails the analysis of data and discussion on research findings.

Chapter Seven states conclusion and recommendations anchored on analysis and findings outcomes.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The chapter outlines theoretical background of transport planning issues. It seeks to gain insights on how public transport is managed in developed economies, review organisation of Structuring and management of urban public transit and present various analytical frameworks that can be used to measure service delivery. The whole chapter is then summarized in a conceptual framework.

2.2 Urbanisation and Urban Transport

Within transportation context, Godard and Fatonzoun (2002: 559) indicates that exponential urbanisation and motorization has been instrumental in contributing to transport problem which include deterioration in accessibility, service levels, safety, comfort, operation efficiency and poor quality of urban environment owing to high vehicular population, inadequate transport facilities and policies, varied transport mix, absence of dependable public transport system, inadequate traffic management practices and parking facilities. Padam and Singh (2004: 3) notes that in the absence of urban transport policy problems identified above are likely to persist.

2.2.1 Urbanisation Trends

UN (2014a: 1) established that there has been continued growth of urban population from 30% in 1950s to 54% in 2014. Waswa *et al.* (2006: 109) observes that since independence in 1963, Kenya has been experiencing rapid urbanisation at a rate of 6% annually. Kenya's Vision 2030 projects that by the year 2030, the level of urbanization will have reached 54%, with nearly 30 million people living in urban areas. The realisation is that developing economies including Kenya are rapidly urbanising. Therefore to anticipate and curtail the negative impact of urbanisation on transportation, there is need to prepare policies that are integrative.

2.2.2 Problems of Urbanisation

Various literatures outline myriad of problems and challenges arising as a result of rapid urbanisation and limited forward planning capacities. These problems are housing scarcity, slums, transport, water supply and sanitation, water and air pollution, solid waste management inadequate provision for social infrastructure, urban poverty, environmental implications (Kadi *et al.*, 2012; Mukiibi, 2012).

2.3 Urban Public Transit

Public transit entails numerous services utilizing shared vehicles to provide mobility to the public. This can be provided by the government or private entities (Pina and Torres, 2001: 930). This sub section seeks to examine the transport policies of other countries/ cities. Secondly, it examines the infrastructure they have put in place for efficient transport in their urbanised areas and lastly, how they organise and manage their urban transit for efficiency.

2.3.1 Perspectives on Transport Policy

Cheong and Nadiah (2013: 69) states that any successful transit policy have to address ability of the policy to integrate land use planning policies in transportation planning while addressing impacts of urban sprawl, have ability to restrict private car usage in urban areas and moving the whole system towards high quality public transit so to be considered sustainable. Based on such plausible argument, the question remains does Kenyan transport policy need to go beyond statement and achieve the same desired outcome above?

New York City Planning Department (2015: 3) road transportation policy focuses on infrastructure enhancement by increasing transport options within current transit network. Secondly, they focus on sustainable modes by appreciating the rationale that financial resources are scarce, the physical space is fixed and that models adopted represent an alternative that can enhance capacity of existing networks at a lower cost as opposed to construction of new ones.

Litman (2011: 7) notes that there are various ways to improve public transit service and encourage transit ridership that most policies should focus on. The first approach would be to increase the service. The service can be increased through opening up of more routes. This means physical expansion of movement channels. The second approach is through improved coordination among different modes such as buses and trains among others. The third is giving transit priority by having special bus lanes, queue-jumper lane and bus-priority traffic signals so as to reduce delay to transit vehicles. Other approaches are grade separation so that transit is not delayed by cross-streets and traffic congestion. The fifth way for improvement is by enhancing comfort through reduced crowding, better seats and cleaner vehicles (Brown and Thompson, 2009, p. 15).

In summary, transport policy are futuristic and contextual in nature seeking to address challenges afflicting transport industry of a given economy with key themes being:

- Service quality;

- Service mix such as mass rapid transit system, light rapid transit and buses;
- Sustainable modes;
- Investment programs on enhanced infrastructure capacity and new projects;
- Travel demand management;
- Network connectivity;
- Integration with land uses/ spatial organisation; and
- Ownership structure and management.

2.3.2 Urban Transport and Infrastructure System

Within this transport network there are core elements that constitute the system and they include channels/ routes/ connecting networks such as roads and railway line, means/ traversing vessel such as vehicles & train, nodes such as terminus and individuals and flow control (Berry and Pred, 1965).

2.3.2.1 Modes and Network Connectivity

Transport modes are conceptualised as means by which mobility is achieved and are categorised based on the surface of choice (land, air and sea), right-of-way (ROW), category, technology and type of operation. The focus of this section is premised on land especially road and rail transport. On the other hand, network of external linkages are critical since they support in opening up immediate surrounding rural hinterlands. Modes can be classified based on Right-of-way, technology and types of service. Based on right of way, there are category A, B and C (Vuchic, 2002). Based on the above classification, Kenyan context displays a limited service mix and investment.

2.3.2.2 Means

Means are the traversing vessels that are used to ferry passengers. In a broad category, means include wagons, trams, metro, rail, taxi, buses and bicycle. In investing in these means, focus is based on carrying capacity, accessibility, affordability, sustainability, psychosocial factors, spatial organisation and overall cost of operations (Gorter and Rienstra, 1997).

2.3.2.3 Nodes

Nodes are interchanges within a transportation network that allow for embarking/disembarking. Galloway (2009) defines it as “as control point or intersection of two or more linear systems”. The design of these nodes are critical since those that operate at lower speed are designed to function at pedestrian scale while those that allow faster flows are meant for automobiles.

2.3.3 Market Space Organisation and Management of Urban Transport

According to Prileszky (2004), organisation and management of public transport can be analysed in the context of ownership conditions, rules controlling entering the market, method of fare control, level of planning, regulation mechanism, and method of acquiring operator's license / rights and subsidisation for. Another perspective is anchored on the strands of players in the sector, their interest and roles. According to Finn and Mulley (2011: 91) there are three strands of participants in urban public transit.

- Agencies that manage the market for the supply of transport services, which are referred to as “the regulator” (this includes transport authorities) ;
- Entities of public and private form that operate the transport services, which are referred to as “the operator” and
- The transport offer, including the network, service types, coverage, intensity, and quality.

2.3.3.1 Ownership and Operation Structure

a) **Public monopoly scheme/ Regulated**

Advanced 1960s and founded on realisation that public ownership would lead to stable or even lower unit cost, ensuring the public of greater return on its funding in the future (Cox Consultancy, 2003). The hall mark of this mode is the lack of competition meshed together with strong central planning. The above scheme can be in the form whereby there is existing operator who is the state or local authority company and thus no possibility of another operator existing. The other key feature of this scheme is the Transit subsidy (Prileszky, 2004: 10). In developed economies, governments have advanced transit subsidy so as to protect against socially undesirable behaviours that might arise out of deregulation (Darido, 2003: 69).

b) **Deregulated open access/ competitive free market scheme/ competition in the market**

This approach rides on competitive free market concept. The core mandate of public entity/ government is to guarantee safety regulations. As a contrast to regulated scheme, there are no restriction on new operators entering markets as they are only required to register new routes with exception being on initiation of new routes. The rolling stock/ vehicles are privately owned while the infrastructure are partly state-owned, but all the two (public and private) are allowed equal access.

c) Deregulated Franchise/ Competitive tendering system/ competition for the market

Pina and Torres (2001: 929 & 930) observes that in most European Union and OECD there has been a paradigm shift through externalisation of local government services – including transport services - with the role of local governments being regulation of the transfer conditions and monitoring of agreements so as to ensure quality, fair pricing, employment and investment. The whole rationale is pegged on the belief that private sector are more efficient in managing public sector economics and hence critical in improving the desired efficiency. The scheme can be categorised as gross cost-based system and net cost based system (Prileszky, 2004: 7).

Table 1: Characteristics of Market Environments for Public Transport Operations

<i>Characteristic</i>	<i>Market Environment</i>		
	<i>Deregulated (open access)</i>	<i>Deregulated (franchise)</i>	<i>Regulated</i>
<i>Type of ownership</i>	Vehicles private; infrastructure mostly private	Private and some public	Public with some private sub – contracting
<i>Quality licensing</i>	Yes	Yes	Yes
<i>Fares regulation</i>	Little or none	Yes	Yes
<i>Access by operator to market</i>	Open access	Protected	Protected
<i>Level of planning</i>	Unplanned	Planned	Planned
<i>Regulatory mechanism</i>	Single route	Fixed group of routes	Single route or fixed group of routes
<i>Entitlement</i>	None	Renewable tender	Fixed entitlement
<i>Subsidies</i>	None	Fixed	Flexible or fixed

Source: Nelson et al. cited in Prileszky, 2004: 8

From 1930s to post-independence of 1970s, Kenya attempted deregulated franchise Net-Cost franchise ownership under Overseas Trading Company (OTC). However, with advent of matatus in 1973, the regulated approach faced cut throat competition from informal and unregulated private sector (Aduwo, 1972: 123). Currently, Kenyan economy exhibits deregulated open market regulatory scheme. The core role of the government is to guarantee quality and safety. The disadvantages identified by Prileszky (2004: 8) are replicated in Kenyan. This has seen exponential growth of informality in all aspects of the mass urban public transit.

2.3.3.2 Travel Demand Management (TDM)

Travel demand management is one of the indicators of a public transit system is well organised. A well formulated TDM strategy is a sure way of reducing unsustainable ridership that leads to congestion, pollution and energy wastage such as single ridership on private cars, low occupancy vehicles. Studies shows that increased road capacity do not necessarily translate into reduced

traffic congestion and ridership on public transit forums. To be able to address congestion and associated pollution there is need to introduce mitigation strategies for demand for car use. This is a significant feature as it seeks to influence travel behaviour/ travel choice of commuters through push and pull strategies (Eriksson et al. 2006: 60).

2.3.3.3 Modal Split

Modal split or share is referred to us as the fraction of total travellers using a given mode for travel purposes. In organised urban transit strategy modal splits/ share that are encourage are those that can guarantee effectiveness by moving large number of individuals per trip and the same time be able to take care of possible externalities associated with transport such as pollution (Jovic, 2000). For instance, Curitiba City of 2.2 million people invested in BRT that run frequently that accounts for 70% of commuters (Goodman *et al.*, 2005: 76). The same is evident in city such as Hong Kong whereby in 2002- 2011 bus and rail accounted for 89.5 travel mode share (Cheong and Nadiyah, 2013: 72-73).

In Nairobi's context the modal share is in favour of NMT which accounts for 49%. In one perspective, this is seen as a healthy endeavour specially in addressing environmental sustainability. However, KIPRA (2006: 1) notes that those who resort to NMT are forced by circumstances since the public transit system in place does not adequately accommodate poor and marginalised section of the community. On the other hand, private transport accounts for 9% while public means accounts for 42%.

Summary of issues

- Rapid Bus Transit and Rail are preferred modal split for public mass transit in well organised transport economies.
- Non-Motorised Transport (NMT) especially walking and cycling are being as alternative options to address environmental sustainability and public health issues
- Modal splits in developed transport system is inclusive and caters for all irrespective of their socio-economic background
- In Nairobi, most commuters (49%) use NMT to their destinations (KIPRA, 2006: 1).
- In Nairobi, poor and marginalised are not well catered for in public mass transport (KIPRA, 2006: 1).

2.3.3.4 Flow control

Flow control refers to traffic improvement actions that entail myriad of strategies so as to reduce delay and travel time. Approaches in flow control that have been adopted across the globe include traffic signalisation that entails timing plan improvement and signal coordination and interconnection. The second one is traffic operations that include converting two-way streets to one way operation, two way street left turn restrictions, continuous median strip for left turn lanes, channelized road way and intersections and roadway and intersections widening and reconstruction. The last is enforcement and management that entails approaches such as incident management system and ramp metering (Institute of Transportation Engineers, 1987).

2.4 Analytical Framework

Key to this study's analytical framework are three concern:

- a) Performance evaluation of public transit in Kenya after formulation of INTP;
- b) Assessment of public transport route network;
- c) Public transport capacity

2.4.1 Performance Evaluation of Public Transit

2.4.1.1 TTI and TRL Model

There are four general categories of transit improvements that can arise out of reformation of transport regulations and organisation (TTI, 2003; TRL, 2004). The first is increased service (more transit vehicle-miles). The second being improved service (more comfortable, convenient, reliable, etc.). The third entails incentives to use transit (lower fares, commuter financial incentives, marketing, etc.). While the last covers transit oriented development (land use patterns designed to support transit, including more compact, walk able, mixed development around transit stations and corridors).

Measuring increased service

Increased service can be measured through the excepting option value. The excepting option value indicates that most benefits depend on how much transit is used, how well the service responds to users' needs and preferences, the amount of automobile travel displaced, and the various savings and benefits that result from reduced vehicle ownership and operating cost, avoided roadway and parking facility expansion, increased safety, etc (Hildago and Carrigan, 2010, p. 21).

Measuring improved service

First approach:

SERVQUAL has been utilised to study the perception of service quality within the hospitality industry including the restaurant firms and tourism business (Allan, 2011; Bojanic and Rosen, 1994; Fu, 1999; Fu, Cho and Parks, 2000; Fu and Parks, 2001; Riemer & Reichel, 2000). Service quality can thus be defined as the difference between customer expectations of service and perceived service. If expectations are greater than performance, then perceived quality is less than satisfactory and hence customer dissatisfaction occurs (Parasuraman et al., 1985; Lewis and Mitchell, 1990). SERVQUAL compares customer expectations before a service encounter and their perceptions of the actual service delivered (Gronroos, 1982; Lewis and Booms, 1983; Parasuraman et al., 1985).

Second approach:

The Florida Department of Transportation - FDOT (2007) provides a checklist of parameters that can be used to measure improved service as shown in *table 2*. These descriptive parameters are to be answered by respondents in a scale of 1-5 ranging from very good, good, fair, bad and very bad.

Measuring incentives to use transit

According to HLB (2000, P. 13, and 14), incentive to use transit can be measured in terms of benefits, costs and equity impacts. Most direct benefits of transit services can be divided into two major categories: Mobility benefits result from increased travel by people who are economically, physically and socially disadvantaged. Efficiency benefits result from reduced vehicle traffic when inefficient automobile travel shifts to more efficient transit travel. Mobility benefits result from additional personal travel that would not otherwise occur, particularly by people who are transportation disadvantaged, that is, they cannot drive due to physical, economic or social constraints. Efficiency benefits consist of savings and other benefits that result when transit substitutes for automobile travel. These include vehicle cost savings, avoided chauffeuring, congestion reductions, parking cost savings, increased safety and health, energy conservation and pollution emission reductions.

Measuring Transit Oriented Development

These refers to land use patterns designed to support transit, including more compact, walk able, mixed development around transit stations and corridors. It entailed analytical review of existing secondary literatures, triangulation, observation and contextual spatial analysis using GIS to show impact of land use on transport.

Table 2: Measuring Improved Service

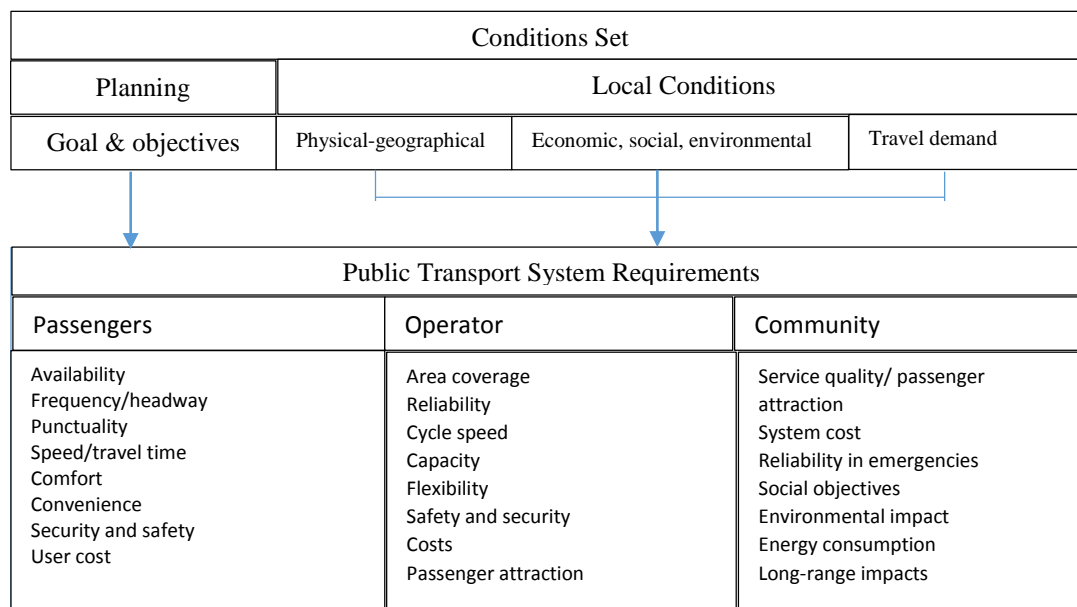
Feature	Description	Indicators
Availability	Where and when transit service is available.	<ul style="list-style-type: none"> · Daily hours of service · Hours of service.
Frequency	Frequency of service and average wait time.	<ul style="list-style-type: none"> · Trips per hour or day · Headways (time between trips) · Average waiting times.
Travel Speed	Transit travel speed.	<ul style="list-style-type: none"> · Average vehicle speeds. · Transit travel speed relative to driving the same trip
Reliability	How well service actually follows published schedules.	<ul style="list-style-type: none"> · On-time operation. · Mechanical failure frequency.
Boarding speed	Vehicle loading and unloading speed.	<ul style="list-style-type: none"> · Dwell time · Boarding and alighting speeds.
Safety and security	Users perceived safety and security.	<ul style="list-style-type: none"> · Perceived transit passenger security. · Accidents and injuries. · Reported security incidents. · Official response to perceived risks.
Price and affordability	Fare prices, structure, payment options, ease of purchase.	<ul style="list-style-type: none"> · Fares relative to average incomes. · Fares relative to other travel mode costs.
Comfort	Passenger comfort	<ul style="list-style-type: none"> · Seating availability and quality. · Space (lack of crowding). · Quiet (lack of excessive noise). · Fresh air (lack of unpleasant smells) · Temperature (neither too hot or cold) · Cleanliness.
Accessibility	Ease of reaching transit stations and stops.	<ul style="list-style-type: none"> · Distance from transit stations and stops to destinations
Baggage capacity	Accommodation of baggage.	<ul style="list-style-type: none"> · Ability, ease and cost of carrying baggage, including special items such as pets.
Universal design	Accommodation of diverse users including people with special needs.	<ul style="list-style-type: none"> · Accessible design for transit vehicles, stations and nearby areas. · Ability to carry baggage · Ability to accommodate people who cannot read or understand the local language.
User information	Ease of obtaining user information.	<ul style="list-style-type: none"> · Availability, accuracy and understand ability of route, schedule and fare information, at stops, stations, destinations by transit agency. · Information available to service people with special needs (audio or visual disabilities, inability to read or understand the local language, etc.)
Courtesy and responsiveness	Courtesy with which passengers are treated.	<ul style="list-style-type: none"> · How passengers are treated by transit staff. · Ease of filing a complaint. · Speed and responsiveness with which complaints are treated.
Attractiveness	The attractiveness of public transit facilities.	<ul style="list-style-type: none"> · Attractiveness of vehicles and facilities.

Adopted from: The Florida Department of Transportation- FDOT, 2007

2.4.1.2 Vuchic Model

Vuchic (2005) advances a different perspective of how to measure improved service within public transit domain using passengers' perspective, operator perspective and community perspective as shown in *figure 3*.

Figure 3: Performance Evaluation of Public Transport



Source: Vuchic, 2005

Passenger perspective:

For commuters, their chief concern while utilising public transport is mostly informed by convenience of the service, comfort and availability (Texas, Transportation Institute & Transport Consulting Limited, 1999). Kittelson et al., (2003) observes that in commuters view, public transit can be referred to us as adequate when the service is close to their locations and whenever they need it. As such, if these expectations are not met, then most would not prefer the service. Measuring parameters as shown in *table 3*.

Table 3: Public Transport Evaluation from Traveller Perspective

Performance indicator	Measurement
Convenience	travel time: the amount of time taken to reach destination; safety and security: possibility of reaching without accident, being mugged accessibility: able to get it when needed
Capacity availability	Is the commuter space available for the required trip
Spatial availability	Is service offered and can a traveller reach it?
Comfort	Vehicle design, driving standards, construction standards, load factors and standards of maintenance
Information availability	Do the travellers know how to utilise the service?
Temporal availability	When is the service provided?

Source: adapted from Texas, Transportation Institute & Transport Consulting Limited, 1999; Kittelson et al., 2003

Operator perspective:

Vuchic (2005) indicates that while user's perspective is paramount in design of public transport system, operators concern are equally valid so as to ensure economic return and efficiency. Seth et al. (2007) supposes that the performance indicators from operators perspective is informed by economic gain aspiration as such it seeks to examine how the system is working so that they can choose a route that has minimal operating cost. In this regard their concerns would be cost efficiency indicators such as operating expense per vehicle revenue kilometre and or hour and cost effectiveness indicators such as operating expense per passenger kilometre and or passenger trip as shown in *table 4*.

Table 4: public transport evaluation from operator perspective

Category	Input	Output
Service efficiency	Number of buses, employees	Distance covered (service coverage)
Cost efficiency	Operating expenses	Number of buses and employees
Income efficiency	Number of buses and employees	Operating income (annual)
Public service efficiency	Number of cars and employees	Density of service (average daily service frequency)

Source: Sheth, 2003

Community perspective:

The community aspirations are anchored on deontological expectations by having a transit system that minimises impact of externalities associated with the process while addressing social issues and environmental sustainability (Sheth et al., 2007).

- a) Offer mobility to individuals who cannot access private car;
- b) Offer transportation to people without ready reach to private vehicles such older citizens of the country and individuals living with disabilities;
- c) Reduction of traffic congestion;
- d) Reduction of air pollution; and
- e) Parking congestion mitigation.

2.4.1.3 Recommended scenario

The study relies on the three measurement perspectives as described in 2.4.1.1 – 2.4.1.3.

2.4.2 Assessment of Public Transport Route Network

Guihaire and Hao (2008) notes that in traveller perspective, public transport routes should be aligned in such a format that they are able to provide multiple direct-through trips; meet the demand, cover large service area, not to digress from shortest way possible and have large service area. For instance, Dodson et al., (2001) notes that high level of public service is attainable if the

networks are designed in such a way that it is able to serve numerous traveller cohorts and varied travel requirement. Moreover, Davison and Knowles (2006) observes that interchange designs are equally integral and that they should be in a way that guarantees passenger safety, ease of use and comfort. **Table 5** shows the adopted indicators.

Table 5: Route Performance Evaluation at Network Level

Indicator	Measurement Formula	Threshold	Remarks
Average bus stop spacing	$A.S.D = \frac{l}{(n-1)}$ <i>l</i> : length of a bus route <i>n</i> : total number of bus stops passed by this route	300-600m. this can vary depending on population density and land use	It shows whether the bus stops are redundant or insufficient
Route overlapping	$R.O = \frac{l}{L}$ <i>l</i> : total length of bus routes <i>L</i> : total length of bus route network	The ratio should be at a low of 5. High route overlap is normally associated with traffic jams	It exhibits the repetition of bus routes to ensure public transport services within a given area have enough and adequate distribution
Network density	$N.D = \frac{L}{A}$ <i>l</i> : total length of road passed by bus <i>a</i> : land-use in bus service coverage	3- 4 km/km ² nearby the CBD 2 -2.5 km/km ² in the suburban areas	It states the degree of consistency between potential travellers and public bus routes
Service coverage	$S.C = \frac{p}{P}$ <i>p</i> : population served in the certain buffer area of a stop. <i>P</i> : total population of a study area	Maximum 400 – 800 metre walk to bus stop, however a max metre may be acceptable in low density areas	It has a bearing on public transport system's performance and level of service which is an indication of the convenient degree of public transport.

Source: adapted from Iles, 2005; Guihaire and Hao, 2008

2.4.3 Public Transport Capacity

To cover lacuna not addressed by evaluation criteria in transport system analysis from commuters, operators & community perspective and from the spatial based route network analysis that access to stops and or route, it becomes imperative to evaluate public transport service capacity in regard to temporal aspects associated with availability of public transport and frequency (Bhat et al., 2005). Service availability is determined in terms of hours of service, service frequency, capacity availability and spatial access while service frequency which utilises average headway (inverse of the average frequency) determines the convenience of public transit to commuters.

The beauty of public transport service capacity evaluation rest on its ability to show public transit system ability to address present demand and to pinpoint the required number of passengers or public transport vehicles that can be adequately served by public transport facilities. If traveller demand is beyond system capacity then is likelihood of reduced quality in terms of reliability, transit speed and increase in passenger loads (Kittelsohn et al., 2003). In determining capacities for public transport system a study can opt for vehicle capacity measured in spaces per vehicle and route capacity that represents actual capacity offered to passengers spaces carried within a determined point in one direction per hour (Vuchic, 2005).

Table 6 shows service capacity performance indicator and their measurement.

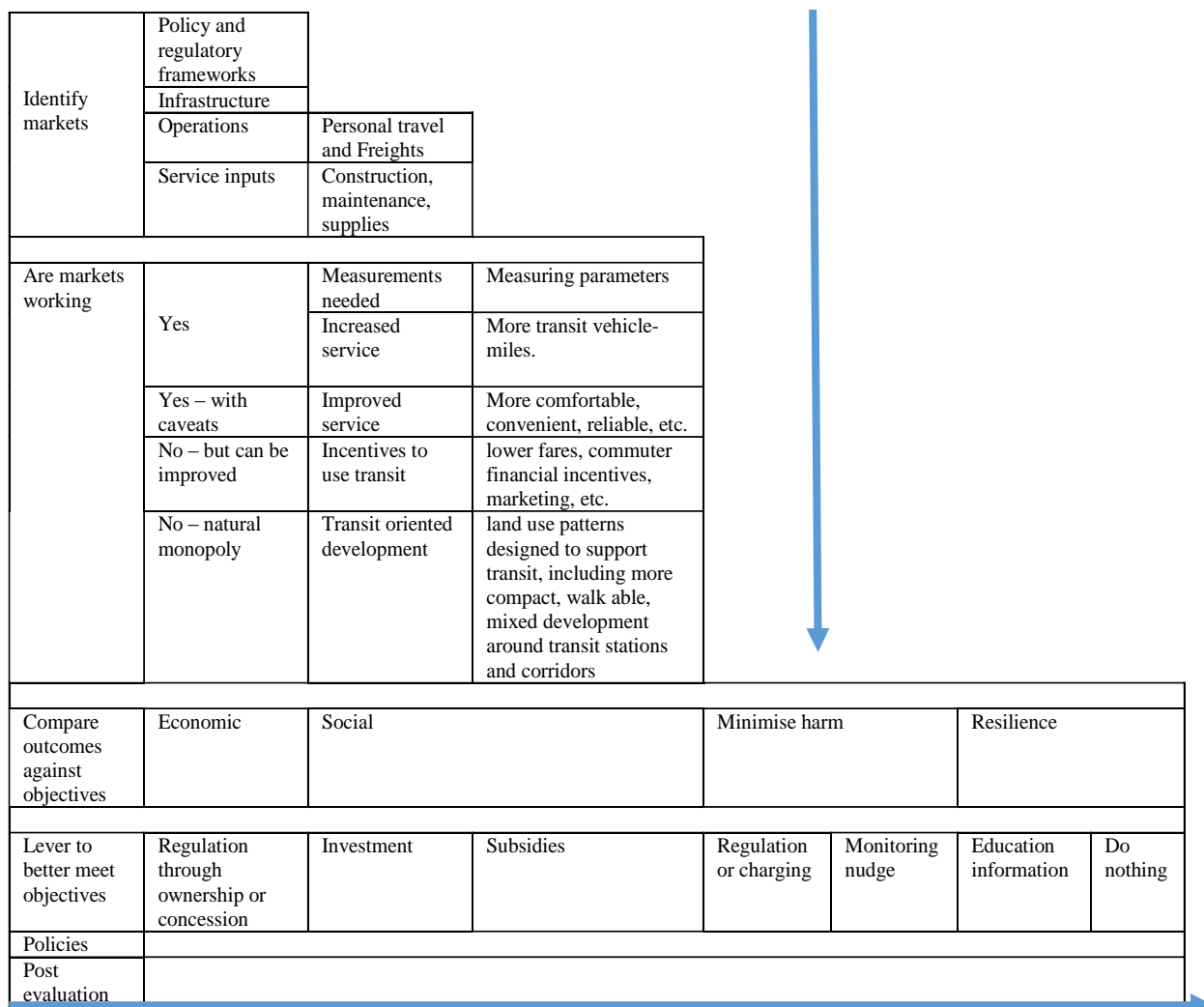
Table 6: Service Capacity Measurement

Indicator	Measurement Formula	Remarks
Observed frequency	$O.F = \frac{V}{t}$ V: public transport buses t: time unit	This shows the level of service offered. It is also a determinant of the span of service that subsequently have a bearing on the convenience of transit for travellers and can limit the types of trips that can be done by public transport
Average network speed	$A.N.S = \frac{\sum V_i S_i}{\sum V_i}$ V _i : number of bus-kilometre operated per day or per hour S _i : travel speed of bus	Average speed (km/h) is the speed that buses travel when in service. System speed is measurable by portion of a service, time of the day or length of trip.
Seat capacity	$S.C = \frac{S \times V}{A}$ S: Number of seats on a public transport bus V: number of buses in service A: service area size	This is used to explain planning level estimate of the capacity delivered by the system. The service area size is an indication of potential transit demand in the factored unit

Source: Adapted from Kittelson et al., 2003; Vuchic, 2005

In summary, the ultimate goal of urban transport system is to facilitate movements so as to access various services and engage in socio-economic activities. The analytical framework below combined with various measurement parameters helped in evaluating performance of INTP in the context of Nairobi’s transport system, inform in possible areas for of realignment. The framework first examines the requisite inputs in the market. Then it aims at answering if it is working or not, compare the outcomes against the set objects, how to leverage on the strengths while minimising weaknesses so as to enhance the policy as basis of the INTP and public transport improvement as shown in **figure 4**.

Figure 4: Analytical Framework



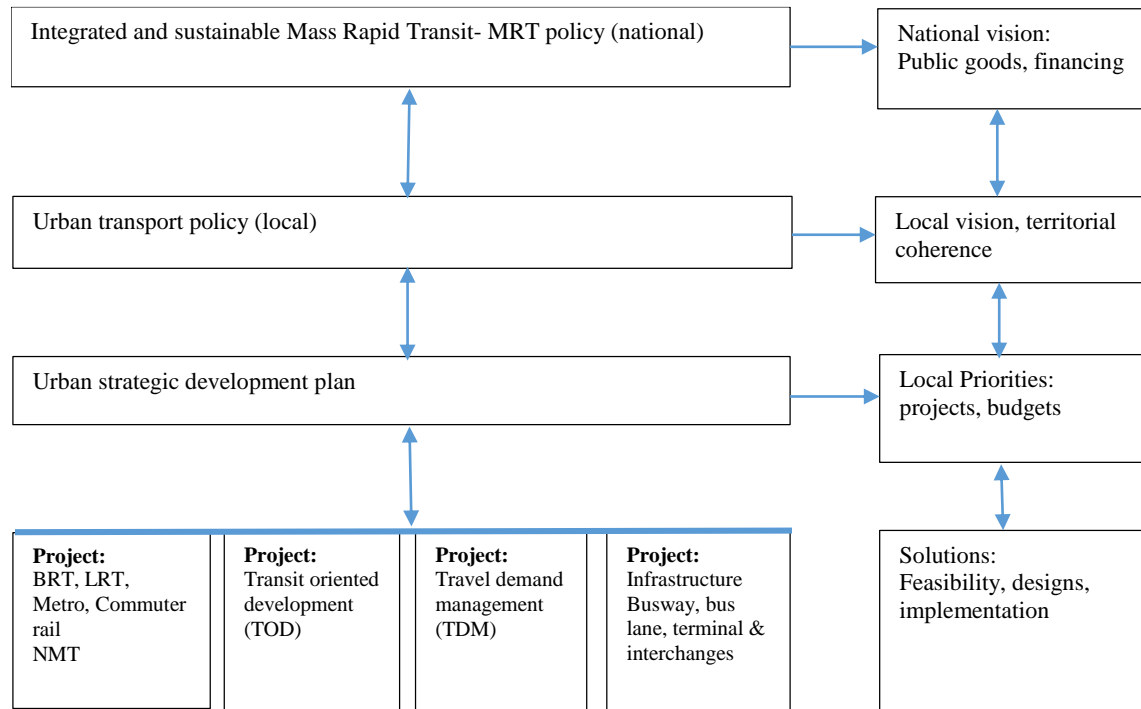
source: Compiled by Author

2.6 Conceptual Framework

To have a sustainable and effective mass rapid transit policy there is need to have at national level a guiding framework on transportation. This is to be cascaded into local level so as to ensure coherence to the local context. To achieve the two, there is need for urban strategic development plan that offers situational analysis, needs, priorities, projects, funding and actors. The projects under urban strategic plan that can be implemented so as to ensure service delivery in MRT include investment in new mass transit and effective systems such as LRT, BRT, commuter rails, heavy rail, metro and NMT. The second project is to invest in TOD so that land use can be integrated with transport to avoid bottlenecks associated with sprawl and strong central CBD. It equally calls

for TDM and investment in infrastructure that supports NMT such as bus ways, bus lanes, and terminals and interchanges as shown in *figure 5*.

Figure 5: Conceptual Framework on Sustainable and Effective MRT Policy



Source: Compiled by Author

CHAPTER 3: URBANISATION AND TRANSPORT SYSTEM IN KENYA

3.1 Introduction

This discusses urban public transport in Kenya by examining how it is regulated, institutions involved, legal frameworks, managed, structured and invested.

3.2 Challenges of Urbanisation

Ngari (2007: 4) found out that as result of rapid urbanisation and growth of informal settlements, myriad of urban problems have rose. These include traffic congestion, poor housing, pollution as result of poor solid and waste water management, increased crime, social inequality, urban poverty and vulnerability, encroachment on riparian reserve, urban decay in older estates and unemployment.

In Kenya, rapid urbanisation, inadequate land use planning, lack of adequate transport planning, transport infrastructure inadequacy, increased vehicle ownership (60% found in Nairobi metro) and institutional framework challenges have led to various transport challenges and problems (KIPPRA, 2015: 1). Chief among these challenges is the traffic jam and congestion during peak hours. According to People 4 Smarter Cities (nd) traffic congestion in the city is costing the economy \$ 500, 000 per day. The same cost is estimated by Ehrlich and Fu (2015) at \$ 600, 000 per day.

In absence of proper planning, inadequate integration of rural-urban linkages, existence of lopsided urbanisation, ‘growth first strategy’ and inability to create urban employment urbanisation process leads to myriad of problems such as pollution, transportation issues, housing shortage, unemployment, inadequate social infrastructure and urban poverty. Urbanisation leads to transportation problems such as traffic congestion, delay in reaching destinations, energy wastage, and noise pollution.

In nutshell the following are the direct causes of traffic congestion in major towns in Kenya:

- Increased vehicle ownership;
- Inefficient spatial distribution of land uses and inadequate of proper transport planning;
- Inadequate transport infrastructure coupled with inadequate traffic control and management (KIPPRA, 2015: 1).

3.3 Urban Public Transport

Mukabanah (2013) observes that road transport Kenya has been demand driven and thus need for rationalisation. The core concern of this sub section it to examine the existing trends within the transport system so as to establish gaps and opportunities within the current structure. The areas of discussion are market space organisation and management schemes, policy and legal framework, institutional framework and stakeholder analysis, operational organisation and existing infrastructure network.

3.3.1 Market Space Organisation and Management Scheme

In reference to *table 1* as described by Nelson et al. cited in Prileszky (2004: 8) an economy can display singly or a mix of the following market environment in the public transit sector:

- a) Deregulated (open access)
- b) Deregulated (franchise)
- c) Regulated

Road transport

Kenya has engaged in myriad of approaches in isolation or in combination. From 1934 to 1973, Kenya exhibited deregulated franchise Net-Cost ownership model. Waweru (2013); Gacheru *et al.*, (2011: 9) notes that during this period, public transport was dominated by multinational British based corporation who had concessions to run transport services in critical transport corridors. The changes in 1973 saw emergence of informal transit sector. This kind of organisation dominated by paratransit also known as deregulated open access dominates the current scene of public transit in the country. One of the failures associated with open market when allowed to operate alongside deregulated franchise is that it allows matatu to operate without paying its externalities' true cost. Equally, the state has attempted at regulated road public transit sector while at the same time allowing for continuation of deregulated open access and franchise. Such attempt is evident when in 1986 the government launched Nyayo Bus Service Corporation to operate bus services across the country by providing affordable bus services while competing with KBS (Waweru, 2013; Mutunga, 2011).

Summary of emerging issues

- i. Kenya has attempted at the three approaches in isolation or in combination;
- ii. The franchise arrangement is described as the best experience Kenya transport sector as it was well coordinated and organised. This is affirmed by (Prileszky, 2004). However, they

were not able to anticipate and address demand arising for need for transport and increased urban rural migration;

- iii. Public mass transit has been politicised as seen in the entry of Nyayo bus in 1986 (Waweru, 2013; Kenya Bus Service, 2012; Mutunga, 2011);
- iv. In Kenyan, public corporation as the operator means failure as they are prone to weak internal control system and poor corporate governance as seen with Nyayo Bus and
- v. The inability to regulate informal paratransit operators/ matatus works to their advantage while stifling organised corporate service providers as the former operate without paying its externalities' true cost.

3.4 Policy and Legal Framework

Policy and legal frameworks are instruments, tools and parameters put in place to enable a sector thrive in an orderly manner by stipulating regulations, the desired outcomes, how to achieve these desired outcomes and responsibility of each institution/stakeholder. Nevertheless, formulation of such policies does not automatically translate to success owing to various bottlenecks, lacuna and structural challenges from the macro environment or from internal constraints. Analysis of policy framework helps in pointing out strengths and weakness of existing policy and legal frameworks and how they can be improved.

3.4.1 Legal notice No. 161 of 2003

The first requirement of the policy is that all motor vehicles seats be fitted with seat belts. Secondly, it requires that all vehicles with tare weight exceeding 3, 048 kilogrammes be fitted with speed limiters. Thirdly, that all PSVs be painted with a 150 millimetre width yellow band on both sides and on rear with a minimum distance of 275 centimetres. Fourth, that all owners to indicate their names and address on the vehicle's body. Fifth, that all matatu crew to wear uniform accompanied by badges issued by registrar of motor vehicles. Lastly, that the conductor and driver are to be employed on permanent basis.

The realisation is that:

Weakness

- While it addresses comfort in terms of number to be ferried, it does not stipulate other comfort measures such as leg room and

- Does not address community concerns such as spread of operators in various routes as it is left for economic forces/ personal choice thus making some routes underserved while others oversupplied.

3.4.2 Traffic Act

Traffic Act (Cap 403 Laws of Kenya) stipulates that no vehicle at any moment shall be driven in Kenyan road unless such vehicle and all parts and equipment thereof, including tyres and lights adhere to the Act. The vehicles and parts thereof shall be maintained in a manner that it does not pose risk to commuters, pedestrian and other road users.

The realisation is that:

- This Act focuses on safety of road users by ensuring vehicles are road worthy and operate as per registered standards;
- Mukabanah (2013) observes that the Act has some unconstitutional sections owing to continual amendments and it is not formulated to align with modern transport trends and
- It proposes strict regulations but this is the point of disconnect with infrastructure development within the country and informality in our economy therefore giving room for corruption as the operators have to align with informality of the economy while at the same time operate to meet transport demand.

3.4.3 Sessional Paper No. 2 of 2012 on Integrated National Transport Policy

Relevant to this study is chapter three of the policy with specific emphasis on road as outlined from page 23-36. Within these thematic critical issues there are proposed policy interventions that the policy paper anticipates that if addressed will be able to create the desired outcomes stated in the strategic objectives of section 61.

The realisation is that:

- The policy offers broad sentiments and thus there is need for further refinement through Acts, and Regulations. For instance, there is need for enactment of the proposed Road Transport Act, 2013 (Mukabanah, 2013);
- In spite of this shortcoming, it has led to anchoring, creation of unified authorities or reinforcement of the roles of existing authorities that regulate various means modes of transport land air and sea- National Transport & Safety Authority and Kenya Railway Corporation; Kenya Civil Aviation Authority and Kenya Maritime Authority. The

remaining question is, if they will translate to sustainable road transport management regimes;

- Does not define market space model (regulated, deregulated franchise and deregulated open access) to be adopted by the government or how they are to be integrated in different contexts;
- Talks of larger reforms yet internal operation reforms of operators is what is required in terms of routing and scheduling;
- Does not seem to address disconnect in transport demand, infrastructure development pace and operators investment in the sector;
- Does not offer concise road map on how to attain investment by private sector in road transport yet this is what is lacking in terms of route choice, design of vehicles
- Anchored and informed enactment of NTSA Act, 2012;
- Offers statement but do not give detailed arrangement of investment programme in road transport especially advanced system of Rapid Bus System and Light Train and
- Silent on the role of county governments.

3.4.4 National Transport and Safety Authority Act, 2012

This Act repealed Transport Licensing Act Cap 404 and led to creation of National Transport and Safety Authority.

The realisation is that:

- It has attempted at amalgamation of road transport functions by transferring road transport department from Kenya Revenue Authority (KRA) and safety issues from Traffic Department to the authority. This can lead to sustainable transport regimes;
- Attempted at formalisation by registering corporate bodies who can adopt corporate governance structure. However, operators have come up into corporates body as means of registration and brand name but not as corporate institution with same belief, ideals and structures. This lead to service discrepancy in the same corporate body;
- The licensing bit focus on revenue generation and not spatial distribution that left to economic forces. This implies that some routes are likely to be underserved;

- Does not address tenets of quality in transit services such as timing, presence of cartels, social justice, and social equity. This implies that quality is left to operators yet their interest is on economic gain and
- Does not address disconnect of proposed tough repercussions against the larger macro-economic environment that is full of informality and thus to survive operators have to gain some informality. At the same time infrastructure development has lagged behind yet implementation of these rules require up to par infrastructure development.

3.4.5 National Transport and Safety Authority (Operation of Public Service Vehicles) Regulations 2013

Section 5 – 14 outline requisite conditions that have to be met by PSV operator. For instance, section 5 of the regulations states that a person applying for PSV license must be member of a corporate body. Section 6 and 7 stipulates internal obligations that have to be met by the applying entity.

The realisation is that:

- These regulations are similar to **Legal notice No. 161 of 2003** with the only difference being requirement to be a corporate body. Thus issues identified in the notice as applicable to this scenario and
- Organisation into corporate bodies implies that they can be taxed thus creating a level playing field as all operator can pay true cost of externalities.

3.5 Institutional Framework and Stakeholders Analysis

A stakeholder is conceptualised as entities that have vested interest by having power over delivery of project outcome or by having influence over the success of the project (Kennon and Howden, 2009: 12). Initially, the regulation of transport industry used to be spread and some extent still spread across numerous bodies such as road board, Motor Vehicle Inspection Unit, Registrar of Motor Vehicles, Driving Test Centre and Traffic Police Department (Chitere and Kibua, 2005: 3). This led to disjointed handling of transport issues. From 2012, there was effort to bring the regulation of public transit under NTSA was constituted (NTSA, 2015).

3.5.1 Policy and Regulatory institutions

These are stakeholders with high degree of influence and importance. At the apex is the policy formulation institution which is the parent ministry. There are institutions within this framework that are mandated to license/ offer rights, regulate, enforce and ensure safety of commuters. They

include National Transport and Safety Authority, Traffic Department, County Governments, registrar of companies, department of cooperatives and motor vehicle registrar.

3.5.2 Financing, development and maintenance institutions

At the second tier as informed by the Kenya Roads Board Act 1999 is the Kenya Roads Board which is responsible for funding and ensuring the finances are utilised effectively. Section 18 (4) creates agency/ authority for developing and maintaining roads The four are Kenya National Highways Authority (KeNHA), Kenya Rural Roads Authority (KeRRA), Kenya Urban Roads Authority (KURA) and Kenya Wildlife Services (KWS). At the same time, Kenya's Constitution as per Article 186 and schedule four (4) and Section 5 of County Government Act, 2012 has devolved some functions of development, rehabilitation and maintenance to County Governments.

3.5.3 Regulatory, registration and enforcement bodies

At the top of this cadre is the NTSA which draws its function and mandate from section 4(1) and (2) of the NTSA Act, 2012. Others are traffic department that draws its powers from Traffic Act; County Government that draws its authority from schedule 4 of the Constitution and County Government Act, 2012; registrar of companies and registrar of cooperatives who are in charge of registering corporate bodies.

3.5.4 Operators

These are stakeholders of high importance but low influence. They are corporate bodies or individual operators. In earlier years, buses were the preferred form of transport. However, presently, the preferred form of transit are the privately owned vehicle (matatus) and mini buses (Nzuve & Mbugua, 2012: 3). Presently, most PSVs in Kenya operate under the banner of Public Service Vehicle Owners Welfare Association of Kenya or Matatu Owners Association (MOA), independent companies such as Citi Hoppa, Double M, KBS, SACCOs such as Kilele, Umoinner and other informal public commuter transport providers.

3.5.5 Commuters

In stakeholder analysis, commuters are users of high importance but low influence. Individuals commute for diverse purposes. There are those travelling to employment sectors/ wealth generation points as employees/ employers. The principal interest of commuters in the whole system is to travel in safe and affordable manner.

3.5.6 Employees

These are individuals engaged by the operators to run their vehicles. Their core mandate is to ferry individuals safely to their destination, guarantee economic interest of the owners and earn income as result of providing labour.

Table 7: summary of institutions and stakeholders in road transport

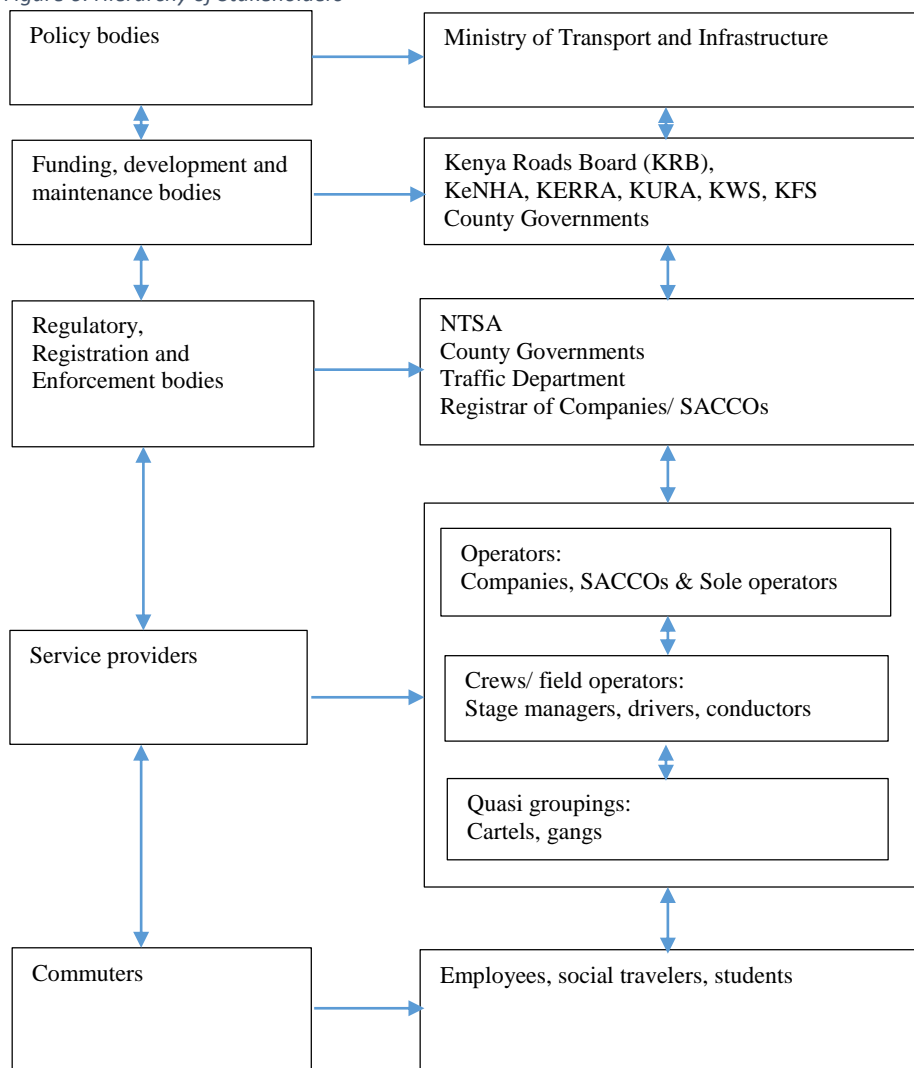
Category	Stakeholder cluster	Stakeholders name	Role and Interest
Public	Policy formulation	Ministry of Transport and infrastructure	Formulate national policies and regulatory framework
	Regulatory, registration and enforcement bodies	National Transport and Safety Authority	Ensure compliance to NTSA Act 2012 Licence operators Ensure safety
		County governments	Ensure proper utilisation of parking lots and thoroughfares Traffic control Issue business permits
		Traffic department	Enforce traffic Act Enforce NTSA Act Enforce Roads Act Traffic/Flow control
		Registrar of companies Registrar of Cooperatives	Registrar corporate bodies as stipulated in NTSA act, Companies Act and cooperatives Act
		Motor vehicle registrar	Registration of vehicles
	Funding, development, rehabilitation and maintenance	Kenya Roads Board	Solicit and administer funds
		KeNHA, KeRRA and KURA	Development, rehabilitation and maintenance of National roads (classA, B & C), rural roads (D, E,F, G, K-W) and urban roads (UA, UC & UL) respectively.
		County governments	Development, rehabilitation and maintenance of County roads, street lighting and parking
Private sector	Operators	Corporate bodies as bus companies and Matatu SACCOS Individual ownership	Provide public transport services that move commuters from one point to another by availing flow entities/ vehicles Avail those who man the vehicles Earn profit from operations
Public body	Operator	County governments	Schedule four of the constitution empowers counties to invest in public road transport, ferries and harbours. This is akin to the arrangement that Nairobi City Council had with OTC. Nairobi has a proposal to invest in mass rapid transit system; Earn income while addressing community interest
Private	Employees	Drivers, conductors, stage managers, agents	Manage the vehicles on behalf of the owners; Ensure passengers reach their destination; Earn income
	Commuters/ passengers	Employees/ workers	To be able to access points of employment and return to retire at their residence safely and at affordable cost
		Students	To reach learning institutions so as to acquire knowledge and retire to their residence safely and at affordable cost
		Employers/ Traders/ entrepreneurs;	To create economic opportunities for employees and ensure their products and services reach required destinations
		Social users	Reach recreational points such as parks, plays grounds and stadia
Informal underground groupings	Gang, cartels,	Create and ensure continued informality; Reap from coercion Control routes	

Adapted from Khayesi (1999: 6)

3.5.7 Hierarchy of the stakeholders

Based on Kennon and Howden (2009: 12); Khayesi (1999: 2) conceptualisation at the apex is policy making organs. At the second tier is the Funding, development, rehabilitation and maintenance institutions which avail finances and physical infrastructure. The third tier is the Regulatory, registration and enforcement bodies that are in charge of licensing and regulating users of the funded physical infrastructure. At the same tier after the third one are the operators and commuters. At the extreme low is the informal grouping such as cartels that thrive on the informality and requires existence of other stakeholders. The interaction of these institutions is not unidirectional but a multipronged to and fro web based relationship as shown in *figure 6*.

Figure 6: Hierarchy of Stakeholders



Source: Compiled by Author

3.5.8 Emerging issues

- The current institutional arrangement especially from public perspective is well addressed as written in the paper. Issues of policy, funding, development, licensing, regulation and enforcement have been addressed. The outstanding concern is the funding level, internal control measures, external interference and capacity of the institutions mandated to do so;
- It is realisable that government has taken initiative to invest in infrastructure but has not taken initiative to invest as a direct player operating her fleets perhaps based on past experience with Nyayo Bus. This has left operations at the hands of private operators whose main interest is economic gains. Investing as direct player would curtail monopolistic behaviours of private operators;
- Currently the corporate bodies are not for purpose of organisational development but as means of registration and branding but have disjointed internal operations and
- The current private operators apart from few have limited capacity to invest in advanced transport system. According to Ministry (2012) development and investment in public transport has not been commensurate with urbanisation rates in Kenya that is expected to hit 50% in 2020. Most investments are in matatus (25 seater and below) and buses.

3.6 Operational Organisation Strategy

Khayetsi (1999: 3 &4) notes that the initial attempt at internal regulation was the formation of umbrella organisations. These organisations were used as means of route allocation. One weakness was that those members who were not powerful enough were allocated less attractive and non-profitable routes. Moreover, this organisation was used for political purposes. As a result of this the organisation was disbanded until 1991.

Currently, Route-based (SACCOs) operates as welfare organisations that allow the service providers to accumulate resources and redistribute them through credit schemes, direct route operations and intervene on issues of welfare. Most of these SACCOs are linked to larger organisations like the Matatu Vehicle Owners Association (MVOA) or MOA that was formed in 1973 to allow owners the control of operations of the sector. However, the route-based organisations are generally stronger than the national bodies like MWA and MOA in articulating the concerns of the industry (OECD, 2009: 4). This is an opportunity that the government can use to formally engage the service providers.

Khayesi (1999: 8) notes that there are numerous informal and illegal players who control this industry. Their survival depends on this industry and thus they resort to extortion, intimidation and gang control of the routes and parking ranks. For instance, Transport Licensing Board by then estimated that 30 % of the newly registered SACCOs were owned by illegal groups. Gicheru *et al.*, (2011: 7) established that with the emergence of new transport policy, cartels and gangs have rushed and registered SACCOs in Nairobi and they demand demand between Ksh30, 000 to 100, 000 as an admission fee yet the process should be voluntary.

Pertinent issues

- The industry is marked with informalities, high number of operators, unstructured operations and cartel controlled thus breeding externalities such as accidents, pollution, congestion, corruption, gangstarism;
- Owing to inadequate capacity from financing and development authorities, regulators and operators there is inadequate supply of transport services, traffic congestion during peak hours, limited road space leading to stiff competition within the road and bad motoring behaviours;
- Low capacity of individual operators and government unwillingness to invest in mass rapid transit system has resulted in long queues of slow moving vehicle and long waiting time as they can only have limited number of individuals per trip;
- Corporate requirement has not taken route in terms of internal controls and operational efficiency and most investment are in low capacity carriers and
- Route based organisations are powerful than national organisations.

3.7 Network and Infrastructure in Kenya

Road network infrastructure connectivity plays a significant role in allowing for spatial interaction, opening up of areas, movement of people access social service, goods and trade opportunities. In pre- independence, road network infrastructure was structure in a way that it was to play secondary auxiliary role to railway line as roads were to link railway line with areas of production such as white highlands of Kenya. In turn, railway line was meant to move bulk products from hinterland to port of Mombasa and imports from port of Mombasa to the hinterland (Ministry of Transport, 2012: 12). At independence Kenya had 45, 000 km of road network with 2, 000 km of these kilometres pave while the remaining were mainly of earth standards. In 2009, Kenya had 11, 189 km of paved road (Kenya Roads Board, 2015b).

3.8 Status and Classification of Roads in Kenya

Public roads in Kenya are classified as national roads, rural roads and urban roads. National roads are developed, rehabilitated and maintained by Kenya National Highway Authority and they are of class 'A', 'B' and 'C'. *Annex I* outlines detailed classification of roads in Kenya.

As by 2012, Kenya had 160, 886 kilometre of road with 63, 291 kilometres classified. The remaining unclassified were to be developed and maintained by local governments, a function that has been taken by county governments, KWS and KFS. *Table 8, 9 and 10* gives a detailed breakdown of road status in Kenya.

Table 8: Classified Road Network in Kenya

Road network	Administering agency	Bitumen	Gravel	Earth	Total	%
International Trunk Roads – A	Roads Dept. of Ministry of Transport and Infrastructure	2, 886	717	152	3,755	6%
National Trunk Roads – B		1, 433	842	524	2, 799	4%
Primary Roads – C		2, 487	3, 209	1, 972	7, 668	12%
Secondary Roads – D	District Roads Committees	1, 167	6, 484	3, 565	11, 216	18%
Minor Roads – E		751	7, 206	18, 592	26, 549	42%
Special Purpose Roads		214	8, 724	2, 366	11, 304	18%
Totals		8, 936	27, 182	27, 171	63, 291	100%
%		14%	43%	43%	100%	

Source: Kenya Roads Board, 2015a

Table 9: Unclassified Road Network in Kenya

Road network	Administering agency	Road type	Kilometres	%
Urban Road Network	County Governments	Adopted urban streets	7, 000	5.2%
Other unclassified roads	County Governments	Rural roads and tracks	110, 000	82.2%
Roads in National Parks & Reserves	Kenya Wildlife Service	National Parks & Reserves Roads	6, 000	6.6%
Roads in National Reserves (contracted from county governments)		(contracted from County Governments)	2, 800	
Forest roads	Forest Department	Forest roads	8, 000	6.0%
Total unclassified			133, 800%	100%

Source: Kenya Roads Board, 2015a

Table 10: summary of road conditions in Kenya

Road classification	Condition (all figures in km)			
	Good	Fair	Poor	Grand total
Classified	10, 651	31, 847	19, 438	61, 936
Unclassified	5, 440	22, 165	71, 345	98, 950
Grand total	16, 090	54, 012	90, 784	160, 886
Condition classified	17%	51%	31%	100%
Condition unclassified	5%	22%	72%	100%
Condition all	10%	34%	56%	100%

Source: Kenya Roads Board, 2015b

3.9 Emerging issues

- Kenya development approach of growth centre and service centre strategy has seen the government focus on class A, B and C of roads. Distribution of urban centres of significance identified in human settlement strategy of 1978 in space indicates that most of these centres are located in former white highlands in Kenya – which are high potential zones and along the Kenya-Uganda rail line. This has led to imbalanced spatial distribution;
- Apart from class A, B & C, classification of roads is based on cash crop production potentiality. The question remains, what other regions with varied agricultural potentiality such as pastoralism? This means that their roads can only be under class U;
- Road development has focused much on development without proper alignment with land use planning. In some instances, it is the transport corridors that influence land use planning as opposed to the opposite;
- There is limited development in modern parking spaces. This has seen congestion with most CBDs. One can equally spend extended time searching for parking space.
- Most road networks converge towards the primate city, Nairobi;
- Constituency Roads committee is integral in minimising skewed distribution and thus should be continued as a perfect example of bottom-up/ participatory approach;
- A paltry of 14% of the classified roads are to bitumen standards. This means accessibility using the remaining 86% is a challenge especially during rainy season;
- Kenya has invested in limited tarmacked road since in 1963, Kenya had 2,000 km of paved road yet in 2009 it had 11, 189 (Kenya Roads Board-KRB, 2015b). This implies in post-independence existence of 46 years Kenya invested in 9189 km. this translates to an annual average of 200 km and
- Variance in statistical data about total length of roads in Kenya s per information presented in table 8, 9 and 10. Kenya Roads Board (2015b) acknowledges this discrepancy by noting that extent of unclassified roads remains unknown as it is estimated to range from 80, 000 to 130, 000 km. this complicates ability for effective maintenance and development planning.

3.10 Salient Realizations on Transportation in Kenya

- 1) Urbanization rate is exceeding the rate at which government is investing in urban transport and as such the urban transport has experienced low level of service quality owing to traffic congestion, long waiting time, pollution, exploitation and unreliability;
- 2) Land use planning has not taken Centre stage in enhancing transport service delivery by curtailing issues such as urban sprawl through compact cities/ densification, opening up of missing links, selectively dispersing economic activities in space to avoid strong dominant CBD;
- 3) The government has continually invested in infrastructure dimension of transport, particularly roads while neglecting the service dimension. The travel demand in Nairobi is 7.5 million trips a day yet the existing vehicles and rolling stock have limited capacity to address this demand (Omwenga, 2011);
- 4) After fall of KBS and Nyayo Bus, the market arrangement and ownership structure is a deregulated open access which has created a demand driven approach that does not address societal expectations especially for lowly profitable routes;
- 5) Travel demand outweighs supply;
- 6) The inefficiencies of public transport has pushed able individuals to resort to private means. Private car ownership grew at faster rate (7%) in 2011 as compared to buses and mini-buses at 5% (KIPPRA, 2015: 1). The private cars constitute 22% of registered vehicles yet account for 64% of traffic volume (Cameron, Laura and Seton, 2012);
- 7) The NTSA Act, 2012 is geared towards registration, identification and safety while neglecting aspects of service quality in transport such as accessibility, design, routing, timing and fares;
- 8) The NTSA Act, 2012 and 2013 regulations are geared towards streamlining externalities without addressing internal control issues and corporate standards yet the internal control issues have direct bearing on external issues. SACCOs are not for the purpose of efficiency and service delivery but a means to registrations as PSV operator and branding. This is evident when accidents happens and route managers are not able to account for anything;
- 9) Route based SACCOs are stronger than national based umbrella bodies in transport thus inculcating shared leadership and control is difficult as the regulator-NTSA has to deal with multiple owners;

- 10) There is limited investment in NMT in Nairobi yet 47% walk while 1.2% cycle;
- 11) The low regulation level especially for non-corporate paratransit operators has created uneven playing field as they are not paying for true cost of their operation as compared to their organized corporate entities such as KBS and Double M services;
- 12) There is no investment in mass public transit system in urban areas such as LRT and BRT;
- 13) Owing to poor design of interchanges and nodes, they have contributed to traffic congestion;
- 14) The public transport system in Kenya has been highly politicized and thus introducing stringent regulations has been a challenge;
- 15) Current operators have limited means to invest in BRT and LRT or at least High Occupancy Vehicles (HOV) so as to reduce round trip required to meet travel demand;
- 16) Kenya development approach of growth centre and service centre strategy has seen the government focus on class A, B and C of roads. Distribution of urban centres of significance identified in human settlement strategy of 1978 in space indicates that most of these centres are located in former white highlands in Kenya – which are high potential zones and along the Kenya-Uganda rail line. This has led to imbalanced spatial distribution;
- 17) Apart from class A, B & C, classification of roads is based on cash crop production potentiality. The question remains, what other regions with varied agricultural potentiality such as pastoralism? This means that their roads can only be under class U;
- 18) Road development has focused much on development without proper alignment with land use planning. In some instances, it is the transport corridors that influence land use planning as opposed to the opposite;
- 19) There is limited development in modern parking spaces. This has seen congestion with most CBDs. One can equally spend extended time searching for parking space.
- 20) Most road networks converge towards the primate city, Nairobi;
- 21) A paltry of 14% of the classified roads are to bitumen standards. This means accessibility using the remaining 86% is a challenge especially during rainy season and
- 22) Kenya has invested in limited tarmacked road since in 1963, Kenya had 2,000 km of paved road yet in 2009 it had 11, 189 (Kenya Roads Board-KRB, 2015b). This implies in post-independence existence of 46 years Kenya invested in 9189 km. this translates to an annual average of 200 km.

3.11 Related Works and Information Gap

There are numerous studies focusing on the public transport sector in relation to matatu industry within domains such as struggle for self-regulation, future of matatu industry in Kenya, transport services in the city and how they can be converted into hybrid mode, mitigation of road traffic congestion in Nairobi metropolitan region, Integrated Transport System for Liveable City Environment and role of matatu industry. For instance, work by Orero and McCormick(2010) is geared towards explaining organisation of paratransit in order to succeed while Gicheru, Migwi and M’Imanyara (2011) explores the socio economic impacts of the new Integrated National Transport Policy. Wambui (2012) did her thesis titled “Strategic responses to changes in the external environment by the matatu subsector within Nairobi central business district”. On the other hand, Mutoria did a work titled “an investigation of the factors influencing the performance of matatu saccos in Kiambu County: the case of selected matatu SACCOs operating in Thika Town, Kenya”.

Secondly, most studies and government effort in Kenya to improve mass public transit has been premised on network connectivity Network which falls within the domain of expression on which a place/ settlement may be reached from other locations through access network such as road, rail, ports and airports so as to enhance contact and interaction and thus giving limited attention to service quality in terms of carrying capacity, safety, reliability and cost effectiveness.

The research is aware of two closely related studies on regard to implementation of 2010 transport policy and gazette notice No. 161of 2003. The first is a paper by Asingo & Mitullah (2007) titled “Implementing Road Transport Safety Measures in Kenya”. The paper assess implementation challenges and emerging policy issues relating to notice No. 161 of 2003 within the subset of service quality in public transit in terms of road crashes. The study points out that there exist a lacuna in implementation of the policy. For instance, while the regulation requires all PSVs to be fitted with speed governor, some of the vehicles were allowed to undertake engine calibration which is prone to tampering. Secondly, the study points that the notice is biased against PSV and that overemphasis on speed limiters and safety belts leads to neglect of other glaring needs in public transit. The other study is one by Orero et al., (2012) that examines progress with the implementation of the public Integrated National Transport policy in Kenya. The study found out

that cost, mode and time implications should be taken into consideration in implementation of such policies.

Therefore this study sets pace in reviewing the impact that the Sessional Paper No. 2 of 2012 on INTP has had based on passengers objectives and weather it is playing its intended role in enhancing improved service delivery or not in urban mass transit sector by addressing various facets of improved service delivery/quality. Equally the study outlines exist lacunas in relation to development of the requisite integrative approach in solving transport problem such as land use planning, investment in modern means, supporting institutional and legal framework and expansion of physical infrastructure.

The knowledge gap addressed by this study will be critical in addressing quality improvement and integration by:

- i) Establishing how to address informality of the sector by addressing externalities facing the corporate bodies/SACCOs and internal control issues – capacity building;
- ii) Possibilities of introducing unified design standards for PSVs to address issues of identification, comfort and safety – currently any vehicle can be PSV so long as they have PSV license;
- iii) Establishing appropriate routing and scheduling schemes that should be adhered to;
- iv) Advising on market structuring approach that is suitable for Nairobi;
- v) How to reinforce enforcement strategy that is not based on human presence-traffic police/NTSA personnel so as to address issues of safety;
- vi)
- vii) How government can come back to the industry not only as regulator but as operator while addressing internal control issues associated with state owned corporations (SOE);
- viii) How to mainstream NMT within the transport system in Nairobi;
- ix) How to address over-crowding of passengers in PSVs and long queues of commuters at “termini” during peak hours;
- x) How to address vehicular congestion arising from poor road space usage by private vehicles, PSVs and Non-Motorised and Intermediate Means of Transport (NMIMT);
- xi) How to enhance drop and pick points, joining of secondary and primary roads;

- xii) Land use planning and road network integration that would guarantee compact city so as to curtail urban sprawl;
- xiii) How current modes can be integrated into hybrid system;
- xiv) Development of non-motorised transport;
- xv) Investment priority areas and strategies in Nairobi that can unlock traffic congestion, commuter distance, travel time and meet the increased demand for travel;
- xvi) Cost regulation in relation to household income and
- xvii) Investing in environmentally sustainable modes of transport.

CHAPTER 4: STUDY AREA

4.1 Introduction

Nairobi gradually emerged in 1989 as result of establishment of railway depot. The city was later to be incorporated as the Township of Nairobi in 1900 by article 45 of the East Africa Order-in-Council that established its boundary as radius of one-mile-and a half from the office of Commissioner H.M Arthur Hardinge. The continued growth saw the municipality elevated to a city status in 1950 through the Royal Charter of Incorporation. After independence, the city was governed under Local Government Act. However, in 1974, the city council was disbanded so as to be governed by City Commission up to 1992 multi-party election that saw the return of Mayor. From 2013, the city is governed as Nairobi City County (Nairobi City County Government, 2015).

4.2 Location, Size and Administrative Units

Nairobi Kenya's capital city is located 1 ° 16'South and, 36 °48' East, 140 kilometres south of the Equator. The city is at altitude 1,680 meters (5,512 feet) above sea level and an approximate area of 696 sq km with seventeen (17) constituencies/ sub counties as shown in *map 1*.

4.3 Demographics

Premised on Kenya Population Census of 2009, Nairobi had an approximate night population of 3, 138, 000 individuals with an annual population growth rate of 4.0%. Measured against a total area of 696 km², the city has a population density of 4, 509 people per square kilometre. If the Nairobi National Park which measures 117km² is excluded, the city has an average density of 5, 429 individuals per square kilometre. The city's population accounts for 8.1% of Kenya's population as the whole country had 38, 610, 000 individuals. The annual population growth rate of 4.0% implies that the city's average exceeds that of the nation which stood at 3%. This coupled by positive net urban to rural migration, the city is likely to experience sustain population expansion.

Based on UN Habitat projections cited in Omwenga (2011), in 2010, it was estimated that Nairobi had 3, 363, 000 people, in 2020 it would be 4, 881, 000 and in 2025 it would be 5, 871, 000. This study equally aligns with the NIUPLAN (2015) recommendation and that implies that Nairobi's population in 2013 was 3, 601, 351; in 2018 it would be 4, 174, 952; in 2023 it would be 4, 677, 771 and in 2030 it would be 5, 21, 500. For the greater Nairobi, in 2013 it is estimated to have had 6, 025, 084 people; in 2018 it will have 7, 493, 496; it 2023 it will have 9, 252, 373 and in 2030 it will have 12, 262, 332.

4.3.1 Emerging issues

- Higher population growth rate in the city (4%) as compared to national rate (3%) and projected higher population of 4, 174, 952; 4, 677, 771 and 5, 21, 500 in 2018, 2023 and 2030 respectively is likely to complicate mass urban transit issues as there will be need for more vehicles/ rolling stock with high capacity to ferry passengers, more road spaces with expanded capacity, integration of land use planning in transport development and investment in modern means of transport such as BRT. Failure to invest in such, there would be sustained traffic congestion, long waiting time before boarding, higher charges during peak travel, economic wastage, and gradual decline in city's competitiveness both locally and globally and increased informality to address existing demand gap;
- Kamukunji/ pumwani area higher density can be linked to its role a critical mass employment and centres service centre since it host Machakos Country Bus Station, Gikomba Open Air Market, Muthurwa Hawkers Market, Pumwani Maternity Hospital and Eastleigh business centre. Apart from CBD, this means that it is one of the *greatest traffic generators*;
- Emergence of Mavoko and Kitengela as dormitory towns with fastest growth has implication on traffic on Mombasa Road and
- High population growth in surrounding towns and Nairobi metropolitan implies that there is need to invest public transport and transport infrastructure at large.

4.4 Livelihoods and Socio-economic Dynamics

Within Eastern Africa, Nairobi City GDP is ranked the second after Khartoum. In 2011, Nairobi's GRDP was estimated at Ksh 221, 965 (NIUPLAN, 2015). Internally, there has been a varied discourse on the GDP per capita wealth of Nairobi. According to World Bank (2015) ranking of counties GDPs, Nairobi City Came 8th with a per capita wealth of US\$1, 081. The fallacy of Nairobi being the leading rich county was equally disapproved by Commission on Revenue Allocation (CRA) in 2013. While relying on poverty index and Kenya Integrated Household Budget Survey, CRA (2013) ranked Kajiado and Kirinyaga as the top richest counties as listed respectively. NIUPLAN (2015) indicates that the GDP assumption for Nairobi in 2009 was 24.4% of Kenya and that GRDP per capita of Nairobi in three times that of the national GDP per capita.

4.4.1 Emerging Realisations

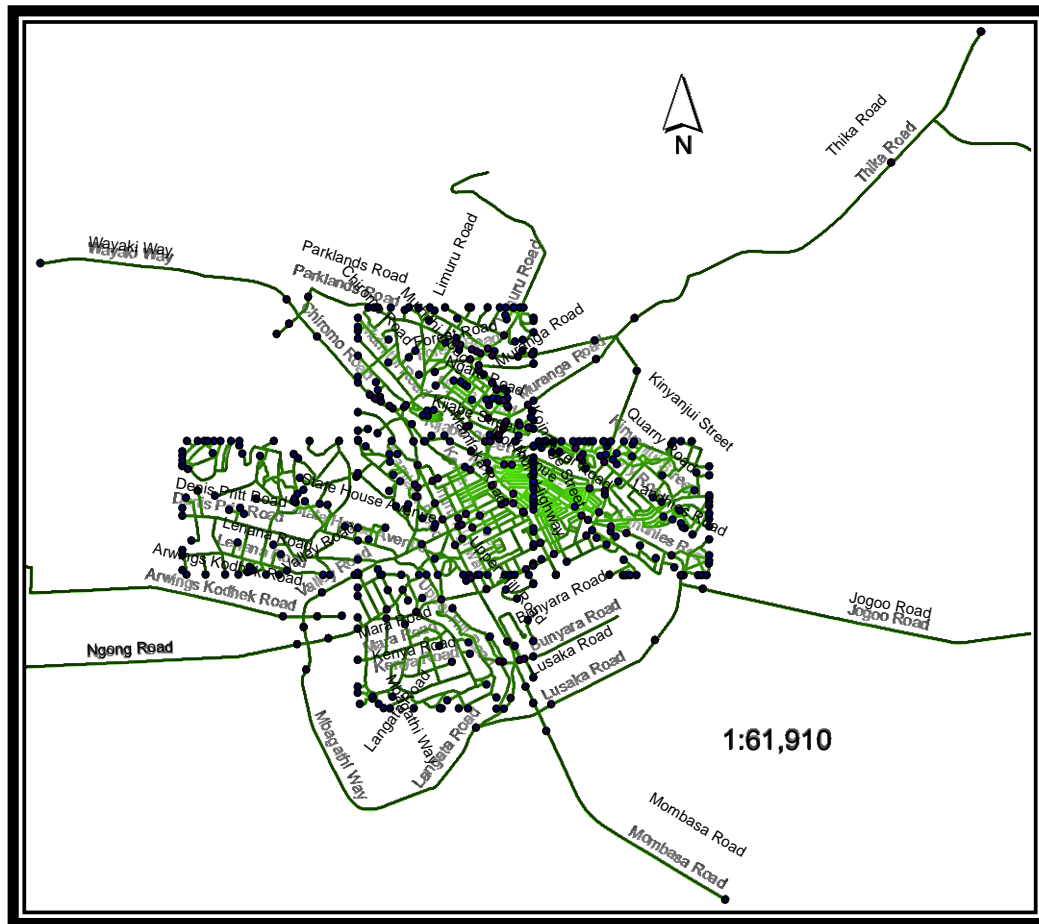
- Nairobi is an important economic hub. To sustain this leadership and enhancing her competitive position by limiting wasted man hours and fuel, there is need to invest in modern mass transit system such as BRT and LRT;
- According to Omwenga (2011), 50-60% of Nairobi's resident are of low income and resides in informal settlements;
- The economy of the city is characterised by informality and most of her residents (50-60%) are categorised as poor as their monthly income range from \$65 -\$78. This calls for public investment in urban rapid mass transit system that is affordable and commensurate to their income or investment of affordable means such as NMT;
- Those with high disposable incomes are the ones investing in private cars which accounts for 15.3% of the modal split (Randu, 2013; Omwenga, 2011). There is need to address informality so as to attract these segment of the society into public transits system and
- Since 11.4% of household own bicycle, it is prudent to invest in NMT so as to encourage commuting using sustainable means.

4.5 Land Use Pattern, Urban Structure and Its Role in Travel Bottlenecks

According to Cervero (2001:1651) urban form and transport infrastructure has a bearing on economic performance and transport bottlenecks experienced in the built environment. The notable within this context is the organisation of land use to form a compact city versus urban sprawl. Muiruri (2015) notes that urban sprawl in Nairobi will continue as result of saturation and urban decay. Close proximity to towns such as Ruaka, Thika, Kitengela and Rongai coupled with the realisation that property prices in these are more affordable than the city centre is likely to spur continued outward movement that would lead to urban conurbation.

KIPPRA (2015: 1) noted that the spatial economic structure of Nairobi has a greater role in the traffic congestion as result of having exclusive focus on CBD thus making it the highest trip attractor. The scenario is worsened by the structuring of working hours within city of 8.00 am – 5.00 pm. This makes to individuals to scramble so as to access jobs and economic opportunities within this framework. The implication of the mono-centric spatial structure is the creation of one dominant trip attractor and trip generator point. *Map 3* shows the convergence of all road network into the CBD.

Map 3: Convergence of Nairobi's Road Networks into CBD



Source JICA, 2006

4.5.1 Emerging realisations

- Urban sprawl has resulted to increased travel time in Nairobi. For instance, there are those residing in dormitory towns such as Ruiru, Mavoko, Kiambu, Rongai and Kitengela who commute daily to Nairobi where their workstations are located;
- While the city is experiencing selective dispersal of services in space to areas such as Upper Hill and Westlands, Nairobi still has strong dominant CBD. Strong dominant CBD that hosts most of the employment and service outlets has resulted to congestion as all are seeking access to it;
- Apart from CBD- Starehe Constituency, industrial area – Makadara Constituency, Kariobangi light industry/ Baba Dogo area – Ruaraka Constituency other principal mass employment centres are still concentrated disproportionately in Starehe, Kamukunji and

Makadara Constituencies. These include Machakos Country Bus, Shauri Moyo Jua Kali sheds, Muthurwa Hawkers Market, Nyayo/Ngara Market/ Grogan Garage, Gikomba Open Air Market, Eatleigh Business Centre, Uhuru Market and Wakulima Wholesale Market.

4.6 Urban Public Transport in Nairobi

Ndetto (2014) identifies three principal circulation routes in Nairobi that experience severe traffic snarl up. The first is Jogoo Road owing to the fact that it is the gateway to the most populated side of the city. In this road, sometimes traffic snarl can stretch from caltext junction in Umoja and Taj Mall to converge in Donholm round about, proceed to Jogoo Road, Race Course Road and ultimately CBD. Other with severe traffic jam are Langata Road, Uhuru Highway and Ngong Road.

4.6.1 Current status

Modal split

Omwenga (2011: 3) citing King' ori (2007) notes that majority (47%) of Nairobi walked to various destinations. Matatu and Mini-Bus accounted for 29%; private car 15.3%; bus 3.7%; institution bus 3.2%; cycling 1.2; train 0.4% and the other classifications 0.2%. According to KIPPRA (2006: 2), 49% of Nairobi's residents uses NMT such as walking and cycling. 42% use public means while 9% uses private car. Within public transport accounted for 75% of the public transport modal split (Chitere *et al.*, 2012: 316). NIUPLAN (2015) established that for all trip purpose with exception "to work" walking accounted for the largest portion of travel mode. Use of matatu dominated "to work trip" purpose and equally had the second largest share in all other purposes for making trip.

Trip Generation Issues

King' ori (2007) estimates that with a population of 3 million and average travel demand rate of 2.5 trips per person-per day. This sums to travel demand rate of 7.5 million per day in Nairobi. NIUPLAN (2015) estimates trip generation by individuals residing Nairobi to be 6.8 million persons trip. Master Plan for Urban Transport in the Nairobi Metropolitan Area (2006) projects the number to grow to 8, 275, 969 in 2025 as shown in *table 11*. However, the concern is that owing to increase in trip rate, increase in trip generation is higher than increase in population and number of households.

Table 11: Future Total Trip Production by Trip

Year	Trip purpose				Total
	Home	Work	School	Others	
2010	2, 754, 523	1, 561, 561	555, 149	1, 058, 297	5, 929, 530
2015	3, 087, 894	1, 751, 447	631, 203	1, 176, 492	6, 647, 036
2025	3, 843, 578	2, 196, 167	783, 155	1, 453, 069	8, 275, 969

Source: Mater Plan for Urban Transport in the Nairobi Metropolitan Area, 2006

Bus companies vs matatus

Transport service provision in the city rests with private operators that either own buses or matatus. Transport services are dominated by the paratransit mode of matatu. In 2008, it was estimated that Nairobi had 15, 000 matatus which operated in 125 routes and accounted for 75% of the public transport modal split. Apart from KBS, since 2002 there has been emergence privately owned bus companies such as Double-M and City Hopper (Chitere *et al.*, 2012: 316).

Private cars

The worrying trend is how the private cars are fast becoming preferred transport mode in Nairobi. Master Plan for Urban Transport in Nairobi Metropolitan Area (2006) projects that private cars will be 716, 138. For instance, in 2013, motors cars increased with 7% as compared to buses and matatus that increased with 5% (KIPPRA, 2015: 1). For instance, various literatures place the percentage using private car as their preferred mode beyond 9% - KIPPRA (2006) states it at 9%; Omwenga (2011 citing King'ori, 2007) states it at 15.3%; Randu (2013) states it at 22% while accounting for 64% of traffic volume.

4.6.2 Transport Demand vs Road Transport Network

Scenario

In 2006, Nairobi had 1, 214. 5 kilometres of roads this constituted a total of 5.3% of Nairobi's land mass. 972 kilometres of the 1, 214.5 are paved while the remaining 178 are earth gravel roads. Out of the total 49 arms constituting transport corridors in Nairobi only 4 of them can handle the current traffic volumes generated. This translates to the fact that during peak hours most (91.8%) of these roads are over stretched (KIPPRA, 2006: 2).

NIUPLAN (2015) corroborates the above observation that existing road networks are highly congested. It is noted that radial roads heading to city core, circumferential roads and bypass roads for instance Eastern Bypass and Outer Ring Road are highly congested. In an event that no-intervention and status quo is maintained, vehicle-hours within Nairobi is estimated to increase 5.3 times as a result of congestion while total vehicle kilometre will expand 2.4 times. Master Plan for

Urban Transport in the Nairobi Metropolitan Area (2006) affirms the same by noting that with current transport network condition, Total Vehicle Trips (in PCU) in 2015 was estimated at 1, 255, 434 per day while it is projected to grow to 1, 759, 290 in 2025. Under this scenario with no intervention, the estimated average speed for vehicles within Nairobi in 2025 would be 11.2 Km/h. As such, there is need of counter measures so as to limit automobile traffic volume.

4.6.3 Emerging Issues

- With only 42% using public transport (KIPPRA, 2006). Nairobi has not invested in MRT as means of moving people;
- Increase in trip rate, increase in trip generation is higher than increase in population and number of households;
- Marginally, those using buses for trip purposes have increased;;
- “to work” purpose is dominated by matatu ;
- For all other purpose trips, walking is the preferred mode. However, those walking are significantly reducing while those using matatus and buses are increasing;
- With 49 % using NMT (KIPPRA, 2006). There is need to invest and mainstream NMT infrastructure in reticulation network planning so as to enhance safety and walkability;
- By accounting for 75% of those who use public transport (Chitere et al., 2012). Nairobi transport is dominated by informal paratransit sector;
- There is increasing movement from trips generated outside Nairobi. In 2013, it accounted for 98, 000 (1.4%) while in 2004 it was 1.2%;
- In regard to within movement. Traffic distribution is heavily skewed towards the west-east movement as compared to south-north;
- Owing to informality and low service levels, most are resorting to private cars. KIPPRA (2006) states it at 9%; Omwenga (2011 citing King’ori, 2007) states it at 15.3%; Randu (2013) states it at 22%;
- Franchise as was the case example in earlier years (1934-1973) is the solution to informality and improved service. Indeed literatures points that most cities are moving to deregulated franchise arrangement;
- By not paying true economic cost, matatus are having unfair advantage over formal bus companies;

- Policy coordination is a concern;
- Mobility of people is an issues as it is common to get stuck in a traffic jam for over 2 hours in a 15 km stretch. This will worsen is current road network capacity is not expanded. In 2015 it was estimated that the average vehicle speed in Nairobi was 19.9 km/m and this expected to reduce to 11.2 km/h in 2025 and
- There is likelihood for increased total vehicle trips from 1, 255, 434 in 2015 to 1, 759, 290 in 2025 so as to meet growing demand for travel.

4.6.4 Current Interventions

- 1) The NTSA through NTSA, 2013 regulations obliges PSVs to be organised in corporate bodies;
- 2) The same regulations limits registration of low occupancy vehicles by not licensing 14 seat vehicles as PSV;
- 3) The County Government has initiated revised movement in arterial and priority CBD roads;
- 4) Rift Valley Railways has refurbished Nairobi-Syokimau Route and availed new wagons so as to address persistent traffic congestion in Mombasa Road;
- 5) Investment in NMT infrastructure such as walk paths;
- 6) County government has formulated NMT policy and Traffic Management Bylaws;
- 7) The Nairobi City County Government is proposing to invest in multi-car-park in a 1.7 acres land located at the junction of Taifa Road and Harambee Avenue;
- 8) Kenya Railway Corporation has built new railway stations at Makadara, Imara Daima and Syokimau under Park and Ride Concept so as to limit vehicle traffic and congestion while offering opportunity to access CBD faster;
- 9) There is a proposed 167 km radial MRT project worth \$4 million involving BRT and LRT. Section for Likoni Road Junction to James Gichuru Road Junction has been tendered;
- 10) Proposed introduction of signalised junctions;
- 11) Junction improvement through channelization. For instance there is ongoing projects for lower hill /Haile Selassie and Upper Hill/ Haile Selassie junction;
- 12) Completion of Eastern, Nothern and Southern Bypass and
- 13) Expansion of Outering Road to dual carriage way.

4.7 Legal and Policy Framework in Nairobi

There are various attempts by the former Nairobi City Council and Nairobi County Government to streamline the operations of PSVs within her area of jurisdiction through various policies. This section examines some of these policies and how they are intended to address transport issues.

4.7.1 Existing Development Plans

NIUPLAN

One of the pragmatic approach to solving transport issues in Nairobi is through NIUPLAN which is heavily influenced by the Master Plan for Urban Transport in the Nairobi Metropolitan Area (NUTRANS). NIUPLAN (2015: 7/15-7/56) proposes a raft of transport development plan. It outlines (1) basic approaches, (2) basic policy, (3) future road network plan, (4) public transport network plan, (5) future network alternatives, (6) evaluation of alternative cases, and (7) staging plan.

NUTRANS

Master Plan for Urban Transport in Nairobi Metropolitan Area, 2006 (NUTRANS) proposes staged development of radial and ring road networks from city centre to peripheral premised on the traffic survey 2004.

Nairobi Metro 2030

This is a localised development strategy aligned to vision 2030. The metro 2060 is premised on 6 goals with one of the goal being “Optimizing Mobility and Accessibility through Effective Transportation”. This goal seeks to:

- Reduce travel times and costs;
- Improve connectivity and accessibility;
- Enhance customer choice and satisfaction;
- Increase patronage of public transport and
- Enhance transport safety and security.

Junction improvement programme are proposals that were formulated by Taskforce on Nairobi Decongestion that recommended abolition of round-about so that they can be replaced by signalised or channelled junction so as to reduce traffic congestion.

4.7.2 Policies and Bylaws on transport in Nairobi

Nairobi City County Government NMT Policy, 2015

This policy appreciates the fact that projects throughout the Nairobi for new roads construction and upgrades have only partially provided physical infrastructure for NMT users. As such it seeks to ensure that the neglected transport mode is treated equally so as to enhance mobility of people by improving walking environment that has proven to be sustainable and requires limited investment.

Bylaws

Under the overall City bylaws, there stipulations guiding public transport sector. They are specifically mention in Part 2 that guide parking; Part 6 on Matatu Terminus; Part 9 on taxi cabs and Part 12 on use of cart on public streets. The city has independent Traffic Management By-Laws, 2009. Part 2 of the By-Law stipulates the use of roads demarcated into traffic lanes.

4.7.3 Emerging issues

The following are concerns:

- 1) Inadequate policy and institutional coordination
- 2) Long travel times and costs;
- 3) Low mobility, connectivity and accessibility;
- 4) Limited customer choice and satisfaction
- 5) Limited patronage of public transport (if one would be given option and economic might, they would opt for private means).
- 6) Transport safety and security
- 7) NMT has not been properly mainstreamed in road network planning and development

CHAPTER 5: STUDY METHODOLOGY

5.1 Introduction

The chapter outlines approaches and techniques developed to address the study objective. It describes the types of data that were sought, sources of such data, the subjects targeted for the study and methods of data collection and data analysis.

5.2 Research Design

The strategy employed in this research project is both comparative and case study design that utilises quantitative and qualitative research. In this case parameters that measures service delivery in urban public transit such as accessibility, mobility and time were compared before enactment of INTP and after enactment using Nairobi City County as the case study.

5.3 Target Population

The targeted population based on household survey were adults residing in Nairobi City County. According to National Census (2009), Nairobi had a night time population of 3, 138, 000. This was later scaled to 206, 148 individuals residing in Mathare North Ward, Maringo/Hamza Ward, Nairobi West Ward and Riruta Ward as described in sub chapter 5.4.

5.4 Sampling Procedure and Sample Size

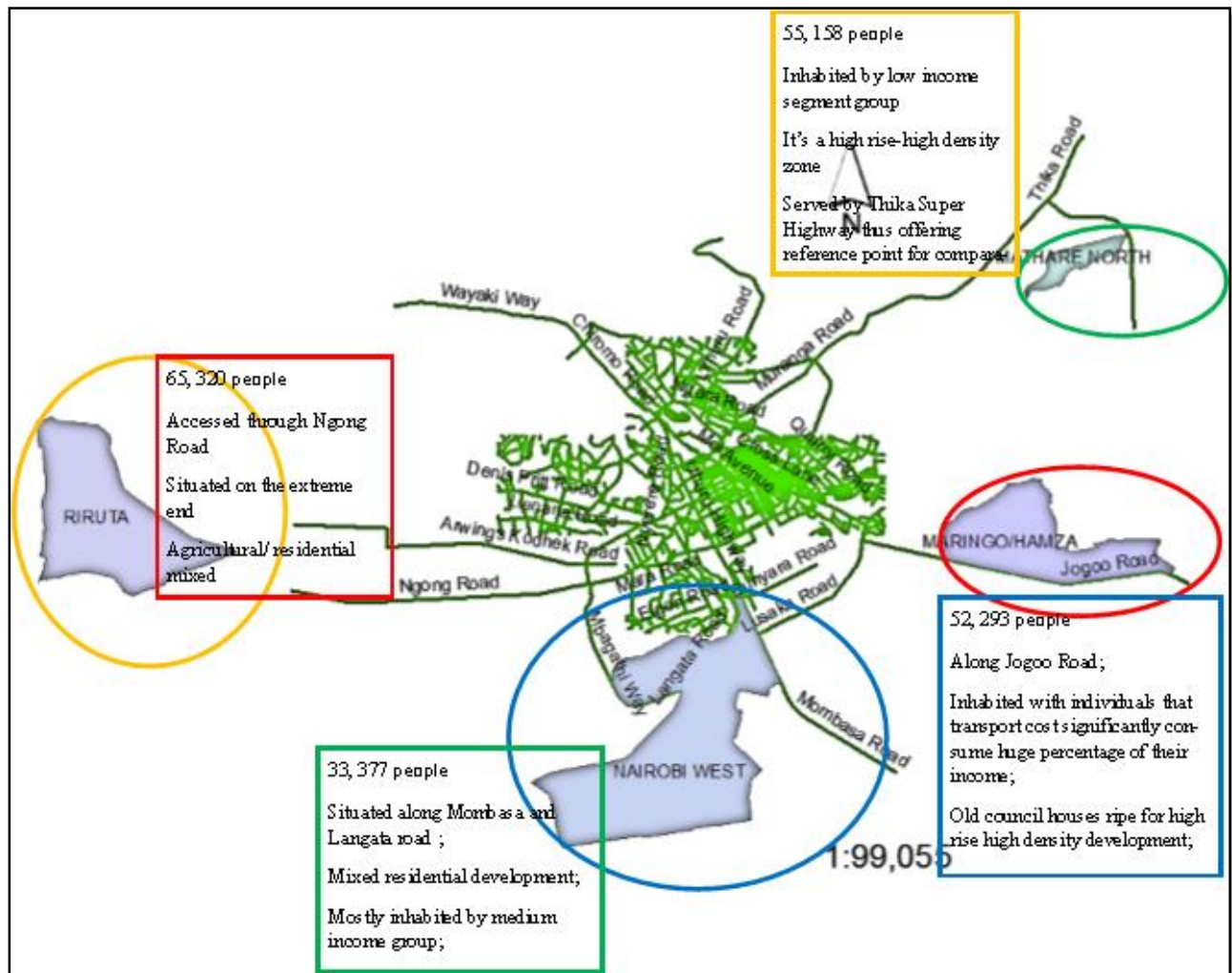
5.4.1 Sampling Procedure

As at 2009, Nairobi had 3, 138, 000 while the targeted population was 206, 148 individuals residing in Mathare North Ward, Maringo/Hamza Ward, Nairobi West Ward and Riruta Ward as shown in *map 4*.

To arrive at the selected wards, the following parameters were followed:

- i) The ward had to be served by one of the roads that are experiencing severe congestion such as Jogoo, Mombasa, Langata and Ngong Road (KIPPRA, 2006).
- ii) Had to represent major socio-economic segment that relies on public transport;
- iii) Had to represent major socio-economic segment that public transport cost consume significant part of their income;
- iv) The choice of the wards was informed by the fact that majority of commuters (47% walking, 1.2% cycling, 29% mini-bus, 3.7% bus and 0.4% train) are categorised not beyond mid class status as the private car (15.3%) modal are for mid class and above.
- v) Equity in spatial distribution in Nairobi area as described in Nairobi Zoning Ordinance;

Map 4: Sampled Wards



Source: Population Census, 2009; Nairobi Zone Ordinance; IEBC; JICA, 2004

5.4.2 Sample size

Israel (1992) notes that taking care of level of precision such say +/-5; the confidence level say 95% and degree of variability one can employ strategies for determining sample size such as:

- Using a census for small populations;
- Using a sample size of a similar study;
- Using published tables
- Using formulas to calculate a sample size.

For the case of this study, published tables was employed.

Published tables

Yamane (1967: 886) developed a simplified formula shown in equation *1 below* of determining sample sizes. The equation has assumed 95% confidence level and $P = 0.5$. The formula informs *table 12* where n is the sample size, N is the population size, and e is the level of precision.

Equation 1: Published Table

$$n = \frac{N}{1 + N(e)^2}$$

Source: Israel, 1992

Sample size for $\pm 3\%$, $\pm 5\%$, $\pm 7\%$ and $\pm 10\%$ Precision Levels Where Confidence Level is 95% and $P = 0.5$.

Table 12: Sample Size Calculation using Published Tables

Size of population	Sample size (n) for precision (e) of:			
	+ or - 3%	+ or - 5%	+ or - 7%	+ or - 10%
500	A	222	145	83
600	A	240	152	86
700	A	255	158	88
800	A	267	163	89
900	A	277	166	90
1,000	A	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	379	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.

Source: Israel, 1992

A). Household Survey Sample Size

This study utilised published table developed by Tamane, 1982. At precision level of $\pm 7\%$ and confidence level of 95% the sample size for the study was 204 respondents since the population under consideration is 206,148. If this sample size is distributed equally among the four Electoral Wards (Mathare North, Maringo, Nairobi West and Riruta) it implies that 51 respondents were interviewed in every ward.

B). Key Informant Sample

The study employed purposive sampling so as to identify and select required respondents. The respondents sampled under this category were categorised as public or private. The key informants in public sector were one (1) representative from NTSA, Nairobi City County Government, Traffic Police department, KURA, and KeNHA. This totalled to five (5) institutions and five (5) respondents. Private sector was limited to operators of transport service. According to NTSA (2015), by 13 January, 2015 Kenya had a total of 635 matatu company/saccos, with Nairobi having 95 companies/saccos that operates within her confines – originating and terminating in Nairobi as shown in *annex 4*. A total of nine (9) matatu saccos/company were involved in the study as shown in *annex 9*.

Table 13: Key Informants in Public and Private Sector

Public sector	Private sector	
NTSA Nairobi City County Government Traffic Police department KURA KeNHA	Companies	
	KBS Management	
	Double M	
	MOA Compliant	
	SACCOs	
	Mathare North Route 29/30	Moonlight Coach Company Ltd
	Maringo Route 10	CBET SACCO
	Nairobi West Route 14	West Madaraka Route 14 Cooperative SACCO
Riruta Route 4W	KASBOWA SACCO	

Source: Compiled by the Author

5.4.3 Sampling Method

The study employed simple random sampling where individuals within the four identified strata had equal opportunity of participating in the study. The selection of participants in household survey was done premised on their willingness to offer data to the research assistants.

5.5 Sources of Data and Data Collection Instruments

5.5.1 Sources of Data

The study sourced data from secondary and primary sources. The research obtained data from published text books, Journal, papers, magazine, newspapers, government of Kenya documents and web based materials. The primary data was sourced from households who are the users of public transport vehicles in routes identified and from key informants such as drivers/ conductors of public transport vehicles plying these routes and managers of SACCOs based in these routes, NTSA and Traffic Department.

Table 14: data collected from secondary sources

<i>Data</i>	<i>Format</i>	<i>Source</i>
NIUPLAN	PDF	JICA/ Nairobi City County Website
Nairobi Metro Transport Master Plan, 2006	PDF	JICA
Transport corridors, boundaries	Shapefile	IEBC and JICA office
Traffic volume, land use map, road classification and conditions in Nairobi	Shapefile	JICA, iHub and digitalmatatus.com
Statistical abstracts	PDF	KBS and KIPPRA website
Licensed transport operators	PDF	NTSA website
Other documents such as BRT, LRT, junction improvement programme, road expansion projects	PDF	JICA, KeNHA, Nairobi County, KRC, iHub and digitalmatatus.com

Source: Compiled by the Author

5.5.2 Data Collection Instruments

The choice of data collection instruments was informed by the study objective and how to measure them as explained in the analysis framework. *Annex 19* summarises data collection instruments. The study data were collected through household questionnaire, key informant interview, observation schedule, computation of mathematical formulas, buffering of existing GIS data, photography and review of existing secondary literature.

5.6 Data Collection Procedure

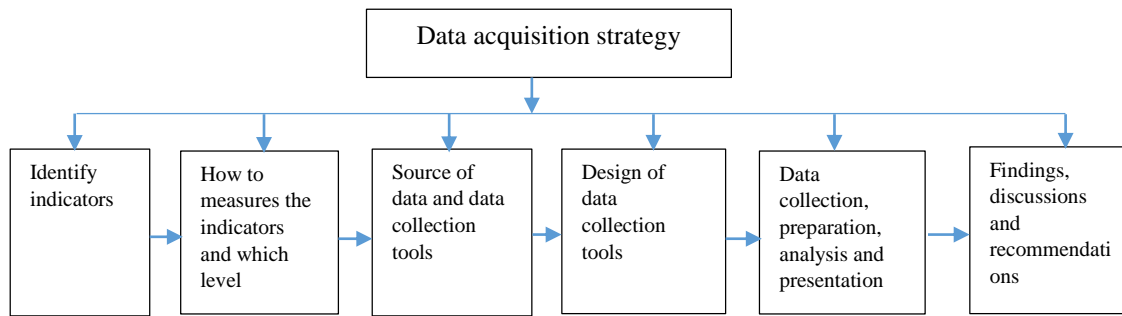
5.6.1 Introduction

The field survey of the study was structured into three parts which include pre-fieldwork, fieldwork and post-fieldwork. The initial two parts are described in 5.6 while the latter is described in 5.9 and 5.10 as sub topics of data analysis and data presentation.

5.6.2 Pre-fieldwork Phase

It entailed desktop work on how to measure service delivery in urban public transit. The initial work as described in the analytical framework was to extract indicators required to show improved or lack of improved service delivery. Secondly, it involved examining data needs and how to measure them, where to acquire the data from and which tool to use to acquire the data. The third aspect involved design of data collection tools that are critical in data collection and subsequent analysis and presentation. Before final development of household questionnaire, a test run was conducted using 10 questionnaires so as to address possible gaps. Fourth, prior contact with institutions was conducted through phone calls.

Figure 7: Data Acquisition Strategy



Source: Compiled by the Author

5.6.2 Fieldwork Phase

This was the actual data collection phase as informed by the Pre-field phase and it entailed collection of data from primary source through questionnaire administration, interviews, observation and photography. It also involved collection of secondary information through literature review and GIS based analysis on shapefiles acquired from JICA and IEBC.

The chronological account of the field work process entailed:

- i) Getting authority to conduct field survey from the Department of Urban and Regional planning (*see annex 8*).
- ii) Getting permission to conduct research from National Commission for Science, Technology and Innovation (*see annex 6*).
- iii) Brief induction of research assistants
- iv) Prior contact with key informants identified was established.
- v) Conducting test run of household questionnaires.
- vi) Household and key informant data collection.
- vii) Dispatched bus per route survey

a). Primary data acquisition

Questionnaires Administration

This involved giving already written down questions to respondents so that they could fill in the required information. The questionnaires were designed for households. Some of the information that was collected through this method included levels of safety, comfort, cost, regularity, & reliability of public transport system, level of professionalism of the operators, and general customer satisfaction levels among others.

Interviews

There were those that were talked to one-on-one. The respondents who were interviewed were majorly the key informants some of whom included central government transport institutions like NTSA, Kenya National Highways Authority, Kenya Urban Roads Authority and SACCOs and the Nairobi City County Government.

The data that was got from these sources specifically included level of integration of transportation and land use planning in Nairobi, the effectiveness of the city transport system, the level of coordination among the agencies responsible for planning and development of road passenger transport infrastructure and services, land banking for future road development and level of investment in high occupancy vehicles. As a way to guide these interviews, the researcher came up with interview schedules for each respondent.

Photography

This basically entailed taking pictures of various phenomena for illustration purposes. The intention was to capture traffic conditions on the roads, land use patterns and road network designs and PSV vehicle conditions among others.

Observation

This entailed capturing observable variables and recording them down. Some of the aspects that were observed included PSV operator behaviour, modal splits, land uses along the corridors, traffic conditions at various times and at different points of the road as well as various vehicle capacities and conditions. Tables in *annex 9* shows a detailed breakdown of data collection work plan, budget of the project, contacts of key informants and contact of research assistants.

b). Secondary Data Collection

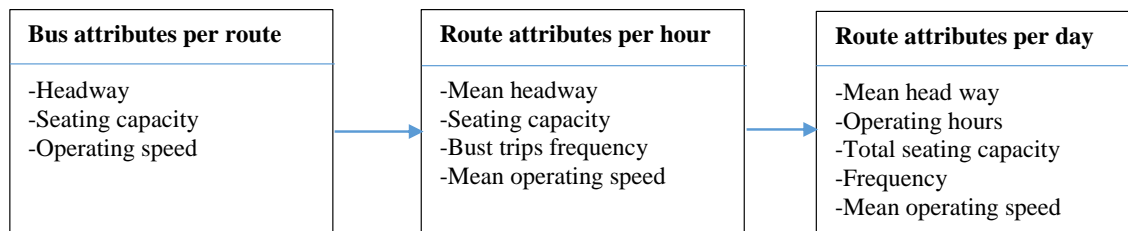
This involved literature review. It entailed reading of books, journals, periodicals and reports written by previous researchers on relevant areas. Key resources included NIUPLAN, GIS data from, JICA, IEBC, iHub and digitalmatatus.com.

c). Dispatched Bus per Route Survey

Recording dispatched bus per route was critical in measuring Convenience, Average bus stop spacing, Route overlapping and Average network speed. The acquired information was critical in answering bus attributes, route attributes per hour and route attributes per day. These are later discussed into details in subsection 6.4 of the analysis. This was conducted using a total of 24 research assistants along the four (4) routes. The survey lasted for two (2) days starting from 6.00

am to 9.00 pm with three (3) of the research assistants – thus totalling 12 allocated one route per day at the extreme terminal of the identified wards while working in five hours shift. On the other hand there were 12 research assistants located at the terminals of the four identified SACCOs in the CBD. **Table 15** show the dispatch recording schedule. The starting point in the morning for recording was at the estate, once it is recorded, the research assistants in CBD are alerted. In the evening the starting point was the CBD.

Figure 8: Information outcome of dispatched bus per route survey



Source: Compiled by the Author

Table 15: Dispatched Bus per Route Survey Schedule

Route	SACCO/Company	Vehicle registration	Seating Capacity	Terminal name		Time			
				At Estate	At CBD	X		Y	
						X1	X2	Y1	Y2

Source: Compiled by the Author

Note:

- X- Arrival or departure at estate terminal
- X1- Bus/matatu departure time at estate
- X2 – Bus/matatu arrival time from CBD at estate terminal
- Y – Arrival or departure at CBD terminal from estate
- Y1 – Bus/matatu departure time from CBD terminal
- Y2 – Bus/matatu arrival at the CBD from estate terminal

The dispatched bus per route survey was measured against the **table 16** below that shows expected service capacity performance indicators as derived from other existing literatures.

5.7 Methodology Framework

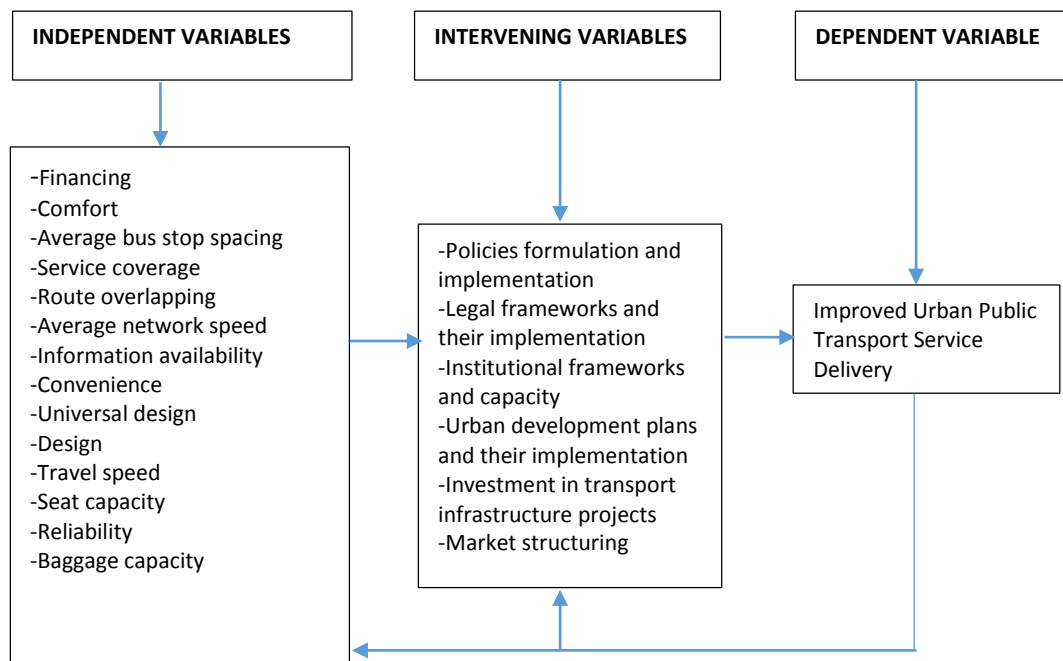
This is a framework utilised by the research to outline the understanding of the subject under investigation. It captures the elements that influence service delivery in public transport and intervening aspects such as policies and land use plans.

Table 16: Headway Limits

<i>Indicator</i>	<i>Condition</i>	<i>Threshold</i>
Headway upper limit	Peak period	Maximum 15-30 minutes
Headway upper limit	Off peak period	Maximum 20-60 minutes
Headway lower limit	-	Minimum 2-3 minutes
Service span	-	18-22 hours
Operating speed	Dense area in mixed traffic	10-12 kph
Operating speed	Bus- only lanes	15-18 kph
Operating speed	Medium-to low density areas	25kph

Adapted from Ceder 2007; White 2002

Figure 9: Research Variables Relationship



Source: Compiled by the Author

5.8 Data Collection Tools Design

The design of the research tools were structured to capture the following parameters as listed in *table 17*. The tools encompassed the nominal as well as the 5-point Likert scale that utilizes ordinal measurement was employed in the study to capture attitudes and perception of respondents.

5.9 Data Analysis

The study adopted both qualitative, quantitative, inferential and triangulation methods of data analysis.

Table 17: Summary of Information Captured by Survey Tools

Type of survey	Purpose	Method	Content of survey
Service performance evaluation	To capture perceptions	Interview households based on over 20 indicators of measuring public service transport as described by Bhat et al., 2005; TTI; TRL, Vuchic, 2003 based on very good, good, fair, bad and very bad.	Interview 204 respondents at house hold level
Levels of operation	To measure internal performance of operators	Interview SACCOs/Companies on business strategy measured as low organisation, moderate and high	A total of 7 respondents interviewed from companies/SACCOs
Dispatched bus per route survey	To acquire information on Convenience, Average bus stop spacing, Route overlapping and Average network speed	Conduct traffic count and recording using 24 research assistants located in estate terminals and CBD in the four identified routes and estates.	Roadside traffic count for 15 hours (6 am – 9 pm) for two days
Person trip survey	To acquire information for the purpose of trip made and mode used	Interview respondents on modes used to work, to home, to school and others	Interview 204 respondents at household level
How to integrate and improve transport	To acquire information on how to best solve the transport issues.	Request for personal opinion of key informants and technical reports. Request for ongoing projects on existing networks, commuter rail, LRT, BRT	Key informants

Source: Compiled by the Author

5.9.1 Qualitative Data Analysis

The qualitative or descriptive information was analysed using narrative, content analysis and anecdotes techniques. In narrative technique, information and results were organized in a logical manner and written up in a narrative style. On the other hand, content analysis, was used to analyse descriptive reports for trends, themes or events. Content analysis was used to summarize descriptive information or transform qualitative information into quantitative information. Content analysis was also used to set up the coding categories for quantitative tabulation. Anecdotes were employed to summarize events or conclusions, and add emphasis to inferences from literature review, and interview sessions.

5.9.2 Quantitative Data Analysis

To measure Service performance evaluation, quantitative data analysis was used to summarize information and data through percentages and statistics of spread. The data was analysed and presented in tables, figures and graphs. The results were subjected to both manual and computer aided analysis, including SPSS.

5.9.3 Inferential Statistics

The study relied on chi-square to infer the research hypothesis. The non-parametric version measures the strength of association between change in pre and post policy.

5.10 Presentation of Data

The result of the research project was presented in a form of a written report. The written report had also to be complemented by maps, drawings, graphic models, photographs and slides.

5.11 Validity and reliability

In conducting the study, conscious attempts were made to produce reliable and valid information that can contribute to the building of knowledge in a sound and scientific manner. One source of validity problem is the fact that the interviews at a time were conducted in Kiswahili and then translated into English. To guarantee reliability and validity the study employed various checks and balances. The first source was triangulation. This entailed the use of multiple sources of data that confirm or corroborate same piece of information (Lupala, 2002a). For instance, data collected through interviews were substantiated with observation.

5.12 Ethical Considerations

The research treated information gotten from respondents confidentially without disclosing the respondents' identity and expressing opinions as they were given. The information meaning were not modified.

CHAPTER 6: DATA ANALYSIS AND PRESENTATION OF FINDINGS

6.1 Introduction

The research administered a total of 382 questionnaires to the respondents. Some questionnaires were filled but others were not properly filled and were treated as rejects. The results and findings of this research study were established through data collected from both primary and secondary sources. The data was then summarized, analysed and presented in continuous prose, tables and charts as appropriate.

6.2 Demographic Information

Household questionnaire administration was conducted from 10th March, 2016 to 16th March, 2016 as shown in *annex 9* and a total of 208 household respondents were interviewed, of the 208 respondents 43.75% were female and 56.25% male. The bulk of the respondents (43.5%) were in the age bracket aged between 21 to 29 years. This was followed by those in the age bracket between 30 to 39 years who comprised 31.2% of respondents. The least number of respondents (2.4%) were above 50 years of age.

Of all the respondents, 39% stated they were self-employed, 32% were employed, 18% were students while the remaining 11% were either a housewife or an employer. Most of the respondents (25%) reported that they had a disposable income per month of Ksh 9,999, 19.2% reported an income ranging from Ksh 1001 to 14,999. While 15.9 had income which ranged between Shs 15,000.00 and 19,999.00. A paltry 0.5 of the respondents received an income that ranged between Shs 50,000.00 to 99,999.00.

6.2.1 Emerging realisations and Discussion on demographics and policy implications

- Most of respondents (43.5%) were below 29 year while 31.3% were in age bracket of 29-39. This has a policy implication in that those below 29 years are yet to be economically stable and thus there should be designed fare capping to take care of their financial limitations. At the same time the second highest grouping of respondents were aged 29-39 who are aiming at stabilising their families and thus have limited disposable income.
- Most of the respondents (39%) were self-employed in informal sector and with a majority (25%) having income of less than 9999 which according to government should not be subjected to PAYE. On the other hand, Majority of the respondents (61.7%) pay between Kenya Shillings thirty and fifty on one way trip as shown in table *18 below*. If it is taken that one has 24 working days in a month, by an average minimum of 40 shillings fare and

thus translating to a total of 80 shillings for a round trip and 1920 for a month, then this is a worrying level on affordability as it would translate to approximately 19.2% of the cost incurred by those earning a maximum of 9, 999 in a month and 9.6% for those earning up to 14, 999. This is a higher figure considering development status of Kenya. For instance, in Mexico City fare as an expense consumed 2% of commuter's monthly income, 3% in Havana and 12.8% for those earning less than \$ 8, 000 in USA. The figures are only comparable to Lagos and Doula whose households spent 15-20% and 14% respectively. However, Nairobi's figure is equally lower than Bolivia at 33% and Chile at 28% (Carruthers, Dick and Saurkar, 2005: 3 and 9). As such there is need for interventions through urban designs that allow commuters to live close to their work places through compact designs or avail facilities for Non-Motorised Transport or subsidise the costs.

Table 18: fare paid per one way travel

Fare paid per one way travel (Shs)	Frequency	Percent
10	1	0.5
20	9	4.4
30	43	21.1
40	26	12.7
50	57	27.9
60	15	7.4
70	18	8.8
80	19	9.3
90	1	0.5
100	10	4.9
120	2	1
140	1	0.5
150	2	1
Total	204	100

Source: Field Data, 2016

6.3 Trip, Trip Generation, Preferences and Network Analysis of Matatus

6.3.1 Trip Generation and Preference

The larger section of commuters, 42.8% use public transport to access work places, 19.7% to their personal business, 14.9% to school, 14.4% to shopping, 3.8% for social reasons, while the remainder use public transport to firm's business. Along gender lines, most females interviewed use public transport for going shopping as opposed to males 22.7% as opposed to 8.7%

respectively. On the other hand, most males interviewed use public transport to go to their work places as opposed to females 45.2% as opposed to females 42.0%. The realization in difference in travel patterns along gender lines could be as a result of most of the male respondents 76.4% were employed or in self-employment as compared to female who had 65.5% as employed or in self-employment.

The above findings is inferred with a strong chi-square measure of association of $p=0.001$. For instance those who stated that they were employed equally 93.8% use public transport to go to their work places and those who had stated that they were students equally 88.6% use public transport to go to school, while those who had said they are housewives equally 81.8% use public transport for going shopping or for personal business.

In terms of frequency of use of public transport by the respondents was at 61.9% who used transport more once a day and two times per day, while 26.6% used it just a few times per week. Three respondents 1.4% indicated that they use public transport only once a month. Table **19 and 20 below** summarises trip generation issues.

Table 19: Trip Frequency

		Agegroup * Trip frequency Crosstabulation						Total
		Over two times per day	Everyday one time	A few times per week	Once a week	A few days per month	Once a month	
Agegroup	Below 20 Years	7	2	6	1	0	0	16
		43.8%	12.5%	37.5%	6.3%	0.0%	0.0%	100.0%
	21-30Years	29	37	24	4	3	1	98
		29.6%	37.8%	24.5%	4.1%	3.1%	1.0%	100.0%
	31-40 years	15	12	13	3	4	1	48
		31.3%	25.0%	27.1%	6.3%	8.3%	2.1%	100.0%
	41-50years	7	3	6	0	5	1	22
	31.8%	13.6%	27.3%	0.0%	22.7%	4.5%	100.0%	
	51-60 years	0	0	1	0	0	0	1
		0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	61 and above	1	0	0	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Total		59	54	50	8	12	3	186
		31.7%	29.0%	26.9%	4.3%	6.5%	1.6%	100.0%

Source: Field Data, 2016

Table 20: age group-purpose of the trip cross tabulation

Age group * Purpose of the trip Cross tabulation		Purpose of the trip							
		To work	To school	To home	Shopping	Personal business	Social	Firm business	Total
Age group	Below 20 Years	2	11	0	0	1	1	1	16
		12.5%	68.8%	0.0%	0.0%	6.3%	6.3%	6.3%	100.0%
	21-30Years	46	19	2	11	14	3	0	95
		48.4%	20.0%	2.1%	11.6%	14.7%	3.2%	0.0%	100.0%
	31-40 years	28	0	0	10	7	2	1	48
		58.3%	0.0%	0.0%	20.8%	14.6%	4.2%	2.1%	100.0%
	41-50years	6	0	0	7	7	1	0	21
		28.6%	0.0%	0.0%	33.3%	33.3%	4.8%	0.0%	100.0%
	51-60 years	0	0	0	0	1	0	0	1
		0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	61 and above	0	0	0	0	1	0	0	1
		0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	Total	82	30	2	28	31	7	2	182
		45.1%	16.5%	1.1%	15.4%	17.0%	3.8%	1.1%	100.0%

Source: Field Data, 2016

An analysis of the correlation between frequency of trip and purpose of trip indicate that there is a strong positive association between frequency of trip and purpose of trip (Pearson Chi-Square value 99.134 and p value=0.001), 87.5% of those who said they were self-employed reported using public transport everyday one time and more than two times a day, similarly most (51.9% of those who said they were self-employed reported using public transport everyday one time and more than two times a day, the strength of this association is corroborated by the Phi and Cramer;s V test (0.699 with a p value of 0.001).

6.3.2 Network Analysis of Matatus

From *Annex 17*, the origin of trips are a depiction of the normal curve expectation as they all originate from residential estates. The difference comes in regard to destination points. Majority of the respondents were terminating at the CBD. A total of 140 terminates at the CBD (102-town, 3-GPO, 3-Ngara, 1-Gikomba, 4-bus station, 13-temple road, 13-railways, 1-muthurwa). This is an indication that most head towards the CBD which is the principal economic hub of the city that is likely to attract higher population in the day.

The breakdown is a pointer to travel towards employment places in the CBD and peri-CBD such as Ngara and Gikomba which host Grogan garage, Nyayo Market and Gikomba Open Air Market. As such there is need not only to expand roads outside the CBD but inside reticulation by reducing bottle necks and reducing vehicle traffic within the CBD.

From the GIS data acquired from Harmsen (2016) and digitalmatatus.com, that captures a built network graph of bus and matatu stage, it emerges that Agip terminus processes approximately 80% of matatu traffic in the city. This is closely followed by Khoja and Kariokor stages.

Connectivity or ability to disembark and embark for those who have to connect to reach their destinations is a challenge. From household data, majority of the respondents 46.8 (94) said that transfer to other routes by public service vehicles was bad. Another 30.3 (61) said that it was good. The remaining respondents rated the transfer as very good, very bad and fair at 10 (20), 9 (18) and 4 (8) respectively. Ambassador Terminal offers the best interconnectivity within Nairobi in that presents the easier platform from embarking from one destination to another. And from observation it is one of the places that host big number of bus fleets (double M, KBS, City shuttle and citi hoppa). This is affirmation that these buses have the widest coverage of the city.

6.3.3 Emerging realisations and Discussion on Trip, Trip Generation, Preferences and Network Analysis

- Over 55% (42.8% use public transport to access work places and 14.9% to school) uses PSVs to access places of employment or educational facilities. This implies that transport routing should be done in a manner that most PSVs head towards places of employment, public institutions and academics institutions. It also indicates need to have deliberate restriction in licensing as opposed to demand driven licencing so that subsequent licences granted to PSVs should be those heading to these places of employment. Land use planning could be re-organised through urban investment infrastructure to create multiple employment points so as to avoid overcrowding at city centre or the City could invest in compact connected communities or through urban designs that allow commuter's to leave close to their work places.
- Most respondents preferred PSVs owing to the fact that it is the most available means and at the same time, 61.9% of respondents used PSVs more than once in a day. This shows that there is a ready market to be tapped both by government and private sector.

Nevertheless, there is need of proper structuring so as to curtail the informality, limited carrying capacity and demand driven operations that exploits this ready demand.

- The busiest terminal in the CBD is Agip followed by Khoja then Kariakor as such the perception that bus stops handling vehicles from Eastland are the busier is refuted. Perhaps the notion is developed owing to their chaotic nature resulting from poor attitude and self-discipline, bad motoring habits and bus stop design deficiencies.
- Kencom/ambassador stage offers the best connectivity in the city. As such designs of such stages should be encouraged to allow travellers to disembark and embark thus allowing smooth transition without walking to another bus terminus.
- Most vehicle traffic in CBD (not human traffic) originates from Mombasa Road, Ngong Road and Thika Road respective. This perhaps is associated with economic status of residents in these neighbourhoods against those from Eastland who at a time might prefer to use alternative modes.
- Connectivity is a concern as connecting to other routes is a challenge owing to structuring of bus stops in the CBD –one cannot disembark and embark immediately.
- Buses have the widest coverage of the city as compared to matatus and as such should be encouraged.

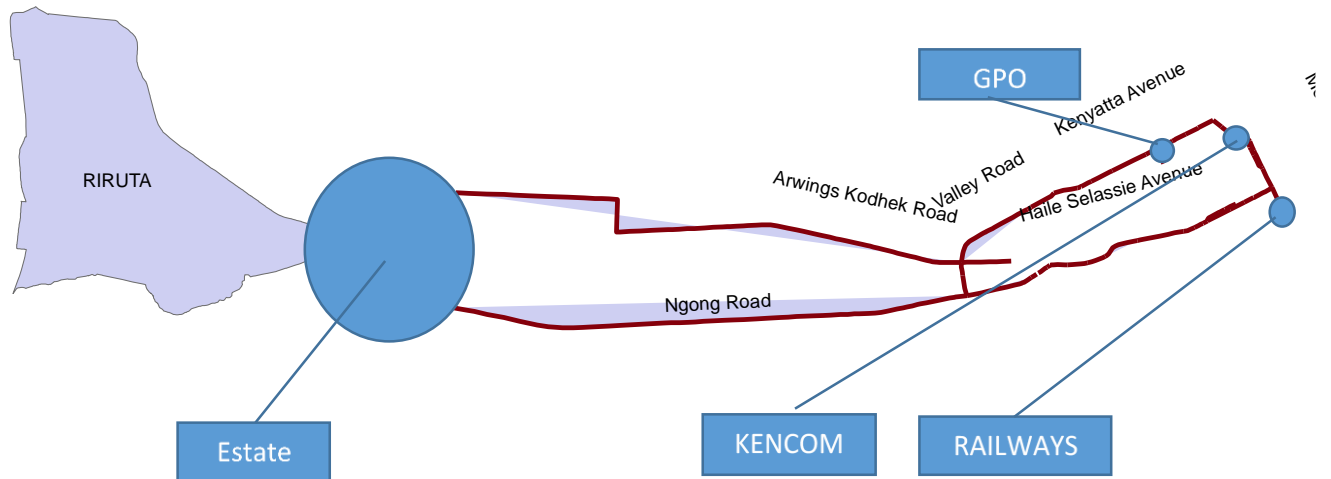
6.4 Dispatched Bus per Route Survey

A dispatched bus per route survey was conducted from 11th to 12th of March 2016 along Riruta-CBD/ route 4W; Maringo-CBD/ route 10; Mathare North-CBD/ route 29/30 as shown in *map 5, 6, 7 and annex 15*. The rationale for employing this tool was to measure effects of the policy on transport service quality such as route transport network, service capacity constraints, deficiency, headway, running time and operating speed as explained in sub section table 27 of 5.5.2, 5.6.2 and 5.8. An in-depth application of the concept is described in section 6.6, 6.7 and 6.8.

Map 5 below shows the possible routing employed by vehicles plying route 4W that serves Riruta-CBD network. From field observation, the vehicles emanating from Riruta can use Argwings Kodhek Road, Join Valley Road, and Kenyatta Avenue and then terminate at GPO or proceed to a section of Kimathi Street that Joins Moi Avenue and terminate at KENCOM. The other alternative applied is Riruta-Ngong Road – Haile Selassie Avenue and then terminate at Railways.

For the purpose of the study, alternative two was applied - Riruta-Ngong Road – Haile Selassie Avenue and then terminate at Railways. The total length of this route is estimated at 9 kilometres.

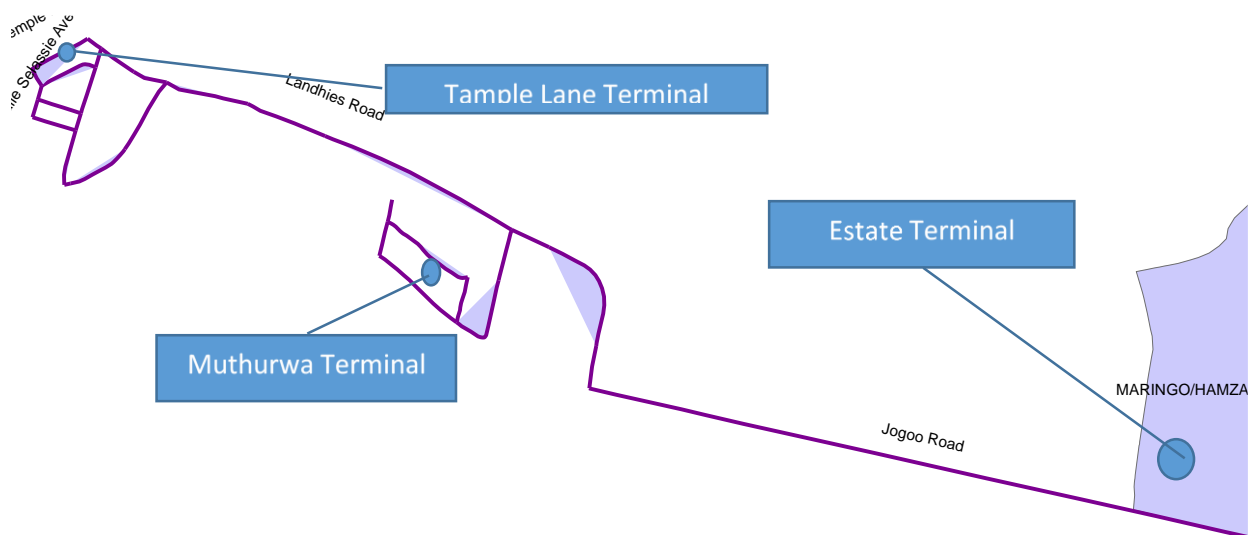
Map 5: Riruta-CBD Route



Source: GIS layer selection from JICA Data

The routing line to CBD from Maringo/ route 10 is a direct path that follows Jogoo Road- Landhies Road and then terminates at Temple Lane. An alternative is to use Jogoo Road- Landhies Road and then terminate at Muthurwa. **Map 6 below** shows the routing. The study employed the first alternative that runs from Jogoo Road- Landhies Road and then terminates Temple Lane. The total length of this route is approximated at 5.5 kilometres.

Map 6: Maringo-CBD Route



Source: GIS layer selection from JICA Data

The route employed by PSVs operating Mathare North-CBD/29 route follows Thika Super Highway-Muranga Road and then Tom Mboya Street. Th terminate at off Muranga Road at Ngara Lane or off Muranga Road at Kirinyaga Road or at Tom Mboya Street near Fire Station as shown in *map 7 below*. For purposes of data colletion, terminal at Ngara Lane was utilised. The distance from Mathare North NYS terminal to Ngara Lane is approximately 5 kilometres.

Map 7: Mathare North - CBD Route



Source: GIS layer selection from JICA Data

As shown *in annex 15*, the lowest travel time recorded along Riruta route was 15minutes while the longest time recorded was 97 minutes. Travelling to CBD along the same route, the lowest time was 13 minutes while the highest was 130 minutes. For the same route, the average waiting time at CBD was 23.1 minutes while at the estate was 19.6 minutes. The seat capacity of all their vehicles was for 29 individuals. For Maringo, the lowest travel time to estate was 15 minutes while the highest was 118 minutes. Travelling to CBD, the lowest time was 8 minutes while highest was 160 minutes. The average waiting time at CBD was 10.6 minutes while at estate it was 19.6 minutes. On the other hand, in Mathare North route, the highest time travelling to CBD was 95 minutes and lowest was 7 minutes. While travelling to estate highest time was 32 minutes and

lowest was 4 minutes. The average waiting time at CBD terminus was 28.95 minutes while at estate it was 25.47 minutes. **Table 21 below** summarises the average timings realised during the exercise.

Table 21: Summary of Dispatched Bus per Route Survey

Route		Riruta estate Satellite/Kabiria-CBD/railways				
Sacco/ company		KASBOWA				
	Travel time to estate	Travel time to CBD	Waiting time CBD	Waiting time estate	Estimated route distance (km)	Estimated travel speed (distance in km/Average two and fro time)
Lowest time in minutes	15	13	2	5	9	12.16 Km/h
Highest time in minutes	97	130	74	56		
Average time in minutes	46.46	44.75	10.55	19.6		
Average two and fro time	44.61 mins (0.74 hrs)		15.075 mins			
Route		Maringo-CBD/Temple Road				
Sacco/ company		Peja Travellers				
	Travel time to estate	Travel time to CBD	Waiting time CBD	Waiting time estate	Estimated route distance (km)	Estimated travel speed (distance in km/Average two and fro time)
Lowest time in minutes	15	8	1	1	5.5	8.33km/hr
Highest time in minutes	118	160	172	131		
Average time in minutes	31.05	48.25	28.75	23.05		
Average two and fro time	39.65 mins (0.66hrs)		25.9 mins (0.43 hrs)			
Route		Mathare North/NYS-Ngara				
Sacco/ company		Moonlight and MANMO				
	Travel time to estate	Travel time to CBD	Waiting time CBD	Waiting time estate	Estimated route distance	Estimated travel speed (distance in km/Avarage two and fro time)
Lowest time in minutes	7	4	2	2	5	9.8km/hr
Highest time in minutes	95	32	124	135		
Average time in minutes	34.95	25.76	28.95	25.47		
Average two and fro time	30.36 mins (0.51hrs)		27.21 mins (0.45hrs)			
Derived combined averages						

Source, Field Data, 2016

6.4.1 Emerging realisations and Discussion on Dispatched Bus per Route Survey

Route length and operating speed

Ceder (2007) opines that route length should be designed in a manner that travel time for one way time should be in a range of 40-100 minute and with an estimated distance of 12-30-km. This translates to a travel speed of 20km/h. the highest time recorded from the survey was 160 minutes. While these figures are on the extreme end of the continuum, it is alarming since from the survey

frequency, a total of seven (7) entries were beyond 100 minutes. Another alarming realisation is that most travel time taken were beyond the minimum of 40 minutes especially along Riruta and Maringo route. This might be attributed to the long route in Riruta and the high population density in Maringo area coupled with limited road capacity of single and dual carriage respectively.

From the survey, the average time recorded was 30.36 minutes which fits within requisite time of 40-100 minutes. Nevertheless, if taken within the context of distance, then the time taken to travel is on the higher end since the furthest point was 9 kilometres and if a vehicle is cruising at recommended speed of 80km/h as per Traffic Act 2014, then with no obstacle and with a maintained drive speed of 80kp/h one should cover a kilometre in 45 seconds. This can be rounded to 1 minute per kilometre. If delay time of 5 minutes is added per kilometre, one should do 6 minutes per kilometre. However, the average travelling speed recorded were 12.1, 8.3 and 9.8km/h. it implies that PSVs along these routes are able to do 8-12 kilometres in an hour which is below the recommended of 20 kilometres per hour.

- As such the route design based on travel time is okay. However, travel speed is way below recommended 20km/h.
- To address this deficiency, there is need for road expansion of carriages serving densely populated areas such as Maringo. A priority would be Jogoo road. Redesign so as to limit bottle necks associated with road expansion then at the entry to CDB becomes narrow by having hoisted roads, interchanges and so on. A case example are Landhies and Temple road; Thika superhighway/ Muranga and Tom Mboya Street.
- Lane reversal could be introduced to enhance travel speed since in the peak travel hours people tend to move in unidirectional formal by trying to access service areas in the morning and in the evening to access residential areas.

Headway / frequency

The second critical derivation from the dispatched bus per route survey is headway. Headway is referred to us as “time interval between two successive transit units traversing a fixed position”. It is integral in showing how frequent users of that area are served along that route. According to Ceder (2007) and White (2002) the required thresholds for headways and travel speed are as shown below:

Table 22: service capacity performance indicator threshold

Indicator	Condition	Threshold
Headway upper limit	Peak period	Maximum 15-30 minutes
Headway upper limit	Off peak period	Maximum 20-60 minutes
Headway lower limit	-	Minimum 2-3 minutes
Service span	-	18-22 hours
Operating speed	Dense area in mixed traffic	10-12 kph
Operating speed	Bus- only lanes	15-18 kph
Operating speed	Medium-to low density areas	25kph

Source: Ceder 2007; White 2002

During peak hours, especially between 6am-7am the headway during peak travel within the same SACCOs studied ranges between 2- 10 minutes. As the peak period progresses, the headway time increases to more than 20 minutes. However, this is influenced by the number of vehicles a Sacco has within a route. The change in headway is explained by the fact that as the hour progresses, most of the vehicles get stuck in snarl ups. However, this fits within the average recommended headway upper limit for peak period that is 15-30 minutes. The headway during off-peak is within the threshold of 20-60.

- The explanation for the above is associated with the instance that public transit during peak period has few travellers and thus waiting time increases and many vehicles are available as compared to those travelling.
- The higher frequency in Mathare and Maringo is a function of being shorter routes.

Travel time

Peak travel hours in Nairobi are in the range of peak 6.00 am -8.00 am and 5pm-9pm. In the three routes surveyed, the lowest time recorded during these peak period was 4 minutes. However, this was a singular occurrence and not consistent occurrence. In most cases the average traveling time as shown in table 4 above ranges from 30. 36 minutes to 44.61 minutes.

The above explains why during the peak travel hours there is limited supply of vehicle owing to large headway leading to exploitation of commuters. At the same time, it is an explanation for long waiting periods at the CBD bus park during off peak travel when passengers are few.

- To reduce travel time, SACCOs could invest on High Occupancy vehicle as most had 29 seater capacity as shown in *annex 15*. There could be deliberate transit oriented development that leads to densification and creation of multiple employment areas thus reducing urge to access the current dominant CBD.

- While the policy proposed ban on low capacity carriers, the operators have invest in medium capacity vehicles. Perhaps the policy should be specific and make it mandatory that all commuter vehicles within Nairobi have a seating capacity of 50+ 1 person.

Bus seating capacity and utilised capacity

Bus seating capacity is described as the highest number of commuters that a vehicle can accommodate. It is inclusive of total number of seats and if applicable the space allowable for standees. On the other hand, utilized capacity refers to number of individuals transported per direction per given unit time.

Most of the vehicles within the sacco/company under consideration had a seating capacity ranging from 28-30 people. Double M services had seat capacity for 45 people in their buses, MOA had a capacity of 29 and City Hoper had a varying capacity of 29-51.

- The improved ownership of High Occupancy Vehicle is commendable but it should be scaled to 50 and above so as to enhance number of those who can travel per given unit of time in one direction using one vehicle. This is equally integral in reducing snarl up as there will be few number of buses in the road.
- Legally as per the 2013 NTSA regulations and Traffic Act, no one even in urban commuter buses is allowed to transit while standing. Perhaps this has impeded investment in smart buses that has both seating capacity and allowable standing space. This would enhance number of commuters accommodated per given time and reduce congestion. As such there is need to review the 2013 NTSA regulations, traffic Act and the policy to give discretion for special licensing within urban areas so long the bus seeking exemption are specially designed for standing passengers.

Waiting time

Waiting time is conceptualised as the difference in time taken from the point of arrival at the terminus and the departure time. At the level of this study, trying to establish time taken by passengers since arrival at the bus would have been a challenge, the study relied on waiting time based on the arrival time of the bus at the terminus and the departure time (bus waiting time). However, possible distortion with this approach is that during peak hours, bus waiting time is lower than the passenger waiting time since there is high supply of passenger to buses.

According to Niyosenga (2011:11) the recommended waiting time in developing economies that take care of various inadequacies in their transport system should be 5 to 10 minutes and at maximum it should be within a range of 10-20 minutes.

Table 22 above shows the lowest and highest waiting time recorded at the estate and at CBD during the survey on the three routes. In summary, the lowest time recorded was 1 minute and the highest was 172 minutes. The average waiting time for Riruta, Maringo and Mathare North route respectively were 15.07 minutes, 25.9 minutes and 27.21 minutes respectively. This is beyond the recommended 5-10 minutes. Apart from the average of 15.07 in Riruta route that could be attributed to high number of buses with carrying capacity of 45 and above, other routes averages are beyond the recommended maximum time of 10-20 minutes.

- One realization is that there is inconsistency in bus waiting time since they are demand driven and not operated in timed schedules. For instance in every entry recorded a new frequency of time was realized. Waiting time is higher at peak hours. However, at the juncture that buses take limited time at terminus. This is attributed to high number of travellers and limited supply of buses at that time.
- There should be a mandatory waiting time introduced by the policy that could be staggered based on peak and off peak travel the same as how operators have staggered pricing. For instance at peak hour, the maximum waiting time before a bus departs should be 5 minutes and off peak it should be 10 minutes.

6.5 Route performance evaluation at network level

To assess whether the INTP has been able to align transport routes to be able to offer multiple direct-through trips; meet the demand, cover large service area, not to digress from shortest way possible and have large service area as per consumer perspective as derived from works of adapted from Iles,2005; Guihaire and Hao, 2008.

6.5.1 Average Bus Stop Spacing (ASD)

As discussed in section 6.4, the total length (l) of Riruta – CBD route is 9 Km (9000 m) and based on physical count, from Satellite/ Kabiria to Town there are 15 bus stops. As such, average bus stop spacing (ASD) in Riruta would be 642m. This is slightly above the required minimum

threshold of 300-600m and as such it can be concluded that along this route, the bus stops are not sufficient.

The total length (l) of Maringo – CBD route is 5.5 Km (5,500 m) and based on physical count, from Maringo to Temple road there are 8 bus stops as shown in plate 1. As such, average bus stop spacing (ASD) in Maringo would be 785.7m. The outcome is not meeting the required minimum threshold of 600m. As such there is need to add at minimum three more bus stops.

Mathare North behind NYS – Ngara total length is 5 kilometres (5000m). The number of bus stops for Mathare North to Ngara are 6. Therefore, ASD for the route would be 1000m. This short of a minimum of 600m.

The above findings is corroborated by the response by the households where 41.7% stated that bus stop location/number (s) were bad and or very bad. In a nutshell, it meant that they were located far from residence

Plate 1: Bus Stops Along Maringo-CBD Route



Source: google earth

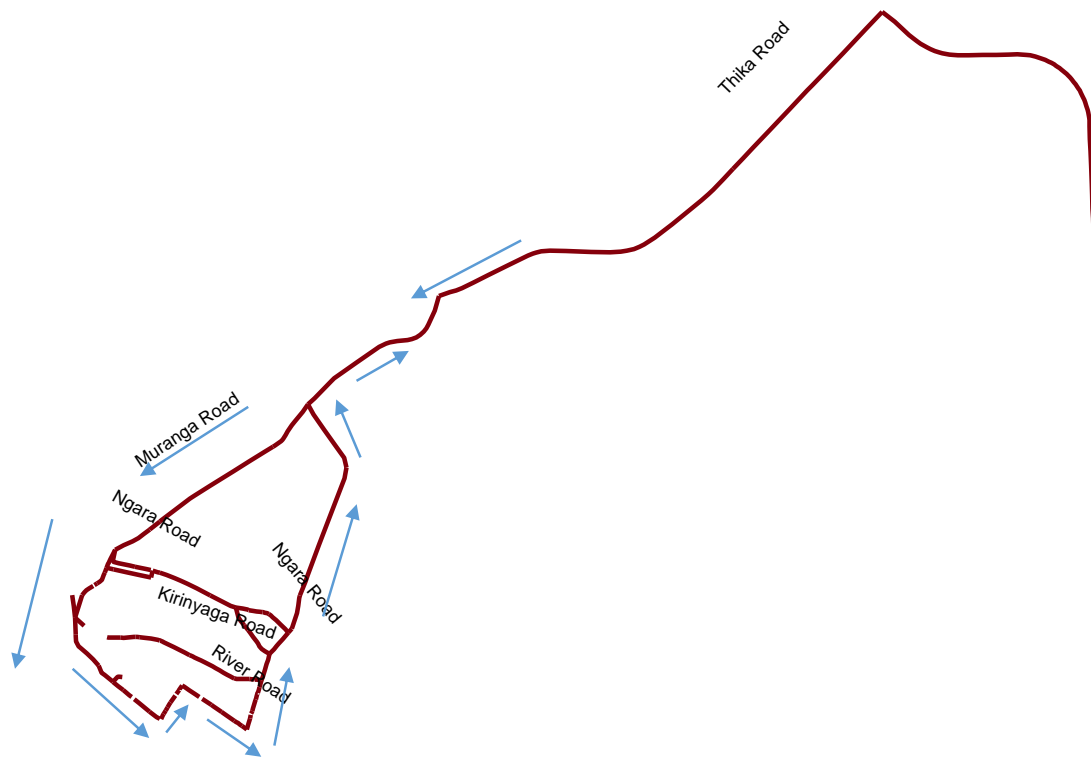
6.5.2 Emerging realisations and Discussion on ASD

- At 642m the bus stops along Riruta- CBD are slightly not sufficient; at 785, Maringo-CBD falls short of 600m threshold and 1000m Mathare-Ngara is way below the threshold. As such there is need to enhance the coverage to a minimum of 600 by increasing stops at along Riruta- CBD to a minimum of 16, Maringo-CBD to 11 and Mathare North behind NYS – Ngara to 7.
- The realisation is that with such widely spaced bus stops, PSVs are likely to create illegal bus stops so as to meet customer demands or an occurrence of the same supported by commuters. This can result into accidents and traffic snarl up.
- There is need to tie policy development in matatu sector with infrastructure development through re-designs of transport corridors, interchanges and other associated road furniture.
- With lack of bare minimum, commuters are likely to be exposed to insecurity especially at night as they walk home after alighting from bus stops.
- Such widely spaced stops could lead to increased commuter cost as commuter might employ other means to bridge gap before boarding PSVs to CBD.

6.5.3 Route Overlapping (R.O.)

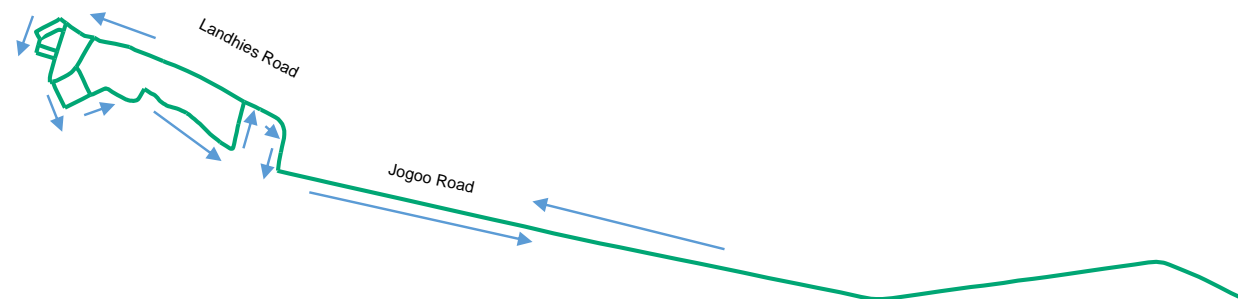
Route overlaps are critical in showing a re-occurrence of a route in a given road section. A higher overlap ratio means that one has greater opportunity for direct travel and chance to commute to multiple destinations. Nevertheless, overlaps beyond ration of 1: 5 is associated with traffic congestion. The aim of this analysis was to get a preview of such possibility and inform the policy on routing and licensing. To come up with total length of bus route network a GIS buffer analysis was conducted as shown in *map 8 and 9* below. The total length of bus route network for Riruta-CBD is estimated at 18 kilometres for Mathare-CBD 10 kilometres and for Maringo - CBD 8.7 Kilometres.

Map 8: total length of bus route network for Mathare-CBD



Source: GIS layer selection from JICA Data

Map 9: total length of bus route network for Maringo-CBD



Source: GIS layer selection from JICA Data

6.5.4 Emerging realisations and Discussion on R.O

- From the above, the route overlapping for the three routes is not more than 1:3. This fits within the ration of 1:5. As such, these networks should not be much prone to traffic snarl. However, from the observation the contrary is the truth. This implies that most commuters along these routes have limited opportunity for direct trips to various destination. Indeed

this is true. For example one residing in Mathare North cannot have direct access say to Kenyatta Hospital. One has to terminate first at CBD and then proceed.

- As such along these routes there is limited opportunity to travel numerous destinations. Thus, the INTP should seek to offer redress where the route overlapping is increased, but at the same time not to create traffic jams by having a routing system and road development plan that links to key employment areas, key social areas, key public places without one terminating before connecting to final destination.

6.6 Service capacity measurement

Vuchic (2005) notes that service capacity measurement is integral in understanding the capability of transport system to move a given quantity of passengers on a bus line under defined parameters. Instead of a whole route analysis, the study was inside looking as the basis of data collection was cascaded to SACCOs. Companies within a selected route. Nevertheless, these can offer critical pointer on the needed measure on service capacity in areas such as observed frequency and seat capacity.

Computation of service capacity was informed by table 14 and based on field data collected using dispatched bus per route survey as shown in annex 18. The rationale for observed frequency was to determine the level of services offered and span of service which are critical in establishing convenience of transit for traveller and limitations on trips that can be achieved by public transport. On the other hand seat capacity indicates capacity delivered by the system.

6.6.1 Observed frequency

For purposes of computing observed frequency (O.F), the number of public transport buses (v) was based on the records obtained during two day survey. For Riruta it was 44, for Maringo it was 119 and for Mathare North it was 45. The study was conducted from 6.00 am to 9.00 pm. This implies in a day there was 15 hour and in two days 30 hours and thus time unit (t) was 30 hours.

6.6.2 Emerging realisations on observed frequency

- Within the 3 routes, Maringo had headway below 5 minutes. Factoring in that most these routes have mixed traffic, it is them that are likely to be most congested.
- Riruta route had low frequency. This implies there is possibility of low operating speed (Armstrong-Wright and Thiriez, 1987). Indeed this affirmed by the finding that the route had the lowest operating speed among the three at approximately 12km/h. nevertheless,

since the PSVs operates in a mixed traffic, there is no significant connection between the speed and frequency as these are greatly influenced existing road infrastructure and traffic situation of the day.

6.6.3 Seat capacity

For the purposes of computing seat capacity (S.C), the number of seats (S) were determined through checking record or physical count. Most had 29 seat capacity. The number of buses in service (V) were computed based on the records obtained during two day survey. For Riruta it was 44, for Maringo it was 119 and for Mathare North it was 45. The service area was premised on the size of the ward as derived from the GIS data from IEBC ward boundaries as shown in *map 5, 6 and 7*. The total area in kilometre square were 4.16, 2.84 and 0.46 respectively.

6.6.3 Emerging realisations on seat capacity and policy implications

- Buses within these routes differ in sizes. This made it difficult to determine offered service capacity. However, from the three routes, seemingly, the longer the routes get the more they tend to employ high carrying capacity vehicles. A case example is of Riruta.
- Vuchic (2005) states that recommendable service span in a day should be 18 hours. But from the field data. The highest service span recorded from the initial first trip and the last one in a given day was 15 hours. This has a huge bearing on number of trips that can be done and desired convenience owing to limited availability. Thus for given particular route licensing assuming no externalities have impeded operators, the policy and licensing authority should stipulate minimum operating hours. For the whole SACCO, there should be routing schedule to offer balance.

6.7 The extent that Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy has been implemented

6.7.1 Introduction

The whole rationale for enacting the policy as stated in section 89 to 102 was to address negative externalities and internalities that have bewildered the public transport in Kenya over the years. At the same time, it was geared to strengthen possible opportunities that exist currently. For instance, the policy aimed addressing (1) integration of transport infrastructure and operations by reducing poor road design such as inadequate drop and pick points, joining of secondary and primary roads. (2) enhancement of transport services and quality by ensuring reduction in Over-crowding of passengers in PSVs and long queues of commuters at “termini” during peak hours, curtailing of

irregular operating schedules offered by public transport operators, and Vehicular congestion arising from poor road space usage by private vehicles, PSVs.

Additionally it sought to ensure (3) consumer protection and cater for consumers with special needs of the policy. (4) Ensuring fair competition. (5) Eliminate impediments to development. (6) Use of non-motorized and intermediate means of transport (NMIMT). (7) Incorporation of safe and secure transport system. (8) Sustainable utilization of the environment. (9) Development of the requisite human capacity and (10) address lack of standards in the design and manufacture of PSV vehicles and NMIMT.

Thus, this sub section went out to measure if the above stated expectations are being attained or not and offer possible strengthening opportunities. It equally aims at showing the level of satisfaction from the consumers. The subsequent analysis and discussions draws from household interview, key informant interview, dispatch bus per route survey, route performance evaluation as discussed in 5.5 and service capacity measurement as discussed in 5.6.

Analysis

6.7.2 Corporate Bodies and HoV

One of the desired aspirations of the policy, Traffic Act and NTSA, 2013 regulations is to have PSVs operators to be organised into corporate entities (companies or saccos). The rationale for this was to ensure ease of administration so as to avoid licensing bodies dealing with numerous individual, improvement internal corporate governance structure that would see the entities operated professionally and ethically. It was also desired that the operators would have more financial power to invest in High Occupancy Vehicle as opposed to low capacity carriers of 14 seats. This in turn would help address issues of traffic congestion associated with high number of vehicles ferrying a few individuals.

According to NTSA, the total registered SACCOs and Companies are 661 and that investment in HoV vehicles has grown phenomenally by 25% and currently they are estimated at 1699 in Nairobi. However, there is concern by bodies such as Kenya Union of Savings and Credit Cooperatives (KUSCO) that PSVs have not embraced the concept of SACCO as they use it as a platform to acquire PSV license (Kariuki, 2016). Indeed this true, based on fare charged, branding

and unity of purpose. It is common to find same operators with same branding but different fare charges.

The increased investment in high capacity carriers is a positive indicator as it will go a long way in decongesting most of Nairobi's roads. However, more still need to be done. One of the policy lacuna is that the policy, the traffic act and regulations do not allow for standing passengers. Allowing standing passengers in HoV with permissible designs (articulated buses of 120 carrying capacity) would replace an estimated 9 of 14 seater matatus.

6.7.3 Punctuality

One of the principal expectation of the policy was to address concerns of transport services and quality. Majority of the respondents generally felt that the punctuality of the public service vehicles is good (59%). Almost the same number of respondents indicated that the punctuality is either bad and very good were almost equal at 18% and 17% respectively. Such positive attributes could be associated with non-adherence to travel route by deviating to back lanes, uncongested routes with the single purpose of either reaching CBD or estate.

6.7.4 Fare Charged

The study realised a close call on the fare charged. (43%) of households interviewed observed that the fares charged were good. At total of 40% felt that fare charged bad or very bad while 8% felt that the fare charged were fair. However, if taken a notch higher through cross tabulation of income against fare charged as discussed in 5.2.1, then the fare charged is pretty higher. From observation experience and general history, there fare charged are haphazard despite some operators displaying fare chat on their vehicles.

6.7.5 Crew Behaviour

While most (42.5%) agrees that the behaviour of operators is good. There is an alarming concern on the higher response rate of those who deem their behaviour to be bad. 30.4 and 13.5% respectively had a feeling that their behaviour is bad or very bad respectively. The question that comes to mind is how a city can have a public service platform whose operators are felt to be of bad behaviour yet they should uphold ethics and integrity expectation. It is these percentages that are responsible for using abusive language, disorderly behaviour, harassing of travellers and thieving habits like no giving back change.

Figure 10: Staff Behaviour



Source: Field Data, 2016

6.7.6 Travel Time and Speed

The length of time taken in minutes by the respondents to reach their destination from the point of origin varied greatly. The variation ranges between 3 minutes and 150 minutes. Out of the 200 respondents interviewed, about 26% take about 30 minutes from point of origin to their destination. This is followed by those who take about 20 minutes at 17%, 9.5% take about 60 minutes, 8.5% take about 15 minutes. The shortest distances i.e. 3 and 6 minutes are covered by 1 respondent each (0.5), while the longest time taken is also by one respondent.

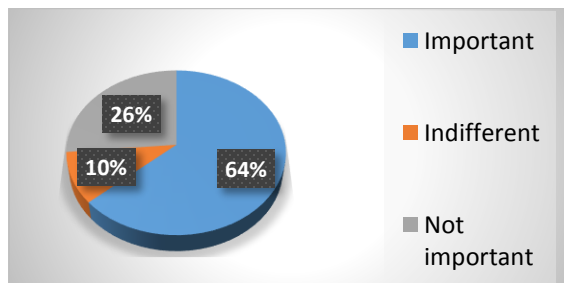
As such it fits with Cedar (2007) argument that travel time should range from 40-100 minutes. From the overall average of 30.6 derived from dispatch survey, then it is prudent to point out that the travel time is within limits. But if location context is roped in as discussed in 5.4.1 then there is need to improve.

Over 50% indicated that travel speed is good, with another 14.6% saying that it was very good and 5.3% indicating that it was fair. Close to 22% said that it is bad, while 7.3% said it was very bad. The average travelling speed recorded were 12.1, 8.3 and 9.8km/h respectively. It implies that PSVs along these routes are able to do 8-12 kilometres in an hour which is below the recommended of 20 kilometres per hour.

Low travelling speed and extended travel hours implies delay that might be associated with traffic congestion or time delays while trying to fill up the vehicle.

Improving public service vehicles services through reduction of travel time was rated as important by 64 (132) respondents out of 208 respondents who answered this question. The proportion of respondents who felt it was not important were 26 (55), while those who were indifferent were 10 (21).

Figure 11: Significance of Reducing Travel Time



Source: Field Data, 2016

6.7.7 Noise Levels

This was rated as one of the failures of private sector operated PSV. The total number of respondents who felt that the noise level in public service vehicles is bad or very were bad 35.1 (73) or 26.9 (56) respectively combined is higher than those who felt positively about the noise. Only 3.8 (8) said it was very good, 30.8 (64) said it was good while 3.4 (7) said it was fair.

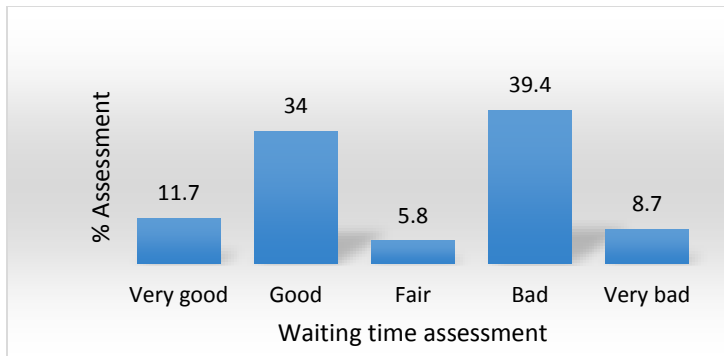
6.7.8 Service Hours

Service hours was rated positively by majority of the respondents. 62.6% said that the service hours of public service vehicles were good. Another 11.7% indicated that the hours were very good, while 5.3% said it was fair.

6.7.9 Waiting Time

The waiting time of public service vehicles was largely rated as bad (39.8%). Those who said it was good constituted 34%, very good 11.7%, 8.7% very bad and 5.8% said it was fair. The same is evident in dispatch bus per route survey where the lowest time recorded was 1 minute and the highest was 172 minutes. The average waiting time for Riruta, Maringo and Mathare North route respectively were 15.07 minutes, 25.9 minutes and 27.21 minutes respectively. This is beyond the recommended 5-10 minutes.

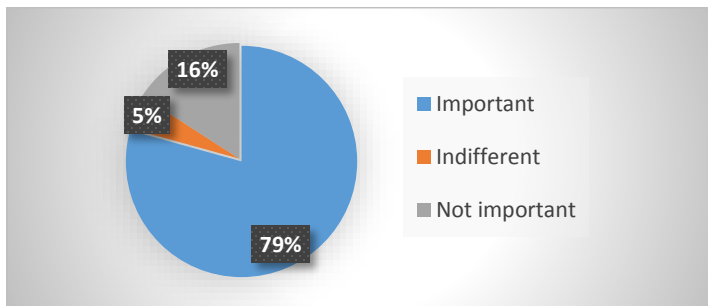
Figure 12: waiting time



Source: Field Data, 2016

Among the three responses available to the respondents, 79% (165) of the respondents said that reduction in waiting time to improve the services provided by the public service vehicles was important. Out of the remaining respondents, a significant proportion of 16% (33) said it is not important while 5% (10) indicated that they were indifferent. See Figure 14.

Figure 13: Significance on Reducing Waiting Time



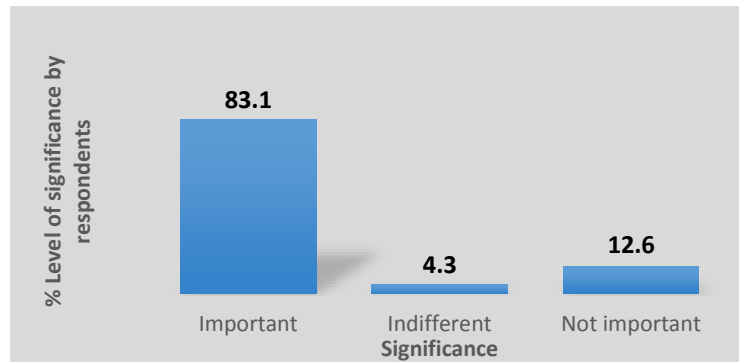
Source: Field Data, 2016

6.7.10 Operational Information

Information is a huge resource in making travel decision. Operational information was rated as bad by the majority of the respondents who answered this question, 37.1 or. About 33 (67) said it was good while 16.3 (33) said it was very bad. The proportion which said it was very good was 10.4 (21) and 3 (6) said it was fair.

Improving bus stop and information to improve public service vehicles services was rated as important by 83.1% (172) respondents, not important was rated at 12.6% (26) and those who were indifferent were 4.3% (9) as illustrated in figure. A total of 207 respondents answered this question.

Figure 14: Significance on Improving Information Levels



Source: Field Data, 2016

6.7.11 On-board Security

Ones security while travelling is paramount in attracting and retaining users so that they do not opt for private means. Robbery, mugging, drugging and pick pocketing in PSVs has been a concern. A total of 203 respondents answered this question. Out of these, the number that felt the on-board security of public service vehicles since 2012 was good almost balanced out with those who felt it was bad at 34.5 (70) and 32.5 (66) respectively, A sizable proportion, 22.7 (46) said that it was very bad with another 7.4 (15) saying it was very good and 3 (6) saying it was fair.

6.7.12 Bus Stop Location/Number

Out of the 205 respondents who answered this question, 54.6 (112) which is more than half of the respondents said that the bus stop location/number of public service since 2012 was good. The next majority respondents to this question was almost three times those who felt it was good at 17.6 (36). About 14 (29) said that it was bad with another 10.7 (22) indicating that it was very bad. A small proportion of the respondents at 2.9 (6) said that the bus stop location/number of public service since 2012 was fair.

The above realisation is slightly differs with Average Bus stop Spacing computations as discussed in 6.5.1. For instance, ASD in Riruta is 642m. This is slightly above the required minimum

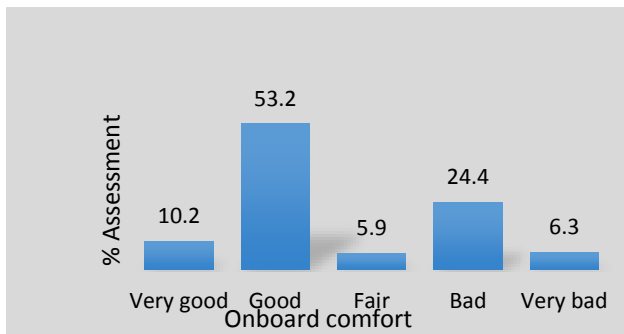
threshold of 300-600m. Additionally, the number of bus stops for Mathare North to Ngara are 6. Therefore, ASD for the route would be 1000m. This short of a minimum of 600m.

6.7.13 On Board Comfort

For an improved service, a given minimum level of comfort is requisite in terms of squab size, leg room and head room. The on-board comfort in PSVs was assessed and more than half of the respondents (53.2%) indicated that it was good. About 24.4% felt that it was bad. Very good, very bad and fair were indicated by 10.2% (21), 6.3% (13) and 5.9% (12) respectively.

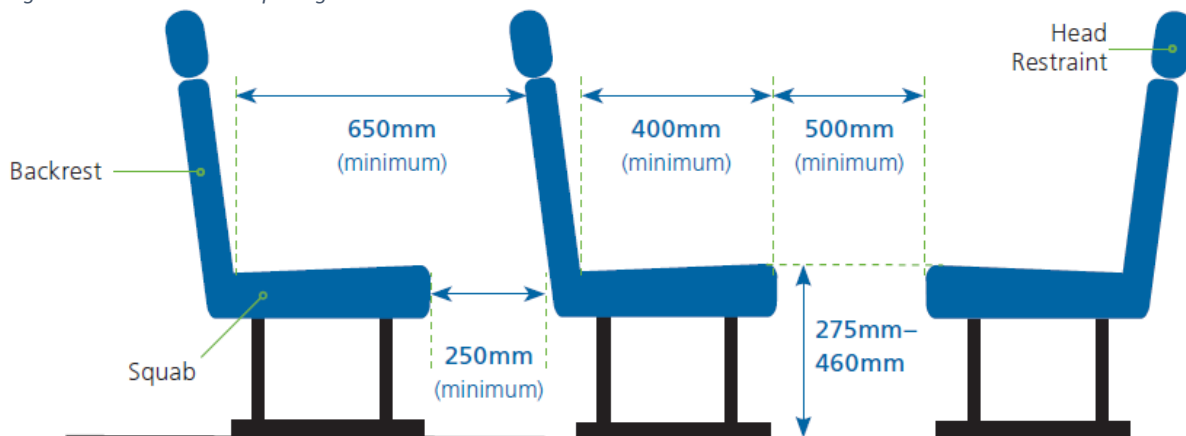
Within the context of comfort and quality, Majority of the respondents indicated that the fleet quality of PSVs was good (49.5%). This was followed by 28.2% who felt that it was bad. Those who felt it was very good were 10.7% while 8.3% felt it was very bad. However, the negative mentality of 36.5% which is a significant percentage having perception that the fleet quality is not good should be addressed at the design/assembly level and at maintenance level.

Figure 15: On Board Comfort



Source: Field Data, 2016

Figure 16: Standard Seat Spacing Dimensions



Source: Taxi Regulator, 2007: 32

If the above opinion is subjected to standards proposed National Vehicle Standards for Small PSVs then a mixed opinion of conformity and non-conformity emerges as some operators meet the standards while some do not. For instance, the minimum required squab width is 400mm, but on actual measure, some PSVs within the SACCO had 3800mm or variations less to 400mm. minimally, it is expected that there should be at least 650mm measured longitudinally and horizontally from the front space to backrest at uncompressed squab height to the rear face of the seat or surface immediately in front of it.

Additionally, it is expected that there should be a minimum of 250mm between the front edge of the squab and the rear face of the seat surface immediately in front of it. From the measures obtained during dispatch survey, the data collected varied from 280-300 mm and as such most of the vehicles meet this criteria.

Thus to curtail non adherence, motor vehicle inspection unit should take in-depth detail of the above during inspection and before licensing by NTSA by adopting Whole Vehicle Type Approval Process (WVT) and Suitability Inspection before issuing conformity license.

6.7.14 Emerging realisations and policy implications

- Operators have adhered to requirement that they be organized into corporate bodies. However, the organization is just meant for acquiring PSV license and not as a means to instilling corporate governance ethics for improved service quality and competitive edge.
- Operators are investing in high carrying capacity vehicle of 29-51 passengers. However, more needs to be done so as to invest in smart buses, articulated buses and BRTs which have over 120 capacity thus able to replace over 9 fourteen (14) seater matatus.
- The NTSA, 2013 regulations, Legal Notice No. 161 of 2003, traffic Act and INTP are stifling growth of HOVs as they tend to favour small operators. Who end up ending formal organized companies as it happened to KBS since these stipulations ban carrying standing passengers yet this is a worldwide practice so long as they are designed for such.
- Punctuality among the PSVs is rated positively as it is not a concern
- Fair charged if pegged against income is high
- Travel time is within limits. However, if taken location context is inculcated then a travel time for 30 minutes for a distance of 5km becomes questionable.
- Traveling speed is below the recommended 20km/h

- Noise levels is a concern to most users owing to loud music played.
- Waiting time is beyond the minimum threshold of 5-10 minutes.
- Dissemination of information on operational schedule and technical hiccups to customers is unavailable in daily operations of PSVs.
- There is need to improve on the number of bus stops as shown in ASD
- Suitability of some vehicles for use as a PSV is wanting owing to inability to meet appropriate standard seat spacing dimensions.
- Over 30% of respondents felt that fleet quality are below par. This might be as result of interior quality, sitting space, leg room and head room.
- No any single PSV was designed to cater for people with special needs/ physically challenged. For instance no mounting ramps and sitting spaces are meant for physical abled individuals as the current ones cannot accommodate enabling equipment such as wheelchair.
- Most commuters are destined to CBD and other employment/recreational/public purpose/utility centres such as Upper Hill, Yaya, Adams Arcade and Industrial Area. There is need for selective transport planning through policy and land use in these zones.

6.8 Characteristics of PSV Operations and Organisation

6.8.1 Introduction

Traits associated with PSV operations can be conceptualised and discussed in various perspective. The first is the consumer perception such as timing, scheduling, routing and fare charged among others. These have already been discussed in 5.7 albeit in different perspective. They can also be discussed from operators and regulatory perspective. Finally, a more elaborate approaches adopted this study is pegged on organisational development structure as shown in Annex 6. This can offer insight on how to strengthen corporate concept in these organisations as envisioned in the Act and the policy.

6.8.2 Analysis Narrative

Peja- it is individually owned with the owner having a fleet of vehicles. The financing was individual savings, family members, friends and bank loan. Friends are still open to invest in the business. It operates only on one route (no.10). They have adopted flat rate fares even when it rains. Maintenance and repair is majorly by the management of the fleet. It complies with some but not all regulations. They depend on touting as a mince of advertising and some advertising on

the vehicles. Guidelines for customer care are given. On business linkages, there is a mix of formal and informal linkages, there is deliberate reach to operators both formally and informally.

KBS is a moderate organization run as a limited company. There is also an internal group ownership but all monies collected goes to the SACCO. There are no restricted routes. They can operate on any route. There are no flat rates. Normally dependent on time and the weather. The cooperative does the repairs by the cash is deducted from the owner's fees. The company complies with all the rules. The protocol is not to advertise but for people to queue but the practice in some cases is touting is done. Customer relation guidelines are given to the crew and discipline is mandatory. Business linkages is a mix of both formal and informal.

KASBOWA is a low organization self-financing and obtaining loans from SACCOS and lending organizations. Operates only on routes stipulated by TLB and adhere to stage managers (gangs) conditions. The pricing is not flat zoned; it varies depending on many factors. The individual does all repairs and maintenance. There is low compliance to regulations especially for the 14 sitters. Advertising is solely by touting. No regulations given on customer relations. Some touts are rude while some are good to customers. There is no networking due to their low operating levels. They have very few vehicles.

West Madaraka is also a low organization self-financed and with the help from family and friends. The routes are defined in the TLB but are not strict as long as the driver and tout meet the daily cash requirement. Traffic jam, weather and events making passengers demand for vehicles dictates the fare charged. Competition also makes cost go down or high. Minor repairs are done by the owners while major ones are done by the SACCOS upon agreement with the owner. Compliance to mandatory regulations is adhered to so does the regulations by the SACCO. Promotion and advertising is by touting. The fleet attendants have good customer relations. They network with other SACCOS. This normally applies when they have their vehicles booked and they can't deliver to client's needs.

Moonlight Coach is a low organization with few vehicles. The financing is from self, family and banks. It operates in one route allocated by TLB/ control of routes by gangs. Mainly have 14-seater matatus. The pricing is flat zoned with variation to weather and traffic. The repairs are done

individually. It complies with some of regulations. Promotion is individually through touting. Customer care guidelines are given and the business linkages are formal and informal.

Double M services is a high limited company that drew financing from family, friends, banks and investors. The routes are controlled by legally mandated transport authorities, complete adherence to assigned routes. They have minibuses and full size buses. Pricing is by use of seasonal tickets which are transferable on deviations allowed. Repairs and maintenance are done by the management from a centralized point. The compliance is full compliance. Promotion and advertising is through touting, advertising on vehicles and centralized advertising strategy. Customer relations are emphasized. Linkages and networking is predominance of formal linkages.

6.8.3 Emerging realisations and implication on policy

- The operational level of most SACCOs and Companies can be categorised as low-moderate organisation. For instance, business ownership is structured in a manner that individuals are the one owning one or more vehicle. This is the greatest source of informality and resistance to change. For instance, small operators were more resistant to phasing out of 14 seater matatus and would always interfere with operations of SACCOs with large buses.
- SACCOs are at the low organisation level since it is an agglomeration for the purpose of acquiring operational license. For instance, financing is left to individuals or family as opposed to investors or banks.
- Companies display a moderate organisation level. For instance, they operate in more than one route, financing is by family and banks, operations are done by management and they tend to adhere to flat zoned ticketing system.

6.9 Consumer Satisfaction

6.9.1 Introduction

The third research in the study was aiming at analysing the effects of integrated national transport policy on public transport service delivery/quality. This section utilises parameters such availability of transport services, boarding speed, price affordability, baggage capacity, universal design, user information, safety and security and personal perception on quality.

6.9.2 Personal Perception on Quality

The participants were asked to rate 7 statements relating to their perception on service quality after the implementation of PSV regulations. The statements were measured on a 5 point likert scale

(where; 1=strongly agree; 2=Agree; 3= Undecided; 4=Disagree; 5=Strongly Disagree). The internal consistency was measured using Cronbach's alpha which yielded an alpha of 0.79 which implies the internal consistency among the 7 items was good. The results on the ratings are as presented in the table 24 below.

Table 23: Consumer Perception on Service Quality

<i>Statements</i>	<i>SA (%)</i>	<i>A (%)</i>	<i>Ud (%)</i>	<i>D (%)</i>	<i>SD (%)</i>	<i>Mean</i>	<i>Standard Deviation</i>
After the requirement of PSV SACCO formation, PSVs are more attractive in color shape and design	14.2	31.7	38.2	9.2	6.7	2.62	1.054
After the requirement of PSV SACCO formation, the PSVs are well ventilated and cozy	3.3	41.7	32.5	11.7	10.8	2.85	1.042
After the requirement of PSV SACCO formation, PSVs are well maintained i.e. break down less often	10	14.2	44.2	25.8	5.8	3.03	1.020
After the requirement of PSV SACCO formation, the picking of passengers at the terminus is more organized	29.2	33.3	12.5	12.5	12.5	2.46	1.359
After the requirement of PSV SACCO formation, Transit staff are more friendlier and professional	25	10	26.7	25	13.3	2.92	1.376
After the requirement of PSV SACCO formation, Transit staff are clean and smartly dressed in uniform	20.8	11.7	21.7	36.7	9.2	3.02	1.303
After the requirement of PSV SACCO formation, there is complaint channel which is responsive	4.2	7.5	21.7	36.7	30	3.81	1.079
Average Mean						2.958	0.792

Source: Field Data, 2016

The results show that 38.2% of the respondents were undecided while 31.7% agreed that PSVs are more attractive in color and design after the implementation of the requirements for PSV SACCO formation. On the same, 14.2% strongly agreed, 9.2% disagreed, while; 6.7% strongly disagreed that PSVs are more attractive after the implementation of the requirement for the formation of PSV SACCOS. On whether PSVs are better ventilated and cozy after the implementation of the requirement for formation of PSV SACCOS, 41.7% agreed, 32.5 % disagreed and 11.7% disagreed with the statement. Additionally, 10.8% of the respondents strongly disagreed while 3.3% strongly agreed that PSVs are better ventilated and cozy after the new laws.

The rating of whether PSVs are well maintained, i.e. broke less often, indicated that 44.2% were undecided, 25.8% disagreed, 14.2% agreed while 10% of the total respondents strongly agree that PSV are well maintained after the new laws. Further, the analysis show that 5.8% of the total participants strongly disagreed that PSVs are well maintained after the implementation of the new laws. The respondents rated their agreement on the organisation of picking passengers at the

terminus after SACCO's formation. From the analysis, 33.3% agreed that packing of passengers is more organised while 29.2% strongly agreed on the same. Equal proportion (12.5%) of the participants fell under the undecided category, disagreed or strongly disagreed with the statement.

On the agreement of whether transit staff are friendlier and professional after the formation of SACCOs, 26.7% were undecided, 25% disagreed while 13.3% strongly disagreed with the statement. Further, 25% of the participants strongly agreed while 10% agreed that transit staff is friendlier and professional after the requirement for the formation of PSV SACCOs. The agreement on whether transit staff is clean and smartly dressed in uniform after the requirement for SACCO formation, 36.7% disagreed, 21.7% were undecided, 20.8% strongly agreed, 11.7% agreed, while 9.2% strongly disagreed with the statement.

6.9.3 PSV Regulations and their role in Improving Quality

The respondents were asked to rate newly introduced PSV regulations and their effectiveness. The construct was broken down into 6 items relating to performance of public transportation after then new regulations were put in place. The statements were measured on a 5 point likert scale (where; 1=strongly agree; 2=Agree; 3=Undecided; 4=Disagree; 5=Strongly Disagree). The reliability test was done using Cronbach's alpha which yielded a value of 0.633, which implies an acceptable level of internal consistency across the 6 items. **Table 25** presents the ratings.

Table 24: PSV Regulation and their Role in Improving Quality

<i>Statements</i>	<i>SA (%)</i>	<i>A (%)</i>	<i>UD (%)</i>	<i>D (%)</i>	<i>SD (%)</i>	<i>Mean</i>	<i>Standard Deviation</i>
The requirement for PSV SACCO formation has led to improved internal discipline and self-regulation	11.7	13.3	20.8	31.7	22.5	3.4	1.293
The requirement for PSV SACCO formation has formalized the industry and created employment	0	3.3	37.5	45	14.2	3.7	0.751
The requirement for PSV SACCO formation has restored order and reduced conflict among stakeholders (Conductor, driver, managers and owners)	13.3	3.3	32.5	41.7	9.2	3.3	1.127
The regulations enforced in 2011 have increased government stakeholder consultation on management of public transport	14.2	5.8	41.7	30.8	7.5	3.12	1.109
The regulations enforced in 2011 have reduced cartels operating in the PSV sector	12.5	15.8	44.2	15.8	11.7	2.98	1.137
The requirement for adoption of high capacity vehicles have reduced congestion at the terminus	2.5	26.7	14.2	31.7	25	3.5	1.202
Average Mean						3.33	0.663

Source: Field Data, 2016

Measuring the effect of regulation on PSV operation was done using likert scale across six statements which yield a Cronbach alpha of 0.63 which is within acceptable level of internal consistency across the six statements. The results indicate that those who either strongly agree or agree constituted 25% of the respondents who noted that requirements for PSV to be organized in SACCOs has led to improved internal discipline and self-regulation. On the other hand 54.2 either strongly disagreed or disagreed that formation of PSV SACCOs has led to internal discipline and improved self-regulation while 20.8 are undecided. The same opinion of non-improvement is exhibited in relation to formalization of the industry as 59.2% reported that it has not led to formalization of industry. A paltry of 3.3% believes it has led to formalization. The above realization affirms earlier literature review that established that the policy and regulation focus more on registration/licensing and speed regulation while ignoring other key tenets of quality service such as safe ridership, time management, flow control, traffic generation and role of land use planning is creating smooth traffic flow.

The same narrative re-occurs when respondents were asked whether formation of PSV SACCOs has restored order and led to reduced conflict among stakeholders. The result shows that 50.9% either strongly disagrees or disagrees. On the other hand only 16.6% either strongly agrees or agrees to the opinion with 32.5% being undecided. At the same time majority believes that INTP and NTSA 2013 regulations has not increased government –stakeholder consultation on management of public transport. A majority (41.7%) are undecided lot; 38.2% either strongly disagrees or disagree that it has not led to stakeholder participation while 20% either strongly agrees or agrees that it has led to government-stakeholders consultation.

One that the INTP received a modest response is on curtailing cartels operating in PSV sector. While 44.2% remained undecided, 28.7% believed it has aided in reducing cartels. On the other flip, 27.5% felt that it has not reduced cartels in the sector. This is an indication that genuine players and owners are engaging and reaping from their investment. This can also be used as an entry point to enhance control over the sector.

Equally, adoption of HOVs has not led to reduction of congestion at terminus. In this case 56.7% either strongly disagrees or disagrees that adoption of HOVs have reduced congestion at the

terminus. On 29.3% agrees/ strongly agrees to this question. This is a key concern especially peak hours when PSVs are parked in disorderly manner causing traffic obstruction and snarl. For instance in certain circumstances commuters can spend more than 30 minutes after the vehicle has had the required capacity/full board owing to obstruction within the termini, bus stops and parking ranks.

6.9.4 Emerging realisations and policy implications

- Is difficult to board vehicle during peak as vehicles are scarce while demand is high. Meaning travel demand management has not been improved. For instance, 80% stated it takes more than 10 but less than 30 minutes to board vehicle during peak hour. The same exert reverse is true as the indication points that vehicles are many as compared to commuters and thus ease of boarding as majority (72) stated they take less than 30 minutes. Hence, formation of SACCOs has not addressed travel demand management (TDM). This is an indication of non-service delivery/quality improvement.
- Time management is an issues in relation to demand as most PSVs take long in bus termini during off peak with 34% stating they take more than 10 but less than 30 minutes. That time lag leads to wastage of man-hours that can be constructively engaged in the economy. This is an indication of non-service delivery/quality improvement.
- Affordability is a concern as 54.2% believes the charges are high in relation to their income. The same trend is replicated is asked in relation to modal choice. This implies, that formation of SACCOs, has not addressed issues of pricing such as price fluctuation as over 50% believe the commuter fee is not affordable. The implication is that perhaps that this 50% of commuters are spending huge fraction of their net income on transport as it is mandatory thereby limiting their savings capacity and disposable income. The net effect is limited investment in capital assets such as housing and limited spending or inability to access quality services such as health and education as significant part is consumed by transport. Finally, it can imply accumulation of more debt as one would need transport at the same time require other basic needs and support services. This is an indication of non-service delivery/quality improvement.
- While most respondents (61.7%) agrees that the PSVs are designed to carry baggage, the concern is adequacy as 64.2% believes they are not adequate. The implication of such is an extra cost for commuters whereby they might be required to pay for extra ticket and

convert seat as baggage space especially is taken within the context that our economy is not fully urbanised and thus commuters might need to transport certain agricultural product from upcountry. The limited baggage space is a disadvantage to low income earners who might have purchased higher order goods within CBD and yet they are not able to hire other public means of transport such as taxi. The bottom-line on baggage capacity inadequacy is on design. This is an indication of non-service delivery/quality improvement.

- In terms of user information in regard to fare and route, most respondents (66.7 and 70.8% respectively) stated that they are aware. This can be attributed to fare charts displayed in the vehicles, route numbers/estates/ terminus traversed by the PSV/ SACCO. This affirms compliance to gazette notice 161, Integrated Transport Policy and NTSA, 2013 regulations. This is an indication of service delivery/quality improvement.
- In terms of perceived quality in regard to colour, ventilation, mechanical breakdown, staff friendliness, staff cleanliness and complain channels, the respondents represented a mixed reaction. In terms of colour 45.9% either strongly agreed or agreed there is improvement. This implies INTP, Gazette notice 161 and NTSA regulations are being followed.
- 45% either strongly agrees or agrees that PSVs are well ventilated and cosy but 32.5% are undecided. This means they might not be aware or can either fall on the divide of those agreeing or not agreeing. A significant figure of 22.5 believes these vehicles are not well ventilated and cosy. As such SACCOs managing these PSVs have to improve. This is because ventilation is critical in aspects of public health while cosiness is an indication of comfort that should attract more riders who have opted to private means.
- Most (62.5%) believe that picking of passengers is more organised than before. This evident with the queues passengers and buses form at the termini. In given termini, passengers are required to fill one bus before moving to the next. This exhibits the queuing system of first in-first out. However, a significant number (25%) thinks the contrary. This implies there are given routes and SACCOs where touting and random manner picking passengers is encouraged. They do not adhere to first in first-out policy. Theirs can be a mix of first in-last out, last in-first out. Thus, the INTP and NTSA 2013 have not adequately addressed picking of passengers.

- Professionalism is still lacking in this sector as only 35% feel they are more friendly and professional as compared to 38.3 who see them as less friendlier and disorganised. Hence, the INTP and NTSA 2013 regulations should address friendliness and professionalism issues by obliging SACCOs to formulate code of conduct & ethical standards, operational standards and customer care policies.
- For any successful customer service and improved quality customer care and feedback channels are critical. However, this is not the case in PSVs even after formation of SACCOs. Most respondents (66.7%) stated there is no complaint channel which is responsive.

6.10 Inferential Statistical Tests

The study sought to establish if there is significant or no significant correlation between enactment of INTP and service quality.

Null hypothesis - H_0 : Implementation of the INTP has not been effective in service delivery

Research hypothesis - H_a : Implementation of INTP has been effective in improvement in service delivery

Note:

- Reject the null hypothesis(H_0) if computed X^2 equals or exceeds the critical value

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	342.000(a)	324	.236
Likelihood Ratio	111.889	324	1.000
Linear-by-Linear Association	13.328	1	.000
N of Valid Cases	19		

Symmetric Measures

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Interval by Interval	Pearson's R	.860	.058	6.964	.000(c)
Ordinal by Ordinal	Spearman Correlation	.896	.066	8.343	.000(c)
N of Valid Cases		19			

From the tables above there is reason to believe that the INTP has had significant positive improvement in the public transport sector. A chi-square of .236 indicates high probability that if the policies are enforced the end results will be achieved. A correlation of 0.066 further indicates that there is high correlation in between the policy implementation and satisfaction of customers with the public sector.

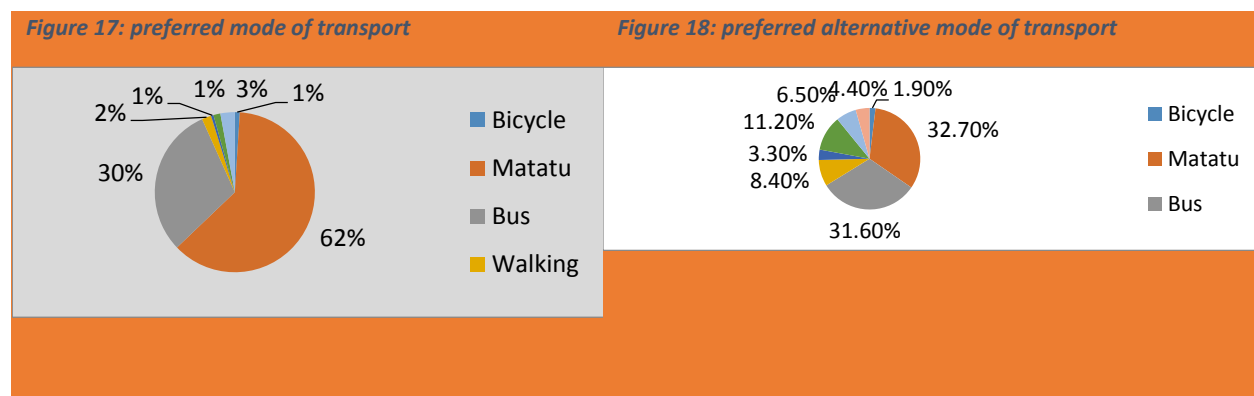
Decision: The research hypothesis (**H_a**) is supported while the null (**H_o**) is rejected.

6.11 How to Combine Current Regulatory Structures with other Appropriate Approaches

6.11.1 Introduction

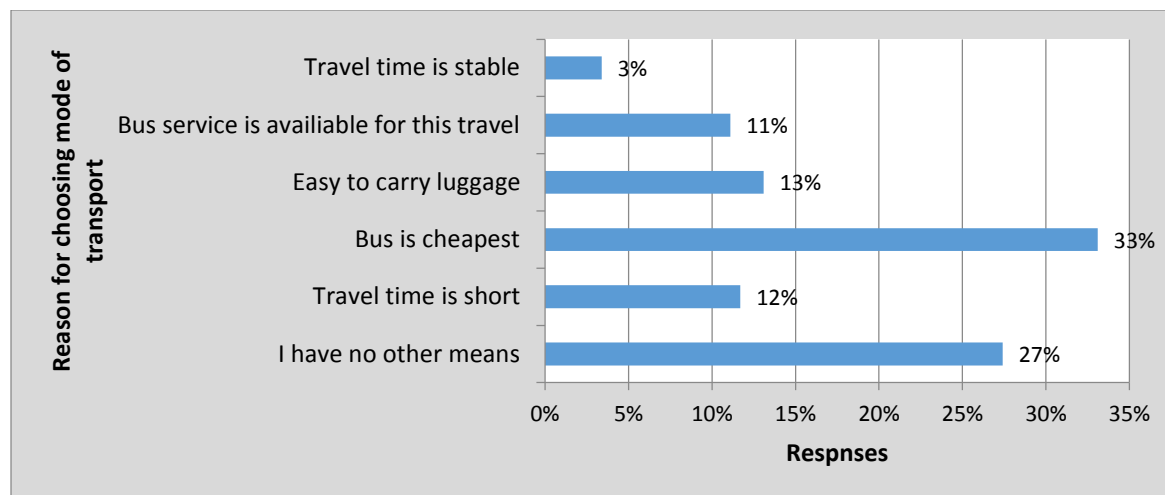
The matatu business under private sector ownership structure is here to stay. The onus is on the regulatory institutions and interested players to come up with a combination of solutions that could ensure quality service so as to address need for transport and sustained economic growth. For instance, matatu remain the most preferred transport mode and the most preferred alternative mode as shown in figure 18 and 19 below.

The reason for preferring matatu was based on the opinion that it was comparatively cheaper and closely followed by the response that they do not have an alternative. Indeed this second response offers a window to explore and develop alternative means. For instance, as shown in figure 21, the two reasons with the highest scores as to why the respondents chose to use PSV as mode of transport were that the PSV was the cheapest and the second reason is that the respondents have no other means at 33% and 27% respectively.



Source: Field Data, 2016

Figure 19: Reason for choosing PSV as mode of transport



Source: Field Data, 2016

Developing an improved transit system has been a rallying call of the Sessional Paper No. 2 of 2012 on INTP and such as per the study objectives, this section seeks to present various plausible alternatives that could be advanced and be incorporated in the policy and other sectoral areas such as land use planning and road development so as to achieve the desired dream of effective transit system. *Annex 18* summarises some of the proposals by respondents on how to improve public transit in Nairobi.

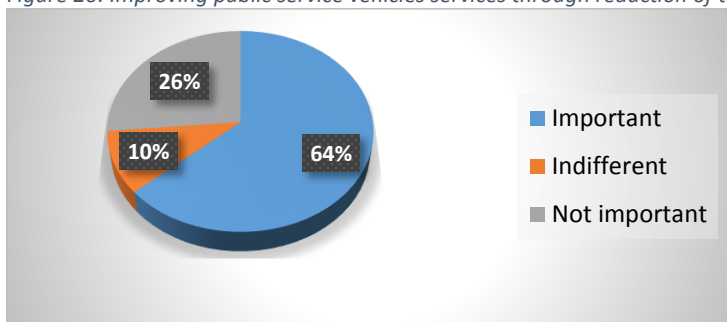
In urban areas the core concern for transportation are (1) traffic flow improvement strategies such as traffic signalisation, traffic operations and enforcement and management. (2) Carrying capacity through MRT such as BRT & LRT and speed issues. (3) Land use planning. (4) Road design and capacity. (5) Application of ICT into public transit. (6) Policy, legislative and regulatory concerns. The subsequent sub section discussions centres on some of the plausible and SMART alternatives.

Most respondents stressed the need to improve certain aspects that they felt were wanting under the current organisation structure of public transit. For instance, The importance of improving the regularity/punctuality of public service vehicles could not have been emphasized more by the 208 respondents who answered this question with almost all the of them indicating that the improvement of regularity/punctuality is important at 92% (191). Only 5% (11) said that it was not important and a paltry % (6) were indifferent.

The question on significance of improving accessibility to public service vehicles was positively answered by the majority of the respondents indicating that the improvement is important at 93% (193). Small proportions of 4% (9) and 3% (6) felt that the improvement of accessibility to public service vehicles was not important and indifferent respectively.

Improving public service vehicles services through reduction of travel time was rated as important by 64 (132) respondents out of 208 respondents who answered this question. The proportion of respondents who felt it was not important were 26 (55), while those who were indifferent were 10 (21).

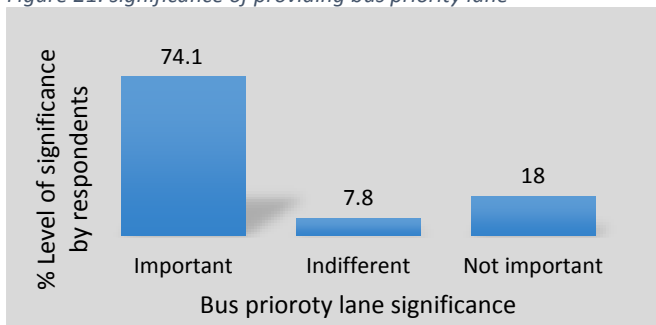
Figure 20: Improving public service vehicles services through reduction of travel time



Source: Field Data, 2016

The significance of providing bus priority lane to improve public service vehicle services was considered important by the majority of the respondents with the proportion of those saying so at 74.1 (152). The proportion of respondents who felt this was not important were 18 (37). Those who said they were indifferent comprised 7.8 (16).

Figure 21: significance of providing bus priority lane

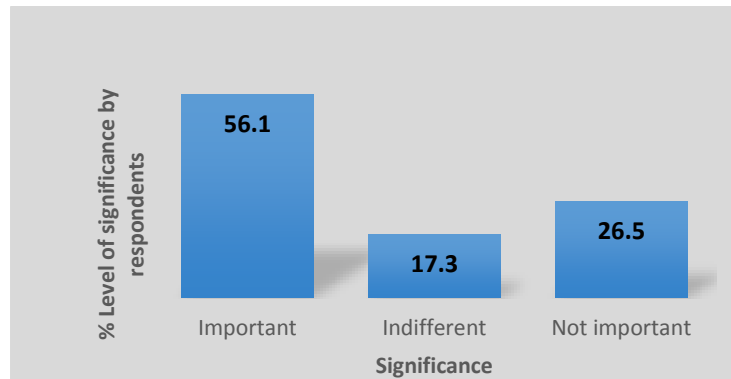


Source: Field Data, 2016

The number of respondents to this question were 196. The responses to these questions are shown on Figure 35. Out of the 196 respondents, 56.1 (110) stated that it was important to introduce state

of art transit system such as LRT and BRT to improve public service vehicles services. On the other hand, some 26.5 (52) said that this was not important, and 17.3 (34) were indifferent to this.

Figure 22: Importance of state of art transit system



Source: Field Data, 2016

6.11.2 Synoptic View of Issues and Plausible Solutions

The participants were asked to suggest ways they thought were necessary to improve the existing regulations. The results showed that majority (41%) of the respondents indicated that there are enough laws and regulations to manage the commuter transport sector and thus called for stringency in the implementation of these regulations. However, participants felt that there is need to do more in the industry than there is in the regulations. At macro level they suggested that the policy should operate within a wider socio-economic policy that addressed issues such as travel demand management that is associated with start and stop of working hours which in Kenya is 8 am to 5 pm.

The highest priority for most respondents (19.8%) was to construct more feeder roads. This was followed by 16.80% who said there is need to regulate fare charged. In the third order of priority was to train on road safety (9.9%) and reduce loud music (6.9%) respectively. Other priority concern were: ease traffic flow (6%); enforce strict traffic rules (6%); and getting rid of corrupt traffic officer (5.6%).

Before presenting various alternatives that could be employed based on the study findings, below is the summary of emerging issues and realisations that inform the immediate discussion as derived from Annex 21 and secondary literatures. Owing to space and time, the immediate sub sections focuses on proposals and alternatives that are linked to land use planning.

Table 25: Summary of Issues and Solutions

Realisations from study findings			
S/No.	Issue	Narrative	Possible solutions
1	Corporate bodies	<ul style="list-style-type: none"> 661 registered saccos/companies Operators have adhered to requirement that they be organized into corporate bodies. However, the organization is just meant for acquiring PSV license and not as a means to instilling corporate governance ethics for improved service quality and competitive edge (Kariuki, 2016).. 	<ul style="list-style-type: none"> Strengthening of internal capacities Instead of Sacco, companies should be encouraged as they are less amorphous.
2	Few HoV	<ul style="list-style-type: none"> High occupancy vehicles has increased by 25% - has risen to over 1699 However, more needs to be done Buses have the widest coverage of the city as compared to matatus and as such should be encouraged. Marginally, those using buses for trip purposes have increased There is likelihood for increased total vehicle trips from 1, 255, 434 in 2015 to 1, 759, 290 in 2025 so as to meet growing demand for travel Low capacity of individual operators and government unwillingness to invest in mass rapid transit system has resulted in long queues of slow moving vehicle and long waiting time 	<ul style="list-style-type: none"> License 50+ 1 seaters only Invest in smart buses, articulated buses and BRTs which have over 120 capacity thus able to replace over 9 fourteen (14) seater matatus. Empower financial muscle of corporate bodies in transport By not only being a regulator, Government to re-consider being a direct player in the industry Reduce taxation/ zero rate taxation on HoVs
3	Gaps in NTSA, 2013 regulations, Legal Notice No. 161 of 2003, traffic Act	<ul style="list-style-type: none"> They tend to favour small operators. Who end up ending formal organized companies as it happened to KBS since these stipulations ban carrying standing passengers Inadequate policy and institutional coordination By not paying true economic cost, matatus are having unfair advantage over formal bus companies. The NTSA Act, 2012 is geared towards registration, identification and safety while neglecting aspects of service quality in transport such as accessibility, design, routing, timing and fares. The NTSA Act, 2012 and 2013 regulations are geared towards streamlining externalities without addressing internal control issues and corporate standards yet the internal control issues have direct bearing on external issues. SACCOs are not for the purpose of efficiency and service delivery but a means to registrations as PSV operator and branding. This is evident when accidents happens and route managers are not able to account for anything. The public transport system in Kenya has been highly politicized and thus introducing stringent regulations has been a challenge as seen in the entry of Nyayo bus in 1986 (Waweru, 2013; Kenya Bus Service, 2012; Mutunga, 2011). The industry is marked with informalities, unstructured operations and cartel controlled The licensing bit focus on revenue generation and not spatial distribution that is left to economic forces. This implies that some routes are likely to be underserved. Does not address tenets of quality in transit services such as timing, presence of cartels, social justice, and social equity. This implies that quality is left to operators yet their interest is on economic gain. Does not address disconnect of proposed tough repercussions against the larger macro-economic environment that is full of informality and thus to survive operators have to gain some informality. At the same time infrastructure development has lagged behind yet implementation of these rules require up to par infrastructure development. The policy offers broad sentiments and thus there is need for further refinement through Acts, and Regulations. For instance, there is need for enactment of the proposed Road Transport Act, 2013 (Mukabanah, 2013). Does not define market space model (regulated, deregulated franchise and deregulated open access) to be adopted by the government or how they are to be integrated in different contexts. Talks of larger reforms yet internal operation reforms of operators is what is required in terms of routing and scheduling. Does not seem to address disconnect in transport demand, infrastructure development pace and operators investment in the sector. Does not offer concise road map on how to attain investment by private sector in road transport yet this is what is lacking in terms of route choice, design of vehicles Offers statement but do not give detailed arrangement of investment programme in road transport especially advanced system of Rapid Bus System and Light Train. Silent on the role of county governments. 	<ul style="list-style-type: none"> Allow for special licensing so long as the design of the vehicle allows for standing passengers. Formalise the sector so matatu owners could equally pay true economic cost Promote franchised market structure Just as CRA has formula for revenue allocation or ERC has formula for fuel pump price the same should apply to NTSA or county governs so as to establish acceptable pricing. Licensing should not be operator driven –operators are informed by economic forces and at some times ignore deontological expectations. Based on population, existing vehicle supply, NTSA/counties should have a scheme for route allocation. A standard acceptable waiting time at the terminus should be introduced. Say at peak 5minutes and off peak maximum of 10 minutes. Develop specific acts and regulations with finer details so as to anchor the policy.
4	Fare charged	<ul style="list-style-type: none"> Fair charged if pegged against income is high The economy of the city is characterised by informality and most of her residents (50-60%) are categorised as poor as their monthly income range from \$65 -\$78. At total of 40% felt that fare charged bad or very bad while. Most of the respondents (39%) were self-employed in informal sector and with a majority (25%) having income of less than 9999. In Nairobi, poor and marginalised are not well catered for in public mass transport (KIPRA, 2006: 1). 	<ul style="list-style-type: none"> Conduct a scientific research and come up with formula based on distance, prevailing fuel prices. Implement price caps Entice large corporates to enter the market so as to liberate and ensure price wars that would lower fare charged Invest in HoVs which have low cost per head which can then be transferred to consumers Encourage cheap and sustainable NMT
6	Slow traveling time and speed	<ul style="list-style-type: none"> Traveling speed is below the recommended 20km/h In 2015 it was estimated that the average vehicle speed in Nairobi was 19.9 km/m and this expected to reduce to 11.2 km/h in 2025. Urban sprawl has resulted to increased travel time in Nairobi. 	<ul style="list-style-type: none"> Road expansion Investing in HoVs to reduce traffic volume on the road while ferrying huge number per trip. Develop alternative such as LRT and BRT Have dedicated bus lane Give priority to buses at the junctions

			<ul style="list-style-type: none"> Lane reversals Transit oriented development through densification and curtailment of urban sprawl so as to limit travel distance
7	Noise levels	<ul style="list-style-type: none"> High noise levels 	<ul style="list-style-type: none"> Set limit levels/ acceptable noise decibels emanating from music
8	Waiting time and headway	<ul style="list-style-type: none"> Waiting time is beyond the minimum threshold of 5-10 minutes they are demand driven and not operated in timed schedules 	<ul style="list-style-type: none"> invest in high capacity carriers Introduce schedule charts and enforce them. For instance, during peak hours, in a terminal/bus stop a buss should not to take more than 5 minutes. Reduce demand driven approach that is based on the notion that PSV must fill to capacity before embarking. Promote service mix by having alternative to matatus such as NMITP, trains
9	Information	<ul style="list-style-type: none"> Dissemination of information on operational schedule and technical hiccups to customers is unavailable in daily operations of PSVs. 	<ul style="list-style-type: none"> Information charts displayed inside vehicles Digital/manual boards at the stations Sound system and periodic announcements
10	Bus stops	<ul style="list-style-type: none"> There is need to improve on the number of bus stops since they are widely spaced beyond the required 300-600m ASD. For instance, average bus stop spacing (ASD) in Riruta would be 785.7m. The outcome is not meeting the required minimum threshold of 600m. 	<ul style="list-style-type: none"> Modernise bus stops Increase ASDs to minimum of 600m Design them to have nodes and interchanges that encourages connectivity (disembarking/embarking).
11	Design standards	<ul style="list-style-type: none"> Over 30% of respondents felt that fleet quality are below par. No any single PSV was designed to cater for people with special needs/ physically challenged. 	<ul style="list-style-type: none"> Design sunken bus stop with ramps to allow physically disabled to access PSVs Make it mandatory before licensing that every PSV must have a space reserved for disabled Motor Vehicle Inspection Unit should adopt Whole Vehicle Type Approval Process (WVT) and Suitability Inspection before issuing conformity license.
12	Dominant single CBD	<ul style="list-style-type: none"> Most commuters are destined to CBD 	<ul style="list-style-type: none"> Through land use planning and economic policy develop multi nodal CBD and centre of employments to ease pressure on the current one. Decentralise and devolve services to avoid need to unnecessarily travel
13	Short service span	<ul style="list-style-type: none"> Vuchic (2005) states that recommendable service span in a day should be 18 hours. But from the field data. The highest service span recorded from the initial first trip and the last one in a given day was 15 hours. 	<ul style="list-style-type: none"> Stipulate as a mandatory requirement for subsequent licence renewal a minimum service hours to be clocked
14	limited opportunity for direct trips	<ul style="list-style-type: none"> limited opportunity for direct trips to various destination as such along these routes there is limited opportunity to travel numerous destinations 	<ul style="list-style-type: none"> introduce radial and through routing enhance connectivity
15	Traffic congestion	<ul style="list-style-type: none"> Evident from observation Long traveling time, waiting hours and large headways 	<ul style="list-style-type: none"> Dedicated bus lanes Limit private car ridership Encourage ride sharing Encourage NMT especially cycling Road expansion, junction improvement Proper land use planning Attitude change and public education Stringent enforcement of traffic laws Introduce radial routing instead of one way routing. Improve road connectivity with service and back lanes License HoVs only Invest in MRT such as BRT and LRT
16	Connectivity	<ul style="list-style-type: none"> Connectivity is a concern as connecting to other routes is a challenge owing to structuring of bus stops in the CBD –one cannot disembark and embark immediately. 	Have integrated terminus.
17	Limited customer choice	<ul style="list-style-type: none"> 62% of respondents preferred matatu mode 33% stated lack of alternative as the reason why they prefer matatu “to work” purpose is dominated by matatu 	Invest in modern and attractive alternatives
18	Informality and Limited patronage of public transport	<ul style="list-style-type: none"> For instance, only 42% using public transport (KIPPRA, 2006). Owing to informality and low service levels, most are resorting to private cars. KIPPRA (2006) states it at 9%; Omwenga (2011 citing King’ori, 2007) states it at 15.3%; Randu (2013) states it at 22%. Those with high disposable incomes are the ones investing in private cars which accounts for 15.3% of the modal split (Randu, 2013; Omwenga, 2011). After fall of KBS and Nyayo Bus, the market arrangement and ownership structure is a deregulated open access which has created a demand driven approach that does not address societal expectations especially for lowly profitable routes. The inefficiencies of public transport has pushed able individuals to resort to private means. Private car ownership grew at faster rate (7%) in 2011 as compared to buses and mini-buses at 5% (KIPPRA, 2015: 1). The private cars constitute 22% of registered vehicles yet account for 64% of traffic volume (Cameron, Laura and Seton, 2012). 	<ul style="list-style-type: none"> Encourage ride sharing Ban or tax highly those using private cars to access CBD Improve quality of PSVs by encouraging corporates
19	NMT	<ul style="list-style-type: none"> With 49 % using NMT (KIPPRA, 2006). There is need to invest and mainstream NMT infrastructure in reticulation network planning. Since 11. 4% of household own bicycle, it is prudent to invest in NMT. There is limited investment in NMT in Nairobi yet 47% walk while 1.2% cycle. 	<ul style="list-style-type: none"> Cabro paving to enhance walkability Introduce cycling lane Have designated parking zone for bicycles Have zones that are restricted so that no any vehicle can access apart from pedestrians

20	Lack of MRT such as BRT and LRTA	<ul style="list-style-type: none"> • By accounting for 75% of those who use public transport (Chitere et al., 2012). Nairobi transport is dominated by informal paratransit sector. • Higher population growth rate in the city (4%) as compared to national rate (3%) and projected higher population of 4, 174, 952; 4, 677, 771 and 5, 21, 500 in 2018, 2023 and 2030 respectively is likely to complicate mass urban transit issues. • The travel demand in Nairobi is 7.5 million trips a day yet the existing vehicles and rolling stock have limited capacity to address this demand (Omwenga, 2011). • 	<ul style="list-style-type: none"> • need for more vehicles/ rolling stock with high capacity to ferry passengers, more road spaces with expanded capacity, integration of land use planning in transport development and investment in modern means of transport such as BRT. • Invest in radial MRT • Have dedicated lanes for buses • Refurbish and expand the capacity of existing commuter rail • Integrate BRT within existing roads
21	Road design, junction bottle necks and distribution issues	<ul style="list-style-type: none"> • 33% of the respondents observed that majority of the roads were narrow • Emergence of Mavoko and Kitengela as dormitory towns with fastest growth has implication on traffic on Mombasa Road. • Kenya development approach of growth centre and service centre strategy has seen the government focus on class A, B and C of roads. • Road development has focused much on development without proper alignment with land use planning. In some instances, it is the transport corridors that influence land use planning as opposed to the opposite. 	<ul style="list-style-type: none"> • introduction of signalised junctions • Junction improvement through channelization. • Expansion of roads, constructing by passes and missing links • Have dedicated lanes where buses have R-o-W
22	Market structure and government absence as a direct player	<ul style="list-style-type: none"> • Government has taken initiative to invest in infrastructure but has not taken initiative to invest as a direct player operating her fleets. • No finite market space model advanced (regulated, deregulated franchise and deregulated open access) to be adopted by the government or how they are to be integrated in different contexts. • Kenya has attempted at the three approaches in isolation or in combination. The franchise arrangement is described as the best experience Kenya transport sector as it was well coordinated and organised. This is affirmed by (Prileszky, 2004). However, they were not able to anticipate and address demand arising for need for transport and increased urban rural migration; • 	<ul style="list-style-type: none"> • Reorganisation of institutional framework so as to deliver a coherent supporting frame; • Function separation so as to create institutions responsible for planning and those whether private that are responsible for operational functions; • Opening market space to encourage entry of new competitors; • Procuring of subsidised services by transport authorities using market process; • Creation of corporate public entities owned by local government that are structured as corporations and as such able to operate under corporate governance and accounting principles; • Adoption of privatisation, joint ventures and other approaches of structuring ownership framework of public transit; • Availing public assets to public and private players; and • Mobilising private investment and public-private partnership model.
23	Lack of proper traffic control, management and lack of proper transport planning (KIPPRA, 2015: 1).		<ul style="list-style-type: none"> • Develop signalised junctions • Junction improvement programs through removal of roundabout and investing in fly overs • Have yellow boxes/ junction box • Giving priority to buses • Introduce park and ride concepts integrated with rail transport • Have vehicle traffic free zones • Have transit oriented development

Source: Author, 2016; Field Data, 2016; literature review materials

6.11.2 Infrastructure Perspective: Junction Improvement

The government has invested heavily in road expansion within Nairobi County. For instance, Thika Super highway project led to expansion of University way into 8 lanes, a 6 lane road covering Forest Road Museum Hill Roundabout, Museum Road and a fork-shaped flyover across Limuru Road. To enhance acceleration speed, Muthaiga Roundabout – Kenyatta University was developed with restricted access and exits. Jogoo-Landhies Road is already a dual carriage way with two lanes. Other arterial roads feeding into the CBD with two or more lanes in each direction include Valley Road-Kenyatta Avenue; Mombasa Road –Uhuru Highway – Waiyaki Way. Government is equally investing in more expansion projects and connection of missing links in project areas such as Eastern, Northern and Southern Bypass and ongoing project of Outer Ring Road.

While road expansion leads to increased speed which lead to reduced time costs of trip and thus making travel more attractive, there is realisation that this is normally a short term solution as road expansion in long run does not result into reduced traffic congestion owing to its ability to create induced demand/ induced traffic (Taylor, 2002: 13). Key to overcoming such deficiencies associated with road expansion, is to invest in junction improvement especially when topography is not the chief causative agent of the bottleneck. Junction are associated with travel bottlenecks that are recipe for traffic conflict (Eyler, 2005: 66). The two levels of government have initiated various raft of measures of junction improvement such as signalised junctions, channelization of lower hill /Haile Selassie and Upper Hill/ Haile Selassie junction and revised movement. To continually improve travel speed, reduce congestion, limit traffic crossing conflicts, enhance safety and enhance capacity in Nairobi, there is need to invest in interchanges at various strategic points.

For the routes under consideration, the following would be a priority with exception of Mathare North Route that is served by Thika Super Highway. Along Jogoo-Landhies the investment priority areas are at (1) Donholm Roundabout. (2) Jogoo/Landhies/ Lusaka Roundabout. (3) Landhies/ Haile Selassies Avenue/ Pumwani Road/ Ring Road Pumwani and River Road Roundabout. For Riruta Route, some investment priorities would be (1) Kenyatta Avenue/ Uhuru Highway Roundabout. (2) Valley Road/ Milimani Road/ Kenyatta Avenue Junction. (3).Ngong Road/Valley Road/ Mbagathi way roundabout. (4) Haile Selassies Avenue/ Uhuru Highway Roundabout.

Plate 2: Landhies/ Haile Selassie Avenue/ Pumwani Road/ Ring Road Pumwani and River Road Roundabout



Source: Overlay of JICA GIS data and Google Aerial Image

Plate 3: Kenyatta Avenue/ Uhuru Highway Roundabout

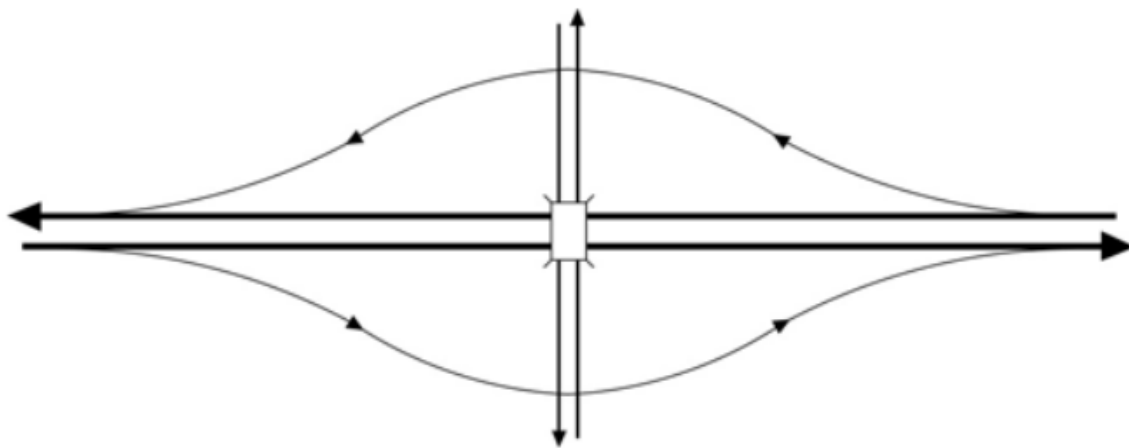


Source: Overlay of JICA GIS data and Google Aerial Image

One of the development project under junction improvement would be construction of traffic interchanges through grade separations and having a combination of ramps. This is critical in curtailing crossing conflicts while at the same time improving safety and capacity. With varying designs, interchanges could be constructed in local streets or in high/freeways. Since most of the identified routes under consideration are local streets apart from two roundabouts (Kenyatta/uhuru highway and Haile Selassie/ Uhuru Highway) the discussion centres on what can be done for local streets.

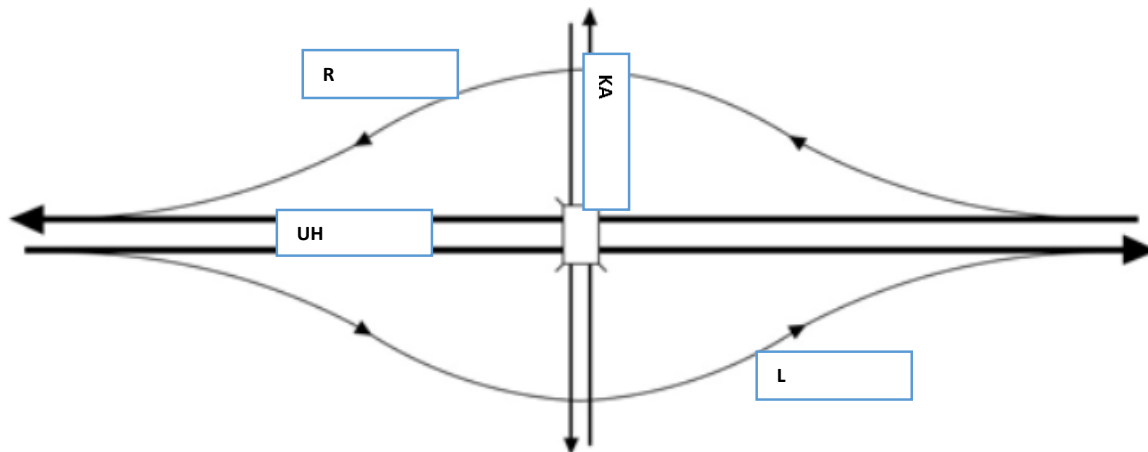
In designing the interchanges for local streets, volume, traffic composition and speed should be taken into consideration. For the case of the above identified junctions/ roundabouts, implementation of isolated off ramps/ partial interchanges should not be implemented as they are sure way of causing wrong-way movements and increased confusion. The simplest design of the proposed interchanges would be the diamond design. Other possible implementations include clover leaf interchanges, interchanges with parallel street systems, single point interchange and trumpet interchanges.

For instance, Type L-2 design of an interchange below (the spread diamond) could be easily applied in most of our roundabouts. In this case, the grade of the cross street is modified to pass over or under the highway. In constructing the above, designs have to take care of maximum sight distance, minimum intersection cross slope, travel distance, general appearance and right-of-way cost.



Source: California Department of Transportation, 2001: 500-2

For instance, if it was to be the context of Uhuru Highway/Kenyatta Avenue Round About with UH being Uhuru Highway and KA being Kenyatta Avenue, at the grade level, Uhuru Highway will continue uninterrupted – this implies that vehicles maintaining the straight direction without branching to KA either way would drive at grade level. KA would be take below the grade (an under pass – those driving straight on KA without having intention to join UH to either left or right direction would drive below the grade. Then those intending to join UH or KA either to either left or right direction would drive above the grade as R and L would be elevated.



Source: Author, 2016

6.11.3 Land Use Planning Perspective: Transit oriented development

Within the context of growth, change and economic manifestation in space, Nairobi CBD/core exhibit a dominant space over other spaces within her boundaries. For instance, the CBD has a population density of 10, 966 people per km² as compared to other economic hubs within the city such as Parklands which have 2, 490 people per km² (Cruz, Sommer and Tempra, 2006: 6). One of the problems associated with such spatial structure with a dominant core is that the CBD of Nairobi has over the years grown dependent on motor vehicles as the chief means of accessing it thus translating into increased demand for carriageways that eats into the limited space and which subsequently compromises the accessibility that endeared economic activity of this area (Karuga, 2003). The same information is corroborated by findings in 6.3.1 of network analysis of matatus.

To limit such negative trends of having a dominant CBD (zone 1A and 1E) which attracts most residence to the CBD leading to traffic congestion, there is need to have deliberate effort to decongest the CBD. The strategies can be inward looking or outward looking. Outward looking

take consideration of the national macro economy under primate city arrangement/ 3k principle and growth centre strategies of total dispersal, selective dispersal or concentration. Inward looking strategies focus on city boundaries by decentralising development, provision of services and empowering of growth areas within the context of centre periphery relationship so as to reduce population pressure on the CBD through approaches such as densification/compact development so as to limit urban sprawl or through transit oriented development.

The focus of this section is an inward looking approach through neighbourhood design and Transit oriented development. Neighbourhood design is premised on nine principle with three of them being key on transportation and they are outlining a mix of land uses and integrating them, ensuring the neighbourhood is well connected to provide multi-modal choice and striving for a more compact urban form and increased density to create distinct neighbourhood nodes (Haixiao *et al.*, 2003). According to America (2007) “TOD is typically defined as more compact development within easy walking distance of transit stations (typically a half mile/ approx. 800m) that contains a mix of uses such as housing, jobs, shops, restaurants and entertainment”.

While there are alternative economic centres that do not requires one to access the CBD for some level of services apart from higher order goods, some of these centres such as Makadara and Ngara are decaying while some have emerged as exclusive hubs or located far away as result of urban sprawl. The current approach to create multiple service and employment centres has not been driven by deliberate comprehensive land use planning such as neighbourhood but by private sector through change of use or through development of shopping malls. Areas that have emerged under later consideration include Westland, Adams Arcade and Nairobi West.

The older planned neighbourhoods in zone 2 and 8 such as Shauri Moyo, Maringo, Jerusalem, Makadara, Komarock and Buru Buru depict such traits of easy walking distance of transit stations while containing a mix of uses such as housing, jobs, shops, restaurants and entertainment. However, they are suffering from decay. At a time their deficiency can be inadequacy in hosting job opportunities due to the level of service they offer. Zone 10, 10E and 11 built under site and service scheme or by NHC are equally showing traits of neighbourhood design and TOD. Zone 6, 7 and 16 such as Mathare, Korogocho, Baba Dogo and Dandora are located to employment

opportunities but they are decaying with poor housing conditions and inadequate supply of other support services such as restaurants and entertainment.

Plate 4: Makadara Neighborhood

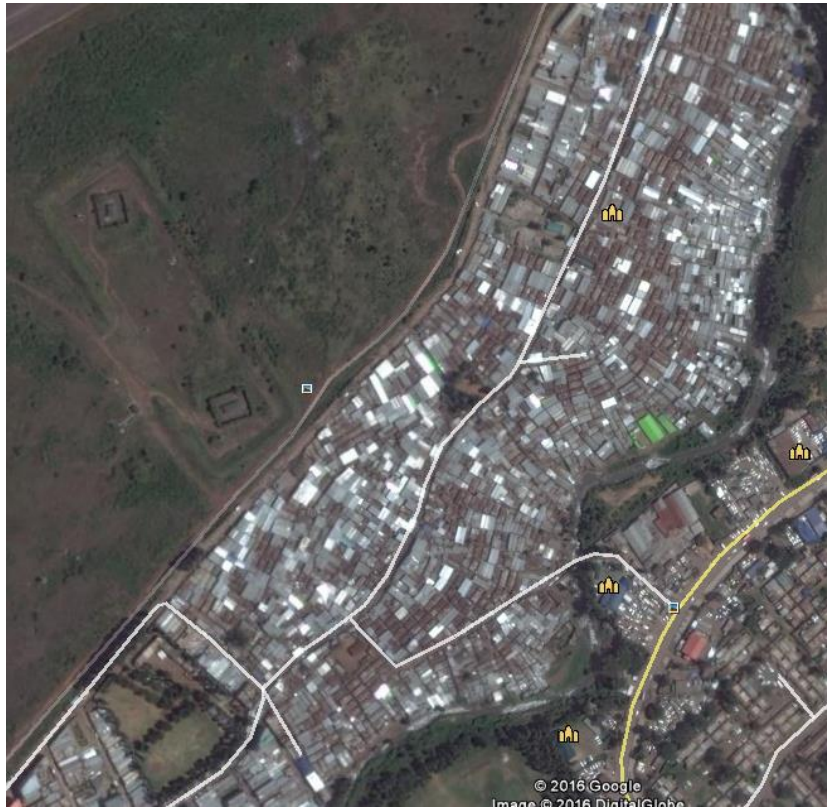


Source: Google Earth

Other neighbourhoods with some traits towards TOD include zone 3, 5 and 6 such as Westlands and Lavington owing to neighbourhood design that availed housing, jobs, shops, restaurants and entertainment closer. However, the shortcoming of these zones is lack of compactness since they are treated as low density zones or inadequate easy walking distance of transit stations since most occupiers of these estates rely on private cars as means of transport.

The zones with less depiction of TOD traits are those falling under special scheduled areas, agricultural/ residential zones, low density zones with single family dwelling unit as the permitted use and some industrial/residential zones. These include zone 19 such as Kahawa Sukari; zone 17 and 18 such as Kasarani; zone 15 such as Kangemi, Waitihaka, Uthuru.

Plate 5: Kiambio Informal Settlement



Source: Google Earth

For instance, plate 8 above shows Kiambio informal settlement that is nestled between Eastleigh Air Base, Uhuru Estate and Buru Buru Phase1. From the aerial image above, there is one reticulation route with some few branching lane. The area has got no supporting social and economic facilities. This makes the occupants travel demand higher as they go to seek services outside their neighbourhood. At the same time, the access is limited and so they have to walk some distance before reaching bus terminals to access PSVs.

Since there exist some of the alternative service centres, to attain transit oriented development, three critical improvements are required. These are renewal of decaying centres, economic strengthening and enhancing of connectivity. This should encompass a city wide exercise with more of the exercise focusing zone 19, 18 and 17.

6.11.4 Policy specific issues

As summarised in table 39 and annex 21, the following are policy, legislative and regulatory gaps that should be addressed:

A). The policy, regulation and Act favour small operators. Who end up ending formal organized companies as it happened to KBS. For instance, Legal Notice No. 161, NTSA Regulations of 2013 amends the Kenya Traffic Act CAP 403 which banned carrying of standing passengers. This implies that bus operators find it difficult to compete during off-peak hours as consumers prefer small vans that are able to fill up quickly – smaller vans have higher frequency in off peak hours (Del Mistro and Behrens, 2012). As such the only time that buses can recoup from this challenge is during peak hours when they could be allowed to carry standing passengers especially if they are designed to carry standing passengers. By not allowing for standing passengers, the implication has been low capacity buses crowding at the centrifugal CBD and along the routes.

The policy and regulations foresaw a need to have human resource capacity development and proper employment contracts. However, this has not been the case with small operators. This implies that they are not paying true economic cost as compared to organised firms such as MOA or KBS as they are not governed by labour regulations on minimum wage and payment of taxes such as PAYE and income duty. The bottom line is continued informality as operator prefer such arrangement for tax avoidance and evasion purposes.

Needed policy response

- i. Have special licensing provision for standing passengers. This would translate to fewer vehicles and the urge to move when all seats are occupied.
- ii. Within Nairobi CBD, instead of an individual owner having multiple vans/buses, it should be made mandatory not only to stop licensing 14 seaters but to upscale it to articulated buses that could carry up to 120 commuters.
- iii. Make it mandatory for individual owners KRA PIN to be linked with tax system so that the moment they do not pay tax as corporates the same is recovered at individual level.

B). Licensing and routing. The current licensing is premised on a demand driven approach. This implies that PSVs seek to operate in lucrative routes – where fare charges are high and thus

neglecting other routes and seeking to access core of the CBD as it offer competitive advantage over other competitors.

The NTSA Act, 2012 is geared towards registration, identification and safety while neglecting aspects of service quality in transport such as accessibility, design, routing, timing and fares.

Needed policy response

- i. NTSA should allocate rote licenses based on need and not as informed by operators choice.
- ii. To limit urge to access CBD, PSVs could be limited to passing through the CBD serving busy routes on both side of the city thus locating termini at the CBD periphery.
- iii. Develop bus termini with high level of connectivity such as KENCOM/ Ambassador that allows commuters to disembark and embark without having to change stations.
- iv. A combination alternative, is to have through routing that connects employment centres to different sides of the city without passing in the CBD. For instance, we could have a vehicle heading to KNH from Umoja without going through CBD.

C). Lack of intermodal integration. In Kenya each mode operate like an independent entity without clear infrastructure and logistic interlink ages. There is minimal effort to interlink road transport with rail or rail transport with air transport. While an attempt has been made to develop park and ride concept in makadara, imara daima and syokimau, the uptake is minimal.

Policy implication

- i. Development of transport network should take into consideration modal integration through appropriate design of nodes and interchanges.
- ii. Integrate R-O-W between LRT and BRT so as to develop robust MRT.

D). Market structure and Limiting number of registered operators. The policy/ regulations is silent on number of operators within a CBD. Currently there are over 600 registered SACCOs/Companies. As regulating massive entities as such becomes difficult. For within city travel, the policy/ Act/ regulation could cap the number of operators through a defined market organisation structure.

The NTSA Act, 2012 and 2013 regulations are geared towards streamlining externalities without addressing internal control issues and corporate standards yet the internal control issues have direct bearing on external issues. SACCOs are not for the purpose of efficiency and service delivery but a means to registrations as PSV operator and branding. This is evident when accidents happens and route managers are not able to account for anything.

Needed policy response

- i. Introduce a plausible market organisation model that addresses the weaknesses of Deregulated open access/ competitive free market scheme/ competition vs. regulated/ public monopoly. A good plausible option is the gross cost-based system Deregulated Franchise/ Competitive tendering system/ competition for the market. This approach has proved to be a better remedy in controlling cost while ensuring efficient and quality service (Prileszky, 2004: 7). The same is evident during franchise ownership model between NCC and OTC (McCornick, et al., 2011; Manundu, Kapila and Lamba, 1983).
- ii. Limit private sector provision of public transport as most of the time the choice of vehicle is informed by technical and economic benefits rather than public good (Vijayakumar, 1986). As such NTSA should come up with optimal mix of PSVs appropriate for urban areas. County government should start operating as owners PSVs.

E). Limited scope that focuses registration, mechanical safety and comfort. For instance, Traffic Act aim was to addresses concerns of road accidents, disorganised operations and careless driving (Mitullah and Asingo, 2007). Issues of comfort such as seat spacing are discussed in section 85 of the Act. The legal notice No, 16 and NTSA 2013 regulations focus on registration of corporate bodies, installation of speed limiters and identification of the vehicles and operating crew.

There is a limited direct stipulation on addressing unpredictability and disorganisation resulting from timing, routing, crime, congestion and location of termini.

Needed policy response

- i. There is need of more regulations and Acts to actualise the aspirations of the policy by describing these into details.
- ii. Make it mandatory for operators and county governments to employ ICT so as to monitor departure time, waiting time and fare calculation.

F). Limited institution capacity for enforcement, institutional coordination and political goodwill. The public transport system in Kenya has been highly politicized and thus introducing stringent regulations has been a challenge as seen in the entry of Nyayo bus in 1986 (Waweru, 2013; Kenya Bus Service, 2012; Mutunga, 2011).

Does not address disconnect of proposed tough repercussions against the larger macro-economic environment that is full of informality and thus to survive operators have to gain some informality.

At the same time infrastructure development has lagged behind yet implementation of these rules require up to par infrastructure development.

The policy offers broad sentiments and thus there is need for further refinement through Acts, and Regulations. For instance, there is need for enactment of the proposed Road Transport Act, 2013 (Mukabanah, 2013). Moreover, it seem not to address disconnect in transport demand, infrastructure development pace and operators investment in the sector.

Does not offer concise road map on how to attain investment by private sector in road transport yet this is what is lacking in terms of route choice, design of vehicles. For instance, it offers statement but do not give detailed arrangement of investment programme in road transport especially advanced system of Rapid Bus System and Light Train. At the same time, it is silent on the role of county government.

Needed policy response

- i. Address issue of corrupt enforcement regime;
- ii. Propose a proper training curriculum and rules for entry. Training leads to professionalism and improved positive attitude. While lack of entry rules lead to attraction of unprofessional investors;
- iii. Enact Road Transport Act;
- iv. Stop haphazard licensing by county government and NTSA as a means of raising revenue. This is equally a sure way of limiting entry into any road transport profession that creates leeway for crooks and
- v. Formulate guidelines for build, own operate and transfer models for PP/ joint ventures.

G). Other gaps in the legal and regulatory framework. A good policy is expected to lead to realisation of a good legislative framework. A sound legislative framework will in turn build stronger institutions which will manage public transit effective.

- i. Kenya has no urban transport policy. The current framework is uncoordinated and fragmented leading to a confused management of road transport. One of the proposals would be to have metropolitan transport authorities for Kenyan cities and major municipalities.
- ii. There no road transport act to govern road transport. The current traffic act is disjointed and non-aligned with constitutional requirements.

- iii. There is inadequate standards and specification. The public transit sector has various models and specifications all licensed to operate as PSVs. Motor Vehicle Inspection Unit (MVIU) should be empowered to develop stronger codes that ensure standardisation of vehicles for use in PSV. Their operations should be strengthened. Currently, they have 19 vehicles for enforcement and operations.

H). Sustainability concerns. Public transit is a principal contributor to environmental degradation.

- i. There should be laws promoting less polluting fuels and rewarding use of fuel efficient vehicles.
- ii. Develop policy towards biofuel development.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This chapter briefly draws conclusions of the study and the resultant recommendations given by the researcher as per the preceding chapter's research findings, data analysis and discussions. The conclusions drawn and recommendations made to the stakeholders and the potential consumers of the findings.

The study sought to examine the effects of introduction of the policy and regulation on customer service in public transport sector by answering the following research question: the extent that Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and National Transport and Safety Authority Regulations 2013 have been implemented; the characteristics of PSV industry operations; consumer satisfaction with PSV service quality offered after formulation of the policy and how the current regulatory structure be combined with other approaches for improved transport system in Nairobi.

In regard to question one, participants were indifferent as to whether the regulations had made any improvement on the public transport sector. Equally, other supporting information derived from capacity measurement and dispatch bus per route survey created two opinions with some results showing level of implementation while others showing the contrary. Timing, routing, fare charges, bus stop spacing, universal design and consumer information were a concern. On the other hand corporation of the sector and investment in high capacity vehicles were a positive note.

In regard to question two, the study established organisation level of the PSV industry ranks as low to medium. For instance, business ownership is structured in a manner that individuals are the one owning one or more vehicle. This is the greatest source of informality and resistance to change. For instance, small operators were more resistant to phasing out of 14 seater matatus and would always interfere with operations of SACCOs with large buses. SACCOs are at the low organisation level since it is an agglomeration for the purpose of acquiring operational license. For instance, financing is left to individuals or family as opposed to investors or banks. Companies display a moderate organisation level. For instance, they operate in more than one route, financing is by family and banks, operations are done by management and they tend to adhere to flat zoned ticketing system.

For consumer satisfaction, that was measured using a perception opinion, a varied mixed reaction emerges. Half of participants agreed that PSV service quality has improved with the implementation of the requirement for the formation of PSV SACCOs ($\bar{X}=2.9$; $SD=0.792$).

Fourth, on how the current regulation can be structured with other approaches for transport reform, the respondents indicated that there are enough laws and regulations to manage the commuter transport sector and thus called for stringency in the implementation of these regulations. However, other participants felt that there is need to do more in the industry than there is in the regulations. The highest priority for most respondents (19.8% was to construct more feeder roads. This was followed by 16.80% who said there is need to regulate fare charged. In the third order of priority was to train on road safety (9.9%) and reduce loud music (6.9%) respectively. However, from dispatch bus per route survey and field experience, the priority areas would be improvement of junction to enhance traffic flow; embed TOD in transportation planning and streamline weaknesses evident if the current policies.

In regard to inferential statistics of measuring association using Chi-Square, the research hypothesis of (H_a) of Implementation of the INTP has led to improvement in service delivery was accepted. It means there is positive association between the policy, the legislation and regulations and improved service quality.

In overall, there is some improvement in service delivery/ service quality. However, these improvements do not massively stands out as certain aspects are not yet achieved. It is only the third research question that returned a clear negative verdict of non-improvement. first and second research question had both negative and positive response of nearly equal weighting. Therefore, the INTP and NTSA 2013 have made tremendous contribution but still leaves a lot to be desired as it only addresses issues of licensing and speed regulations while ignoring other pertinent issues such as flow control, physical bottlenecks, formalisation of the sector, reduction in conflict, passenger comfort, routing issues and passenger safety that would give birth to a holistic integrative approach.

7.2 Recommendations

From the conclusion above, the study came up with recommendations influenced by the realisations and information derived in the field work research, secondary literatures and theoretical background of integrative transport planning.

7.2.1 Policy Makers

- 1) Ministry of Transport and Infrastructure in collaboration with National Parliament should enact policy on urban transport policy. So as to address the unique needs of urban transport to be adequately addressed.
- 2) Just as NTSA was created as a regulatory institution, there is need to create Metropolitan Transport Authority as an investment arm in transport services within the city and other major municipalities.
- 3) There is need to create a new Road Transport Act to replace the inconsistent Traffic Act Cap 403.
- 4) There is need to enact law to address issues of sustainability by formulating laws on promoting less polluting fuels and rewarding use of fuel efficient vehicles and development of policy towards biofuel development.
- 5) County Governments to come up with market organisation regimes based on scientific study on the best plausible options for urban areas within their jurisdiction.
- 6) While preparing land use development plans, incorporation of transit oriented development schemes should be a priority.
- 7) County assemblies should formulate localised version of transport policy so to overcome lacunas associated with generalisation against the informal nature of Kenyan economy.
- 8) Amend Legal Notice No.161 and NTSA Regulations of 2013 to allow for standing commuters in situations where such buses are designed to do so.
- 9) Make matatus pay for the true cost of their operations to create a level playing field.

7.2.2 Policy Implementers

- 1) Motor Vehicle Inspection Unit should adopt Whole Vehicle Type Approval Process (WVT) and Suitability Inspection before issuing conformity license.
- 2) Address issue of corrupt enforcement regime especially by traffic officers and county inspectorate department by having strong oversight regime.

- 3) NSTA to develop entry requirement and training curriculum for operation crew just as in other professions so as to enhance professionalism.
- 4) Road development agencies such as KeNHA, KURA, KERRA and County Governments should work towards traffic flow improvement at junctions by doing away with roundabouts and X junctions and substituting them with interchanges.
- 5) NTSA in collaboration with county governments should come with scientific licensing regime that ensure equitable distribution of buses in all routes based on population and deontological expectations as opposed to market driven forces.
- 6) Ministry responsible for transport or NTSA should come up with fare regime based on inflation, distance, and fuel price and neighbourhood characteristics.
- 7) County governments should employ use of ICT in most of critical bus termini in order to enhance waiting time, travel time and queuing system.
- 8) To limit the tendency of private players to focus on economic benefits rather than public good, national government and or county governments should not only focus on infrastructure development and licensing but also on their own fleets. A case point is to invest in Rapid Mass Transit through Light Rail or Bus Rapid Transit.
- 9) KeNHA, KURA, KERRA and County Governments in designing bus stop should focus on modal integration, connectivity and location at periphery so as to avoid crowding at CBD.
- 10) NTSA to stipulate in license a minimum required service span say of 18 hours per day as a pre-condition for renewal.
- 11) In all PSVs as a mandatory minimum for licensing, there should be at least a seat reserved for disabled.
- 12) Waiting time during peak period should be a maximum of 5 minutes and a maximum of 10 minutes during off peak hours. County governments should introduce metering system at bus parks that if contravened an extra penalty is incurred.
- 13) Develop silo parking so as to accommodate more PSVs.
- 14) County should ensure that route overlapping ration is maintained at 5 while bus stop spacing at a maximum of 600m.
- 15) KeNHA, KURA, KERRA and County Governments should develop infrastructure for NMIT so to encourage sustainable alternatives.

7.2.3 Operators

- 1) Should scale their investment in buses of high carrying capacity so as to help decongest roads while moving huge number of people per trip.
- 2) They should invest in ICT to aid in decision making about routing and timing.
- 3) They should embrace through trips as opposed to those terminating at CBD so as to enhance opportunity of travellers to reach numerous destinations.
- 4) Improve on their service span hours, coverage and headway so as to improve quality.
- 5) Limit the inside noise levels through low decibels of music played.
- 6) Improve on customer information by having digital boards, voice over loudspeaker announcements and fare charts.
- 7) There should be a digital database of licensed drivers and in case of indiscipline, NTSA should firmly discipline wayward drivers through withdrawal of driving licence and total ban.
- 8) Enforce queuing system of first-come first served with exception of people with special need so as to ensure orderly boarding.
- 9) Invest in ticket transfer and season ticketing system as opposed to daily ones.
- 10) Ensure there are seating reservation for people with disability.

7.2.4 Users

- 1) Enhance patronage to public transit so as to reduce traffic congestion.
- 2) Behave in orderly manner during peak hours while accessing public transit.
- 3) Have preference for NMIT means.

7.3 Prioritised Recommendation

7.3.1 Quick Wins

- 1) Amend Legal Notice No.161 and NTSA Regulations of 2013 to allow for standing commuters in situations where such buses are designed to do so.
- 2) Make matatus pay for the true cost of their operations to create a level playing field.
- 3) Motor Vehicle Inspection Unit should adopt Whole Vehicle Type Approval Process (WVT) and Suitability Inspection before issuing conformity license.
- 4) Address issue of corrupt enforcement regime especially by traffic officers and county inspectorate department by having strong oversight regime.

- 5) NTSA to stipulate in license a minimum required service span say of 18 hours per day as a pre-condition for renewal.
- 6) In all PSVs as a mandatory minimum for licensing, there should be at least a seat reserved for disabled.
- 7) Waiting time during peak period should be a maximum of 5 minutes and a maximum of 10 minutes during off peak hours. County governments should introduce metering system at bus parks that if contravened an extra penalty is incurred.
- 8) Operators should invest in ICT to aid in decision making about routing and timing.
- 9) Operators should embrace through trips as opposed to those terminating at CBD so as to enhance opportunity of travellers to reach numerous destinations.
- 10) Operators should improve on their service span hours, coverage and headway so as to improve quality.
- 11) Operators should limit the inside noise levels through low decibels of music played.
- 12) Operators should improve on customer information by having digital boards, voice over loudspeaker announcements and fare charts.

7.3.2 Medium Term

- 1) Ministry of Transport and Infrastructure in collaboration with National Parliament should enact policy on urban transport policy. So as to address the unique needs of urban transport to be adequately addressed.
- 2) Just as NTSA was created as a regulatory institution, there is need to create Metropolitan Transport Authority as an investment arm in transport services within the city and other major municipalities.
- 3) There is need to create a new Road Transport Act to replace the inconsistent Traffic Act Cap 403.
- 4) There is need to enact law to address issues of sustainability by formulating laws on promoting less polluting fuels and rewarding use of fuel efficient vehicles and development of policy towards biofuel development.
- 5) NSTA to develop entry requirement and training curriculum for operation crew just as in other professions so as to enhance professionalism.

- 6) Road development agencies such as KeNHA, KURA, KERRA and County Governments should work towards traffic flow improvement at junctions by doing away with roundabouts and X junctions and substituting them with interchanges.
- 7) NTSA in collaboration with county governments should come with scientific licensing regime that ensure equitable distribution of buses in all routes based on population and deontological expectations as opposed to market driven forces.
- 8) County governments should employ use of ICT in most of critical bus termini in order to enhance waiting time, travel time and queuing system.
- 9) To limit the tendency of private players to focus on economic benefits rather than public good, national government and or county governments should not only focus on infrastructure development and licensing but also on their own fleets. A case point is to invest in Rapid Mass Transit through Light Rail or Bus Rapid Transit.
- 10) KeNHA, KURA, KERRA and County Governments in designing bus stop should focus on modal integration, connectivity and location at periphery so as to avoid crowding at CBD.
- 11) Develop silo parking so as to accommodate more PSVs.
- 12) County should ensure that route overlapping ration is maintained at 5 while bus stop spacing at a maximum of 600m.
- 13) KeNHA, KURA, KERRA and County Governments should develop infrastructure for NMIT so to encourage sustainable alternatives.
- 14) Should scale their investment in buses of high carrying capacity so as to help decongest roads while moving huge number of people per trip.

7.3.3 Long Term

- 1) County Governments to come up with market organisation regimes based on scientific study on the best plausible options for urban areas within their jurisdiction.
- 2) While preparing land use development plans, incorporation of transit oriented development schemes should be a priority.

7.4 Areas for Further Research

In concluding the study, there are emerging discourse that elicits need for deeper interrogation in reference to transport within Nairobi and major municipalities.

- 1) The long term market organisation structure (regulated, deregulated franchise or deregulated free economy).

- 2) The appropriate transport mix between high capacity carriers and low capacity.
- 3) Possible formula of determining fare pricing while taking into consideration distance, economic status and travel time.
- 4) Distribution of concessions to operate in given routes required number of vehicles per a given section of the route.
- 5) Possible spatial re-organisation so as to entrench TOD in the city.
- 6) Focus on studying the higher level changes and institutional capacity adjustment and their effectiveness in implementing traffic laws. This also calls for analysis of the coordination of transport regulations across the different institutions and government departments.
- 7) Another area of study suggested here is to investigate the effectiveness of traffic police in implementation of new traffic laws where the focus will be on the role of traffic bribes, prosecution and successful cases relating to the breaking of the new laws.

REFERENCES

- Abraham, P. and Taylor, E. (1999). Customer satisfaction and its measurement in hospitality enterprises. *International Journal of Contemporary Hospitality Management*, 11 (7): 326-339.
- Aduwo, G. O. and Obudho, R. A. (1992). Urban transport system: A case of the Matatu mode of transport in the city of Nairobi, Kenya. *African Urban Quarterly*, Vo.7 (1) and (2).
- Aduwo, I. G. (1990). *The Role, Efficiency and Quality of Service of the Matatu Mode of Public Transport in Nairobi: A Geographical Analysis*. M.A. Thesis, University of Nairobi.
- Asingo, P. 2004. The Institutional and Organisational Structure of Public Road Transport in Kenya. DP no. 050 Nairobi: IPAR.
- Asingo, P. Q., & Mitullah, W. (2007). Implementing Road Transport Safety Measures in Kenya. Working Paper 545. IDS: University of Nairobi.
- Berry, B. J. and Pred, A. (1965). *Central place studies: a bibliography of theory and applications with supplement*. Philadelphia: Regional Science Research Institute.
- Bhat, C., Guo, J., Sen, S., & Weston, L. (2005). Measuring access to public transportation services: review of customer-oriented transit performance measures and methods of transit submarket identification (pp. 48). Texas: Center for Transportation Research, The University of Texas Austin.
- Bojanic, D. C. & Rosen, L.D. (1994). Measuring Service Quality in Restaurants: An Application of the SERVQUAL Instrument. *Hospitality Research Journal*, 18(1): 4-14.
- Brookings (2012). The 10 traits of globally fluent Metro Areas. Retrieved on 5 January, 2016 from:
<http://www.brookings.edu/~media/Multimedia/Interactives/2013/tentraits/Nairobi.pdf>.
- Brown, J. and Thompson, G. L. (2009). *The Influence of Service Planning Decisions on Rail Transit Success or Failure*, Mineta Transportation Institute (www.transweb.sjsu.edu); at [www.transweb.sjsu.edu/MTIportal/research/publications/documents/ServicePlanningDecisions20\(with%20covers\).pdf](http://www.transweb.sjsu.edu/MTIportal/research/publications/documents/ServicePlanningDecisions20(with%20covers).pdf).
- Cameron L., Laura W. and Seton S. (2012), Kenya's Climate Change Action Plan: Mitigation Chapter 7: Transportation. International Institute for Sustainable Development, Canada.
- Central Bureau of Statistics (2009). *Population and housing census results*. Retrieved on 20th March 2012 from:
<http://www.knbs.or.ke/Census%20Results/Presentation%20by%20Minister%20for%20Planning%20revised.pdf>
- Cereda, V. (2009). Compact City and Densification Strategies The Case of Gothenburg (Doctoral dissertation, Dissertation Masters of European Spatial Planning and Regional Development, Blekinge Technical Highschool).
- Cervero, R. (2001). Efficient urbanisation: economic performance and the shape of the metropolis. *Urban Studies*, 38(10), 1651-1671.
- Cheong, C. C., & Nadiah, L. O. H. (2013). Transport Policies and Patterns: A Comparison of Five Asian Cities. JOURNEYS.
- Chitere, P. O. and Kibua, T. N. (2005). *Efforts to improve road safety in Kenya: achievement and limitation of reforms in matatu industry*. Institute of Policy Analysis and Research

- Cox, W., & Consultancy, W. C. (2003). *Competitive Participation in US Public Transport: Special Interests Versus the Public Interest*. Wendell Cox Consultancy and Conservatoire National des Arts et Metiers.
- Darido, G. (2003). Regulation of road-based public transportation and strategies for the developing world. *Transportation Research Record: Journal of the Transportation Research Board*, (1835), 66-73.
- Datta, P. (2006, June). Urbanisation in India. In *European Population Conference*, Bratislava, Slovak Republic, June (pp. 21-24).
- Davison, L. J. & Knowles, R. D. (2006). Bus quality partnerships, modal shift and traffic decongestion. *Journal of Transport Geography*, 14(3), 177-194.
- Directorate for financial and enterprise affairs competition committee, Global forum on competition. (2009). *Competition policy and the informal economy session II: contribution from Kenya*. DAF/COMP/GF/WD(2009)9
- Dodson, J., Mees, P., Stone, J. & Burke, M. (2011). The principle of public transport network planning: a review of the emerging literature with select examples: Urban Research Program, Griffith University.
- Drakakis-Smith, D. (2011). *Urbanisation in the developing world* (Vol. 66). Routledge.
- Eriksson, L., Garvill, J., & Nordlund, A. M. (2006). Acceptability of travel demand management measures: The importance of problem awareness, personal norm, freedom, and fairness. *Journal of environmental psychology*, 26(1), 15-26.
- Finn, B., & Mulley, C. (2011). Urban bus services in developing countries and countries in transition: A framework for regulatory and institutional developments. *Journal of Public Transportation*, 14(4), 5.
- Fu, Y. Y. (1999). Service Quality Dimensions Influencing Older Diners' Intention to Return. *Proceedings of Fourth Annual Graduate Education and Graduate Students Research Conference in Hospitality and Tourism*, 549-558.
- Galloway, R. (2009). Space Node Place. Institute of Transportation Engineers, "Strategies to Alleviate Traffic Congestion", *Proceedings of ITE's 1987 National Conference*, San Diego, March 1987, Washington, D.C, ITE, 1987.
- Gicheru, E., Migwi, W. and M'Imanyara, K. (2011). *An Analysis of the Socio-Economic Impact of the New Integrated National Transport Policy: The Case of 14-Seat Transport SACCOs in Kenya*. A paper presented at ICA global research conference. Mikkeli, Finland.
- Goodman, J., Laube, M., & Schwenk, J. (2005). Curitiba's bus system is model for rapid transit. *Race, Poverty and the Environment*, 75-76.
- Gorter, C., & Rienstra, S. A. (1997). Factors influencing the Composition of the Urban Transport System in the Year 2030-A Panel Analysis of Experts' Opinions (No. 96-181/5). Tinbergen Institute Discussion Paper.
- Government of Kenya (2013). *National Transport and Safety Authority (Operation of Public Service Vehicles) Regulations 2013*. Nairobi: Government Printing Press.
- Government of Kenya (2013). *National Transport and Safety Authority Act, 2012*. Nairobi: Government Printing Press.
- Graeff (2009). *The organization and future of the Matatu industry in Nairobi, Kenya*.
- Gronroos, C. (1990). *Service Management and Marketing-Managing the Moments of Truth in Service Competition*. Massachusetts: Maxwell MacMillan.

- Guihaire, V., & Hao, J. K. (2008). Transit network design and scheduling: A global review. *Transportation Research Part A: Policy and Practice*, 42(10), 1251-1273.
- Hammer, C. & Ikle, F.C. (1957). Intercity telephone and airline traffic related to distance and the 'propensity to interact'. *Sociometry*, Vol. 20, pp. 306 -316.
- Heinzle, F., Ander, K. H., Sester, M. (2006). Pattern Recognition in Road Networks on the Example of Circular Road Detection. In: Raubal.M, Miller.H.J, Frank.A.U, Goodchild.M.F.(Eds): *Geographic Information Science, GIScience2006*, Munster, Germany, LNCS, vol. 4197, pp.253-267.
- Hildago, D and Carrigan, A. (2010). *Modernizing Public Transportation: Lessons Learned From Major Bus Improvements In Latin America And Asia*, EMBARQ (www.embarq.org); at www.embarq.org/sites/default/files/EMB2010_BRTREPORT.pdf.
- Hinamen, V. (1975). *Journey time and occupancy characteristics of the Helsinki metropolitan public transport system*. Helsinki University of Technology: Helsinki
- HLB (2000). *Economic Study to Establish A Cost-Benefit Framework For The Evaluation of Various Types of Transit Investments*, Transport Canada (www.tc.gc.ca/programs/environment/urbantransportation/transitstudies/docs/Cost-Benefit.pdf).
- Iles, R. (2005). *Public transport in developing countries*. NL: Emerald Group Publishing Ltd.
- IPAR (2004): *The institutional and organizational structure of public road transport in Kenya*. IPAR Nairobi
- Isard, W. ed., (1960). *Methods of regional analysis: an introduction to regional science*, the MIT Press, Cambridge.
- Israel, G. D. (1992). *Determining sample size*. University of Florida Cooperative Extension Service, Institute of Food and Agriculture Sciences, EDIS.
- Jovic, J. J. (2000). MODAL SPLIT MODELLING-SOME EXPERIENCE. In *URBAN TRANSPORT SYSTEMS. PROCEEDINGS FROM THE 2ND KFB RESEARCH CONFERENCE IN LUND, SWEDEN, 7-8 JUNE, 1999 (BULLETIN 187)* (No. 187: 02).
- Kadi, A. S., Halingali, B. I., & Ravishankar, P. (2012). Problems of Urbanization in Developing Countries: A Case Study in India. *International journal of science and nature*, 3(1), 93-104.
- Kennon, N., Howden, P., & Hartley, M. (2009). *Who Really Matters?: A Stakeholder Analysis Tool*.
- Kenya Bus Service – KBS (2012). *History*. Retrieved on 29 December, 2015 from: <http://kenyabus.net/history.html>.
- Kenya Roads Board (2015a). *Kenya road network*. Retrieved on 1 January, 2016 from: <http://www.krb.go.ke/road-network/kenya-road-network>.
- Kenya Roads Board (2015b). *Road inventory and condition*. Retrieved on 1 January, 2016 from: <http://www.krb.go.ke/road-network/road-conditions>.
- Khayesi, M. (1999). *The Struggle for Regulatory and Economic Sphere of Influence in the Matatu Means of Transport in Kenya: A Stakeholder Analysis* Kenyatta University, Nairobi Kenya.
- KIPPRA (2006). *Organising urban road public transport in Nairobi city*. Policy brief No. 18/2006
- KIPPRA (2015). *Mitigating Road Traffic Congestion in the Nairobi Metropolitan Region*. Policy Brief No.2/2015. Retrieved on 6 December, 2015 from:

- <http://www.kippra.org/downloads/Mitigating%20transport%20congestion%20in%20Nairobi.pdf>.
- Kittelton, Associates, Transportation Research Board, Transit Cooperative Research Program, Federal Transit Administration, & Transit Development Corporation (2003). *A guidebook for developing a transit performance-measurement system*. Washington, D.C.: Transportation Research Board of the National Academics.
- Lee-Smith, D. (1989). “*Urban Management in Nairobi: A Case Study of the Matatu Mode of Public Transit*”, in *African Cities in Crisis: Managing Rapid Growth*, Richard E. Stern and Rodney R. White (eds.), Boulder: Westview Press.
- Lewis, D. and Williams, F. (1999). *Policy and Planning as Public Choice*, Ashgate (www.ashgate.com); at www.fta.dot.gov/documents/Policy_and_Planning_as_Public_Choice.pdf.
- Litman, T. (2003), *Transportation Cost and Benefit Analysis Guidebook*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/tca.
- Litman, T. (2011). Smart Congestion Relief: Comprehensive Analysis Of Traffic Congestion Costs and Congestion Reduction Benefits, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/cong_relief.pdf; an earlier version published as “Evaluating Rail Transit Benefits: A Comment,” *Transport Policy*, Vol. 14, No. 1 (www.elsevier.com/locate/tranpol), January 2007, pp. 94-97.
- Lovelock, C. and Gummesson, E. (2004). Whither Services Marketing?: In Search of a New Paradigm and Fresh Perspectives. *Journal of Service Research*, 7 (1): 20-41.
- Ministry of Transport and Communication [MOTC] (2004), Transformation of Road Transport Report.
- Muiruri, P (31 December, 2015). More residents to live away from the city in 2016. The Standard. Retrieved on 5 January, 2016 from: http://www.standardmedia.co.ke/m/story.php?articleID=2000186642&story_title=More-Nairobians-to-live-away-from-the-city-in-2016-Lamudi.
- Muting, K. (16 August, 2011). White elephants from the Nyayo era. Daily Nation. Retrieved on 29 December, 2015 from: <http://www.nation.co.ke/lifestyle/DN2/White-elephants-from-the-Nyayo-Era-/-/957860/1219924/-/13h76vk/-/index.html>.
- Mutongi, K. (2006). Thugs or Entrepreneurs? Perceptions of Matatu Operations in Nairobi, 1970 to the Present. *Africa* 76 (4) pg 549 -568.
- Muturia, M. S. (2013). An investigation of the factors influencing the performance of matatu SACCOs in Kiambu County: the case of selected matatu SACCOs operating in Thika Town, Kenya (Master dissertation, SCHOOL OF BUSINESS, KENYATTA UNIVERSITY).
- Nabielek, K. (2012, July). The Compact City: Planning Strategies, Recent Developments and Future Prospects in the Netherlands. In Proceedings of AESOP 26th Annual Congress, METU, Ankara (pp. 11-15).
- National Transport and Safety Authority (2015). *Who we are*. Retrieved from: http://www.ntsa.go.ke/index.php?option=com_content&view=article&id=88&Itemid=486.
- Ngari, J. (2007). Taming rapid urbanisation and transport planning for sustainable development: lessons in Nairobi City, Kenya. Retrieved on 6 December, 2015 from: file:///C:/Users/acr/Desktop/NEW%20MATERIAL%20FOR%20THESES/18_Taming-

- rapid-urbanization-and-transport-planning-for-sustainable-développement-lessons-in-Nairobi-city-Kenya-Jobson-NGARI.pdf.
- Nwana C. (1981) *Research Methodology and Statistic for Beginning Research Student*. Awka, Christian printing and publishing.
- Nzuve, S., & Mbugua, S. (2012). *A Survey of Competitiveness in the Passenger Road Transport Sector in Nairobi-Kenya*. Available at SSRN 2129063.
- Okabe, A., Boots, B., Sugihara, K. and Chiu, S. N. (2000). *Spatial Tessellations: Concepts and Applications of Voronoi Diagrams*, Second Edition, 97-103. John Wiley and Sons.
- Okeke, A. O. (1995) *Foundation Statistics for Business Decision*; Enugu. High mega system Limited.
- O'Leary, J. (1993). *Comparing Public and Private Bus Transit Services: A Study of the Los Angeles Foothill Transit Zone* (No. Policy Study No. 163). Reason Foundation.
- Orero, R. and McCormick, D. (2010). *Organization of Paratransit in Nairobi: Voluntary Vs. Mandatory Savings and Credit Co-operatives*. Institute for Development Studies, University of Nairobi.
- Orero, R., McCormick, D., Chitere, P., Mithullah, W. V., & Ommeh, M. S. (2012). *Assessing progress with the implementation of the public transport policy in Kenya*. SATC 2012.
- Parasurama, A., Zeithaml, V. A. & Berry, L. L. (1985). A conceptual model of service quality and its implication for future research. *Journal of Marketing*, 49 (4): 41-50.
- Patel, D. (1988). Some issues of urbanization and development in Zimbabwe. *Journal of Social Development in Africa*, 3(2), 17-31.
- Pina, V., & Torres, L. (2001). Analysis of the efficiency of local government services delivery. An application to urban public transport. *Transportation Research Part A: Policy and Practice*, 35(10), 929-944.
- Potts, D. (2012). Challenging the myths of urban dynamics in sub-Saharan Africa: The evidence from Nigeria. *World Development*, 40(7), 1382-1393.
- Prileszky, I. (2004). *Directions in the Economic Regulation of Pubic Bus Transport*.
- Reimer, H. & Reichel, A. (2000). *Assessing service quality in the Israeli tourism industry using SERVQUAL*. Proceedings of Fifth Annual Graduate Education and Graduate Students Research Conference in Hospitality & Tourism.2000, 273-280.
- Republic of Kenya (2003): *National Integrated Transport Policy*
- Republic of Kenya (2003): *Legal Notice no. 161 of 2003*.Government Printer
- Republic of Kenya (2005): *Legal Notice no. 65 of 2005*.Government Printer.
- Republic of Kenya (2010). *Sessional paper on integrated national transport policy*. Ministry of Transport, Nairobi
- Republic of Kenya, 2007: *Kenya Vision 2030 – The Popular Version 2 Kenya*:
- Republic of Kenya, *The Kenya Roads Act, 2007*: Government Printer, Nairobi..
- Seth, C., Triantis, K. & Teodorovic, D. (2007). Performance evaluation of bus routes: a provider and passenger perspective. *Transportation Research Part E: Logistics and Transportation Review*, 43(4), 453-478.
- Sheth, C. (2003). *The measurement and evaluation of performance of urban transit systems: the case of bus routes*. MSc, Virginia Polytechnic Institute and State University, Virginia.
- Taskforce on Nairobi Decongestion (2015). *Decongestion of Nairobi City*.
- TRL (2004). *The Demand for Public Transit: A Practical Guide*, Transportation Research Laboratory, Report TRL 593 (www.trl.co.uk); at <http://www.demandforpublictransport.co.uk/TRL593.pdf>.

- TTI (2003). *Urban Mobility Study*, Texas Transportation Inst. (<http://mobility.tamu.edu/ums>).
- United Nation – UN (2014a). World Urbanization Prospects. Retrieved on 29 November, 2015 from: <http://esa.un.org/unpd/wup/highlights/wup2014-highlights.pdf>.
- Vuchic, V. R. (2005). *Urban Transit: Operations, Planning and Economics*. John Wiley & Sons, Inc.
- Wambui, M. A. (2012). Strategic responses to changes in the external environment by the matatu subsector within Nairobi central business district (Doctoral dissertation, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI).
- Waswa, F., Otor, S. C. J., & Mugendi, D. N. (2006). Environment and Sustainable Development Nexus. School of Environmental Studies and Human Sciences, Kenyatta University.
- Waweru, K (11 September, 2013). The rise and fall of Nyayo’s buses service as graft eroded all gains. The Standard. Retrieved on 29 December, 2015 from: <http://www.standardmedia.co.ke/article/2000093260/the-rise-and-fall-of-nyayo-s-buses-service-as-graft-eroded-all-gains>.
- World Bank (2015a). Urban population (% of total). Retrieved on 29 November, 2015 from: <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS/countries?display=map>.

ANNEXES

Annex 1: Road Classification in Kenya

Table 26: Rural roads

Class	Description
Class D	Secondary Roads linking locally important centres to each other, to more important centres or to higher class roads.
Class E	Any link to minor centre
Class F	Forest roads
Class G	Road serving government institutions
Class K	Roads accessing coffee (kahawa) growing areas
Class L	Roads accessing settlement scheme areas
Class P	National park roads
Class R	Roads accessing rural areas
Class S	Roads accessing sugar growing areas
Class T	Roads accessing tea growing areas
Class U	Unclassified rural roads including mining roads etc
Class W	Roads accessing wheat growing areas

Source: Roads Act, 2007

Table 27: Urban Roads

Class	Description
Class UA	Urban Arterials
Class UC	Urban collectors including primary distributors, district distributors
Class UL	Urban local roads including minor distributors, local streets, residential stand access, commercial and industrial stand access, shopping streets.

Source: Roads Act, 2007

Annex 2: Road Inventory in Kenya

Table 28: Summary of Road Inventory

Road class	Paved	Unpaved	Total
A	2, 772	816	3, 588
B	1, 489	1, 156	2, 645
C	2, 693	5, 164	7, 857
D	1, 238	9, 483	10, 721
E	577	26, 071	26, 649
SPR	100	10, 376	10, 476
U	2,318	96, 623	98, 941
Total	11, 189	149, 689	160, 886

Source: Kenya Roads Board, 2015

Annex 3: Strategy and Organisation of Matatu Business

Table 29: measuring operational level

Strategy	Low organisation	Moderate organisation	High organisation
Business ownership, structure and levels of investment	Individual, owning one or more vehicles	Group ownership (family, partnerships, cooperatives, limited companies)	Limited companies
Financing	Self, family, and friends	Self, family and banks	Investors and banks
Routes and vehicle types	Operate in one route allocated by TLB/ control of routes by gangs Considerable deviation from routes Mainly 14-seaters	Operate in one or more than one routes; routes controlled by cooperatives or management companies; some deviation from routes Mainly 25–55 seater minibuses	Routes controlled by legally mandated transport authorities; complete adherence to assigned routes. Mini and full-size buses
Pricing	Flat zoned, variation with traffic and weather	Flat zoned, monthly coupons and smart cards	Seasonal tickets which are transferable, no deviations allowed
Operations – repair and maintenance, recruitment	Individually undertaken by each operator	Done by management companies	Centralized
Regulatory compliance	Low or non-existent compliance	Complies with some, but not all, regulations	Full compliance

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Promotion and advertising	Individual promotion through touting at stages	Some advertising on vehicles	Centralised advertising strategy
Customer relations	Not emphasized	Guidelines given	Emphasized
Business linkages and networking	Mainly personal ties and linkages through informal groups	Mix of formal and informal linkages	Predominance of formal linkages

Source: adopted from McCormick, 2013: 142

Annex 4: Registered Matatu SACCOs and Companies Originating and Terminating within Nairobi

Table 30: Registered Matatu SACCOs and Companies

No.	Company/ SACCO	Route
1	BURUBURU 58 TRAVELLERS SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	58
2	CBET SACCO	NAIROBI, JOGOO RD, BURUBURU
3	CITY HOPPER LIMITED/FANAKA MERCHANTS LIMITED	B/STN, KAWANGWARE, SATELITE, NGUMO, KNH, KAREN, UTAWALA, UMOJA, KABIRIA, KE NCOM, GPO
4	CITY STAR SHUTTLE LIMITED	
5	CITY TRAM SHUTTLE LTD	Temple Lane-Jogoo Rd-Outer Ring Rd.-Kangudo Rd.-Kantafu Market Temple Lane-Jogoo Rd-Outer Ring Rd.-Kangudo Rd.-Kantafu Market
6	CITY TRAVELLERS SAVINGS AND CREDIT COOPERATIVE SOCIETY LIMITED	
7	COMPLIANT MANAGEMENT COMPANY LIMITED	NAIROBI, KIKUYU, NGONG, K ANGEMI, UTHIRU, KINOO, W/LANDS, EASTLEIGH
8	COUNTY LINK SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LTD	BUS STATION, MOMBASA RD, BUNYALA RD, LIKONI RD, BALOZI, DIAMOND PARK, EXECUTIVE PARK
9	DABUMATO COMMUTER SERVICE SAVINGS & CREDIT CO-OPERATIVE SOCIETY LTD	NAIROBI, BURUBURU
10	DAKIKI MATATU OWNERS SACCO	KIKUYU, DAGORRET, NAIROBI
11	DANDORA USAFIRI TRAVELLERS SACCO	NAIROBI, DANDORA
12	DIX-HULT MATATU OWNER SACCO	NAIROBI, KARIOBANGI, OUTERING, EASTLEIGH, HURUMA
13	EASTERN BYPASS SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	EASTERN BYPASS TRAVELLERS COMPANY LIMITED
14	EASTLANDS EAGLES LIMITED	
15	EASTLEIGH COMMUTER SERVICES LIMITED	NAIROBI, EASTLEIGH
16	EASTLEIGH ROUTE SACCO	EASTLEIGH, JUJA RD, TOWN
17	ELEVENTH HOUR TRANSPORT SACCO	KISERIAN, RONGAI, KNH, RAILWAYS
18	EMBASSAVA COOPERATIVE SAVINGS AND CREDIT SOCIETY LTD	MUTHURWA, JOGOO ROAD, EMBAKASI, ACCRA ROAD, MOMBASA ROAD, EMBAKASI
19	ESTATES CONNECTION LIMITED	DANDORA, BURUBURU, CITY STADIUM
20	FIG KOMBA	FIGTREE, NGARA, GIKOMBA, KIAMBIU
21	FORWARD TRAVELLERS SACCO LTD	NAIROBI, KAYOLE, OUTERING, EASTLEIGH
22	FOURTY FOUR SACCO	NAIROBI, ZIMMERMAN, KAHAWA WEST, GITHURAI
23	GITHURAI 45 SACCO	
24	HANNOVER COMMERCIAL ENTERPRISES LTD	
25	HIGHRISE KIBERA SACCO	NAIROBI, KIBIRA
26	HIMOSA TRAVELLERS SACCO	MUTHURWA, ENTERPRISE RD, LUSAKA RD, KWA NJENGA
27	HURUMA 46 SAVINGS AND CREDIT CO-OP SOCIETY LTD	
28	HURUMA MINI-BUS SACCO LTD	HURUMA, PANGANI, KARIOKOR, TUSKER
29	INDIMA (NJE) SACCO	IND/AREA, KWA NJENGA, KYANGOMBE, MAASAI, MOMBASA RD, B/STN
30	JESMAT TRAVELLERS CO-OPRATIVE	
31	JONSAGA FLATS SACCO	
32	KANGEMI MATATU OWNERS SACCO	NAIROBI, W/LANDS, KANGEMI
33	KANI TRANSPORT SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	MUTHURWA, B/STN, NAIROBI, KAYOLE UTAWALA
34	KARIOBANGI MATATU OWNERS SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	NAIROBI, KARIOBANGI NORTH, MATHARE NORTH
35	KARURI COMMUTERS SERVICES SAVINGS AND CREDIT CO- OPERATIVE SOCIETY LIMITED	
36	KASBOWA SAVINGS AND CREDIT COOPERATIVE SOCIETY LIMITED	NAIROBI, DAGORETTI CORNER, RIRUTA SATLITE

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

37	KAWANGWARE MATATU SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	NAIROBI,KAWANGWARE RIRUTA
38	KAZANA TRAVELLERS SERVICES LIMITED	NAIROBI,KINOO,ZAMBEZI,KARI
39	KENYA BUS SERVICE MANAGEMENT LIMITED	B/STN,KENCOM,GPO,UTAW ALA,LANGATA,KENYATTA,KA WANGWARE,RIRUTA,NGUMO .
40	KIBERA MATATU OWNERS COOPERATIVE SAVINGS AND CREDIT SOCIETY LIMITED	RT 8/42
41	KILLETON COMMUTERS SERVICES SAVINGS AND CREDIT COOPERATIVE LTD	RT 48/107
42	KIRAGI TRAVELLERS SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	8B
43	KIU INVESTMENT SACCO	GITHURAI,MWIHOKO,KAHAWA SUKARI,MWIKI,RUIRU,EMBA KASI,BYPASS,NAIROBI
44	LAKENYA TRANSPORT SACCO LTD	34
45	LATEMA 22 TRAVELLERS SACCO	
46	LIKANA ROUTE 114/115 MATATU CO-OPERATIVE SOCIETY LTD	
47	LOPHA MULTIPURPOSE CO-OPERATIVE SOCIETY	NAIROBI,AGA KHAN,PANGANI,NDENDERU,WANGIGE,RUIRU,JUJA
48	LUCKY BABA DOGO TRAVELLERS SACCO LTD	NAIROBI,THIKA RD,BABANDOGO
49	MARIMBA TRAVELLERS SACCO	ZIMMERMAN,THIKA RD,NAIROBI
50	MAVEROUS SHUTTLE LIMITED	KOMAROCKS,KANGUNDO RD,JOGOO RD,MFANGANO STREET
51	MEGARIDER MANAGEMENT LIMITED	
51	MNK SACCO SOCIETY LTD	KASARANI,KAYOLE,KARIOBANGI
52	MOONLIGHT COACH COMPANY LTD	GLOBE CINEMA,MATHARE NORTH (29/30)
53	MWAMBA TRAVELLERS SACCO	
54	MWIKI PSV SACCO	
55	MWIRONA SACCO LTD	BUS STAIION,KASARANI,MWIK
56	NABOKA TRAVELLERS SACCO	NAIROBI,BOMAS,KAREN
57	NAKATHI TRAVELLERS SACCO LIMITED	NAIROBI,THIKA RD,KAHAWA WEST
58	NAWAKU SACCO	
59	NAWASUKU SACCO	KU,KAHAWA SUKARI,WARREN,RUIRU
60	NAZIGI SACCO	
61	NEEMA TRAVELLERS AGENCY LTD	
62	NEO KENYA MPYA COMMUTERS LIMITED	
63	NGOKANA SAVINGS AND CREDIT COOPERATIVE SOCIETY	
64	NGONG TRAVELLERS SACCO	
65	NGUMO-LINE SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LIMITED	ST PETERS,VALLEY ROAD,SERENA,MBAGATHI,NGUMO
66	NGUSO TRAVELLERS SACCO	NAIROBI,SOUTH C,SOUTH B,IND/AREA
67	NMOA SACCO SOCIETY LIMITED	
68	ONGATA LINE TRANSPORTERS	
69	ONGATA RONGAI BUS SERVICES	
70	OROKISE SACCO LTD	
71	OROMATS SACCO SOCIETY LTD	
72	OUTER CIRCLE SACCO	NAIROBI,JOGOO RD,BURUBURU,OUTERING RD
73	OUTREACH TRAVEL	
74	PAKIN ALICIA SACCO SOCIETY LTD	NAIROBI,KIKUYU, DAGORETTI
75	PEJO TECH COMPANY LTD	NAIROBI,KARIOBANGL,DANDORA
76	PINPOINT SOLUTION (K) LTD	NAIROBI, KAYOLE
77	RASASI INVESTMENT LIMITED	
78	REMBO SHUTTLE SAVINGS AND CREDIT SACCO LTD	R/WAYS,A/RIVER,KITENGELA
79	ROG TRAVELLERS SAVINGS AND CREDIT COOPERATIVE SOCIETY LTD	
80	RONGAO SAVING AND CREDIT COOPERATIVE SOCIETY LIMITED	NAIROBI,KISERIAN,RONGAI
81	RUKAGINA 44 SACCO	
82	RUNA TRAVELLERS SACCO	
83	RUNKA SERVICES COOPERATIVE SAVINGS AND CREDIT SOCIETY LTD	RT 11,48,107
84	RWAKEN INVESTMENTS LIMITED	
85	ST. MARYS TRANSPORT SACCO SOCIETY	RT 15

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

86	SUPER HIGHWAY 45 SACCO SOCIETY LTD	
87	TAWALA UTAWALA SACCO	
88	UMOINNER SACCO LTD	R/NGALA,,JOGOO RD,UMOJA
89	UMOJA INNERCORE TENA MATATU OWNERS SAVINGS AND CREDIT CO-OPERATIVE SOCIETY LTD	UMOJA,JOGOO RD,NAIROBI
90	UMOWA SACCO	
91	UNIFIED INTERNATIONAL LIMITED	NAIROBI,GITHURAI 45
92	UTAWALA BY-PASS TRAVELLERS SACCO	
93	WALOKANA MULTIPURPOSE CO-OPERATIVE SOCIETY LTD	
94	WEST MADARAKA ROUTE 14 COOPERATIVE SACCO	HAILLE SELASIE,LANGATA,NAIROBI WEST,MADARAKA,STRATHMORE
95	ZURI GENESIS COMPANY LIMITED	

Source: Extracted from NTSA, 2015f registration list

Annex 5: University Introduction Letter

Ss

Annex 6: National Commission for Science, Technology and Innovation (NACOSTI) Permit

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.


REPUBLIC OF KENYA

 National Commission for Science,
 Technology and Innovation
RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT:
MR. MOSES OMONDI OKEYO
 of **UNIVERSITY OF NAIROBI, 0-40400**
 migori, has been permitted to conduct
 research in **Nairobi County**

Permit No : NACOSTI/P/15/1798/6136
 Date Of Issue : 30th June,2015
 Fee Recieved :Ksh. 1000

on the topic: **EFFECTS OF FORMING
 PUBLIC SERVICE VEHICLE'S SAVINGS
 AND CREDIT COOPERATIVE SOCIETIES
 ON PUBLIC TRANSPORT SERVICE
 DELIVERY: THE CASE STUDY OF NAIROBI
 COUNTY**

for the period ending:
4th December,2015


 Director General
 National Commission for Science,

Applicant's _____
 Director General

Annex 7: Dispatched Bus per Route Survey

Route	SACCO/Company	Vehicle registration	Seating Capacity	Terminal name		Time			
				At Estate	At CBD	X		Y	
						X1	X2	Y1	Y2

Annex 8: Mathematical operations

Table 31: Route performance evaluation at network level

Indicator	Measurement Formula
Average bus stop spacing	$A.S..D = \frac{l}{(n-1)}$ l: length of a bus route n: total number of bus stops passed by this route
Route overlapping	$R.O = \frac{l}{L}$ l: total length of bus routes L: total length of bus route network
Network density	$N.D = \frac{L}{a}$ l: total length of road passed by bus a: land-use in bus service coverage
Service coverage	$S.C = \frac{p}{P}$ p: population served in the certain buffer area of a stop. P: total population of a study area

Table 32: Service capacity measurement

Indicator	Measurement Formula
Observed frequency	$O.F = \frac{V}{t}$ V: public transport buses t: time unit
Average network speed	$A.N.S = \frac{\sum V_i S_i}{\sum V_i}$ V _i : number of bus-kilometre operated per day or per hour S _i : travel speed of bus
Seat capacity	$S.C = \frac{SxV}{A}$ S: Number of seats on a public transport bus V: number of buses in service A: service area size

Source: Author, 2016

Annex 9: Work Plan, Budget and Contacts

Table 33: Data Collection Work Plan

Day	Date	Activity (s)	Personnel	Outcome
1 Monday	07/03/2016	-Introduction -Building of contact -Booking of appointments	2	A close working rapport with government institutions and the seven (7) identified PSV companies/saccos
2 Tuesday	08/03/2016	-Introduction -Building of contact -Booking of appointments	2	A close working rapport with government institutions and the seven (7) identified PSV companies/saccos
3 Wednesday	10/03/2016	-Training of research assistants - Pretesting of tools	18	A team of research assistants who are able to comprehend the research work at hand and conduct it within due process of research ethical considerations.
4 Thursday	11/03/2016	-Dispatched bus per route survey	18	Collected data relating to objective 1, table 28, annex 11 and objective 3
5 Friday	12/03/2016	-Dispatched bus per route survey	18	Collection of data relating to objective 1, table 28, annex 11 and objective 3
6 Saturday	14/03/2016	-Household questionnaire administration	16	Collected data relating to objective 1, 2 and 3
7 Monday	15/03/2016	-Route performance evaluation -Service capacity evaluation	8	Collected relating to study objective 1, 2, 3, table 13, table 14 and annex 11
8 Tuesday	16/03/2016	Key informant interviews	13	Perspectives from government institutions, PSV companies and SACCOs on objective 1 and 2
9 Wednesday	17/03/2016	Coding	4	Collected data are entered into analysable format
10 Thursday	18/03/2016	Data entry	4	Data entered into analysis softwares such as SPSS/ Excel
11 Friday	19/03/2016	Data entry	4	Data entered into analysis softwares such as SPSS/ Excel
12-14 Saturday – Monday	20-22/03/2016	Analysis and computations	4	Information that meanings can be derived from so as to address research questions
15-19 Tuesday-Saturday	23-28/03/2016	Report writing	4	-First draft -Reporting to supervisors
	Continual improvement			
	May External examiner			

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Table 34: Field Work Budget

Date	Activity (s)	Days	Units	Unit Cost	Total Cost	Remarks
7-8/3/2016	Airtime for booking appointment	1	1	500.00	500.00	A close working rapport with government institutions and the
	Building of contact and booking (personel)	1	1	1,200.00	1,200.00	
10/3/2016	Training (1-4 hours) - 1,740 x 2 = 3,480 (22 pax)					
	Recruitment Coordination	1	1		120.00	
	Printing - Training	1	220	2.00	440.00	
	Printing - Manuals	1	120	2.00	240.00	
	Printing - Household	1	625	2.00	1,250.00	
	Printing - SACCOS/Companies/Gov	1	720	2.00	1,440.00	We will have 8 hour training (1,740/-x2) and 4 hour day 2
	Venue -Tumaini Meeting chambers 5th Floor (Rm 6A)	1	2	1,740.00	3,480.00	Order from outside (caterting)
	Lunch	1	19	250.00	4,750.00	Refund for training days
	Fare Refund	1	19	200.00	3,800.00	Collected data relating to objective 1, table 28, annex 11 and
11/3/2016	Dispatched bus per route survey Ras Fee	2	18	1,000.00	36,000.00	
12/3/2016	Dispatched bus per route survey Ras Fare	2	19	150.00	5,700.00	Collected data relating to objective 1, 2 and 3
14/03/2016	Household questionnaire administration RA fees	1	16	1,000.00	16,000.00	Work on Sunday Afternoon
	Household questionnaire administration - RA fare	1	16	200.00	3,200.00	Collected relating to study objective 1, 2, 3, table 13, table 14
15/03/2016	Route performance evaluation fee	1	8	1,000.00	8,000.00	More Desktop -
	Route performance evaluation fare	1	8	200.00	1,600.00	Perspectives from government institutions, PSV companies and
	Service capacity evaluation - Team Leader (inclusive)	1			-	moses
16/03/2016	Key informant interviews	1	13	1,000.00	13,000.00	moses
16/03/2016	Data entry screen development and testing (Inclusive)				-	Data entered into analysis softwares such as SPSS/ Excel
17/03/2016	Coding	1	4	1,000.00	4,000.00	
18-19/03/2016	Data entry	2	4	1,000.00	8,000.00	
20-22/03/2016	Analysis and computations (cost inclusive)	3	4		-	-First draft
	Reseach Coordination and analys costs	15	1	2,200.00	33,000.00	-Reporting to supervisors
23-28/03/2016	Report writing	2	1	2,200.00	4,400.00	
	Mpesa/Bank Charges (1% of total)				1,501.20	
	TOTAL				151,621.20	
Notes: I have a selected a team of your RAs with research experience.						

Source: Author, 2016

Table 35: Key Informants in Public and Private Organisations Contacts

	Public sector	Private sector	Respondent	Contacts
1	NTSA		One Representative	Saf: 0709 932 000 Telkom: 020 6632 000
2	Nairobi City County Gov. - Inspectorate/Transport		County Executive – Mohamed Abdulahi – 0728 490 590, Chief Officer- Engineer Michael Ngari – 0700468381	Roads, Public Works and Infrastructure Saf: 0720941496 Email address: cogut@nairobi.go.ke
3				
4	Traffic Police department		Taffic Commandant	info@kenyapolice.go.ke Phone: 254-020-3341411
5	KURA			Tel: 020 8013844 Email: info@kura.go.ke
6	KeNHA		Cell: +254 0731 330336 0700 423606	Tel: 020-2632237/ 020-2642475 Email:rm.nairobi@kenha.co.ke
Companies				
1	KBS Management			Head Office: View Park - Hotline Telephone: 020 2019685 +254 727 999 286 +254 733 125 494
2	Double M			
3	MOA Compliant			
SACCOs				
	Route		Name of SACCO	
1	Mathare North Route No 29/30		Moonlight Coach Company Ltd	
2	Maringo Route, No10		CBET SACCO	
3	Nairobi West Route No14		West Madaraka Route 14 Cooperative SACCO	
4	Riruta Route 46		KASBOWA SACCO	

Source: As indicated in websites and through contact persons

Table 36: Institution Contact Person (s)

Public sector	Private sector
1. Karen Engineer at – KURA	1. Jackline Mwangi - Fleet Director, KBS
2. Eng. Kayoti Design – KENHA	2. Alex - Fleet Director, KASBOWA
3. Nairobi County Government - City Hall - Engineer Kimani	3. MR Njagi - Fleet manager - West-Madaraka
4. Mr. Kibe- KERRA	4. Hillary Kamau - Manager Double M
5. Mr. John Kiarie - in-charge Licensing department – NTSA	5. Onesmus Karakacha - Fleet manager, Moonlight Coach Company
6. Nairobi County Government - Supp. Swaleh Lutukzi City Traffic Manager	6. Dishon Kamau - Fleet manager, PEJA Travellers Limited
	7. Charles Kamau -Fleet Manager – MOA

Source: Author, 2016

Table 37: Research Assistants Contacts

NAME	CELLPHONE	EMAIL
1. BASIL DAN RAYMOND	0702822018	basilmiswa45@gmail.com
2. JOY WANJALA	0701775760	joy.rejinajoy@gmail.com
3. PETER ODONGO	0724448828	odongopeter80@gmail.com
4. MOCHAMA YUVY NALSE	0724 105 297	yuvynalse@gmail.com
5. MARIA DJESSY ODHIAMBO	0720-411991	marie.djessy@gmail.com
6. OBANGO DOUGLAS OJONY	0722 938 687	douglaswize@gmail.com
7. MOCHAMA FRANKLIN SAGINI	0710 113 330	franklinsagini@gmail.com
8. GLADYS NANGIRA	0721205677 / 0735293689	gnangira@gmail.com
9. JAMES OUMA OKEYO	0724 756304	okeyojames2012@gmail.com
10. KENNETH OMONDI ODONGO	0715 647 039	odongokenneth54@yahoo.com
11. LILIAN ANYUKAI	0728360074	lilianyukai@gmail.com
12. LINDA AKINYI ODHIAMBO	0707-600833/0737-439697	linda.akinyi@gmail.com
13. MASUDI ABIOLA	0703627121	masudiabiola@gmail.com
14. MAURICE OTIENO OWINO	0717173178	m.otieno11@gmail.com
15. NANCY AWINO OCHIENG	+254 037 929 77	nancyawinoochieng@gmail.com
16. OPADO LINDA ADHIAMBO	0708774438 / 0713773326	opadolinda@gmail.com
17. OKETCH SALOME VUHASHO	0723840527	oketchsally@yahoo.com
18. THADEUS TEDDY ODEDE	0722257322	teddyeast99@yahoo.com

Source: Author, 2016

Annex 10: Household Questionnaire

Name of respondent (Optional).....
 Name of Interviewer..... Place of interview.....
 Time of interview..... Date.....

PERSONAL INFORMATION

Sex [male] [female]
 Age []
 Occupation
 1. Employer [] 2. Employee [] 3. Self-employed [] 4. Student []
 5. Housewife [] 7. Others
 Income per month
 1. Under 9, 999 2. 10, 000-14,999 3. 15, 000-19, 999 4. 20, 000 – 29, 999
 5. 30, 000 – 39, 999 6. 40, 000 – 49, 999 7. 50, 000 – 99, 999 8. Above 100, 000

TRIP ORIGIN

Starting point estate

End point zone/ street

PURPOSE OF THE TRIP

To work [] To school [] To home [] Shopping []
 Personal business [] Social [] Firm business [] Others []

TRIP FREQUENCY

Over two times per day [] Every day one time [] A few times per week []
 Once a week [] A few days per month [] Once a month []

FARE PAID

How much do you pay on one-way travel (in kshs)

PREFERRED TRIP MODE

Bicycle [] Matatu [] Bus [] Walking [] Railway []

Taxi, tuk tuk [] Motor cycle, boda boda [] Private car []

ALTERENATIVE MODES

Which are the alternative mode available to you (multiple answers acceptable)?

Bicycle [] Matatu [] Bus [] Walking [] Railway []

Taxi, tuk tuk [] Motor cycle, boda boda [] Private car []

REASON FOR USING PSV (multiple answers is acceptable)

I have no other means [] travel time is shortest [] bus is cheapest [] easy to carry luggage []

Bus service is available for this travel [] trave time is stable []

TIME

Approximate average time taken to reach destination from point of origin (in minutes or hours) []

Approximate average time taken to reach point of origin from destination []

SERVICE LEVEL

i) Do you know about the Integrated National Transport Policy of 2012?

Yes

No

ii) What is your assessment of the public service vehicle services since 2012 s listed below:

	Very good	good	fair	Bad	Very bad
Punctuality					
Fare					
Staff behaviour					
Travel time/ speed					
Noise level					
Service hours					
Ticketing system					
Air quality					
Fleet quality					
Feeder service					
Onboard comfort					
Transfer to other routes					
Waiting time					
Driver's skills					
Operational information					
Onboard security					
Bus stop facility					
Bus stop location/ number					
Service hours					

State how significant are the following indicators to improve PSV service?

Indicator	Important	Indifferent	Not important
Improvement of regularity/ punctuality			
Improvement of accessibility			
Reduction of travel time			
Feeder service			
Reduction of waiting time			
Extension of service hours			
To provide the bus priority lane			
Introduction of state of art transit system such LRT and BRT			
Improvement of bus stop and information			
Parking space at the bus stop/ terminal			

iii) What can be done, in your view, to improve public transport service in the country?

.....

Annex 11: Dispatched Bus per Route Survey

Route	SACCO/Company	Vehicle registration	Seating Capacity	Terminal name		Time			
				At Estate	At CBD	X		Y	
						X1	X2	Y1	Y2

Note:

- X- Arrival or departure at estate terminal
- X1- Bus/matatu departure time at estate
- X2 – Bus/matatu arrival time from CBD at estate terminal
- Y – Arrival or departure at CBD terminal from estate
- Y1 – Bus/matatu departure time from CBD terminal
- Y2 – Bus/matatu arrival at the CBD from estate terminal

Route performance evaluation at network level

Indicator	Measurement Formula
Average bus stop spacing	$A.S..D = \frac{l}{(n-1)}$ <i>l</i> : length of a bus route <i>n</i> : total number of bus stops passed by this route
Route overlapping	$R.O = \frac{l}{L}$ <i>l</i> : total length of bus routes <i>L</i> : total length of bus route network
Network density	$N.D = \frac{L}{A}$ <i>l</i> : total length of road passed by bus <i>a</i> : land-use in bus service coverage
Service coverage	$S.C = \frac{p}{P}$ <i>p</i> : population served in the certain buffer area of a stop. <i>P</i> : total population of a study area

Service capacity measurement

Indicator	Measurement Formula
Observed frequency	$O.F = \frac{V}{t}$ <i>V</i> : public transport buses <i>t</i> : time unit
Average network speed	$A.N.S = \frac{\sum V_i S_i}{\sum V_i}$ <i>V_i</i> : number of bus-kilometre operated per day or per hour <i>S_i</i> : travel speed of bus
Seat capacity	$S.C = \frac{S \times V}{A}$ <i>S</i> : Number of seats on a public transport bus <i>V</i> : number of buses in service <i>A</i> : service area size

Annex 12: SACCOs and Company Questionnaire

Name of Respondent (Optional).....
 Name of Interviewer..... Transport Route.....
 Time of interview..... Date.....

1. For how long have you worked in the public transport industry?

2. What common experiences do you encounter in your daily work as regards the following?

	Experience	Impact on service delivery
Condition of roads and related infrastructure		
Capacity of roads and related infrastructure		
Treatment by passengers/customers		
Treatment by vehicle owners		
Treatment by the Traffic police		
Treatment by NCCG Traffic officers		
Treatment by NTSA officers		
Others (Specify)		

3. Do you know about the Integrated National Transport Policy of 2012?

Yes [] No []

4. Do you think there has been change in any of in the following since 2012? (This is the year when the policy came to place)

	Very good	good	fair	Bad	Very bad
Punctuality					
Fare					
Staff behaviour					
Travel time/ speed					
Noise level					
Service hours					
Ticketing system					
Air quality					
Fleet quality					
Feeder service					
Onboard comfort					
Transfer to other routes					
Waiting time					
Driver's skills					
Operational information					
Onboard security					
Bus stop facility					
Bus stop location/ number					
Service hours					

5. How has the policy made your service delivery better?

6. What can be done, in your view, to improve public transport service in the country?

8. Operational level

Comment on the following by ticking appropriately

Strategy	Low organisation	Moderate organisation	High organisation
Business ownership, structure and levels of investment	Individual, owning one or more vehicles	Group ownership (family, partnerships, cooperatives, limited companies)	Limited companies
Financing	Self, family, and friends	Self, family and banks	Investors and banks
Routes and vehicle types	Operate in one route allocated by TLB/ control of routes by gangs Considerable	Operate in one or more than one routes; routes controlled by cooperatives or management companies; some deviation from routes	Routes controlled by legally mandated transport authorities; complete adherence to assigned routes. Mini and full-size buses

	deviation from routes Mainly 14-seaters	Mainly 25–55 seater minibuses	
Pricing	Flat zoned, variation with traffic and weather	Flat zoned, monthly coupons and smart cards	Seasonal tickets which are transferable, no deviations allowed
Operations – repair and maintenance, recruitment	Individually undertaken by each operator	Done by management companies	Centralized
Regulatory compliance	Low or non-existent compliance	Complies with some, but not all, regulations	Full compliance
Promotion and advertising	Individual promotion through touting at stages	Some advertising on vehicles	Centralised advertising strategy
Customer relations	Not emphasized	Guidelines given	Emphasized
Business linkages and networking	Mainly personal ties and linkages through informal groups	Mix of formal and informal linkages	Predominance of formal linkages

Annex 13: NTSA Key Informant Interview Schedule

1. Based on your judgement, what form of change has taken place on the following aspects since the Integrated National Transport Policy was formulated?

	Very good	good	fair	Bad	Very bad
Punctuality					
Fare					
Staff behaviour					
Travel time/ speed					
Noise level					
Service hours					
Ticketing system					
Air quality					
Fleet quality					
Feeder service					
Onboard comfort					
Transfer to other routes					
Waiting time					
Driver's skills					
Operational information					
Onboard security					
Bus stop facility					
Bus stop location/ number					
Service hours					

2. How many registered PSVs SACCOs and Companies are licensed to operate commuter services in Nairobi?
3. How many high Occupancy Vehicles have you registered to operate in Nairobi Since 2012?
4. What do you think can be done to improve the public transport service delivery?

Annex 14: KURA/KeNHA/KeRRA Key Informant Interview Schedule

1. Do you think the Integrated National Transport Policy (2012) **adequately** provides for public transport service?

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Yes [] No []

2. If no, what aspects are missing?

3. Based on your expertise judgement, how do you compare the public transport sector before and after the policy along the following lines?

	Very good	good	fair	Bad	Very bad
Punctuality					
Fare					
Staff behaviour					
Travel time/ speed					
Noise level					
Service hours					
Ticketing system					
Air quality					
Fleet quality					
Feeder service					
Onboard comfort					
Transfer to other routes					
Waiting time					
Driver's skills					
Operational information					
Onboard security					
Bus stop facility					
Bus stop location/ number					
Service hours					

4. How does the policy affect land use and transportation planning? (City Planning Department)

5. How does the policy affect road infrastructure provision and design? (City Engineering Department)

How does the policy affect your work in traffic management (traffic department and city traffic management section only)?

6. Kindly provide us with data on the following:

- a) The total number of accidents involving PSVs in 2012, 2013, 2014 and 2015
- b) The statistics of those charged with non-compliance with public transport rules

7. How does the policy affect road land use/transportation planning (KURA/KeNHA, KERRA only)?

8. How does the policy affect road infrastructure provision and design (KURA/KeNHA, KERRA only)?

9. What do you think can be done to improve the public transport service delivery?

Annex 15: Results for Dispatched Bus per Route Survey

Table 38: Day one results for Riruta

ROUTE	SACCO/ COMPANY	VEHICLE REGISTRATION	SEATING CAPACITY	TERMINAL NAME		TIME				Travel time to Est	Travel time to CBD	Waiting time -CBD	Waiting time -Est	SEAT SPACING(CM)
						X		Y						
						X1	X2	Y1	Y2					
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	619	810	715	710	55	51	5	X	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	626	605	712	708	X	42	4	21	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	633	615			X	X	X	18	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	820	805	705	700	60	X	5	15	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	755	750	921	912	X	67	9	5	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	850	815	944	934	X	44	10	35	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	832	826	931	922	X	50	9	6	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1026	955	920	917	35	X	3	31	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1215	1200	1341	1339	X	84	2	15	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1259	1240	1500	1447	X	108	3	19	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1450	1430	1550	1530	X	40	20	20	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1515	1506	1610	1555	X	40	5	9	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY		1632	1524		88	X	X	X	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1643	1943	1806	1800	97	77	6	X	28
4W	KASBOWA	KBH 051V	29	RIRUTA	RAILWAY		1742	1700	1650	42	X	10	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY		1755	1710	1655	45	X	15	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1800	1842	1820	1815	22	15	5	X	28
4W	KASBOWA	KBH 051V	29	RIRUTA	RAILWAY	1802	1847	1825	1820	22	18	5	X	28
4W	KASBOWA	KBH 051V	29	RIRUTA	RAILWAY	1900	2000	1925	1920	35	20	5	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1906	2010	1940	1930	30	24	10	X	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	1920	2015	1945	1940	30	20	5	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	2020	2130	2050	2040	40	20	10	X	28
										Min	22	15	2	5
										Max	97	108	20	35
										Ave	46.2	45.0	7.3	17.6

Source: Field Data, 2016

Table 39: Day two results for Riruta

ROUTE	SACCO/ COMPANY	VEHICLE REGISTRATION	SEATING CAPACITY	TERMINAL NAME		TIME				Travel time to Est	Travel time to CBD	Waiting time -CBD	Waiting time -Est	SEAT SPACING(CM)
						X		Y						
						X1	X2	Y1	Y2					
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	643	615	724	715	X	32	9	28	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	657	630	744	734	X	37	10	27	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	756	700	850	843	X	47	7	56	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	903	950	922	919	28	16	3	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	920	910	1040	1032	X	72	8	10	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	944	934	1017	1015	X	31	2	10	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	1002	950		1115	X	63	X	12	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1215	1207	1115	1113	92	X	2	8	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY			1229	1115	X	X	74	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1147	1130			X	X	X	17	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1239	1230	1403	1330	X	51	33	9	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	1355	1340	1510	1452	X	57	18	15	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1450	1430	1600	1539	X	49	21	20	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1515	1501			X	X	X	14	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY			1613	1700	X	X	X	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY			1640	1730	X	X	X	X	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	1856	1800	1730	1716	30	X	14	56	28
4W	KASBOWA	KAT973L	29	RIRUTA	RAILWAY	1715	1830	1755	1750	35	35	5	X	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1600	1854	1745	1730	69	130	15	X	28
4W	KASBOWA	KAS 331V	29	RIRUTA	RAILWAY	1800	1830	1815	1813	15	13	2	X	28
4W	KASBOWA	KAW 488B	29	RIRUTA	RAILWAY	1820	1800	1845	1840	X	20	5	20	28
4W	KASBOWA	KAU 106V	29	RIRUTA	RAILWAY	1900	2020	1922	1915	58	15	7	X	28
										Min	15	13	2	8
										Max	92	130	74	56
										Ave	46.71428571	44.5	13.8	21.6

Source: Field Data, 2016

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Table 40: Day one results for Maringo

ROUTE	SACCO/ COMPANY	VEHICLE REGISTRATION	SEATING CAPACITY	TERMINAL NAME		TIME				Travel time to Est x2-y1	Travel time to CBD Y2-x1	Waiting time -CBD y1-y2	Waiting time -Est x1-x2	SEAT SPACING(CM)
						X		Y						
						X1	X2	Y1	Y2					
10	PEJA TRAVELLERS	KBG 816E	29	MARINGO	TEMPLE ROAD	615	610	910	855	X	160	15	5	30
10	PEJA TRAVELLERS	KBY 823R	25	MARINGO	TEMPLE ROAD			800	740	X	X	20	X	28
10	PEJA TRAVELLERS	KBS 160T	25	MARINGO	TEMPLE ROAD	1622	1815			X	X	X	X	28
10	PEJA TRAVELLERS	KAX 938C	29	MARINGO	TEMPLE ROAD	1836	1652	1910	1902	X	26	8	X	30
10	PEJA TRAVELLERS	KBV 220A	25	MARINGO	TEMPLE ROAD	1908	1657	1945	1935	X	27	10	131	28
10	PEJA TRAVELLERS	KBN 679N	33	MARINGO	TEMPLE ROAD	1723		1946	1938	X	135	8	X	30
10	PEJA TRAVELLERS	KCE 484E	33	MARINGO	TEMPLE ROAD			1905	1900	X	X	5	X	30
10	PEJA TRAVELLERS	KBY 823R	25	MARINGO	TEMPLE ROAD	1730	1921			X	X	X	111	28
10	PEJA TRAVELLERS	KCF 508Z	25	MARINGO	TEMPLE ROAD	1851	1751	1920	1905	X	14	15	60	28
10	PEJA TRAVELLERS	KBQ 553U	29	MARINGO	TEMPLE ROAD			1930	1915	X	X	15	X	30
10	PEJA TRAVELLERS	KBV 986A	25	MARINGO	TEMPLE ROAD	2010	2008	1925	1918	X	43	7	2	28
10	PEJA TRAVELLERS	KBG 594K	25	MARINGO	TEMPLE ROAD	2040	2038	2018	2010	20	X	8	2	28
10	PEJA TRAVELLERS	KBB 602T	25	MARINGO	TEMPLE ROAD	2035	2030	2010	1945	20	X	25	5	28
10	PEJA TRAVELLERS	KBX 232U	25	MARINGO	TEMPLE ROAD	1920	1915	2055	2040	X	80	15	5	28
10	PEJA TRAVELLERS	KBG 594K	25	MARINGO	TEMPLE ROAD	1925	1921	2101	2045	X	80	56	4	28
10	PEJA TRAVELLERS	KBW 884J	33	MARINGO	TEMPLE ROAD	1130	1118	1235	1220	X	50	15	12	30
10	PEJA TRAVELLERS	KBQ 353U	33	MARINGO	TEMPLE ROAD	1135	1120	1240	1232	X	57	8	15	30
10	PEJA TRAVELLERS	KBU 220A	33	MARINGO	TEMPLE ROAD	1140	950	1245	1238	X	58	7	110	30
10	PEJA TRAVELLERS	KBN 679N	33	MARINGO	TEMPLE ROAD	1142	1020	1302	1244	X	62	18	82	30
10	PEJA TRAVELLERS	KCE 484E	25	MARINGO	TEMPLE ROAD	1145	1100	1248	1232	X	47	16	45	28
10	PEJA TRAVELLERS	KBC 884O	33	MARINGO	TEMPLE ROAD	1147	1130	1309	1252	X	65	17	17	30
10	PEJA TRAVELLERS	KBZ 922C	33	MARINGO	TEMPLE ROAD	1130	1020	1315	1248	X	78	27	70	30
10	PEJA TRAVELLERS	KCB 499D	33	MARINGO	TEMPLE ROAD	1155	1108	1322	1251	X	56	31	47	30
10	PEJA TRAVELLERS	KCA 047A	25	MARINGO	TEMPLE ROAD	1152	1112	1330	1302	X	70	28	40	28
10	PEJA TRAVELLERS	KCA 508Z	33	MARINGO	TEMPLE ROAD	1240	1102	1348	1338	X	58	10	98	30
10	PEJA TRAVELLERS	KBV 986A	25	MARINGO	TEMPLE ROAD	1235	1100	1401	1322	X	47	39	95	28
10	PEJA TRAVELLERS	KBN 679N	25	MARINGO	TEMPLE ROAD	1252	1209	1352	1335	X	43	17	43	28
10	PEJA TRAVELLERS	KAX 938C	25	MARINGO	TEMPLE ROAD	1310	1240	1422	1348	X	38	34	30	28
10	PEJA TRAVELLERS	KAX 807U	25	MARINGO	TEMPLE ROAD	1224	1220	1338	1330	X	66	8	4	28
10	PEJA TRAVELLERS	KBS 594K	33	MARINGO	TEMPLE ROAD	1235	1229	1338	1330	X	55	8	6	30
10	PEJA TRAVELLERS	KBQ 553U	33	MARINGO	TEMPLE ROAD	1315	1310	1411	1345	X	30	26	5	30
10	PEJA TRAVELLERS	KBN 679N	25	MARINGO	TEMPLE ROAD	1322	1318	1440	1348	X	26	52	4	28
10	PEJA TRAVELLERS	KAR 313V	25	MARINGO	TEMPLE ROAD	1325	1319	1358	1347	X	22	11	6	28
10	PEJA TRAVELLERS	KBV 986A	33	MARINGO	TEMPLE ROAD	1339	1327	1431	1404	X	25	27	12	30
10	PEJA TRAVELLERS	KBS 160T	33	MARINGO	TEMPLE ROAD	1339	1331	1441	1408	X	29	33	8	30
10	PEJA TRAVELLERS	KBS 594K	25	MARINGO	TEMPLE ROAD	1343	1333	1429	1400	X	17	29	10	28
										Min	20	14	5	2
										Max	43	160	56	131
										Average	27.7	54.3	19.6	36.1

Source: Field Data, 2016

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Table 41: Day two results for Maringo

ROUTE	COMPANY	12th March REGISTRATION	CAPACITY	ATESTATE	AT CBD	X	X2	Y	Y2						SPACING(CM)
10	PEJA TRAVELLERS	KCE 484E	25	MARINGO	TEMPLE ROAD	620	749	715	655	34	35	20	X		28
10	PEJA TRAVELLERS	KBV 986A	25	MARINGO	TEMPLE ROAD	645	810	735	720	35	35	15	X		28
10	PEJA TRAVELLERS	KAV 303Q	25	MARINGO	TEMPLE ROAD	647	822	743	726	39	39	17	X		28
10	PEJA TRAVELLERS	KAH 227W	25	MARINGO	TEMPLE ROAD	651	836	757	728	39	37	19	X		28
10	PEJA TRAVELLERS	KAX 938C	25	MARINGO	TEMPLE ROAD	659	841	800	736	41	37	24	X		28
10	PEJA TRAVELLERS	KCF 721X	25	MARINGO	TEMPLE ROAD	715	830			X	X	X	X		28
10	PEJA TRAVELLERS	KBW 884J	25	MARINGO	TEMPLE ROAD	735	900	830	815	30	40	15	X		28
10	PEJA TRAVELLERS	KBB 602T	25	MARINGO	TEMPLE ROAD	800	933	900	840	33	40	20	X		28
10	PEJA TRAVELLERS	KBS 594K	25	MARINGO	TEMPLE ROAD	830	959			X	X	X	X		28
10	PEJA TRAVELLERS	KAS 807U	25	MARINGO	TEMPLE ROAD	836				X	X	X	X		28
10	PEJA TRAVELLERS	KBQ 553U	25	MARINGO	TEMPLE ROAD	839				X	X	X	X		28
10	PEJA TRAVELLERS	KCE 484E	25	MARINGO	TEMPLE ROAD	840	955	927	910	28	30	17	X		28
10	PEJA TRAVELLERS	KBV 986A	25	MARINGO	TEMPLE ROAD	856	1020	947	930	33	34	17	X		28
10	PEJA TRAVELLERS	KBS 594K	25	MARINGO	TEMPLE ROAD	930	1056	1031	1015	25	45	16	X		28
10	PEJA TRAVELLERS	KCF 721X	25	MARINGO	TEMPLE ROAD	946	1121	1050	1031	31	45	19	X		28
10	PEJA TRAVELLERS	KBG 816E	25	MARINGO	TEMPLE ROAD	958	1139	1105	1040	34	42	25	X		28
10	PEJA TRAVELLERS	KBB 602T	25	MARINGO	TEMPLE ROAD	1015	1200	1129	1057	31	42	32	X		28
10	PEJA TRAVELLERS	KCF 508Z	25	MARINGO	TEMPLE ROAD	1033	1227	1156	1122	31	49	34	X		28
10	PEJA TRAVELLERS	KBX 282U	25	MARINGO	TEMPLE ROAD	1049	1234	1200	1140	34	51	20	X		28
10	PEJA TRAVELLERS	KBS 594K	25	MARINGO	TEMPLE ROAD	1108	1100	1210	1158	X	50	12	8		28
10	PEJA TRAVELLERS	KAX 807U	33	MARINGO	TEMPLE ROAD	1120	1112	1304	1200	X	40	64	8		28
10	PEJA TRAVELLERS	KBS 594K	33	MARINGO	TEMPLE ROAD	1126	1124	1240	1210	X	44	30	2		30
10	PEJA TRAVELLERS	KBQ 553U	33	MARINGO	TEMPLE ROAD	1126	1125	1231	1208	X	42	23	1		30
10	PEJA TRAVELLERS	KCF 508Z	25	MARINGO	TEMPLE ROAD	1136	1130	1222	1215	X	39	7	6		28
10	PEJA TRAVELLERS	KAS 102V	25	MARINGO	TEMPLE ROAD	1145	1142	1400	1240	X	55	80	3		28
10	PEJA TRAVELLERS	KBV 986A	33	MARINGO	TEMPLE ROAD	1146	1144	1420	1234	X	48	106	2		30
10	PEJA TRAVELLERS	KBW 884J	33	MARINGO	TEMPLE ROAD	1154	1152	1540	1248	X	54	172	2		30
10	PEJA TRAVELLERS	KBV 220A	33	MARINGO	TEMPLE ROAD	1155	1153	1321	1258	X	63	24	2		30
10	PEJA TRAVELLERS	KCF 508Z	33	MARINGO	TEMPLE ROAD	1158	1154	1409	1254	X	56	75	4		30
10	PEJA TRAVELLERS	KAS 102V	33	MARINGO	TEMPLE ROAD	1159	1136	1330	1302	X	63	28	23		30
10	PEJA TRAVELLERS	KBV 986A	33	MARINGO	TEMPLE ROAD	1209	1200	1440	1258	X	49	102	9		30
10	PEJA TRAVELLERS	KBW 884J	25	MARINGO	TEMPLE ROAD	1209	1206	1408	1304	X	55	64	3		28
10	PEJA TRAVELLERS	KBV 220A	25	MARINGO	TEMPLE ROAD	1212	1202	1512	1310	X	58	122	10		28
10	PEJA TRAVELLERS	KBS 160T	25	MARINGO	TEMPLE ROAD	1216	1214	1315	1308	X	52	7	2		28
10	PEJA TRAVELLERS	KAS 102V	33	MARINGO	TEMPLE ROAD	1219	1206	1340	1311	X	52	29	13		30
10	PEJA TRAVELLERS	KBV 986A	25	MARINGO	TEMPLE ROAD	1222	1215	1411	1315	X	53	56	7		28
10	PEJA TRAVELLERS	KBX 282U	25	MARINGO	TEMPLE ROAD	1224	1220	1431	1328	X	54	63	4		28
10	PEJA TRAVELLERS	KBW 884J	25	MARINGO	TEMPLE ROAD	1224	1221	1348	1330	X	56	18	3		28
10	PEJA TRAVELLERS	KBV 220A	33	MARINGO	TEMPLE ROAD	1225	1222	1409	1334	X	59	35	3		30
10	PEJA TRAVELLERS	KAX 807U	33	MARINGO	TEMPLE ROAD	1225	1223	1552	1337	X	72	135	2		30
10	PEJA TRAVELLERS	KAV 303Q	25	MARINGO	TEMPLE ROAD	1415	1400	1452	1445	X	30	7	15		28
10	PEJA TRAVELLERS	KAL 206S	33	MARINGO	TEMPLE ROAD	1430	1406	1504	1438	X	8	26	24		30
10	PEJA TRAVELLERS	KBW 884J	33	MARINGO	TEMPLE ROAD	1435	1420	1540	1500	X	25	40	15		30
10	PEJA TRAVELLERS	KBV 220A	25	MARINGO	TEMPLE ROAD	1441	1426	1535	1515	X	34	20	15		28
10	PEJA TRAVELLERS	KAX 807U	33	MARINGO	TEMPLE ROAD	1500	1429	1552	1538	X	38	14	71		30
10	PEJA TRAVELLERS	KAX 938C	33	MARINGO	TEMPLE ROAD	1505	1443	1620	1542	X	37	38	22		30
10	PEJA TRAVELLERS	KBV 986A	33	MARINGO	TEMPLE ROAD	1508	1500		1540	X	32	X	8		30
10	PEJA TRAVELLERS	KBV 823R	25	MARINGO	TEMPLE ROAD	1513	1503		1548	X	35	X	10		28
10	PEJA TRAVELLERS	KBS 594K	25	MARINGO	TEMPLE ROAD	1519	1504		1534	X	15	X	15		28
10	PEJA TRAVELLERS	KAW 663V	33	MARINGO	TEMPLE ROAD	1521	1506		1554	X	33	X	15		30
10	PEJA TRAVELLERS	KBV 269P	33	MARINGO	TEMPLE ROAD	1525	1507		1538	X	13	X	18		28
10	PEJA TRAVELLERS	KCF 508Z	25	MARINGO	TEMPLE ROAD	1528			1602	X	74	X	X		
10	PEJA TRAVELLERS	KBG 816E	33	MARINGO	TEMPLE ROAD	1540	1521		1610	X	30	X	19		30
10	PEJA TRAVELLERS	KBC 455G	25	MARINGO	TEMPLE ROAD	1550	1542		1630	X	40	X	8		28
10	PEJA TRAVELLERS	KBN 679N	33	MARINGO	TEMPLE ROAD	1555	1545		1633	X	38	X	10		30
10	PEJA TRAVELLERS	KBV 220A	33	MARINGO	TEMPLE ROAD	1558	1546		1635	X	37	X	12		30
10	PEJA TRAVELLERS	KBV 986A	33	MARINGO	TEMPLE ROAD	1600	1550		1640	X	40	X	10		30
10	PEJA TRAVELLERS	KBQ 553U	33	MARINGO	TEMPLE ROAD	1650	1645	1620	1600	25	X	20	5		30
10	PEJA TRAVELLERS	KBS 160T	25	MARINGO	TEMPLE ROAD	1655	1650	1635	1600	15	X	35	5		28
10	PEJA TRAVELLERS	KBG 816E	29	MARINGO	TEMPLE ROAD	1657	1652	1632	1610	20	X	22	5		30
10	PEJA TRAVELLERS	KBV 986A	25	MARINGO	TEMPLE ROAD	1720	1710	1650	1615	20	X	35	10		28
10	PEJA TRAVELLERS	KBN 679N	25	MARINGO	TEMPLE ROAD	1735	1730	1710	1655	20	X	15	5		30
10	PEJA TRAVELLERS	KBV 823R	25	MARINGO	TEMPLE ROAD	1835	1830	1815	1800	15	X	15	5		28
10	PEJA TRAVELLERS	KBS 594K	25	MARINGO	TEMPLE ROAD	1955	1950	1930	1915	20	X	15	5		28
10	PEJA TRAVELLERS	KCE 484E	33	MARINGO	TEMPLE ROAD	1915	1910	1850	1830	20	X	20	5		30
10	PEJA TRAVELLERS	KCF 508Z	25	MARINGO	TEMPLE ROAD	1955	1946	1915	1855	31	X	20	9		28
10	PEJA TRAVELLERS	KAX 938C	29	MARINGO	TEMPLE ROAD			1655	1620	X	X	35	X		30
10	PEJA TRAVELLERS	KBX 232U	25	MARINGO	TEMPLE ROAD			2110	2045	X	X	25	X		28
10	PEJA TRAVELLERS	KBB 602T	25	MARINGO	TEMPLE ROAD		2050	2031	2015	19	X	16	X		28
10	PEJA TRAVELLERS	KBV 220A	25	MARINGO	TEMPLE ROAD		2100	2040	2000	20	X	40	X		28
10	PEJA TRAVELLERS	KBG 816E	29	MARINGO	TEMPLE ROAD	2005	2000	1940	1900	20	X	40	X		30
10	PEJA TRAVELLERS	KBV 220A	25	MARINGO	TEMPLE ROAD	610	735	658	640	37	30	18	X		28
10	PEJA TRAVELLERS	KAV 303Q	25	MARINGO	TEMPLE ROAD	630		750	730	X	60	20	X		28
10	PEJA TRAVELLERS	KBX 282U	25	MARINGO	TEMPLE ROAD	700	750			X	X	X	X		28
10	PEJA TRAVELLERS	KCF 508Z	25	MARINGO	TEMPLE ROAD	730	947	900	820	47	50	40	X		28
10	PEJA TRAVELLERS	KBG 816E	25	MARINGO	TEMPLE ROAD	740	1000	910	830	50	50	40	X		28
10	PEJA TRAVELLERS	KAX 318S	25	MARINGO	TEMPLE ROAD	800	1025	930	844	55	44	46	X		28
10	PEJA TRAVELLERS	KAL 206S	25	MARINGO	TEMPLE ROAD	820	1055	959	855	56	35	64	X		28
10	PEJA TRAVELLERS	KBV 269P	25	MARINGO	TEMPLE ROAD	845	1105	1025	910	40	25	75	X		28
10	PEJA TRAVELLERS	KAS 102V	25	MARINGO	TEMPLE ROAD	905	1150	1040	935	70	30	65	X		28
10	PEJA TRAVELLERS	KCB 499D	25	MARINGO	TEMPLE ROAD	930	1158	1000	959	118	29	1	X		28
10	PEJA TRAVELLERS	KBC 455G	25	MARINGO	TEMPLE ROAD	1000	1200	1135	1030	25	30	65	X		28
10	PEJA TRAVELLERS	KAW 663V	25	MARINGO	TEMPLE ROAD	1015	1215	1145	1100	30	45	45	X		28
										Min	15	8	1	1	
										Max	118	160	172	131	
										Average	34.4	42.2	37.9	10.0	

Source: Field Data, 2016

Table 42: Day one results for Mathare North

ROUTE	SACCO/ COMPANY	VEHICLE REGISTRATION	SEATING CAPACITY	TERMINAL NAME AT ESTATE AT CBD		TIME				Travel time to Est	Travel time to CBD	Waiting time -CBD	Waiting time -Est	SEAT
						X		Y		y1-x2	Y2-x1	y2-y1	x1-x2	SPACING(CM)
						X1	X2	Y1	Y2					
29/30	MOONLIGHT	KAW 563V	51	MATHARE NORTH	NGARA	1711	1650	1736	1715	46	4	21	21	Seat Spacing?
29/30	MOONLIGHT	KAW 527B	51	MATHARE NORTH	NGARA	1656	1646	1717	1700	29	4	17	10	Seat Spacing?
29/30	MOONLIGHT	KAW 155D	51	MATHARE NORTH	NGARA	1738	1735	1758	1749	23	11	9	3	Seat Spacing?
29/30	MOONLIGHT	KAW 527B	51	MATHARE NORTH	NGARA	1811	1734	1836	1820	52	9	16	37	Seat Spacing?
29/30	MOONLIGHT	KAS 343Q	51	MATHARE NORTH	NGARA	1741	1732	1811	1757	29	16	14	9	Seat Spacing?
29/30	MOONLIGHT	KAS 309V	51	MATHARE NORTH	NGARA	1742	1738	1809	1752	21	10	17	4	Seat Spacing?
29/30	MOONLIGHT	KAW 563V	51	MATHARE NORTH	NGARA	1755	1742	1821	1807	39	12	14	13	Seat Spacing?
29/30	MOONLIGHT	KAW 155D	51	MATHARE NORTH	NGARA	1816	1814	1843	1829	29	13	14	2	Seat Spacing?
29/30	MOONLIGHT	KAS 309V	51	MATHARE NORTH	NGARA	1824	1821	1851	1836	30	12	15	3	Seat Spacing?
29/30	MOONLIGHT	KAW 527B	51	MATHARE NORTH	NGARA	1852	1848	1924	1908	36	16	16	4	Seat Spacing?
29/30	MOONLIGHT	KAW 563V	51	MATHARE NORTH	NGARA	1859	1848	1921	1909	33	10	12	11	Seat Spacing?
29/30	MOONLIGHT	KAS 343Q	51	MATHARE NORTH	NGARA	1858	1856	1924	1911	28	13	13	2	Seat Spacing?
29/30	MOONLIGHT	KAW 155D	51	MATHARE NORTH	NGARA	1859	1846	1934	1914	48	15	20	13	Seat Spacing?
29/30	MOONLIGHT	KAS 309V	51	MATHARE NORTH	NGARA	1906	1902	1931	1919	29	13	12	4	Seat Spacing?
29/30	MOONLIGHT	KAW 527B	51	MATHARE NORTH	NGARA	1944	1938	2009	1951	21	7	18	6	Seat Spacing?
29/30	MOONLIGHT	KAW 563V	51	MATHARE NORTH	NGARA	1944	1936	2014	2002	28	14	12	8	Seat Spacing?
29/30	MOONLIGHT	KAS 343Q	51	MATHARE NORTH	NGARA	1945	1939	2019	2005	30	20	14	6	Seat Spacing?
29/30	MOONLIGHT	KAW 155D	51	MATHARE NORTH	NGARA	1954	1943	2027	2011	44	17	16	11	Seat Spacing?
29/30	MOONLIGHT	KAS 343Q	51	MATHARE NORTH	NGARA	1957	1940	2036	2017	56	20	19	17	Seat Spacing?
						Min				21	4	9	2	
						Max				56	20	21	37	
						Ave				34.26	12.42	15.21	9.68	
ROUTE	SACCO/ COMPANY	VEHICLE REGISTRATION	SEATING CAPACITY	TERMINAL NAME AT ESTATE AT CBD		TIME				Travel time to Est	Travel time to CBD	Waiting time -CBD	Waiting time -Est	SEAT
						X		Y		y1-x2	Y2-x1	y2-y1	x1-x2	SPACING(CM)
						x1	x2	y1	y2					
14/03	Moonlight	KAS 309V	51	Mathare North	Ngara	620	750	730	647	20	27	17	20	Seat Spacing?
14/03	Moonlight	KAW 563V	51	Mathare North	Ngara	638	830	806	703	24	25	63	118	Seat Spacing?
14/03	Moonlight	KBX 869G	51	Mathare North	Ngara	710	700	640	738	20	28	58	10	Seat Spacing?
14/03	Moonlight	KAW 527W	51	Mathare North	Ngara	650	905	847	717	18	27	30	135	Seat Spacing?
14/03	Moonlight	KAS 343Q	51	Mathare North	Ngara	841	718	658	902	20	21	124	83	Seat Spacing?
14/03	Moonlight	KAS 343Q	51	Mathare North	Ngara	955	952	930	1027	22	32	57	3	Seat Spacing?
						Min				18	21	17	3	
						Max				24	32	124	135	
						Ave				20.67	26.67	58.16	61.5	
					Day 1 agregation	Min				18	4	9	2	
						Max				56	32	124	135	
						Ave				44.595	25.755	44.29	40.43	

Source: Field Data, 2016

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Table 43: Day two results for Mathare North

12th March														
ROUTE	SACCO/ COMPANY	VEHICLE REGISTRATION	SEATING CAPACITY	TERMINAL NAME AT ESTATE		TIME X				Travel time to CBD X1-Y2	Waiting Time -CBD Y2-Y1	Waiting Time -CBD X2-X1	Travel time to Estate Y1-X2	SEAT SPACING(CM)
					AT CBD	X1	X2	Y1	Y2					
29/30	MOONLIGHT	KAW 527B	51	MATHARE NORTH	NGARA	846	746		904	18	X	60	X	
29/30	MOONLIGHT	KAW 563V	51	MATHARE NORTH	NGARA	855	757		916	61	X	58	X	
29/30	MOONLIGHT	KAW 155D	51	MATHARE NORTH	NGARA	817	743		834	17	X	34	X	
29/30	MOONLIGHT	KAS 309V	51	MATHARE NORTH	NGARA	802	755		821	19	X	7	X	
29/30	MOONLIGHT	KAW 155D	51	MATHARE NORTH	NGARA	1415			1440	25	X	X	x	
29/30	MOONLIGHT	KAW 527B	51	MATHARE NORTH	NGARA	1430			1500	70	X	X	x	
29/30	MOONLIGHT	KAS 309V	51	MATHARE NORTH	NGARA	1430			1605	95	X	X	x	
29/30	MANMO	KAS 309V	51	MATHARE NORTH	NGARA	1611	1607	1603	1625	14	X	8	4	28
29/30	MANMO	KAQ 528V	29	MATHARE NORTH	NGARA	1705	1654	1644	1715	10	X	11	10	28
29/30	MANMO	KAW 155D	51	MATHARE NORTH	NGARA	1718	1715	1658	1725	7	x	3	17	28
29/30	MANMO	KAS 343Q	37	MATHARE NORTH	NGARA	1645	1640	1650	1655	10	x	5	10	28
29/30	MANMO	KAW 527B	51	MATHARE NORTH	NGARA	1748	1737	1728	1757	9	x	11	9	28
29/30	MANMO	KAX 024S	27	MATHARE NORTH	NGARA	1755	1749	1738	1806	51	x	6	11	28
29/30	MANMO	KAS 309V	51	MATHARE NORTH	NGARA	1806	1800	1748	1817	11	x	6	12	28
29/30	MANMO	KAQ 528V	29	MATHARE NORTH	NGARA	1812	1808	1756	1824	12	x	4	12	28
29/30	MANMO	KAS 343Q	37	MATHARE NORTH	NGARA	1808	1806	1804	1837	29	x	2	2	28
29/30	MANMO	KAW 155D	51	MATHARE NORTH	NGARA	1837	1833	1821	1850	13	x	4	12	28
29/30	MANMO	KAW 563V	37	MATHARE NORTH	NGARA	1846	1842	1830	1854	8	x	4	12	28
29/30	MANMO	KAQ 528V	29	MATHARE NORTH	NGARA	1912	1908	1857	1925	13	x	4	11	28
29/30	MANMO	KAS 309V	51	MATHARE NORTH	NGARA	1934	1930	1915	1947	13	x	4	15	28
									Low	7		2	2	
	14th March								High	95		60	17	
									Ave	25.3		13.6	10.5	

Source: Field Data, 2016

Annex 16: Key Informant Respondents

		Frequency	Percent
KII Respondents	Double M	1	8.3
	PEJA	1	8.3
	KBS	1	8.3
	Kasbowa	1	8.3
	West Madaraka Route	1	8.3
	Moon Light	1	8.3
	KURA	1	8.3
	KENHA	1	8.3
	KERRA	1	8.3
	Licensing Department	1	8.3
	City Engineering Department	1	8.3
	City Traffic Management	1	8.3
	Total	12	100.0

Source: field data, 2016

Annex 17: Trip Origin and Destinations

Table 44: Start point (origin) of respondents' journey

Start point	Frequency	Percent
Riruta	44	21.2
Maringo	48	23.1
Friends center	2	1
Riruta kwa maji	3	1.4
Uchumi	1	0.5
Mutindwa	2	1
Mathare	52	25
Nairobi west	22	10.6
South C	3	1.4
Westlands	2	1
Hilloks	1	0.5
Ngara	1	0.5
Kawangware	1	0.5
Uthiru	1	0.5
Kangemi	2	1
South B	1	0.5
Langata	3	1.4
Rongai	1	0.5
Town	5	2.4
Dam estate	1	0.5
Majengo	1	0.5

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Pipeline	1	0.5
Kireti estate	2	1
Huruma	1	0.5
Embakasi	2	1
Kinoo	1	0.5
Kahawa west	1	0.5
Roysambu	1	0.5
Total	206	99
Missing System	2	1
Total	208	100

Source: field data, 2016

Table 45: End point of respondents' journey

End point	Frequency	Percent
Kenyatta market	2	1
Temple road	13	6.3
Nairobi railways	13	6.3
Town	102	49
Upperhill	1	0.5
GPO	3	1.4
Muthurwa	1	0.5
Adams	7	3.4
Yaya	5	2.4
Prestige	1	0.5
Allsops	1	0.5
South C	1	0.5
Githurai	2	1
Ngara	3	1.4
Gikomba	1	0.5
Juja	2	1
Industrial area	1	0.5
Nairobi West	20	9.6
Bus station	4	1.9
Nyayo	1	0.5
Jogoo Road	2	1
Gilgil	2	1
Dagoretti	1	0.5
Kenyatta	2	1
Kibera	1	0.5
Total	192	92.3
Missing System	16	7.7

Total	208	100
-------	-----	-----

Source: field data, 2016

Annex 18: Improvement Suggestions

Table 46: how to improve public transport services in Kenya

What can be done to improve public transport service in Kenya	Responses		Percent of Cases
	N	Percent	
Construct more feeder roads	46	19.80	23.50
Regulate fares	39	16.80	19.90
Ease traffic flow	14	6.00	7.10
Introduce trump trains	3	1.30	1.50
Introduce card payment	4	1.70	2.00
Improve vehicle condition	5	2.20	2.60
Reduce loud music	16	6.90	8.20
Enforce strict traffic rules	14	6.00	7.10
Police stop harassing operators	2	0.90	1.00
Remove un roadworthy matatus	4	1.70	2.00
Train on road safety	23	9.90	11.70
Get rid of road cartels	2	0.90	1.00
Introduce more bumps	1	0.40	0.50
Matatu staff to have badges	5	2.20	2.60
Regular transfer of traffic officers	2	0.90	1.00
Get rid of corrupt officers	13	5.60	6.60
Revoke licenses for careless drivers	2	0.90	1.00
Locate strategic points for terminus	3	1.30	1.50
Create awareness on transport policies	2	0.90	1.00
Ensure security in matatus	4	1.70	2.00
Increase number of vehicles	5	2.20	2.60
Construct good railway lines	2	0.90	1.00

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

Bust stops to have shades	2	0.90	1.00
Matatus to take people to destination	1	0.40	0.50
Government to regulate private cars	2	0.90	1.00
All matatus to have first aid kits	1	0.40	0.50
Increase number of roads	4	1.70	2.00
Have hotlines to report rude staff	1	0.40	0.50
Install more security lights	2	0.90	1.00
Increase footbridges	1	0.40	0.50
Drivers should be older in age	2	0.90	1.00
Employ more ladies in the public transport	1	0.40	0.50
All SACCOS and companies to have a responsible in-charge	1	0.40	0.50
Eliminate roundabouts	2	0.90	1.00
Employ more police officers	1	0.40	0.50
Total	232	100.00	118.40

Source: field data, 2016

Annex 19: Data needs Matrix

Data needs	Indicators	Measure	Source of data	Instrument
Examine the extent of implementation of Sessional Paper No. 2 of 2012 on the Integrated National Transport Policy and section 5, 7 & 9 of National Transport and Safety Authority Regulations 2013	Presence of yellow line and vehicle colour;	Qualitative	Field observation	Observation schedule, photography
	Total number of registered SACCos/ company post 2012 vis-à-vis pre 2012	Sum total	Key informant interview	Interview schedule
	HoVs registered in post 2012 vis-à-vis pre 2012	Sum total	Key informant interview	
	Leg and head room, universal design	Tape rule		
	Reviews against set objectives in INTP;		Technical report reviews; Kenya Bureau of Statistic;	GIS spatial analysis
Assess the PSV industry operations level	Business ownership, structure and levels of investment	Individual, owning one or more vehicles	Registrar of companies/SACCOS	Key informant interview schedule
		Group ownership (family, partnerships, cooperatives, limited companies)	NTSA	
		Limited companies	Managers/ Employees	

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

	Financing	Self, family, and Friends Self, family and banks Investors and banks	Managers/ Employees	Key informant interview schedule
	Routes and vehicle types	Operate in one route allocated by NTSA/ control of routes by gangs Considerable deviation from routes Mainly 14-seaters Operate in one or more than one routes; routes controlled by cooperatives or management companies; some deviation from routes Mainly 25–55 seater Minibuses Routes controlled by legally mandated transport authorities; complete adherence to assigned routes Mini and full-size Buses	NTSA Managers/ Employees Observation	Key informant interview schedule Observation schedule
	Pricing	Flat zoned, variation with traffic and weather Flat zoned, monthly coupons and smart cards Seasonal tickets which are transferable, no deviations allowed	Managers/ Employees	Key informant interview schedule
	Operations – repair and maintenance, recruitment	Individually undertaken by each operator Done by management Companies Centralized	Managers/ Employees	Key informant interview schedule
	Regulatory compliance	Low or non-existent Compliance Complies with some, but not all, regulations Full compliance	Managers/ Employees NTSA Nairobi City County Government	Key informant interview schedule
	Promotion and advertising	Individual promotion through touting at stages Some advertising on Vehicles	Managers/ Employees NTSA Nairobi City County Government	Key informant interview schedule Observation schedule

ASSESSING INTP AND PUBLIC TRANSPORT SERVICE DELIVERY IN NAIROBI, KENYA

		Centralised advertising strategy		Photography
	Customer relations	Not emphasized Guidelines given Emphasized	Managers/ Employees	Key informant interview schedule Observation schedule Photography
	Business linkages and networking	Mainly personal ties and linkages through informal groups Mix of formal and informal linkages Predominance of formal linkages	Managers/ Employees	Key informant interview schedule
The effects of Sessional Paper No. 2	Convenience	travel time: the amount of time taken to reach destination; scheduling safety and security: possibility of reaching without accident, being mugged accessibility: able to get it when needed	Observation and computation Household survey Traffic department	Dispatched buses per route survey Household questionnaire Key informant interview schedule
	Capacity availability	Is the commuter space available for the required trip	Household survey	Household questionnaire
	Spatial availability	Is service offered and can a traveller reach it?	Computation	Computation formula: $S.C = \frac{P}{P}$
	Comfort	Vehicle design, driving standards, construction standards, load factors and standards of maintenance	Observation Measuring Mechanical engineering standards	Observation schedule Measuring rule Manufacturers guide book Photography
	Information availability	Do the travellers know how to utilise the service?	Household survey Observation	Household questionnaire Observation schedule
	Temporal availability	When is the service provided?	Household survey Observation Drivers/managers	Household questionnaire Observation schedule Key informant interview
	Universality	Are they designed to cater for needs of those with special needs	Observation	Observation schedule Photography
	Average bus stop spacing	$\frac{l}{n-1}$ A.S..D --- $(n-1)$ l : length of a bus route	Existing secondary data such as length of the route & stops	Formula computation

		n : total number of bus stops passed by this route	Actual measuring using odometer and counting	Odometer/ distance measuring equipment
	Route overlapping	$R.O = \frac{l}{L}$ l : total length of bus routes L : total length of bus route network	Existing secondary data such as length of the route & stops GIS Data from roads authority/JICA Actual measuring using odometer	Formula computation Buffering analysis Odometer/ distance
	Service coverage	$S.C = \frac{P}{P}$ p : population served in the certain buffer area of a stop. P : total population of a study area	Existing secondary data GIS Data from roads authority/JICA	Formula computation Buffering analysis
	Average network speed	$A.N.S = \frac{\sum V_i S_i}{\sum V_i}$ V_i : number of bus-kilometre operated per day or per hour S_i : travel speed of bus	Existing secondary data GIS Data from roads authority/JICA	Formula computation Buffering analysis
How current regulation structure maybe combined with other approaches for transport reform in Nairobi	Integration Existence of advance mass transit such as LRT & BRT	Comparison with best practices	Ministry of Infrastructure and Transport, KURA, KeNHA, County Government, KRC	Key informant interview

Source, Author, 2016; McCornick et al., 2013; Kittelson et al., 2003; Vuchic, 2005;Iles, 2005; Guihaire and Hao, 2008