



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

DEPARTMENT OF CIVIL ENGINEERING

A thesis submitted in partial fulfilment of the requirements for the degree

of

Masters of Philosophy

in

Transport Studies

**An Investigation of the Perceived Consequences to Employees of Reducing
Employment Related Trip End Choices in Cape Town**

Prepared by

Hazvinei Tsitsi Tamuka Moyo

Supervised by

Emeritus A/Prof Romano Del Mistro

December 2013

Dedication

This thesis is dedicated to my Mum, Dad, Nelson, Hamadziripi, Itai, Kudzai and my niece Tatenda. Thank you guys for continuously taking the midnight calls when I was missing home.

Acknowledgements

My heartfelt appreciation and thanks to Professor Romano Del Mistro, my supervisor, who has been the most inspiring of mentors. Thank you so much, Prof. You are the epitome of what supervision should be. Your attention to detail and sharpness in thought pushed this project in a much more focused direction. You pushed me to have confidence in myself. I remain eternally grateful.

My most sincere gratitude to: The African Centre of Excellence for Studies in Public and Non-motorised Transport (ACET) which funded my Masters studies through the Volvo Educational and Research Foundations (VERF); to Dorothy thank you for your Choice Modelling expertise, you have been great help; I would also like to thank my colleagues in the post graduate lab for the fun Fridays, which served as a much appreciated break, the brainstorming sessions and the emotional support. It's been great.

I would also like to thank The Research Lamppost, who helped me collect my data.

Last but not least, I would like to thank the Lord Almighty for being my strength when I thought I had taken on too much. Thank you for showing me that in You there is hope and eternal joy.

Plagiarism Declaration

“I know the meaning of plagiarism and declare that all the work in the documents, save for which is properly acknowledged, is my own.”

Signature:

Signed by candidate

 12 December 2013 _____
Signature Removed

Abstract

In South African, the bench mark for transport expenditure is 10% of monthly income. In the global South “transport poverty” is not a foreign concept considering that most individuals use more than 10% of their income on transport. The driver of these high transport costs is the positioning of economic activities relative to residential areas. Additionally, concerns over Peak Oil’s impact on fuel prices means transport will become even more unaffordable in the future. Through a literature review, this thesis understands the precariousness of transport costs and how they are exacerbated by long commuting distances between places of residence and job locations. This sets the foundation of this thesis and helps in understanding how city structures and travel behaviour are weaved together.

This thesis addresses the issue of affordable transport by arguing that providing individuals with a large catchment area from which they can choose jobs is not always beneficial. It builds an argument by borrowing from the “too much” choice theory which posits that the availability of many options does not result in benefits and that there is a point of sufficiency when providing choice. It further argues that access to a larger catchment area in job search is accompanied by a decrease in utility.

To test this hypothesis, a stated preference survey was carried among 400 individuals within the Cape Town area in the low and lower middle income groups. From various literatures, it is posited that these individuals have limited options in terms of transport flexibility, in that respect they are identified as the most vulnerable to the impacts of climate change and Peak oil.

Literature review and focus group discussions were carried out to inform on the variables to use in the stated preference design. For analysis purposes, a multinomial logit (MNL) was

used. Inference into the importance of variables, the current commuting patterns, willingness to take a salary decrease and the influence of catchment size and job opportunities on utility were carried out. One key finding from this research was that as catchment size increases, there was a decrease in the level of utility that individuals attained. The findings also showed that the current structure of cities in the global South does not encourage affordable travel as commuting distances for marginalised groups are relatively long. By looking at the monetary value of each catchment size using the parameters from the estimated models, it was found that catchment 2 yielded the highest level of utility compared to other catchment areas. Catchments 4 and above i.e. distances greater than 20 km were found to yield negative utility. Flowing from this finding, it was concluded that shorter commutes are more beneficial and that an increase in catchment size resulted in a decrease in utility.

Further, it was found that as the number of job opportunities increases, there was a decrease in utility. One key conclusion coming from this finding is that in this current context, reducing trip end choices met by a provision of 20 jobs opportunities per month for the low income respondents and 3 job opportunities per month for the lower middle income respondents may lead to a reduction in negative consequences associated with increased choice. From the findings and methods implemented in this study, it is found that stated preferences can be a tool that can be used to guide in policy decisions that pertain to possible future planning.

Table of Contents

Dedication	i
Acknowledgements	ii
Plagiarism Declaration	iii
Abstract	i
Table of Figures	ix
List of Tables	x
Glossary of Terms	xi
Abbreviations	xiii
Introduction	1
Literature review	5
2.1 Introduction	5
2.2 Choice and its contested nature	7
2.2.1 Prechoice conflict, post choice satisfaction and post choice dissonance	8
2.2.2 Benefits and negative impacts of increased choice in different sectors	9
2.2.2.1 Choice in the Retail Sector	9
2.2.2.2 Choice in the financial sector.....	11
2.2.2.3 Choice in the health sector	12
2.3 Why is the ‘too much choice’ effect observed in some contexts?	13
2.3.1 Decision Strategies Implemented to Regulating the “Too Much” Choice Effect	15
2.3.1.1 Satisficing.....	15
2.3.1.2 Utility maximisation.....	16
2.3.1.3 Heuristics as a choice strategy	16
2.3.1.4 Reason- based action.....	17
2.3.1.5 Principal agent problem (Agency dilemma)	17
2.3.1.6 Choice and the role of Policy	18
2.3.4 Conclusion	18
2.4 How do people make Job Choices?	19
2.4.1 Connection between job search and job choice decisions from a job seekers perspective	20
2.4.2 Decision theory	21
2.4.2.1 Expectancy theory	21
2.4.2.2 Soelberg’s Generalisable Decision Processing Model	22
2.4.2.3 Image theory	23
2.4.3. Job attributes specific Decision Theories	23
2.4.3.1 Objective theory	23
2.4.3.2 Subjective theory	24

2.4.3.3 Critical Contact theory	24
2.4.4 Factors affecting Job Choice	25
2.4.4.1 Location	25
2.4.4.2 Financial compensation	26
2.4.4.3 Organisation perception	26
2.4.4.4 Person Organisation fit (P-O fit).....	27
2.4.5 Relative Importance of factors affecting Job Choices.....	27
2.4.5.1 Relative importance by Gender	27
2.4.5.2 Relative importance depending on Career Stage	28
2.5 Empirical Application of Decision making Strategies	29
2.5.1 Utility maximisation	29
2.5.2 Elimination by Aspects (EBA).....	30
2.5.3 Satisficing /Conjunctive	30
2.5.4 Lexicographic Heuristics.....	31
2.6 Job Housing Balance: Linkage to affordable transport and accessibility	31
2.6.1 Rationale for looking at accessibility	32
2.6.2 The Job-housing balance nexus: Theoretical background.....	34
2.6.3 Factors leading to Job –Housing Imbalances	35
2.6.3.1 Skill shortages and Racial Discrimination.....	35
2.6.3.2 Limited Options amongst the Unemployed.....	36
2.6.3.3 Two wage earner households.....	36
2.6.3.4 Imbalance between the supply of Jobs and Housing	36
2.6.3.5 Fiscal and Exclusionary Zoning.....	37
2.6.4 Negative Impacts of Job-housing imbalances	37
2.6.4.1 High Travel costs and excess commuting.....	37
2.6.4.2 Social Exclusion.....	37
2.6.5 Potential Gains from Creating Job-Housing Balance.....	38
2.6.6 Relationship between Urban form and Travel behaviour.....	39
2.6.7 Conclusion	41
2.7 Excess commuting	41
2.7.1 Introduction	41
2.7.2 Defining Excess Commuting.....	42
2.7.3 Causes of Excess Commuting	44
2.7.3.1 Relationship of the Urban Form and Excess Commuting	44
2.7.3.2 Explaining excess commuting through Job-Housing Balance.....	46
2.7.3.3 Tenancy and excess commuting	47
2.7.3.4 Modal choice and Excess Commuting.....	47
2.7.3.5 Job type and Excess Commuting	47
2.7.4 The extent of excess commuting between socio-economic groups.....	48
2.7.5 Conclusion	49
2.8 Travel demand management as a solution to Transport Affordability	49
2.8.1 Introduction	49

2.8.2 Brief History of TDM.....	50
2.8.3 Understanding the share of public transport costs.....	50
2.8.4 The role of habit and behaviour in TDM policies	52
2.8.5 Towards Public Transport: Evaluation of TDM efforts	53
2.8.6 Examples of TDM and their impacts on Affordable Transport.....	55
2.8.7 Conclusion.....	57
2.9 General Conclusion	57
Methodology: Questionnaire Development and the Survey	60
3.1 Introduction	60
3.2 Summary of Objectives.....	62
3.3 Methodologies in the Elicitation of Preferences among Individuals: Revealed vs. Stated Preferences.....	62
3.3.1 Stated Preference Methods	64
3.3.1.1 Contingent Valuation (CV).....	64
3.3.1.1.1 Open ended.....	65
3.3.1.1.2 Dichotomous or Referendum	65
3.3.1.2 Contingent Analysis (CA).....	66
3.3.1.3 Choice Modelling (CM).....	66
3.3.1.3.1 Choice experiments	66
3.3.1.3.2 Contingent Ranking.....	66
3.4 Discrete Choice Study	67
3.4.1 Developing the Discrete Choice Experiment	67
3.4.1.1 Identifying Attributes through Literature.....	67
3.4.1.2 Focus Group Discussions: Refining Attributes.....	69
3.4.1.2.1 Defining the Sampling Frame	69
3.4.1.2.2 Screening for Focus Group Participation	70
3.4.1.2.3 Outcomes from focus groups	70
3.4.2 Defining the attributes and their levels.....	72
3.4.2.1 Distance from home-.....	72
3.4.2.2 Travel time-.....	73
3.4.2.3 Cost of transport	73
3.4.2.4 Change in Salary	73
3.4.2.5 Number of Job Opportunities-.....	74
3.5 Experimental design and choice sets	74
3.5.1 Construction of choice sets.....	76
3.6 Formulating the Questionnaire.....	76
3.6.1. Piloting the Questionnaire	77
3.7 Main Survey.....	77
3.7.1 Sampling.....	78
3.7.2 Training of Interviewers	78

3.7.3 Survey Administration Mode	79
3.7.4 How the Sampling Points were identified	79
3.7.5 Data Limitations	79
3.8 Estimation Procedure	80
3.8.1 Discrete Choice Model Estimation.....	80
3.8.1.1 Basic Utility Maximisation Theory	80
3.8.1.2 Conceptualising Utility Maximisation within a Job Choice Framework.....	80
3.9 Multinomial Logit	81
Description of the Data and Findings	83
4.1 Introduction.....	83
4.2 Description of Data.....	83
4.2.1 Socio-Demographic Characteristics of Respondents	84
4.3 Results from semi-structured questions	85
4.3.1 Views on Salary Decrease	85
4.3.2 Perceptions on different attributes.....	85
4.3.3 Travel times and Distances Comparisons.....	88
4.3.4 How many people thought of changing their jobs, or take a salary decrease.....	88
4.3.5 People spending more than 10% of income on transport per month.....	89
4.4 Results from the Discrete Choice Experiment (DCE).....	90
4.4.1 Status Quo Analysis	91
4.4.2 Econometric Model Analysis	91
4.4.2.1 Establishing the a Priori expectations of the variables and how they influences Utility	92
4.4.2.2 Criteria used to choose the “best fit” model	93
4.4.3 Summary of Models and the Type of Analysis Carried out.....	94
Several statistical analyses were carried out. Table 8 provides a preview of the type of analyses carried out. A brief description of the analysis and the section discussing the analysis is provided in the table.	94
4.5 Estimated models and choosing the “best fit” model for each income group	95
4.5.1 “Forced choice” models for the low and lower middle income groups	95
4.5.1.1 Analysing the forced choice models for the low income respondents.....	96
4.5.1.2 “Best fit” model for the “forced” choice for the low income	97
4.5.1.3 Analysing the “forced” choice models for the lower middle income respondents	98
4.5.1.4 “Best fit” model for the “forced” choice case for the lower middle income group	98
4.5.2 Importance of attributes in monetary terms for the Low and Lower middle income groups	99
4.5.2.1 Value of Travel time and Distance for the low income Respondents.....	99
4.5.2.2 Value of Travel time and Distance for the lower middle income Respondents	100

4.5.3 “Unforced choice” models for the low and lower middle income groups	101
4.5.3.1 Analysing the “unforced choice” models for the low income respondents	101
4.5.3.2 “Best fit” for the “unforced choice” case for the low income respondents	104
4.5.3.3 Analysing the “unforced choice” case for the lower middle income respondents	104
4.5.3.4 “Best fit” model for the “unforced” choice for the lower middle income group	105
4.6 Utility with respect to the different Catchment Sizes (commuting distances).....	105
4.6.1 Impact of Catchment Size and Utility: “Forced” Choice case for the low and lower middle income respondents.	105
4.6.2 Impact of Number of Jobs and Utility for the low and lower middle income respondents.	107
4.6.3 Impact of Catchment Size and Utility: “Unforced Choice” case for the low and lower middle income respondents	109
4.7 Analysis of data for willingness to take/ not take a salary decrease.....	111
4.7.1 Data Analysis for Respondents willing to take a salary decrease	112
4.7.1.1 “Best fit” model for respondents willing to take a salary decrease	112
4.7.2 Analysing data for respondents not willing to take a salary decrease	113
4.7.2.1 “Best fit” model for people not willing to take a salary decrease.....	113
4.8 Influence of Income level, Gender and Age on Job Attributes	113
4.8.1 Influence of income on Job Choice decisions	114
4.8.2 Effect of age on Job Choice decisions	114
4.8.3 Effect of gender on Job Choice decisions	115
4.8.4 Conclusion	115
Discussion of Results.....	116
5.1 Introduction	116
5.2 Outcomes from the Semi-structured questions	117
5.3 Findings from the “forced” choice analysis	117
5.3.1 On the effect of catchment size on utility for the low income respondents	118
5.3.2 On the effect of catchment size on utility for the lower middle income respondents	119
5.3.3 Monetary Worth of each Catchment Size per Income Group	120
5.3.4 The Importance of Linking Catchment Sizes, Number of Jobs and Utility	121
5.4 Findings from the “unforced choice” analysis.....	122
5.4.1 On the “unforced choice” findings for the low income respondents.....	123
5.4.2 On the “unforced choice” findings for the lower middle income respondents	123
5.5 The significance of the Alternative Specific Constant	124
5.6 On the willingness to take a salary decrease to work in the ideal location	124
5.7 On the influence of income and age on utility	125

5.8 Potential Sources of error for the study	126
5.9 Summing up the findings	127
General Conclusion: Impacts of Reducing Catchment Size to Employees	128
6.1 Introduction	128
6.2 Towards Policy and Accessibility to Jobs	129
6.2.1 Unattractiveness of the current city structures in relation to work commutes	129
6.2.2 On the cost of “too much” choice.....	131
6.3 Policy Recommendations.....	133
References.....	135
Bibliography	152
Appendices.....	155
Appendix 1	155
Appendix 2	156
Appendix 3	157
Appendix 4	158
Appendix 5	159
Appendix 6	160
Appendix 7	161
Appendix 8	168
Appendix 9	169
Appendix 10	171

Table of Figures

Figure 1: Relationship between Satisfaction / Utility with Number of Choices.....	61
Figure 2: Stated Preference Methods: Source (Merino-Castello, 2003).....	64
Figure 3: An example of the Stated Preference choice pair.....	76
Figure 4: Probability Density functions of for the Gumbel and Normal Distributions (same mean and variance)	82
Figure 5: Importance of Variables	87
Figure 6: Commuting Time and Distance Comparisons.....	88
Figure 7: Individuals who thought of changing their jobs, willing to take a salary decrease..	89
Figure 8: Monthly income dedicated to transport.....	90
Figure 9: Status Quo versus Alternative 1 and 2	91
Figure 10: Responsiveness of Utility to changes in distance for the low income	106
Figure 11: Responsiveness of Utility to changes in distance for the lower middle income ..	106
Figure 12: Impact of the Number of Jobs Advertised on Utility for the Low income respondents	107
Figure 13: Impact of the Number of Jobs on Utility for the Lower Middle income respondents	108
Figure 14: Responsiveness of Utility to changes in distance for the low middle income	109
Figure 15: Responsiveness of Utility to changes in distance for the lower middle income ..	110

List of Tables

Table 1: Job attributes Preferences Linked to Gender Role	28
Table 2: Revealed and Stated Preference MethodsSource: (Kjær, 2005).....	63
Table 3: Literature on Job Attributes	68
Table 4: Screening Criteria for Focus Groups	70
Table 5: Attributes levels for the Low Income Group.....	75
Table 6: Attributes Levels for the Lower Middle Income	75
Table 7: Characteristics of the Sample	84
Table 8: Preview of Estimated Model Variants, Type of Analyses and the Sections in which they are discussed	95
Table 9: Selected "Forced" Choice Models	96
Table 10: Unforced choice models for the low and lower middle income groups.....	103
Table 11: The monetary value of Utility for each Catchment number	120

Glossary of Terms

Attributes – variables that make up an alternative.

Best fit –an estimated model that better represents the respondents preferences compared to other estimated models

Current Location- this is the work location that respondents are currently commuting to.

Dummy variables- are proxy variables that are used to estimate non-linear relations. They take a value of either 0 or 1.

Global South- developing countries

Hyperchoice- a marketing concept which describes a condition where individuals have too many options and end up not buying anything.

Ideal Location- this is the work location that was previously identified by respondents as one that would result in affordable transport costs, convenient for transport accessibility and also resulted in a short commuting time.

Job-housing balance- a situation where there are a sufficient number jobs to match the number of workers in the area.

Low income group- people earning between R3000-R6400 in 2013

Lower middle income group- people earning between R6401-R12800 in 2013

Marginalised groups- individuals who have difficulties in accessing their basic needs

Peak Oil- an economic concept that points to the rate of extraction of oil and how it reaches a maximum, and thereafter extraction declines.

Pilot Survey- a survey that is carried out before the main survey to test the research instrument.

Revealed Preferences-the concept that explains that the preference for a product by consumers or individuals is shown by what they purchase on the real market.

Stated Preferences- the concept that explains that the preference for a product by consumers or individuals can be shown by the choice from a set of hypothetical products.

Transport Poverty – the situation where individuals spend more than 10% of income on transport.

Urban Poor- people who live in cities who find it difficult to afford basic necessities.

Utility – describes the benefit that an individual derives from consuming a good or taking part in an economic activity

Abbreviations

CA- Conjoint Analysis

CBD- Central Business District

CV- Contingent Valuation

DCE- Discrete Choice Experiments

IIA- Independent of Irrelevant Alternatives

IID- Independence and Identically Distributed errors

LI- Low Income

LWM- Lower Middle Income

MNL- Multinomial Logit

NASA- National Aeronautics and Space Administration

NHTS- National Household Travel Survey

TDM- Travel Demand Management

Chapter 1

Introduction

Traditional theories on urban form posit that employment is concentrated in the central business district (CBD) and that individuals make a trade-off between cheaper housing and transport costs (Alonso, 1964). With the exponential growth of cities and urban sprawl, distances to the CBD have increased and consequently impacted on commuting to work for most individuals. Increase in fuel prices which translates to an increase in transport costs has made peripheral home locations—mostly occupied by marginalised groups—unattractive as transport has become unaffordable for this cohort of individuals. Furthermore, residing closer to the city is not an attractive alternative considering the expensive rentals.

Behrens et al., (2004) indicated that an outcome of apartheid planning was a transport network that mainly served the minority white population and this led to a highly skewed transport sector particularly road and railway. Indeed, the transport system excluded the black population from efficiently participating in economic activities as households are in the peripheries and are isolated from transport development (Kane, 2002). South Africa is one of the many examples where marginalised groups have limited access to affordable transport and how this has marginalised already poor groups from participating in productive economic activities. Amongst these groups a large portion of income is allocated to transport costs and this figure will continue to increase as global oil supply continues to deteriorate which further propels the upward trajectory of fuel prices and hence transport costs.

Additionally, large cities are associated with opportunities especially by people in the rural areas; this has led to the growth in the population of city dwellers in most developing

countries. In most cases people who migrate from the rural areas settle in the peripheral areas where they are isolated from transport or proper infrastructure. Due to the unavailability and inability to access opportunities, there has been a tremendous deterioration in the standards of living for the urban poor.

Shifting to less expensive modes like non-motorised and public transport is not an option as they are already utilising these alternatives. With 'Peak Oil' the urban poor will continue to be vulnerable in terms of transport affordability and basic needs. With that in mind, this calls for policies that will ensure travel to work for marginalised groups is affordable. Perhaps increasing public transport ridership is a starting point but there is a need to marry the way cities are structured and the needs of its dwellers.

On the other side, the use of motorised transport in the cities which has significantly contributed to climate change has become a topical issue. Increasing mobility and accessibility through transport infrastructural improvements that support the current modes will only exacerbate the consequences of carbon emissions without providing solutions to the urban poor. Unger et al., (2010) posited that transport will continue to be the largest contributor of carbon emission for the next 50 years and as such, there is a need to adopt a new transport strategy that addresses climate change and affordable transport issues.

Given the current commuting distances a solution that would solve the issue of affordable transport while encouraging sustainable travel would be to reduce the distance between the work place and the residential areas. However, a solution like this would result in a reduction in the number of choices available to individuals within a job search context.

This study tries to understand the impact on employees of a reduction in workplace pool- a reduction in the radii of accessible jobs. To investigate and identify the costs associated with

reducing employment related trip end choices to employees this research uses the notion of utility and how it changes with an increase in opportunities or catchment size.

In parallel, it tries to understand the consequences of reducing catchment size by looking into the real and perceived benefits of choice. The hope is that by understanding these effects, it may initiate debate in directing the growth and future city structures to ensure that employees are matched to employment opportunities. Additionally, it assists in understanding the benefits that can accrue from reduced motorised travel. The question being addressed here is whether individuals need as much choice as they have at their disposal, and if not, at what point is choice regarded as “sufficient”

As this discussion progresses, three key areas are analysed with the aim of providing a background and support, for the notion of choice, how it may inform policy on city structures and its influence on transport affordability.

- **1 What are the benefits and cost of increased choice?** Literature on choice has shown that there is a certain point at which choice is optimal thereafter there is a decline or no benefits. The central aim of the broader research is to try and show this relationship within the job search/choice context and hopefully this will act as a guide in understanding the benefit that people derive from having a larger employment pool.
- **How do employees carry out their job search?** This looks at employer and job attributes that individuals consider as important when looking for a job. Attention is given to the roles that location and travel time play in guiding job search. Additionally, reviewing literature on job search strategies aids in understanding how a reduction in home to work distances can be achieved. This is a possible avenue in making transport accessible to marginalised groups. Furthermore, there is a possibility

that the benefits from a reduction in commuting distance may trickle down and potentially address some of the issues within the climate change debate.

- **Is it feasible to employ city restructuring as a solution to affordable transport?** If this is possible, what size should the sub-cities be in order to encourage public and non-motorised transport? Furthermore, how transport infrastructure is designed will impede travel to other zones and this is crucial in preventing or reducing excess travel. This aspect will be addressed through recommendations that are made to ensure that supportive policies are put in place to reach a common goal.

The rest of this discussion consists of 5 chapters. Chapter 2 provides a literature review that aids in understanding choice as a concept. This looks at research in psychology and marketing. Additionally it also reviews literature on job-search theory, the job-housing nexus, excess commuting and travel demand management (TDM). Chapter 3 provides a brief discussion of stated and revealed preference and their application to elicit consumer preferences. It further discusses the development of the research tool and how the sample for the study was identified. It discusses the theoretical framework from which the empirical model is built from. This is followed by Chapter 4 which provides the results for the study. Chapter 5 provides a detailed discussion of the findings and how they address the research question. Chapter 6 concludes the discussion by pointing out the applicability of these findings in developing world cities and provides recommendations based on the findings from the research.

Chapter 2

Literature review

2.1 Introduction

The 21st century has seen a growing interest in the future of the planet and how the next generation is to survive given the alarming rate of the depletion of already limited resources. Efforts have been made to advance climate change initiatives with the aim of insuring the continuation of the planet as we know it. However most of these efforts have not come to fruition or close to meeting the targets agreed upon in the several climate change conferences (COP 17, 2011). Perhaps the approach is misplaced and different strategies need to be implemented. Targeting large polluters and coming up with alternative fuels seems right, but what needs to be addressed is whether this has produced quantifiable and long term solutions and if not, a different approach needs to be implemented. Maybe creating willingness amongst cars users (directly or indirectly) to reduce reliance on cars towards public transport and non-motorised transport (NMT) is a better strategy. Nevertheless, if willingness is not cultivated, the very nature of the limited supply of oil will impose such behaviour through fuel shortages and fuel price hikes. The majority of individuals in the global South live in extremely precarious existence marked by low, unstable incomes and a great reliance on public transport to carry out day to day activities (Behrens, et al., 2004). What this means is that in the long run, an increase in fuel prices will make transport even more expensive for most individuals in the global South.

The question is how will this help in alleviating the climate change and peak oil problems. A study by NASA's Goddard Institute for Space Studies (Unger, et al., 2010) showed that for

the next fifty years, road transport will be the largest contributor of carbon emissions. With this in mind, coming up with ways to limit trips by motorised transport is a starting point, but how we go about this is the vital aspect in the climate debate. Perhaps the first step is to identify different aspects on how people make their choices, it is only then that we can fully start discussing the impacts of a reduction in choice for individuals within a job choice framework and the benefits thereof.

As mentioned earlier, concern is for marginalised groups and reducing the disparities between jobs and housing may reduce the use of motorised transport. Suggested schemes are either through TDM but this still results in people travelling as far as they want through the use of sustainable modes such as public transport. Secondly, city restructuring by encouraging multiple work nodes which can potentially reduce the distances that people travel to go to work. The size of these multiple nodes is fundamental in this discussion as it ascertains the number of opportunities that may be available in each node. This is the crux of this research as it helps in beginning to understand the notion of sufficiency. However this might need to be done in a transport planning framework that makes travelling to farther destinations difficult (Del Mistro and Proctor, 2012). This is the alternative that is explored further in the discussion.

The solution suggested above can be implemented to reduce work commutes. However, one outcome inherent in such a strategy is a reduction in the number of work opportunities that are accessible to employees. Additionally there may also be costs emanating from the need for individuals to adjust their job expectations or attributes in their job search process. By looking at the costs associated with having fewer jobs to choose from as employment options the literature review points out a possible area of research on whether costs of reduced job opportunities can be traded off for benefits within the climate change matrix. This literature

review seeks to help in understanding the perceived benefits and costs of choice and then use these findings in understanding choice within job search.

Section 2.2 discusses choice, specifically the influence of choice on utility and satisfaction. Additionally, the coping mechanisms adopted by individuals to deal with the “too much” choice effect are explored. This is followed by literature on job decision theories which look at how people make their job choices. Factors that people consider when making job choices are reviewed in section 2.4, and this focuses on identifying the importance of these attributes in different professional settings. Section 2.5 identifies literature on choice making strategies and how they are implemented. The job housing nexus is discussed in section 2.6 and this focuses on understanding the disparities that exist between job and housing. Furthermore, factors that lead to these disparities and the negative effects are identified. Potential gains from creating a balance between jobs and housing are also discussed. Excess commuting is discussed in section 2.7 to try and establish if it maybe a cause of high transport costs, by providing insights into excess commuting within a Cape Town setting. A discussion on TDM and how they can be a tool for transport affordability and climate change is carried out in section 2.8. Finally section 2.9 concludes by summarising key findings from the literature review.

2.2 Choice and its contested nature

This section evaluates the importance of choice and how this impacts everyday decisions. The literature reviews choice from several aspects of life and more importantly choice in a job search context. The motivation for looking at job choice is to understand the value people place on having many job options and also how this affects employee decisions. The approach here is to look at location and how it influences job choice decisions and the importance of travel times.

Various literatures on choice exhibit conflicting results as to when and under what circumstances choice is considered to be “sufficient” This discussion delves into choice and how people deal with situations where they are expected to make a choice in several contexts e.g., consumer products, service providers, education, health care, etc.

2.2.1 Prechoice conflict, post choice satisfaction and post choice dissonance

Before engaging in the choice process individuals are particular about the number of options that are available to them. More choice brings satisfaction and also enables individuals to have confidence in their life choices (Langer and Rodin, 1976). In *The Paradox of Choice*, (Schwartz, 2004) explained that abundant choice is attractive to people, but there are negative effects that emanate from having too much choice. Several negative effects from choice stand out in his analysis, for example, decision paralysis, decision quality suffers and high expectations¹ among others. Before the actual decision is made, people tend to eliminate options that are inferior within a choice set. Brownstein (2003) posited that as one eliminates inferior choices from a choice set, options that remain are close together which makes the decision process more difficult.

When faced with options that are close together, uncertainty on whether one will make the right decision may result in decision deferral. In some cases there is also uncertainty of whether a better option might have been left out (Schwartz, 2004). Even though individuals make use of all the information available in the decision process, there is no guarantee that they will be satisfied with their chosen option (Svenson and Shamoun, 1997). In essence, the choice process is associated with pre-choice conflict, post-choice satisfaction and post-choice dissonance of which some of these aspects may lead to decision deferral.

¹ The secret to happiness is low expectations
(http://www.ted.com/talks/barry_schwartz_on_the_paradox_of_choice.html?quote=132)

The concept of choice is one that is based on the premise that people are rational thinkers and always aim to maximise their utility with each decision they make. What happens if making a decision is a daunting experience? Can one trade off the positive benefits that emanate from choosing an option with the negative effects? There is a whole array of questions that arise when one thinks of the choice process and the value of choice itself. Kahneman and Tversky (1974, 1979) analysed utility maximisation theory and applying it to modern society, they found that humans do not always conform to rational choice making behaviour. In their study, they concluded that people violate rationality quite often.

Utility theory suggests that people engage in activities until a point is reached where utility begins to increase at a diminishing rate. Thereafter, a satiation point is reached where engaging in an activity does not result in an increase in utility (McAlister, 1982). The same applies to choice, as one is offered a whole range of options they are excited by the unlimited possibilities that come with choice. However, a point is reached when motivation from choices begins to wane and individuals begin experiencing negative effects from too much choice. The aim of looking at choice is to address the perceived and actual benefits from choice and at the same time try and find a point where choice is sufficient to render maximum and positive benefits to an individual.

2.2.2 Benefits and negative impacts of increased choice in different sectors

This section explores choice and its application to different contexts within the economy. It shows the value of choice within the different employment sectors to get an understanding of the perceived value of choice.

2.2.2.1 Choice in the Retail Sector

Taylor and Brown (1988) pointed out that the availability of choice gives individuals a sense of control. In the same spirit, Deci and Ryan (1985) put forward that choice has the effect of

bringing out feelings of intrinsic motivation which are attributed to physical and psychological benefits. Research in psychology and marketing on human behaviour in a choice environment has shown that choice improves the quality of peoples' lives as it enables them to pursue their goals (Markus and Schwartz, 2010).

Most successes in consumer services have emanated from giving consumers the opportunity to choose from a large spectrum of options. In a society where people seek to be unique and have different tastes, providing more options increases the likelihood of meeting these diverse preferences (Schwartz, 2004).

Juxtaposing the above findings, more choice has also been observed to result in individuals being overwhelmed by information in the choice process. In some cases, this has led to individuals finding it more beneficial to defer making a choice. In an analysis of the effect of choice, (Iyengar and Lepper, 2000) observed that people were more drawn to sampling a variety of 24 jam flavours compared to 6 jam flavours. However, when it came to the actual purchase, only 3% of those who sampled 24 flavours bought jam compared to 30 % in the 6 flavour sample. Their analysis illustrates decision paralysis when a person is faced with an abundance of options. In another study of college students, they found that individuals were more willing to write an essay for extra credits if they were given the option to choose the topic to write on. Furthermore, individuals wrote better essays when they were given fewer (6) topics to choose from compared to an extensive list (30). This shows that in some contexts, providing individuals with fewer options enhances their ability to process information thus increasing the will to choose and also make sound decisions.

In an analysis of hyperchoice amongst consumers, Mick et al., (2004) observed that the inability to process information in a timely manner exerts confusion and is psychologically draining, resulting in people opting out of making a choice and leaving shops empty handed.

These findings are also supported by Baumeister and Vohs (2003). Turning to practical examples, Healy (2012) showed that Wal-Mart and Apple Inc marketing strategies are such that they limit products within each category compared with most companies in their respective industries but have continued to perform well compared to their counterparts. This supports the notion that limiting choice is not always detrimental. A study that also supports the notion that less could be better, Fasolo et al., (2009) observed that ALDI a German retail store sells more than its competition even though it puts 35 times fewer items in its stores. In another study, Goldstein (2001) pointed out that Procter and Gamble experienced an increase in sales after it reduced its product varieties in the Head and Shoulder brand.

Still, companies like the McDonalds food chain had an economic turnaround in 2003 due to an increased variety in their menu by including healthier options. Furthermore, another fast food chain in the USA, Subways has also managed to attract more customers by allowing customers to ‘tailor’ their menu. This has resulted in great success for the food chain (Paterson, 2010). The above literature findings show that choice in different aspects may result in positive or negative outcomes.

2.2.2.2 Choice in the financial sector

One may argue that the above literature is biased towards consumer choice which may seem trivial compared to health, finance (investment choices) and insurance situations. In a study on pension plans, Huberman et al., (2003) found that the number of participants in a pension scheme reduced when the options for the pension schemes increased. They found that for an additional 10 plans that were added to choose from, there was a 1.5% decrease in participation.

2.2.2.3 Choice in the health sector

In the health care sector patients are becoming more aware of the benefits of choice and as such are keen on being involved in their treatment plan. Bryant, et al., (2007) makes reference to techniques that have been implemented to aid patients in making their treatment choices. This illustrates that choice, has become an important part in the well-being of individuals such that providing an environment in the health care sector where people feel they have control in their care is important. Interestingly, like in the case of consumer products Bundorf and Szrek (2010) found that providing a variety of health plans increases the likelihood of matching patient needs. But, in a study on drug choice plan, they observed that choice was more difficult when patients were faced with 16 plans as compared to 2 plans. This is congruent to findings in consumer products, (Goldestein, 2001, Iyengar and Lepper, 2000) and other related studies on choice, (Scheibehenne, et al., 2009, Oulasvirta et al., 2009). In sum, choice taken from several contexts, (health, consumer, finance) provided in moderation appears to be more beneficial than “too much” choice.

The notion of “too much” choice can be transposed to situations which entail day to day human interactions. Grant and Schwartz (2011) evaluated the consequences of having an excess of a good thing with reference to virtue, wisdom, courage and knowledge among other things. They concluded that exercising these attributes is beneficial until a certain point is reached. Instead of liberating, choice may be counterproductive thus antagonising the motivation for choice. People are faced with choices that range from the mundane to the most important things in life and this shows how making a choice is ever present and differs depending on the circumstances Schwartz (2004). He explains that free will, instead of empowering individuals may lead to people being conflicted and lose confidence in their ability to make one or more decisions. If choice is inherent in all these facets of life, how then can it be structured such that it serves a positive purpose?

The above literature has aimed at arguing that “too much” choice results in negative effects and has pointed out instances where this has been observed. However, examples have also been cited in the discussion where the provision of many options has also resulted in benefits. The presence of choice is not detrimental, but the process that people go through in trying to make a decision is what makes “too much” choice counterproductive. The question here is, is “too much” choice always associated with negative outcomes and is the effect always observed when individuals are faced with many options? Research has shown that there are some instances where, individuals are still able to attain benefits and make sound decisions even when they are faced with many options. The next section explores further the “too much” choice concept and identifies situations where it has been observed.

2.3 Why is the ‘too much choice’ effect observed in some contexts?

With a wide range of options, individuals are most likely to find an option that is close to their preference, but individuals do not respond the same to an abundance of options. People who have articulated preferences before a choice process respond differently to the provision of options (Chernev, 2003). In a study on consumers with prior preferences and those who had to construct preferences during the study, Chernev (2003) observed that individuals with articulated preferences enjoyed the choice process and also found it easier to make decisions compared to those without prior preference. He further found that a variety of options also strengthened preferences amongst individuals who knew what they were looking for. In support of this, (Diehl and Poynor, 2010) explained that prior preferences enable individuals to match their preferences even when they are faced with a large choice set. Mogilner et al., (2008) posited that individuals with no prior preferences felt dissatisfied with their choices if they were choosing from a large assortment set. Using the identified literature, prior knowledge of preferences allow people to make choices without exerting pressure on individuals thus moderating the ‘too-much choice’ effect.

Product assortment also reduces the ‘too much choice’ effect amongst consumers through a reduction in confusion between products. Assortment may come in the form of, organised setups, option categories (microwaves put in a different shelf to blenders) and attribute based variations. Ordered assortments improve the information structure thus reducing the burden of making a choice (Diehl and Zauberan, 2005). (For insight on ordered assortments and how they impact choice in on-line marketing see Lee and Lee 2004).

By offering a range of assortment strategies, individuals are able to eliminate undesirable options based on either their attributes or category (microwave versus blender) making the choice process easier and more enjoyable. For instance, Canon advertises its products by explaining the different attributes between the different camera models (Butler and Joinson, 2010). This makes the choice process easy as the customer can easily identify the features they are looking for in a camera.

Assortment can be defined as the presence of a variety of products made by the same company. For example, Tiger Brands in South Africa is famous for having a wide range of consumer goods and branded foods (Tiger Brands, 2011). This aids consumers in making inferences on quality which is a vital choice strategy. In a study on consumer choice on chocolates, Berger et al., (2007) observed that consumers prefer to choose from a large assortment compared to a small set. Assortment in this study represented quality to consumers which is an attribute that aids in the choice process.

Interestingly, using a hypothetical choice situation, Carroll et al., (2011) observed the “too much” choice effect when volunteering organisations were grouped into categories. They observed that the larger the number of organisations a student looked at, the more confused and discouraged they were to choose an organisation to volunteer with and considered deferring the decision.

Decisions are subject to constraints such as time, with that in mind, any excess time spent on making a decision represents an opportunity cost. In activities such as shopping, consumers prefer to spend just enough time and any additional time leads them to question whether the time they are spending is worth the satisfaction they derive from the purchase. Due to time limitations individuals would rather stop the search process rather than waste additional time thus resulting in choice deferral which is a characteristic of the “too much” choice effect (Jessup, et al., 2009). The human brain can only process so much within a given time frame, as such, if people are given unlimited time to make choices the probability of observing the “too much” choice effect may decrease (Haynes, 2009; Scheibehenne, et al., 2009).

The above discussion provided examples of the “too much” and ways of moderating it. The next section identifies strategies that individuals have adopted to make the decision process bearable.

2.3.1 Decision Strategies Implemented to Regulating the “Too Much” Choice Effect

Conceptualisation of choice is perhaps important in understanding the differences in decision strategies amongst individuals. Can we attribute the nature of choice as a process to make the distinction between maximisers and satisficers? In his study, Simon (1978) describes maximisers as individuals who seek out more options until they find an option that has the highest expected utility whereas satisficers look for a good enough option.

2.3.1.1 Satisficing

Schwartz (2004) proposed several ways in which individuals may cope with “too much” information. One interesting concept is that of satisficing where in the choice process, individuals choose the first option that they encounter which provides an acceptable level of utility or their aspiration level. Simon (1956) explained that human limitations in information processing and the human environment make it impossible for people to maximise. In essence he points out that people tend to satisfice in the hope of reaching maximisation

without making it their primary goal. This means that if a person evaluates information and options for a sufficient number of times they would eventually reach an option that maximises their welfare even though that was not the initial goal. Satisficing behaviour in this instance will result in satisfactory outcomes when faced with a lot of information.

2.3.1.2 Utility maximisation

Utility maximisation theory is based on the assumption that individuals are rational beings whose aim is to maximise their utility subject to constraints. However, there are certain instances where people have been observed to deviate from rational choice making strategies (Kahneman and Tversky, 1979; Ellsberg, 1961). Utility maximisation has also been employed in career decisions where individuals choose being entrepreneurs as opposed to being formally employed. With this decision, individuals choose to be self-employed when the expected utility from starting their own business is greater than what they expect to get if they were formally employed (Douglas and Shepherd, 2000).

2.3.1.3 Heuristics as a choice strategy

Heuristics can be defined as the use of past experiences or experience based techniques to make choices without much effort and reliance on psychological participation to make decisions (Kahneman and Tversky, 1974). Bryant, et al., (2007) pointed out that in the face of excessive information people tend to use heuristics to make decisions. This lightens information overload enabling people to make sound decisions. In a study of pension schemes in Sweden, Hedesström et al., (2004) found that individuals employ heuristic choice rules as a coping mechanism when faced with difficult decisions. In some instances, individuals may maximise one attribute in their search process especially an attribute they have encountered before. This represents a heuristic based approach.

2.3.1.4 Reason- based action

As mentioned earlier, choice is associated with post choice dissonance amongst individuals and the choice process in itself has uncertainty and conflict. In the presence of difficulty to make a decision on alternatives that are seemingly similar, choice can be explained by balancing the reason for and against choosing a specific alternative. This is referred to as reason-based choices (de Clippel and Kfir, 2012). In a study of choice between printers and MP3 players, Sela et al., (2008), found that individuals chose printers (virtuous) as opposed to MP3 players (vice). In a study, Shafir et al., (1993) found that when people are faced with equally important options they choose an option that is important on an attribute that is considered to be superior and convincing. What reason-based action suggests is that as long as a reason for taking a particular choice is convincing, then conflict and post choice dissonance are highly unlikely. (For further analysis on how the need to justify choices influences decisions, see Simonson and Nowlis, 2000; Shafir, et al., 1993).

Reason-based action has also been observed to result in deviation from rational choices (Barber, et al., 2003). One of the most cited examples where reason-based action has resulted in deviation from rational choice behaviour is what is referred to as the ‘decoy effect’ (Huber, et al., 1982). What this entails is having two options that are almost equivalent but dominate each other on one attribute. Introducing a third option that is dominated by only one of the original options might result in reduction in the choice burden. For example if two options A and B appear similar, introducing C which is dominated by A on one attribute might result in A being chosen as the preferred option. In essence the third alternative (C) would have acted as a ‘decoy’ (Connolly and Reb, 2012).

2.3.1.5 Principal agent problem (Agency dilemma)

The other dimension of the ‘too much’ choice effect is post choice dissonance among individuals. “Too much” choice makes people feel responsible for bad outcomes as they feel

they should have done better considering the information that was available to them. Schwartz (2004) proposed that introducing a distinction between the principal and the agent in a decision process may help individuals deal with information. What this entails is having another person make the decision for you. If the outcome turns out to be unsatisfactory, it is easier to cope as the blame is placed on another person. What he suggested in his analysis was the use of an agent to catalyse the choice process.

2.3.1.6 Choice and the role of Policy

As mentioned earlier, individuals deviate from rational choice making behaviour, and in some cases this may call for interventions to ensure that people make rational decisions. The role of behavioural economics has been one that has resulted in implications on what decisions individuals are allowed to take. Mostly, this has led to the application of libertarian paternalism which is a situation where individual decision making is interfered with, without taking away the freedom to choose from individuals (Ménard, 2010). This has been implemented to ensure that there are no instances where individuals defer making a choice. An interesting example is the case of organ donation in an American and European context. Schwartz (2006) looked at the choice of becoming an organ donor in the USA and he observed that if people were asked to opt into organ donation in America, fewer people would participate. Additionally, there is the case of mandatory health care purchase which is another example of paternalism as a way of limiting/ regulating “too much” choice (Rajan, 2012). In that regard, in some cases it is beneficial for institutions to give people a “nudge” in the right direction to enable them to make better choices when faced with many options.

2.3.4 Conclusion

This section of the literature review has tried to illustrate the contested nature of choice and the consequences associated with having “too much” choice. The aim was to identify and understand the choice landscape form and its applicability to different sectors of the economy

with the aim of identifying aspects that can be transposed to the current research question. Furthermore, the literature has identified the dimension of choice and what it means for decision making. Choice is such that, in small quantities, it is *beneficial* but as the number of options increase, the *benefits increase at a decreasing rate* and eventually reaches a *satiation point* and thereafter result in negative effects. Perhaps adopting an Aristotelian view where we find a point beyond which benefits are marginal may be an approach that ensures that choice does not reduce welfare in any of the ways pointed out in the literature.

2.4 How do people make Job Choices?

The preceding section focused on choice from a financial, consumer and health perspectives. This section addresses job choice by focusing on decision theory and factors that are regarded to be important by individuals when they are looking at a company to work for. By identifying the attributes that individuals define as important, it helps in identifying issues that may limit the extent to which a reduction in catchment area may result in individuals being unable to satisfy their career goals. Furthermore, this helps in understanding whether it is the structure of employers or what individuals seek that result in the dispersion of residential locations and work places.

An aspect that resonates closely with the purpose of this study is the nature of choice when people are trying to make job choices, mainly the choice of a company to work for and the location of the workplace relative to the residential area for an individual. What is paramount in this discussion is the employment of search strategies such as maximising behaviour by individuals as they try to maximise their choice of employers with regards to intangible aspects.

2.4.1 Connection between job search and job choice decisions from a job seekers perspective

Job choice is a complex process and research on the subject has found several attributes that are considered important for example organization reputation (Gatewood et al., 1993; Highhouse et al., 1998; Turban et al., 1998) and perceptions of person–organization (P–O) fit (Cable and Judge, 1996; Judge and Bretz, 1992; Cable and Judge, 1997). However as we move from one generation to the next, attributes that are considered to be important have evolved and new ones have emerged (Cable and Judge , 1997). In a study of 242 graduate students, Konrad et al., (2000) observed that there were generational differences in preferences by gender where attributes like location/distance and work hours are particularly important amongst women. Special attention is made to factors that have repeatedly affected employment choice decisions including but not limiting it to location.

Looking at choice in a job framework might guide in understanding the value that people place on choice and how this affects job location decisions. When looking at location, travel time may also be used as a proxy as it may indicate how far a job is from an individual's residential area. Furthermore, travel time will also help in evaluating the weighting that people put on it and how this impacts the time reserved for none work activities. Reviewing this aspect in the literature, will also determine whether individual behaviour may be influenced or is responsive to limitations in catchment area when applied to job choice decisions.

Job choice is a multi-stage process and as such economic agents make decisions through all these stages until they find the job that is a right fit in terms of their preferred attributes. Barber (1998) explained that the initial stage is when an agent identifies the consideration set. This set is comprised of jobs that a person considers appropriate to apply for. When a person has applied for these jobs and has gotten interviews, they decide on which interviews to take

or reject. After the interview stage an agent may have several job offers. This is the final stage and the person has to choose the job that meets their requirements.

The questions to be addressed are, what criterion do agents use when they decide on the jobs? Do they look at situational variables (organisational characteristics, job attributes, recruiter characteristics or do they only consider what they are looking for in a job (individual characteristics)? The theory of Work Adjustment posits that the job choice process seeks to align individual characteristics to variables that pertain to the company and the job itself. Essentially it explains that individuals look for particular attributes within an organisation, while organisations look for certain attributes from employees (Davis and Lofquist, 1984). What the theory suggests is that an economic agent will not apply or accept a job if it does not meet certain requirements and at the same time an organisation will not give an interview or a job to a person who does not meet certain requirements. The point of departure is to familiarise with decision theory and how this can be applied to a job search situation.

2.4.2 Decision theory

Identifying literature on decision theory may help to shape and understand the behaviour of economic agents when faced with choice from a job search perspective.

2.4.2.1 Expectancy theory

This model is based on the premise that decisions are motivated by perceived positive benefits from a chosen outcome. Stated differently, decisions are a function of the probability of obtaining a job offer and the attractiveness of the job offer. The most referred to is the expectancy theory by Vroom (1964). He gathered that, agents consider a job to be acceptable if they can trade off an unattractive attribute for an attractive one within a choice set. For example an agent can ignore that a chosen job requires that they travel long distances to work if the company provides transport to and from work. In this context, to compensate would be

to replace a preferred attribute with a satisfactory alternative attribute. In his findings, he further concluded that sets with few choices require complex comparison among options calling for agents to use compensatory strategies. In support of Vrooms theory, Wanous et al., (1983) in a study of graduate students were able to predict the jobs students would choose. They also found compensatory search strategy behaviour amongst the respondents.

2.4.2.2 Soelberg's Generalisable Decision Processing Model

Soelberg (1967) propounded that decision makers do not seek an option that fully meets their search criteria. Instead, they select the first option they encounter that is close to satisfying their requirements. In essence he defined agents as satisficers as opposed to maximisers. According to Soelberg, the decision process does not involve trade-offs between attributes, it is based on attributes that are good enough to give some level of utility. Sheridan et al., (1975) in a study of 49 nursing students found that once agents found attractive attributes within a consideration set, they would make a choice based on those attributes as opposed to seeking more attributes that they can compensate for the unattractive ones. They further observed that agents use non-compensatory strategies when making their choices as most of them continued to search out more attributes for comparison.

However, a body of literature, (Billings and Marcus, 1983, Johnson and Meyer, 1984 and Timmermans, 1993) found that individuals used compensatory strategies when faced with limited information and non-compensatory strategies when there is an excess of information. Interestingly, a previous study by Olshavsky (1979) pointed out that the use of compensatory and non-compensatory strategies are part of the decision process, but they are used at different stages within the decision process. They are applied when faced with different choice set sizes at different stages in the decision process and as such agents constantly shift from compensatory to non-compensatory decision strategies within one search process.

2.4.2.3 Image theory

This theory posits that decision making is a process made up of two stages, screening and choice. In the screening stage, options are selected in terms of whether they are compatible with the agents' attributes or standards. This is more of a non-compensatory strategy as jobs that are lacking in a particular attribute are screened out. If only one job remains that becomes the agents' choice but if more than one option remains a 'profitability' test is carried out where the remaining options are evaluated on the basis of all attributes. This is a compensatory strategy approach and has some of the characteristics within the expectancy theory (Beach and Mitchell, 1987).

There above decision theories took a holistic approach to the job choice process by looking at it as one unit as opposed to factoring in the uniqueness of each job. Behling et al., (1968) propounded three distinct job choice theories, namely, objective theory, subjective theory, and critical contact theory. These theories look at the job search process by looking at specific attributes that are considered important by individuals when looking for a job.

2.4.3. Job attributes specific Decision Theories

2.4.3.1 Objective theory

Behling et al., (1968) proposed that job selection is based on evaluating the perceived negative and positive benefits of each job offer in terms of measurable attributes. Essentially, the objective theory looks at individuals as economic agents whose aim is to maximise their economic status by selecting an organisation that will provide them with competitive pecuniary rewards. A "desirability index" is formulated based on assigning weights to each attribute thus ranking them in order of importance. In addition to monetary aspects, job seekers may also look at other attributes for example location, educational opportunities and individual growth (Young, et al., 1989).

2.4.3.2 Subjective theory

This theory defines job seekers as individuals who are driven by the fulfilment of their psychological needs. In that regard, an individual would select an organisation where they feel that the work environment caters for their individual psychological needs. In some instances, this may even require that the firm restructures the position to meet these needs (Young, et al., 1989). In his study of college students, Englander (1960) concluded that students who majored in teaching were mostly driven by the idea of self-concept and found teaching as a field where they could experience such psychological needs. Self-concept is defined as the way in which someone perceives themselves and this is usually developed through interaction within an environment (Shavelson, et al., 1976). With that in mind, individuals would select an organisation where they feel that there is room for them to implement their self-concept and subsequently have their psychological needs met.

2.4.3.3 Critical Contact theory

This theory recognises insufficiency of information available to job seekers at the beginning of a job search and when they go for interviews. More importantly the information available to individuals is not adequate for them to make subjective and objective decisions and as such they rely on recruiters to signal attributes about the firm. Rynes (1991) suggested that when economic agents are faced with inadequate information, they rely on interviewer cues for some of the organisation characteristics. Furthermore, decisions are also based on the information they get from the recruiter and more importantly the recruiters behaviour (Behling, et al., 1968).

This section of the literature review has pointed out that job search requires that individuals evaluate several aspects before arriving at their most preferred job option. It further pointed out that people have to make trade-offs in order to find a job and for organisations to fill a vacancy. In that regard, no one job can be completely evaluated using one specific theory.

2.4.4 Factors affecting Job Choice

In a study of 427 faculty members, Mahony et al., (2006) identified 13 attributes that individuals considered to be important in determining whether to take new job offers namely, compensation, location, work setting, leadership opportunities, research opportunities, reputation, satisfaction of work needs, feelings of being wanted by the university, similarity of goals, culture, fit in organisation, recruiter approach and recruiter description. Some of these attributes are reviewed in this section including but not limiting them to affordability factors, location and the organisation itself. By looking at these factors, there is a possibility of making inferences on whether it is possible and feasible to match employee needs within smaller radii without depriving them of attributes that are pertinent to them. However, it is important to note that attributes that are considered to be important may vary depending on profession.

2.4.4.1 Location

In this case location is defined in terms of where a job is located relative to the home or other areas of economic and recreational activities. Mahony et al., (2006) in a study of sport management staff found that location (town, city or part of country) was consistently ranked as the most important attribute when deciding on whether to take a new job or stay with the current institution. In a study to find the relative importance of job attributes by gender, Hanson and Pratt (1991) found that women consider location to be an important factor when they were looking for a job. Turban et al., (1998) in a study of employees of an industrial plant found that most individuals rated location as the tenth most important attribute when accepting a job, however when it came to rejecting a job offer, location was considered to be the most compelling argument. Pounder and Merrill (2001) found that location was considered as one of the important factors when individuals were making a decision on taking a principal position. Additionally, in a study of 242 graduate students, Konrad et al., (2000)

observed that there were generational differences in preferences by gender where attributes like location and work hours are particularly important amongst women. In another research that looked at individuals responses to information provided in adverts, Reeve and Schultz (2004) found that location was an important aspect in creating positive intentions for individuals to apply for a job.

2.4.4.2 Financial compensation

Compensation amongst other factors also stood out as an important factor supporting the objective theory. In a study of hotel employees in Hong Kong, Simons and Enz (1995) found that amongst other factors, good wages were regarded as important by hotel employees. This supports findings by Siu et al., (1997) who observed that good wages was a motivator in the work place. Another study by Graham and Leung (1987) also showed that good wages was an important attribute amongst hotel workers.

2.4.4.3 Organisation perception

How individuals perceive an organisation is an important characteristic in the job choice process. Individuals are attracted to companies that have a long standing positive image Liang and Wei (2009). In a study of college students in Pakistan, Gul et al., (2011) observed a positive relationship between organisation image and the intention to apply. If job seekers are attracted to an organisation by its standing as a brand, then the decision on whether to accept or reject a job offer may also be influenced by branding amongst other issues. Perhaps branding may also be defined in terms of a firm's fulfilment of its social responsibility duties. Bhattacharya et al., (2008) explained that corporate social responsibility activities play a large role in attracting quality employees and at the same time reduce employee turnover in firms. Corporate social responsibility was also found to be important among MBA students (Montgomery and Ramus, 2003).

2.4.4.4 Person Organisation fit (P-O fit)

Person organisation fit (P-O fit) and person job fit (P-J fit) have become two of the leading criteria of job selection among job seekers. The motivation behind this is that people seek to find a balance between the work life and the social life and as such the organisation that one selects has to cater for social needs (Carless, 2005). Judge and Bretz (1992) and Scott (2001) argued that the values that an organisation is perceived to possess influences whether a person is attracted to that firm or not. In a study, Chapman et al., (2005) found that organisation characteristics can be applied as good predictors of applicant intentions to apply or take up a job with an organisation.

2.4.5 Relative Importance of factors affecting Job Choices.

Theorists have argued that differences in values, attitudes and behaviour are mainly dependent on gender roles and gender social culture and they have a great impact and influence on self-concept and self-representation (Eagly, 1987; Gutek et al., 1990; Terjesen et al., 2007). What this implies is that there are differences that are inherent in gender roles. Males and females in this framework are therefore expected to value different attributes.

2.4.5.1 Relative importance by Gender

Roles in society between males and females also help in mapping the attributes that are attractive to each gender and these roles can be defined in terms of job attributes. In a study, Konrad et al., (2000) found differences in attributes by which males and females define themselves. They found that males define themselves as income providers (earnings, benefits, security and openings), achievement (opportunities for promotion, challenge, task significance and accomplishment), exhibition (prestige, recognition) and endurance (challenge, non-physical work environment) Females express themselves as homemakers (good hours, easy commute, location, no opportunities for travel), affiliation (opportunities to make friends, working with people, not solitude), nurturance (opportunities to help others),

among other factors. They found that women would select organisations that would ensure there was no conflict between their social and work life. Furthermore, women also define themselves in relation to others and as such their decisions are motivated by the need to avoid tension and conflict with their partners. In that regard, factors such as location, family friendly benefits, and flexible working hours were considered to be important amongst women in job choice decisions.

The table below summarises the different attributes that are considered to be important using gender roles

Table 1: Job attributes Preferences Linked to Gender Role

Gender Roles and Job attributes	Job attributes
<u>Masculine</u>	
Income provider	·Earning , benefits, security
Dominance	·Leadership , responsibility, power
Achievement	·Opportunities for promotion, task significance, challenge, accomplishment
<u>Feminine</u>	
Homemaker	·Good hours, easy to commute, not many opportunities for travel
Affiliation	·Opportunities to make friends, working
Nurturance	·Opportunities to help others

(For more on job attribute preferences and how they differ by gender, see, Bundy and Norris, 1992; Robinson and Beutell, 2004).

2.4.5.2 Relative importance depending on Career Stage

For sales professionals, importance of attribute is dependent on whether they want to change organisations or to stay with their current employer. Flaherty and Pappas (2002) posited that sales people are motivated by different attributes depending on which stage they are in their career. In the establishment stage where sales people seek to be recognised, they prefer a good working environment. Earlier work by Cron and Slocum (1986) support these findings.

The reviewed literature on decision theory suggests that agents are assumed to act in isolation. Guler et al., (2009) argued that the majority of economic agents are tied to family units and as such decisions are made jointly as they have the potential to change several aspects of the family. This means that the job search process is not a one agent problem but one that affects people surrounding the decision maker. This will be incorporated in the discussion of job-housing balance and the presence of multiple worker households and how this affects job choices.

2.5 Empirical Application of Decision making Strategies

The starting point is to understand decision strategies and their application in making job decisions. Decision making theories were reviewed earlier, but they mainly concentrated on the theoretical aspects of each method. This section will briefly review decision strategies and their application in empirical studies. In so doing, a theoretical background for modelling choice in this thesis is established.

2.5.1 Utility maximisation

Utility maximising conjectures that individuals seek to maximise their utility and as such the alternative they choose within a choice set is one that provides them with the greatest utility (Koppelman and Bhat, 2006). In other words the option that is selected has the highest utility compared to any other alternative within a choice set. Furthermore, rationality in behaviour is one of the core aspects to utility maximising theory. What rationality implies is that if an individual is faced with the same choice set in the future, he/she is expected to choose the same alternative. One interesting concept in understanding utility is the transitivity law which states that if an individual is asked to choose between three alternatives A, B and C, and A is preferred to B and B is preferred to C; then the individual must prefer A to C (Aleskerov, et al., 2007.). This can be represented as below,

$A > B > C$ by transitivity, $A > C$ meaning that if a rational individual is asked to choose between A and C they will choose A.

Essentially the choice process is based on the utility derived from the combination of all attributes and the alternative that has the highest utility is chosen.

2.5.2 Elimination by Aspects (EBA)

This method was posited by Tversky (1972) who explained that individuals arrive at their desired option by a process of elimination. Essentially, each alternative is viewed as being comprised of several aspects. Expressed in simple terms, an individual identifies an attribute he/she considers to be the most important and eliminates any alternative that does not perform well on this attribute. This process goes on until only one alternative is left and this becomes an individual's choice. In essence, EBA does not involve any trade-off (non-compensatory strategies) between attributes as an individual completely excludes any alternative that does not cater for the preferred attribute. In a study on organisation choice amongst college students, Osborn (1990) found that individuals facing organizational choice considered specific attributes that had to be met before an option was considered to be a possible alternative. This shows the use of EBA to make a decision and how individuals occasionally deviate from normal trade-offs or utility maximising strategies.

2.5.3 Satisficing /Conjunctive

This is based on Simons (1956). The theory posits that individuals have limited cognitive abilities and decisions are not motivated by utility maximisation but by the requisite to attain a satisfactory level of utility. What this implies is that individuals have a predefined utility level they need to reach and any alternative that does not meet this criterion is discarded. Furthermore, an individual builds this utility by a combination of relevant attributes and the levels each of these attributes take. The search process stops the moment an alternative that meets this criterion is met. Alternatives are sequentially evaluated and as such there is room

to leave out an even more satisfying alternative. In that regard, the order in which alternatives are presented is very crucial in a satisficing framework.

2.5.4 Lexicographic Heuristics

This method is almost similar to the EBA approach. An individual has a predefined attribute they consider to be the most important on the list of all available attributes. An alternative that has the highest level on this important attribute is chosen as the preferred alternative. For example in a job search process, if an individual deems transport costs to be the most important attribute, the chosen option would be the one that has the least transport costs (Waiyan and Hensher, 2012).

The above section briefly reviewed some of the decision strategies that individuals employ when faced with decisions. (For further analysis on more decision strategies, see Payne, et al., 1993).

2.6 Job Housing Balance: Linkage to affordable transport and accessibility

This section discusses the job-housing balance and how this relates to affordable travel among marginalised societies. A study on public transport expenditure in South Africa showed that households who are in the lower income band (up to R500 per month) use more than 20% of their income on transport (Walters, 2008). By reviewing literature on job housing balance, it helps in identifying the causes of job housing imbalances and whether this has exacerbated high transport costs. Furthermore, by looking at the job-housing nexus, attention can be drawn to identifying what can be done to reduce transport expenditure by finding solutions to the imbalances

Public transport and walking are the main modes for most commuters in the global South and play a crucial role in ensuring that the transportation needs of the urban poor are met. However, due to lack of funds and excessive growth in the urban population (Gauthier and

Weinstock , 2010) coupled with increased transport costs, a vast population of individuals in most developing countries find it difficult to carry out their day to day activities or accessing the work place. This may be identified as emanating from limited accessibility or high travel costs. Looking at the structure and location of most low income residential areas in South Africa, one can say that these areas are situated in the outskirts of the city which makes it difficult for people to access the work place and if they can it is at high cost. With oil prices increasingly becoming an area of concern, there is pressure in identifying ways to make travel affordable amongst the urban poor.

Peak oil can be explained as a situation whereby oil production reaches a maximum and there after production declines such that the available supply is insufficient to meet the demand. With an increase in demand not matched by supply, there is an upward trajectory in domestic fuel prices. Tracing the linkages within the greater economy shows that eventually domestic transport and food price hikes occur which are mostly felt by the marginalised groups who have a limited means of subsistence (Bériault, 2007). Molin and Timmermans (2002) posited that the nineties were characterised by drastic increase in transport costs that surpassed the daily cost of living. This trend is inevitable in the future due to oil depletion or higher costs of oil extraction which will result in high oil prices. This is the backdrop for this section as it will point to the implications of fuel prices on transport affordability for the marginalised groups and the importance of creating a balance between houses and jobs. The goal here is to try and change the landscape of opportunity accessibility and the urban form such that they enable commuters to continue accessing workplaces at affordable costs and more importantly a possible move towards non- motorised transport.

2.6.1 Rationale for looking at accessibility

The starting point is to give an outline of the urban form, transport structure and at the same time try argue how they are not supportive of the goal to make work travel affordable for

commuters in the global South beyond peak oil. Attention is given to the location of residential areas relative to jobs and how these may contribute in addressing some of the imbalances that exist within the urban system. What all this drives at is how accessible opportunities are and whether there are changes that can be effected to ensure that people reach their preferred destinations within a reasonable time frame and at an affordable price. The primary concern is accessibility of the workplace by individuals; as such a tentative definition of accessibility is adopted. Accessibility is defined as the ease with which the workplace is reached (Downs, 1994). Using an opportunity based measure proposed by Breheny (1978) accessibility is mainly concerned with the number of opportunities available within a certain distance. To sufficiently define accessibility, Bertolini et al., (2005) propounded that it should take into account three distinct assumptions on why people travel:

- People travel to take part in activities; e.g. work, leisure etc.
- People desire to have a diverse choice set of activities (in this case several job opportunities)
- Travel time and travel costs (important in least developed economies) influence the ability to participate in activities.

Looking at the above assumptions, they fall within the goals of this discussion. As mentioned earlier, the aim is making the workplace accessible at the least possible cost -both pecuniary and non-pecuniary- and ensuring that there are sufficient choices to warrant satisfaction.

Increased transport costs continue to pose problems for individuals as they try to make residential location decisions. With that in mind, it might be helpful to draw linkages between residential models and this may be a starting point in understanding the interaction of the job-housing framework and how households make their residential choices in an age of increasing transport costs.

This discussion commences from understanding whether land uses affect travel behaviour and try to put this in context with commuting trends in the global South. Banister (1999) and Priemus et al., (2001) explained that travelling is a derived demand in that people need to travel in order to take part in certain activities for example jobs and recreational activities. This implies that if these activities are located within the vicinity of residential areas, there is a reduction in the need to travel. In the same spirit, Van Wee (2002) posited that travel behaviour is greatly influenced by transport and as such understanding travel behaviour stems from understanding how land uses and transport are linked together. Essentially, the role of land uses/built environment (job location and housing balance etc.) is considered as one that is important in influencing travel behaviour and sustainable accessibility. In that regard, they can be used in addressing the issue of rising transport costs and access to opportunities by commuters in the global South.

2.6.2 The Job-housing balance nexus: Theoretical background

Most of the discussion on the job-housing balance emanated from what is known as the spatial mismatch theory which proposes that the location of houses and jobs are far apart due to the structure of the housing market, racial discrimination in employment and the unavailability of jobs for the urban poor (Gottlieb and Lentnek , 2001). Furthermore there is debate on decentralisation of employment and how this is pro-poor as some jobs will be located close to residential areas mainly occupied by marginalised groups.

It can be argued that traditional theories of the urban structure (people locating further away from the CBD and jobs being centrally located) are not supportive of the goal of affordable accessibility to opportunities by people. The usefulness of these theories in explaining modern day residential and company location is further challenged by the emergence of suburbanisation of employment and the continuous increase in transport prices such that

locating at the outskirts of towns in search of cheaper housing is not a trade-off that results in monetary savings (Waddell, et al., 1993).

Molin and Timmermans (2002) pointed out the changes in the global oil prices and how they have affected travel costs in relation to daily costs of living. This supports why the trade-off of housing costs with longer commutes no longer fits into 21st century household-job location debate. This suggests that instead of people commuting from labour rich communities to job rich locations, why not encourage city structures that ensure there is a balance between opportunities (jobs) and workers. This section tries to explain the causes of job-housing mismatches and the potential benefits that can be derived from creating a balance. The aim is to explain how the dispersion of houses and jobs influences commuting behaviour and patterns.

Banister (1999) posited that trip generation is mainly characterised by large differences in origins and destinations can be explained by the dispersion of opportunities which emanated from the growth in mobility. This can be defined as a classic example of people moving from labour rich areas to employment rich centres creating a phenomena referred to as job-housing mismatches.

2.6.3 Factors leading to Job –Housing Imbalances

2.6.3.1 Skill shortages and Racial Discrimination

One of the arguments raised on the emergence of job and housing mismatches is the shortage of skills and racial discrimination in hiring trends by employers (Mark and Mefford, 2007). This results in the reduction of the number of opportunities within a certain travel time frame or distance. Supporting this argument, McQuaid et al., (2001) observed that manual labour and educated people (specialised labour) are likely to travel farther for employment opportunities.

2.6.3.2 Limited Options amongst the Unemployed

Timmermans (2003) argues that one attribute that has precipitated job-housing mismatches is the lack of options amongst unemployed people. Job opportunities are not always close to the residential areas of the unemployed population. He points out that the spatial allocation of land-uses makes people travel. He further postulated that in the case of unemployed people, accessibility and travel times are secondary issues that are only evaluated after a job offer has been accepted. In light of this, it is essential to understand how unemployed people make household location decisions. Kim and Horner (2003) explained that job distribution and transport costs are primary factors in determining housing locations and developments.

2.6.3.3 Two wage earner households

Households are aware of the trade-off between housing and job locations; the decision is made difficult when accounting for multiple worker households (Clark, et al., 2003). Ewing and Stoker (2012) argued that job housing mismatch is inevitable when an area has a large share of households who do not work in the same vicinity. A clear distinction between the primary and secondary earner normally results in households locating in an area that is close to the primary earner's place of employment. This implies that one person in the household would have to commute a longer distance. In situations where the salaries between spouses are equally comparable, the location of the household would be in a place that is central to the two places of employment (Cervero, 1989).

2.6.3.4 Imbalance between the supply of Jobs and Housing

The rate at which new jobs are created within a certain area should be matched by the supply of housing within that area. Weitz (2003) argued that if the supply of housing and job creation within a certain area are not matched, there will be an increase in the number of people who work in this new area but live somewhere else and few who live and work in that new area. This can potentially result in job-housing imbalances.

2.6.3.5 Fiscal and Exclusionary Zoning

Fiscal and exclusionary zoning is characterised by zoning land specifically according to high revenue- generating and low services demanding activities which result in a low supply of housing in other areas. The resultant effect of this is that some areas are exclusively allocated to groups of people who fall under a particular tax bracket and also those that fall within a certain social or ethnic groups (Rolleston, 1987). This normally leads to suburban house pricing increases to levels that are unaffordable by most individuals leading to household locating farther from places of employment (Ewing and Stoker, 2012).

2.6.4 Negative Impacts of Job-housing imbalances

Inefficiencies in commuting defined by high travel cost and excess commuting can also be attributed to job-housing imbalances.

2.6.4.1 High Travel costs and excess commuting

By looking at the balance between jobs and housing Niedzielski (2006) proposed that information can be gathered to evaluate whether jobs or workers need to be relocated to strike a balance between housing and jobs and at the same time potentially reduce commuting. Furthermore, Zax and John (1991) posited that a lot of job turnovers can be attributed to the unwillingness by individuals to commute long distances. As such, job and residential locations need to be evaluated in the same framework and this may provide some solutions needed in the global South to ensure sustainable accessibility.

2.6.4.2 Social Exclusion

Job-housing imbalances have also resulted in social exclusion through the inability to reach opportunities. Preston and Raej (2007) posited that a solution to social exclusion would be to reduce transport costs but this is not applicable in an age where fuel prices are expected to increase. Solutions that would work in a global South context are those that incorporate urban planning policies and travel behaviour to ensure that most people are more drawn to using

public transport. If a sufficient number of choice passengers are captured, there is a possibility of a reduction in subsidising the public transport system. This may go a long way as some of the money that was previously dedicated to subsidising the public transport system can be used for other transport projects.

2.6.5 Potential Gains from Creating Job-Housing Balance

In a study Loo and Chow (2011) argued that achieving a job-housing balance could lead to relatively shorter commutes and distances and one way to achieve this is to relocate firms to areas that are labour rich. In line with relocating of firms, Cervero (1996) proposed zone swapping where sections of the industrial areas are converted into residential and portions of the residential are turned into industrial. He goes further to explain that zone swapping will not only have an effect of redistributing and scattering employment and creating a better balance between jobs and housing but it will also result in a reduction of vehicles on freeways which works towards the climate change goals. These findings were also supported by Sultana (2002) who proposed that by creating a balance between housing and jobs there is an increased probability of shorter commutes where non-motorised transport is made possible. Additionally, Duncan and Cervero, (2006) posited that the land-use planning through facilitating good job-housing balances may contribute to a reduction in motorised travel. This may also lead to a reduction in air pollution (Armstrong and Sears, 2001).

A good case study on relocation and its influence on commuting and the job-housing framework is that of the relocation of the Hong Kong International Airport (Loo and Chow, 2011). They proposed that airports are centres of employment and as such effects of airport relocation can be transposed onto a firm relocation framework. The study showed that airport relocation led to the decentralisation of employment to the labour rich areas thus improving the job-housing balance especially in newly developed areas. This supports findings by Banister (1999). He further proposed that developments should ensure that employment and

housing are provided at the same time. This addresses some of the disparities between housing and employment locations.

One may argue that firms are concerned with their performance and as such prefer to locate in prime locations. Davidsson (1989) argued that location is a paramount factor during economic recessions where companies that occupy niche locations are most likely to benefit. In a study, on firm employment growth as a measure of performance, Hoogstra and Van Dijk (2004) concluded that location matters. However, they go further to explain that, the effect depends on the type of service being considered e.g. offices versus manufacturing. Location was found to be important for manufacturing. Looking at the employment structure of the global South, it is mainly comprised of manufacturing or manual labour (Keane and te Velde, 2008) and such if location is important, then companies may potentially gain by locating in the labour rich areas.

2.6.6 Relationship between Urban form and Travel behaviour

As mentioned earlier the built environment plays a large role in determining how people move. Timmermans (2003) argued that the land use structures should be designed in such a way that they provide options instead of dictating travel behaviour and mode. On the other hand establishing the relationship between urban form and travel behaviour is important as this may be a stepping stone in understanding their contribution in solving commuting problems in the global South. So, how can urban planning policies be directed towards providing accessibility without limiting the ability of economic agents to travel. This speaks to the issue of accessibility through sustainable means and how the urban form can be structured to facilitate this.

Sustainability can be defined as productive harmony between nature and humans. With climate change a pressing problem, the aim is to have urban structures which can be defined as being appropriate for walking, cycling, and efficient public transport which in a way help

in mitigating the negative impacts associated with transport and other human activities (Dumreicher, et al., 2000). The above can be easily translated into the ability of individuals to access the work place through non-motorised transportation with public transport as an option that is readily available.

Activities that take place within an urban environment and how they are positioned relative to each other determine how people move. Using the concept of density defined as the number of opportunities present within a square kilometre, Van Wee (2002) explained that high density areas are associated with less travel compared to low density areas. This is mainly due to an almost balanced spatial allocation of activities and this reduced the need to travel long distances to participate in activities. In the long run, this would result in savings in travel time and costs. In a study, Stead (2001) observed that 27% of the travel behaviour (travel distance) was explained by the land use characteristics. In support of these findings, Schwanen et al., (2004) proposed that high densities and high levels of job-housing balance discourage travel and hence influence travel behaviour. However, these results are examples from developed countries and may not be applicable in a global South context where transport infrastructure, policy and implementation are not fully developed.

The issue of urban form and how it relates to travel behaviour is one that is made complex by individual choices in residential location. If individual choices are not at par with policy or the goals of city planners, then all efforts to strike a balance within a job-housing framework are futile. Cao et al., (2009) posited a self-selection argument which states that people intentionally self-select neighbourhoods that give them their desired accessibility. Furthermore, market forces also influence household locations and jobs and this is effectively transferred to travel patterns and is independent of the structure of the urban form. In a study on population-employment interaction, Hoogstra et al., (2005) found that jobs follow people

and have also found instances where there is a “weak dual causality”. This is an essential finding within a job and housing framework.

2.6.7 Conclusion

The above literature has argued on job-housing balance and the factors that can be attributed to the mismatches. Additionally, suggestions were made on how a balance can be achieved. What the literature suggests are high densities or mixed land uses where jobs and housing are in the same vicinity to enable a reduction in travel expenditures. However, care has to be taken to ensure that in implementing alternative spatial allocations, households are not moved from one form of excessive expenditure (transport costs) to another which is potentially high rentals. Priemus et al., (2001) explains that compactness may result in the suburbanisation of industry and housing which may impact land rents and real estate due to locational preferences.

2.7 Excess commuting

2.7.1 Introduction

One aspect that has emerged from the discussion on imbalances is excess commuting. The motivation behind looking at excess commuting is to further understand whether land uses affect travel behaviour and try to put this in context with commuting trends in the global South. Banister (1999) and Priemus et al., (2001) explained that travel is a derived demand in that people need to travel in order to take part in certain opportunities; for example jobs and recreational activities. This implies that if these activities are located within the vicinity of residential areas, there is a reduction in the usage of motorised transport to access these opportunities. Van Wee (2002) posited that travel behaviour is greatly influenced by transport and as such understanding travel behaviour stems from understanding how land uses and transport are linked together.

Horner (2002) explained that the urban form describes the location of workers and jobs. This motivated how understanding excess commuting may be a fundamental aspect in understanding the relationship between the urban form and daily commutes. Furthermore, probing into this concept will help in guiding whether solutions or excess commuting mitigation might help to address the issue of affordable travel and climate change. Although outside the scope of this discussion, this section begs the question on whether excess commuting can be resolved through city restructuring. Additionally, it delves into looking at the possible explanations for excess commuting mostly by utilising the traditional urban structure theory and the spatial mismatch hypothesis. This section looks at the following aspects,

- To briefly review the measures and definitions found in the literature on excess commuting/travel.
- Try to identify and explain the causes of excess commuting.

2.7.2 Defining Excess Commuting

Horner (2008) suggested that there is a linkage between the location of jobs and housing and how they affect travel behaviour. This supported findings by Small and Song (1992) who posited that monocentric and polycentric city structures have different minimum commutes. In that regard, excess commuting is defined as the difference between what is regarded as the optimal commute value (measured in time or distance) and the actual average commute value for a particular city structure (Frost and Linneker, 1998). Ma and Banister (2006a) defined excess travel as the additional trip to work that results from the difference between actual or average commute and the possible minimum commute due to the relationship between house and job locations.

Literature on excess commuting shows that there is no consensus as to the acceptable unit of measure of excess commuting between time and distance. This has also led to conflicting results of excess commuting for cities. Hamilton (1982) used distance as a measure for excess commuting and suggests that people choose their residential and job locations such that they minimise commuting costs. In their study, using distance as a measure for excess commuting was a true representation of the distance cost aspect. In using distance as a measure, it can either be straight line distance or network distance. Ma and Banister (2006a) proposed that network distance is the most suitable measure as it accounts for friction of distance that affects travel behaviour.

Furthermore, White (1988) and Ma and Banister (2006b) proposed that time was an accurate measure of excess commuting in that people are more worried about the time they spend travelling as opposed to distance. They further distinguished between door-to-door commuting and over-the-road commuting to try and give a clear picture of time as a measure of excess commuting. Door-to-door time includes time taken to do all the activities that form part of the journey to work e.g. parking and walking to the car. Over-the-road commuting is the mostly applied as it excludes the time individuals spend looking for parking space and walking to their cars. In a study, Scott et al., (1997) also supported the use of time as a better representation as it accounts for the speed and flow of traffic and modal splits.

Ma and Banister (2006b) evaluated the notion of distance and time as measures of excess travel and found that they were both appropriate under different circumstances. They found that in decentralised city structures shorter commutes were possible if defined in terms of time. They pointed out that individuals were more concerned with an increase in the speed of travel as opposed to distance. This results in people saving on time thus leading to shorter commutes. They further postulated that if vehicle kilometres that individuals travel are reduced, this can translate to a reduction in fuel consumption and a low carbon footprint.

An important thing to note is that excess commuting can also be voluntary as people trade off long commutes for other attributes e.g. good schools, neighbourhood quality and environmental amenities. Literature on job decision theory (Carless, 2005) points out that people seek to find a balance between their work life and social life and a reduction in time spent on work related activities means more time for family and other leisure activities. In that regard excess travel measured in terms of time fits into the job-housing balance (Ma and Banister, 2006b).

What the above shows is that the measure of excess commuting and its acceptability depends on the motivation behind the need to identify excess commuting patterns. The choice in the dimension of measure of excess commuting is therefore guided by policy goals which in this context can either be sustainability or job-housing balances.

2.7.3 Causes of Excess Commuting

The literature on excess commuting suggests that there are many variables within the urban structure and behavioural attributes that contribute to excess commuting. Commuting is defined by morphological and behavioural aspects. Morphological aspects determine how people travel and detect how they commute as it relates to the urban form. On the other hand the behavioural aspect explains the willingness of individuals to travel. Coined in these two aspects is the shaping of commuting levels for individuals within an urban system (Charron, 2007). This brings in the issue of centralisation or decentralisation of economic activities and how it affects excess commuting.

2.7.3.1 Relationship of the Urban Form and Excess Commuting

Excess commuting has been applied as a tool to evaluate the land use–transport relationship (Horner, 2008; Charron, 2007). What this means is that different urban forms will have different levels of excessive commuting and in some cases the urban form encourages excess

commuting. The 21st century has seen a rise in the decentralisation of employment from the traditional monocentric structures where employment is mainly concentrated in the CBD. Still, decentralisation poses a lot of imperfections when it comes to job search. In most cases decentralised urban forms make it impossible for individuals to have a clear view of their future job locations. This impacts the extent of excess commuting. If individuals had perfect information on their future job locations, they would choose housing locations such that they can optimise their current and future work commutes. This resonates well with the case of unemployed workers who search for jobs with imperfect information and the resultant effect is excess commuting (Larsen, et al., 2004). In support of this, van Ommeren and van der Straaten., (2008) posited that due to lack of sufficient information, unemployed individuals take the first vacant jobs or residences that they encounter in their search process; this may result in excess commutes.

Monocentricism and polycentricism play a large role in determining travel behaviour amongst employed and self-employed people (Van Ommeren and Van der Straaten 2008). They suggested that in monocentric city structures, individuals are aware of where they will work in the future. This is mainly due to the presence of jobs within the central business district this may result in excess commuting in the future being low or absent. What this means is that employment densities can be used to gauge excess commuting and in most cases, high densities are associated with low excess commuting as activities are within close proximity.

Centralised metropolitan areas allow for shorter commutes if they are supported by a structured and balanced job housing ratio. Ma and Banister (2006b) explained that minority groups due to limited resources have limited mobility. In that regard, decentralisation might be an impediment to mobility resulting in low excess commuting amongst the poor. One interesting aspect raised in the literature is the nature of shorter commutes in decentralised

cities. As mentioned earlier, people have become more aware of increases in speed as opposed to distance. What this proposes is that in decentralised cities, shorter commutes are only defined in terms of time travelled as opposed to actual distance travelled (Ma and Banister, 2006b). What their study suggests is that excess commuting or shorter commutes are possible under both monocentric and polycentric city structures. What is important is to ensure that supportive policies are implemented in order to complement each other and ensure that they reach a common goal in evaluating excess commuting.

2.7.3.2 Explaining excess commuting through Job-Housing Balance

It is difficult to minimise travel for both individuals in a two worker household. In most cases, in dual worker households, one worker's commute is not optimised given that there are two maximisation problems compared to one worker households (Ma and Banister, 2006a). Kim (1995) posited that because two worker households are not flexible to swap jobs, they have less excess commuting as compared to single worker households. These findings are also supported by Buliung and Kanaroglou (2002) in their study of Toronto where excess commuting was found to be high amongst single worker households.

Job and housing balance is one aspect that can be used to quantify the extent of excess commuting. Job-housing balance is a concept of a compact community where people can both live and work within a particular location (Giuliano, 1991). The relationship between housing and jobs affects commuting behaviour (Horner and Mefford, 2007). It is therefore important to encourage mixed land uses as a way to mitigate excess commuting. One of the proposed mixes is the coexistence of commercial and residential uses within the same vicinity (Horner, 2008).

2.7.3.3 Tenancy and excess commuting

The issue of tenancy plays a large role in determining travel behaviour and how far people travel. As in the case of two worker households, home owners find it difficult to change jobs or residential locations compared to renters. Crane (1996) posited that due to the costs in moving, home owners might be reluctant to relocate houses to be closer to their jobs thus resulting in excess commuting. These findings were supported by Kim (1995) who found that home owners had high levels of excess commuting compared to renters. (For more on the relationship between home ownership and excess commuting see van Ommeren and van der Straaten, 2008).

2.7.3.4 Modal choice and Excess Commuting

A look at excess commuting and how it relates to modal choice is essential in that it identifies the areas where transport policy should be focused on. In a study of Dublin, Murphy (2009) showed that the commuting distance for public transport users could be reduced if public transport travel networks were brought onto the private transport network. What this means is that if policy is directed at public transport improvement and making it a priority mode, there is can be an increase in its ridership.

2.7.3.5 Job type and Excess Commuting

Another important aspect to look at is whether excess commuting is exacerbated by the location of particular jobs in certain locations. This brings in a comparison of location between white collar and manual jobs. Giuliano and Small (1993) found that service labour had low excess commuting compared to technical labour. Supporting these findings, O'Kelly and Lee (2005) found that despite the short minimum commutes by service workers, they have greater excess commuting compared to industrial workers. They attributed this to the travel behaviour inherent in service workers.

In a research on how search imperfection (defined by inadequate information) affects job locations, Van Ommeren and Van der Straaten (2008) posited that the rate of job arrivals depends on the job density. What this implies is that the higher the job density, the lower the excess commuting. It then follows that jobs that are scarce in particular locations would result in individuals travelling long distances in order to go to work. Specialisation also depends on the level of education amongst individuals. One would therefore argue that excess commuting is high amongst specialised professionals as compared to less specialised workers. This makes relocation of employees a difficult solution to excess commuting given that there may be scarcity of certain jobs within some locations thus making a balance mix difficult.

2.7.4 The extent of excess commuting between socio-economic groups

One aspect that resonates with the objectives of this literature review is looking at the extent of excess commuting among different socio-economic groups. Due to limitations in finances the poor communities in developing countries have limited travel opportunities (Behrens, et al., 2004). In a survey of Cape Town, Tabane (2005) found that excess travel amongst the poor was 6% compared to 16% for the affluent. This can also be linked to the findings that excess commuting is low amongst residents of periphery locations which are mostly occupied by the poor population. In that regard, policies that are aimed at reducing excess travel and mitigating climate change can slowly target changing travel behaviour amongst the rich. Interestingly, Del Mistro (2010) shows that the poor are the most vulnerable to the consequences of excessive travel (high fuel prices due to oil depletion, climate change) and yet they have limited options in terms of travel and mode choice. However, given the low percentages of excess commuting between the different groups, addressing excess commuting may not provide quantifiable benefits to solve transport affordability and climate change issues in 21st century cities.

2.7.5 Conclusion

The above literature on excess commuting identified factors that contribute to excess commuting. More importantly it shows that excess commuting is a phenomenon that can be used to address environmental consequences that result from increased travel. Furthermore, it has tried to explain how the urban form might have contributed to excess commuting. The aim for reviewing excess travel was to evaluate whether high transport expenditures are embedded in the commuting decisions made by marginalised groups.

Regarding transport policy, the fundamental aspect is to implement it within a supportive framework that addresses sustainable accessibility and climate change goals. One of the interesting points raised by this review is whether the relocation of firms to the suburban areas results in shorter or longer commutes. Given that travel times have remained constant over the years, this calls for an evaluation of whether city restructuring and travel demand management policies that have been implemented are contributing towards solving climate change issues (Levinson, 1997).

2.8 Travel demand management as a solution to Transport Affordability

2.8.1 Introduction

This section looks at travel demand management (TDM) measures as a transport policy and how they have contributed in ensuring improved access to transport and at the same time helping in alleviating the negative externalities associated with transport. Additionally, it looks at TDM and its role in encouraging the use of public transport or discourages the use of private transport to farther locations. Focus in this section is on how TDM's can be used to fulfil some of the aims of the literature review specifically affordable accessibility for the urban poor in the global South. The proposition is that implementation of TDMs be primarily rooted in the provision of affordable travel in the global South with congestion and other

environmental problems as secondary issues. These are all pertinent issues but for the purposes of this discussion they are not the primary focus.

TDM can be defined as demand side initiatives aimed at influencing travel demand especially single occupancy vehicles (SOV) over time (Loukopoulos, et al., 2005a). Dorsey (2005) defines TDMs as strategies that are aimed at reducing vehicle trips leading to efficient use of transportation. At the core of TDMs is the need to reduce motorised transport but providing a wide range of travel options to those who wish to be mobile.

2.8.2 Brief History of TDM

TDM measures were first introduced during World War 2 in the United States when there were vast shortages in fuel against the need to transport workers to war related work. What this entailed was a reduction in single occupancy vehicles (SOV) through carpooling as a way of relieving the pressure on fuel supplies (SCAG, 2008). Furthermore in the 1950s and the 1960s, there was a vast growth in the construction of road networks to try and absorb the demand for travel.

However, with the 1970s oil crisis and the unavailability of funds to support further road construction, there was another set of strategies, this came as a way to improve mobility while using the available road networks. During the same time there was a new interest in the effects of pollution on the environment and TDM strategies were implemented aimed at improving the environment (Meyer, 1999). Looking at 20th and 21st century transport policy, TDM measures have become a blueprint for successful transport provision and in trying to address climate change issues.

2.8.3 Understanding the share of public transport costs

Most African cities are comprised of unplanned peripheral settlements which are far from amenities. Individuals from these areas have difficulties in participating in economic

activities at an affordable cost. In a study of African cities, Olvera et al., (2008) found that households spend between 15-20 % of the household income on transport which is high relative to their wages. What their study showed was that relative to other household expenses, travel was the highest expenditure and that daily use of public transport was unaffordable. Furthermore, they showed that there was inconsistent use of public transport characterised by high use at the beginning of the month and occasional use when there were sufficient funds and the rest of the times individuals walked.

In a study of Kenya, Salon and Gulyani (2010) showed that most marginally segmented individuals cannot afford public transport and as such they limit travel outside their residential areas. Olvera et al., (2003) posited that social exclusion, poverty, poor services and a lack of growth result from poor public transport provision in the global South. Additionally, given the response of transport costs to changes in the economic climate, increases in oil prices due to peak oil will lead to high public transport fares thus further marginalising already socially excluded individuals.

Human behaviour and response to price increases can be used through transport elasticities to analyse TDM. In a study in the UK, Dargay (2007) found that for every 10% increase in fuel prices, there was a reduction in car usage of a range between 1 to 3%. Using the same elasticity measure, Paulley et al., (2006) found that for every 10% increase in bus fares, there was a 4% decrease in bus patronage. However, the responsiveness to changes in the use of public transport also depends on what type of activity the mode is used for.

One important thing to note from the elasticities is that car travel is more affected by car prices compared to fuel prices. This means that once a car has been acquired, it is difficult to influence car usage among individuals. Furthermore, car usage is more susceptible to prices as opposed to measures that are aimed at influencing behaviour (Dargay, 2007). Korhonen

and Heiskanen (2008) explained that car ownership encourages car usage, transport policies should move away from concentrating on reducing car use but on the reduction of car ownership.

The question is whether TDM's can be considered as a solution in addressing transport challenges in the developing world and if so how can they be implemented to derive benefits?

2.8.4 The role of habit and behaviour in TDM policies

The success of TDMs is embedded in the ability to capture choice users. Habit plays a crucial role in ensuring that there are more public transport choice users. Habits are defined as those actions that have continuously been repeated and in most cases they are a starting point when people are making decisions or choices (Garling and Axhausen, 2003). With that in mind, it is difficult to expect instant changes in behaviour of something that has developed over a long period. Supporting this thought, Bamberg et al., (2003) posited that the frequency with which an action is carried out is a sign that a person has well-established habits. On the other hand, habits are difficult to break if individuals do not detect a change in situations or environments (Garling and Axhausen, 2003; and Verplanken and Wood, 2006). In a study, Fujii et al., (2001) observed that forcing people to take alternative course of actions from what they normally do can make people aware of other alternatives such as walking, public transport and cycling instead of SOV.

Factoring in habits into travel demand policies allows for the development of TDM measures that are context appropriate in that they cater for the needs of car-users and ensure that they can efficiently participate in opportunities when using public transport and NMT. The core issue is to perhaps understand why there are difficulties in altering car-user behaviour by analysing their activities and evaluate whether they can be carried using alternative modes. Loukopoulos et al., (2005a) pointed out that a shift to public transport by car users may have

broader consequences as it implies a change in their mobility patterns and hence possible impacts on their out of home activities.

In a study, Hiscock et al., (2002) observed that cars were regarded as a status symbol and also added security compared to public transport. Travel demand policies are therefore competing with human issues that are considered as pertinent and this may be a possible explanation for inertia in travel choices. Supporting this argument, Verplanken and Wood (2006) posited that the success of policy interventions aimed at influencing behaviour is greatly influenced by the ability to incorporate consumers (for example car-users) in designing them. On the other hand, Behrens and Del Mistro (2006) explained that successful TDM rely on understanding how habits are formed and the circumstances under which they can be broken. This therefore suggests that TDM should target the most vulnerable habits to instigate change. Research has also made reference to human behaviour and habits as impediments to the success of travel demand policies (Behrens and Del Mistro, 2006; Behrens et al., 2007; Gärling and Axhausen, 2003; Bamberg, et al., 2003).

2.8.5 Towards Public Transport: Evaluation of TDM efforts

It is essential to understand that TDM can either be coercive or non-coercive. Gärling and Schuitema (2007) evaluated the acceptability, effectiveness and political feasibility of TDM and they defined coercive measures as those that force car-users to reduce car use (for instance road pricing) and non-coercive measures as those that provide car-users with more options (like the improvement of public transport). What their study showed is that non-coercive measures do not draw people to change their car use patterns but coercive measures such as increasing car user costs may have a positive effect. However, they concluded that a combination of both coercive and non-coercive is more feasible and acceptable.

Using a model to evaluate the acceptability of TDM in trying to reduce car use, Eriksson et al., (2006) found that personal norms, problem awareness and specific TDM evaluation measures played an important role in TDM acceptability. They also found that the perceived fairness of the measure also played an important part in the success and acceptability of a TDM. One of the explanations raised for resistance to TDM is that some individuals feel that they have not contributed to problems being addressed by the TDM measures and as such it is unfair for them to be expected to change their behaviour (Sheldon, et al., 1993).

Furthermore, in a hypothetical study which is closely related to their previous study, Eriksson et al., (2006) used a combination of an increase in fossil fuel tax, improvement in public transport and a combination of the two as TDM tools to influence travel behaviour. They observed that a move towards the use of public transport was acceptable if it was accompanied with an improvement in public transport. They explained that a reduction in car use is greatly influenced by the type of activity that the car is used for. They went further to propose that TDM should be structured such that they provide more opportunities than restrictions.

In a study, Katimura et al., (1999) argued that TDM measures can be used to maintain or improve the quality of public transport. When people are making mode choice decisions, they seek a mode that provides them with comfort and has a high quality, as such, if TDMs can result in a high quality public transport, choice users can be attracted. They further proposed that affordability issues raised by public transport users as a result of insufficient funds to subsidise the service can be addressed through an improved public transport system.

So, in order to attract car-users to public transport, there is a need to understand what they consider as usable public transport and what drives them to use motorised transport. Deng and Nelson (2012) posited that information gathering on what customers perceive as a good

service is a stepping stone towards successful public transport provision. To get an understanding of this, attention needs to be directed towards TDM efforts that advocate for high occupancy vehicles (HOV) and evaluate whether they have failed or succeeded. In so doing, the feasibility of using TDM's as a sustainable transport strategy may be addressed. To carry out this task, literature on TDM efforts is provided focusing on some interventions that have been implemented.

2.8.6 Examples of TDM and their impacts on Affordable Transport

In a study of a set of TDM measures in Cambridge and Newcastle, Thorpe et al., (2000) utilised four measures (improving public transport, road user charging, increasing parking charges and zone access control) to evaluate the acceptability of TDMs amongst individuals. The study showed that measures that were aimed at improving public transport through increased quality, frequency of the service and reduction in fares were more popular amongst car-users. This shows that car-users can be encouraged to use public transport if there is no interference on their day to day activities. On the other hand, they also bring out that the size of the city determines how acceptable some of the measures are; especially when it comes to implementing zone access control as a tool. They observed that zone access control is an acceptable tool in small and compact cities where activities are in close proximity. (For further evaluation on the acceptability of road pricing see Loukopoulos et al., 2005; Johansson et al., 2003).

Bus Rapid Transit (BRT) is one TDM that has received a lot of support as shown by its growth in most parts of the world; e.g. Cape Town via the Travel Smart initiative or IRT, Curitiba (Brazil), Bogota (Colombia) , Dar es Salaam Bus Rapid Transit (DART) (City of Cape Town; 2012 and Wright and Hook, 2007). BRT represents a bus system operating on dedicated lanes and provides efficient and cost-effective urban mobility hence its popularity in developing cities (Deng and Nelson, 2012; Hensher and Golob, 2008). However the

success of these strategies relies on complementarity of transport goals and city planning policies. What this requires is that transport and planning be integrated such that they become a single entity instead of having competing policies. This means land-use has to fit transport needs and transport needs also have to be well-suited for the land-use patterns (Potter and Skinner, 2000). Furthermore, they posited that land-use transport integration ensures that all stakeholders especially trip generators benefit.

Making reference to the DART, Nkurinziza et al., (2012) pointed out that there are long term benefits that can accrue from BRT implementation such as cheaper and enhanced accessibility to amenities; despite their primary focus on alleviating congestion and environmental challenges. Additionally, they explained that the success of BRT is dependent on the ability to understand user needs and factors deemed important when choice is provided. Too and Earl (2010) demonstrated that a huge gap between user needs and public transport service may result in failures of TDMs. In that regard, it is important to involve employers and employees and other stakeholders into TDM implementation (Meyer, 1999). What this means is that TDMs should be context sensitive for instance the DART resonates with the needs of the urban poor in the Tanzania context (Nkurunziza, et al., 2012).

Additionally, BRT interventions such as the Rea Vaya have resulted in many positive outcomes such as a reduction in social exclusion and affordable fares for urban dwellers (Chakwizira, et al., 2011). This is an example of how TDM can be used to solve affordability issues and they can be implemented at a national level without impacting on other transport goals.

The bulk of the poor population in developing countries relies on public transport for mobility and is the most vulnerable to the negative effects associated with increased transport costs. On the other hand, they cannot afford to switch to car-use and public transport as the

most affordable alternative is non-motorised transport (Behrens, et al., 2004). In that regard, it is important to target groups of individuals who use private cars. It is paramount that we understand that the success of providing affordable work access to the urban poor stems from engaging with car users and making them aware of sustainable travel modes. What this calls for is collective effort between car-users, transport planners and public transport users to achieve this goal.

2.8.7 Conclusion

As mentioned earlier, the motivation TDM implementation should be to solve issues surrounding affordable transport in the global South. The argument is that if TDMs can be employed to alter mode choices, there might be a move towards non-motorised transport and public transport. Furthermore, with TDMs that focus on providing more sustainable modes of transport, there is a possibility of influencing land-use and transport integration policies to accommodate multi modality.

Furthermore, this brief review has shown how TDMs can make public transport affordable and can encourage and instil a culture of public transport especially amongst choice users. What is needed is to change the image of public transport by creating an attractive system to capture choice passengers. Additionally, keeping choice users informed on alternative modes helps in making them aware of sustainable travel choices. This will not only solve problems around affordability (VTPI, 2005a) but contribute towards sustainable transport and trying to reduce the contribution of transport to climate change.

2.9 General Conclusion

The literature reviewed the implications and benefits of having choice and how it is perceived by people from different areas of life. Furthermore, it went on to demonstrate the downside of having “too much” choice. Search mechanisms that aid in regulating the “too much” choice

effect were identified in the literature. Three distinct characteristics on the responsiveness of utility to an increase in choice were identified:

- In small quantities choice is beneficial.
- As the choice set increases, the benefits of having choice increase at a decreasing rate.
- Choice eventually reaches a satiation point where an additional increase in choice results in negative effects.

Additionally, the literature looked at how economic agents make their job and residential location choices. The motivation in looking at this was to try and identify possible linkages that exist between job search and location choices and whether they can be an explanation for the disparities that exist between housing and jobs.

Identifying whether search strategies implemented by individuals can be used to explain long commutes and unaffordable transport within a global South context was also an important aspect. In line with this, job-housing balance was looked at and identifying factors that lead to imbalances was fundamental in identifying possible areas that may assist in solving affordable travel concerns.

Some job attributes that economic agents consider as important in their job search were also identified and these were found to vary depending on profession and stage in one's career. A literature review on job attributes and how they vary between different genders was reviewed.

Excess commuting and travel demand management were looked at. Given the results on excess commuting from the various literatures, it is concluded that addressing excess commuting alone is not sufficient to address climate change issues and reducing travel in developing world cities. By further looking at TDMs the literature review showed that

coercive measures that force individuals to use public transport and implementing them in a supportive framework may result in an increase in the use of public transport by choice users.

The literature review on choice and the effects of having “too much” choice forms the fundamental aspects for this discussion. This review resonates to the purposes of this study in that it helped in identifying whether the same analysis can be done with a job search context. Essentially this will aid in taking a rigorous approach in placing the positive and negative effects of limiting employment destinations for employees. This may be crucial in understanding the notion of sufficient access in cities of the developing world especially in a job choice framework.

CHAPTER 3

Methodology: Questionnaire Development and the Survey

3.1 Introduction

The central aim is to investigate the impacts on employees of a reduced employment workplace pool. This potentially has negative and positive impacts on individuals. From an affordability point of view, a reduction in commuting distance might translate into a reduction in transport costs (Del Mistro, 2010). More importantly if distance to work places is sufficiently decreased, there may be a shift towards non-motorised transport which has the potential of substantially reducing the monthly cost on transport for households.

However, a reduction in the catchment area from which an individual can look for a job would also result in a reduction in utility. This emanates from a reduction in possible job opportunities and a possible need to readjust expectations in job attributes during job search. The concern of this discussion is to investigate the amount of accessibility that individuals need by understanding the perceived costs/ benefits of having choice. A hypothesis needs to be formulated to aid in understanding what this discussion seeks to investigate. Looking at the “too much” choice theory, the argument is that providing individuals with choice does not lead to an improvement in utility; however, there is a point beyond which the benefits that accrue from having choice become negligible. Figure 1 is used to explain the relationship between utility/ or satisfaction and choice.

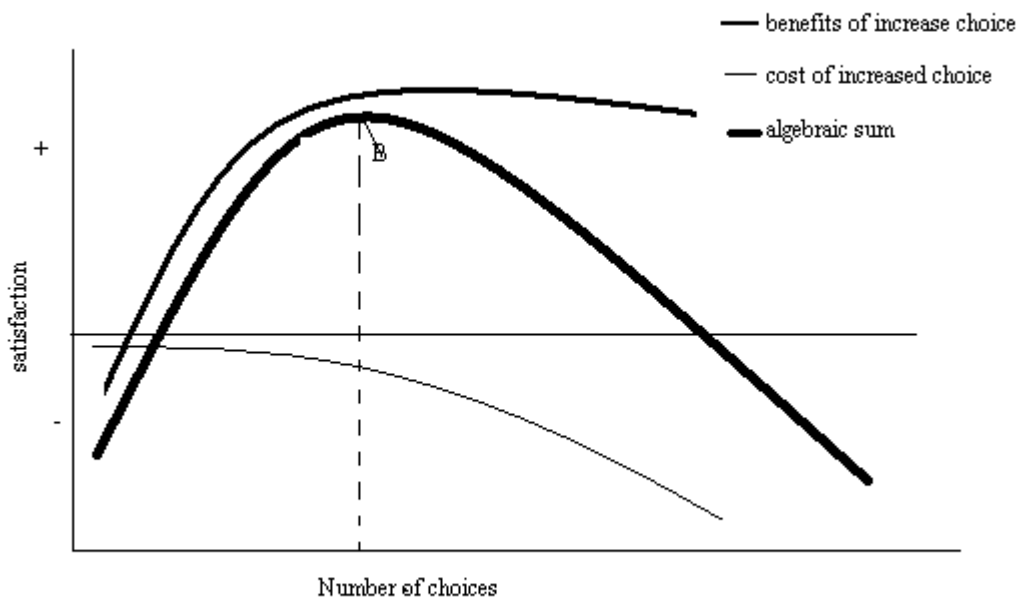


Figure 1: Relationship between Satisfaction / Utility with Number of Choices

The relationship presented in the diagram shows that as the number of choices increases, the benefits from choice increase until a certain point (B) is reached where utility is at its maximum. The fundamental relationship being shown is that utility increases until it reaches a point where the rate of increase begins to increase at a decreasing rate. With that in mind, it is possible to find a point where utility is at its maximum (B) and beyond this point, the benefits are negligible. This is the fundamental relationship used in this thesis to discuss the notion of “sufficient” access. By borrowing from this concept, this thesis will try to model how individuals make job choices and also evaluate the perceived cost or benefits of a reduction in choice.

The aim is to show that that as the employment catchment size increases or as the number of job opportunities increase, the utility individuals derive from the increased choice decreases. This may be due to several attributes that will be identified and used in developing the research tool. By identifying a commuting distance or catchment area that provides “sufficient” choice and at the same time maximise utility, this thesis hopes to inform on policy on the extent of accessibility that should be provided to individuals in a job search

context. The hypothesis built is that, the provision of choice to individuals within a job choice framework does not continue to yield benefits, instead there is a point where choice is regarded as sufficient and beyond that, there are costs. One of the expected policy implications flowing from this hypothesis is that this may be a guide in structuring future and the growth of cities such that the sizes provide “sufficient” opportunities.

Quantitative and qualitative methods will be used. Among other things, this chapter reviews literature on methods used to elicit preferences among individuals and then identifies a method appropriate for this study. Individual behaviour can be modelled either through revealed or stated preferences. An understanding of how these methods are used in determining consumer preferences is essential in trying to put the research objectives in context with modelling theory. Furthermore, this will allow for an appropriate method of analysis to be chosen for the purposes of this thesis.

3.2 Summary of Objectives

A list of sub-objectives that will aid in addressing the research question are summarised below:

- Understanding the perceived costs/ benefits of having choice
- Modelling how people make job choices
- Try and establish a point similar to point B in figure 1 for the current study.
- Transpose the “too much” choice notion onto a job choice framework

3.3 Methodologies in the Elicitation of Preferences among Individuals: Revealed vs. Stated Preferences.

Revealed preferences entail identifying consumer preferences by looking at actions that individuals have taken in the past on products (services) that are available on the market (Bennett and Blamey , 2001). On the other hand, Adamowicz et al, (1994) proposed that stated preferences involve identifying individual choices by asking individuals to make

decisions based on hypothetical situations. What this implies is that deducing preferences in a stated preference framework entails looking at products/services that are not available on the market and in the process try and find what individuals prefer through presenting them with hypothetical scenarios. To identify which method is suitable for this thesis, a look into the contexts in which the methods are applied is important as it will enable to match a method with the current research question.

Table 2: Revealed and Stated Preference Methods

	Valuation Methods	
	Revealed Preferences	Stated Preferences
Approach	Consumers' preferences are revealed through	Consumers are asked to state their preference for
Direct Methods	Competitive market price (observation of market prices)	Contingent valuation (directly asking individuals their WTP)
Indirect Methods	<ul style="list-style-type: none"> • Travel cost method • Hedonic pricing method • Discrete choice 	Discrete choice experiment (estimation of the WTP by use of a price variable)
Applicable goods	Real goods	Hypothetical and real goods
Disadvantages	<ul style="list-style-type: none"> • Limited to the supply of information regarding values that have been experienced • Limited to the number of cases where non-market values/goods exhibit a quantifiable relationship with market goods • Choice sets, attributes of choice options and individual characteristics are not controlled /designed a priori but rather occur/co-occur 	<ul style="list-style-type: none"> • Absence of incentive for the respondent to provide • Incentive for respondent to behave strategically • Overall costly evaluation (more complicated to design and analyse, and also more costly to undertake the survey) • Vulnerable to violation of economic decision making • Observed preferences may not reflect actual behaviour
Advantages	<ul style="list-style-type: none"> • External validity is maximised because the choices observed are real market choices in which consumers have committed money, time and /or other resources • Low-cost evaluation 	<ul style="list-style-type: none"> • Provides preferences and information that are otherwise impossible to reveal when actual choice behaviour is restricted in some way

Source: (Kjær, 2005)

The above table provides a brief outline of stated and revealed preferences. It gives the advantages and disadvantages of each method and the circumstances under which the two methods can be applied. For the purposes of this research, stated preferences are the chosen method of analysis. More importantly, they are chosen as they allow for a total evaluation of

goods due to their ability to incorporate non-use and option values thus allowing for an analysis of hypothetical goods and interventions (Kjær, 2005).

3.3.1 Stated Preference Methods

SP methods are divided into two broad categories, Contingent Valuation (CV) and Multi-attribute Valuation (MAV). These are shown in the figure 2,

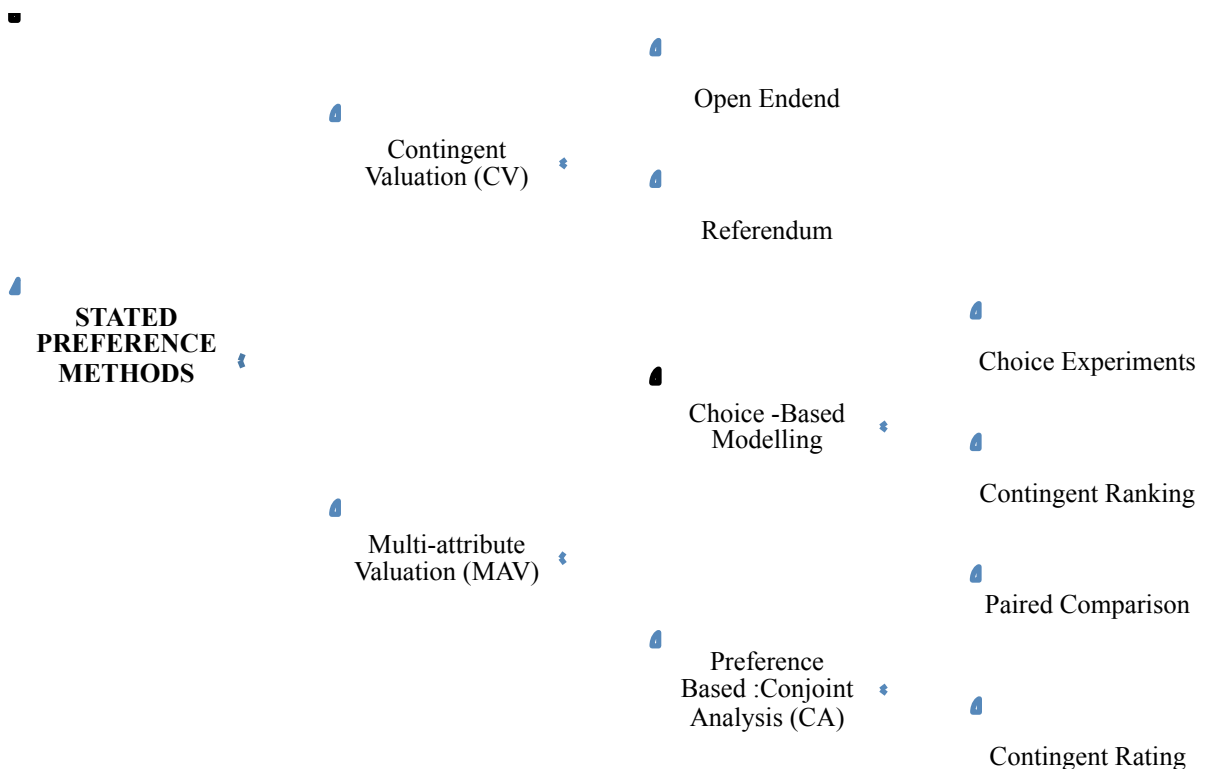


Figure 2: Stated Preference Methods: Source (Merino-Castello, 2003)

A brief review on what each method entails is given below.

3.3.1.1 Contingent Valuation (CV)

This is a direct survey approach that is used to estimate individual preferences. It utilises a hypothetical market where individuals are asked to make a decision on a product or service within that market (Kjær, 2005). CV has two methods of making inferences on individual behaviour i.e.

- Open ended
- Dichotomous or Referendum

3.3.1.1.1 Open ended

Respondents are asked open ended questions to state their willingness to pay for a service or product. Merino-Castello (2003) pointed out that because of the open ended nature of questions; many individuals find it difficult to answer questions hence the limited use of the method.

3.3.1.1.2 Dichotomous or Referendum

This presents individuals with questions requiring a 'yes' or 'no' response. One of the criticisms lodged against the use of the dichotomous method is that only one scenario is presented at a time to an individual. This makes it difficult to measure preference between two goods simultaneously. In real life scenarios, individuals make decisions based on one or more alternatives thus allowing them to make trade-offs between product attributes. Furthermore, given the structure of questions within this framework, with time individuals may begin to act strategically thus resulting in biased responses (Merino-Castello, 2003).

Due to the inability for CV to present respondents with several scenarios to make comparisons between attributes, MAV has become a popular method to make preference judgements (Merino-Castello, 2003). This is a survey based method and is divided into Contingent Analysis (preference based) and Choice Modelling (choice based). These methods allow for the evaluation of alternatives simultaneously and these alternatives are defined by attributes which can be expressed in different levels. One of the attractive characteristics of these methods is that they allow for the evaluation of willingness to pay especially when a cost or price factor is included as an attribute.

3.3.1.2 Contingent Analysis (CA)

This is divided into contingent rating and paired comparison. *Contingent rating* involves individuals being presented with several scenarios at different times from which they are asked to rate them individually on a numerical scale. With this method, there is no direct comparison between alternatives. On the other hand, *paired comparison* entails individuals being faced with two alternatives and are asked to point out the strength of each chosen alternative on a numerical scale (Hanley and Wright, 2001).

3.3.1.3 Choice Modelling (CM)

This consists of choice experiments and contingent ranking.

3.3.1.3.1 Choice experiments

Individuals are presented with a choice set and they are asked to choose their preferred alternative. This choice set may include 2 or more alternatives that are compared. The structuring of the choice sets is such that the status quo or an alternative similar to the status quo is used as a reference alternative. This is normally included in all the scenarios and this is a legitimate choice option. When an individual chooses the status quo, it implies that there is inertia to move or that their current situation is more attractive than the offered alternatives. Furthermore, respondents are expected to make decisions by making trade-offs between attributes (Merino-Castello, 2003).

3.3.1.3.2 Contingent Ranking

A ranking system is utilised where individuals are asked to show their preferences starting with the most to the least preferred. All alternatives are explained using various attributes at different levels thus allowing individuals to make trade-offs (Merino-Castello, 2003).

Given the brief insight into stated preference methods, discrete choice experiments are identified as appropriate for this research.

3.4 Discrete Choice Study

The literature review on stated preferences provided a background to the methods that could be used to elicit preferences among individuals. Discrete choice experiments due to their ability to mimic real products are chosen to elicit job preferences. Furthermore, given that they are based on utility theory, it makes them an attractive option in that individual behaviour can be modelled through utility maximisation.

3.4.1 Developing the Discrete Choice Experiment

The first stage in designing the questionnaire for the choice experiment was to come up with relevant attributes that people consider within a job choice framework. Two approaches were used to identify attributes namely:

- A literature review on job related studies particularly looking at attributes that pertain to job satisfaction and applying, accepting and rejecting of jobs
- Focus groups discussions

3.4.1.1 Identifying Attributes through Literature

The literature reviewed looked on, type of job (skilled or unskilled), sector, (private or public), gender, type of country (developed/developing) and the stage in the job choice process as a way of distinguishing the importance of different attributes. The findings are presented in the Table 3. From the literature review, the number of attributes was too high for modelling purposes within a discrete choice framework. The next step was to carry out focus group discussions to try and reduce the list of attributes to only those that resonate with the study area.

Table 3: Literature on Job Attributes

Attributes	Types of jobs		Sector		Gender		Type of country		Job stage		
	Skilled	Unskilled	Private	Public	Male	Female	Developed	Developing	Applying	Leaving/Accepting	Staying/Rejecting
Working Hours	●	●	●			●	●	●	●	●	●
Travel time to work		●				●	●	●	●	●	●
Type of Industry	●										
Transport costs	●	●	●	●	●	●	●	●		●	●
Employee training	●		●	●	●	●	●	●	●	●	●
Leave days/Vacation							●				
Size of Company /Standing of a company				●			●			●	
International assignments							●				
Reputation of the company (organisation perception)					●	●		●	●		●
Advancement Opportunities	●			●	●	●	●			●****	●
Nature of work (is it challenging , interesting)	●			●	●	●	●	●****		●	●
Level of Job security	●			●	●	●		●	●	●****	●
Salary	●			●	●***		●	●****		●****	●
Fringe Benefits				●		●		●****		●****	●
Location/ Distance from home								●			●
Mode of transport								●	●	●	●
Characteristics of the Labour Market (competition)	●	●	●	●	●	●	●	●	●	●	●
Autonomy (Freedom from to make decisions)	●			●	●		●				
Relationship with co-workers	●					●		●****		●	●
Relationship with supervisor	●					●		●****		●****	●

Compiled from (Rockers et al, 2012; Kolstad, 2011; Mangham and Hanson, 2008; Chimanikire, et al., 2007; Bender et al, 2005; Penn-Kekana et al, 2005; Konrad et al, 2000; Scott, 2001; Wiersma, 1990; Tversky, 1972; Jurgensen, 1978)

***Literature on job satisfaction and importance by gender showed that men rank earnings and autonomy and women state that a relationship with co-workers/supervisor is important. Attributes in the table are those that were identified to be in the top 5 of factors considered to be important in various studies. However, some of these factors depend on the career stage of individuals. Given that, there might be disparities in the literature on how important some of these factors are.

**** Literature was found for Cameroon, Ghana, Kenya, Malawi, Senegal, South Africa, Uganda and Zimbabwe for health professionals and agricultural professionals. For Zimbabwe, literature was on general employee dissatisfaction which led to high employee turnover.

3.4.1.2 Focus Group Discussions: Refining Attributes

Focus groups are a qualitative research methodology that can be used to gather information on opinions, beliefs and insights of the general population through small groups (Kitzinger and Barbour, 1999). Research argues that the list of attributes to be used for choice modelling should be based on understanding the target population and various policy issues that may affect how people make choices (Hall, et al., 2004). In support of this, Bennett and Blamey (2001) posited that, attributes should be relevant to policy makers and that they should be meaningful and important to respondents. Before carrying out the focus groups, it was necessary to first identify the sampling frame for the study. This ensured that the individuals to participate in the discussions fit into the research aims.

3.4.1.2.1 Defining the Sampling Frame

The income groups for the study were defined based on the NHTS (2003) which helped to identify individuals classified as living in ‘transport poverty’. These are individuals spending more than 10% of income on transport. One interesting observation from the NHTS data was that most of the people in the low and lower middle income group were spending more than 20% of their income on transport costs. Additionally, Walters (2008) also showed that a large percentage of individuals spend more than 20% of income on transport. This is above the national bench mark pegged at 10% of income (Behrens, 2005).

The data from the NHTS also showed that a portion of high income earners were spending more than 10% of income on transport. However, this group of individuals was excluded from the study as they are perceived to have more flexibility in terms of transport options. A study by the City of Cape Town (2010) showed that the high income earners have an influence on where businesses can be located. To some extent, this implies that work related transport expenditure is likely to continue being in the reach of these individuals.

More importantly, the structure of the cities due to apartheid planning in a South African context has exacerbated “transport poverty” and long commutes for most marginalised groups. Selecting the target population is therefore based on aspects that are fundamental in distinguishing the different population groups i.e. transport affordability and distance. This led to the sampling frame being limited to the low and lower middle income earners.

To investigate the stated hypothesis for this thesis, residential areas within Cape Town are used as a reference group.

3.4.1.2.2 Screening for Focus Group Participation

Each of the focus groups consisted of 8 participants and the screening criteria is shown in Table 4 below.

Table 4: Screening Criteria for Focus Groups

low income people	lower middle income
<ul style="list-style-type: none"> • people earning R3000 –R6400 	<ul style="list-style-type: none"> • people earning R6401-R12800
<ul style="list-style-type: none"> • employed and not looking for a new job 	<ul style="list-style-type: none"> • employed and not looking for a new job
<ul style="list-style-type: none"> • employed and looking for a new job 	<ul style="list-style-type: none"> • employed and looking for a new job
<ul style="list-style-type: none"> • unemployed in the past 6 months and actively looking for a job 	<ul style="list-style-type: none"> • unemployed in the past 6 months(actively looking for a job)
<ul style="list-style-type: none"> • had to be public transport users 	<ul style="list-style-type: none"> • had to be private car users (no carpooling , car clubs etc.)

3.4.1.2.3 Outcomes from focus groups

Some of the responses that came out of the discussions as people shared their experiences made the present study a relevant issue in a global south context. Regarding travel times, one participant in the low income group stated that, *“If I travel more than an hour to work, by the time I get to work, I will be too tired to work”* Another individual stated that, *“If I could work closer, it will enable me to spend more time with my son which might help in keeping him out*

of gangs.” This speaks to the need for some individuals to try and balance their family and work life. The general consensus from the participants in both income groups was that they spend a lot of time on work related travel.

On transport costs, one participant had his monthly ticket on him, he made a comment stating that, *“I don’t understand why some of my colleagues are using the bus or the minibus taxi, the train is much cheaper.”* The response to that from most individuals was that the train stations were too far from their residential areas and that made it difficult for them to get to work on time. They further iterated that they had to wake up very early if they wanted to use the train and walking to the stations in the early hours of the morning was unsafe. Most of these individuals opted for the mini-bus taxis because of they are relatively accessible compared to other modes.

From the lower middle income group, one of the comments that continuously came up in the discussion was that, *“All I want is to be able to cover my fuel costs and be left with enough money for other expenses.”* This shows that transport costs are very critical when people are deciding where to work or where to stay.

One lady iterated that, *“I will never take a job that makes me drive more than 1hr 30 minutes in one direction even if the salary is high.”* This alludes to the notion of trade-offs that individuals make in decision making.

Box 1: Summary of the focus group discussions.

The format for the focus group discussions was the same in both groups. Participants were first asked to describe their experiences with regards to their journey to work with great emphasis on, how much they spent on transport per month, how long it took them to get to work, the distance and their mode of transport to work.

Secondly, participants were asked to state the factors that they considered to be important when searching for a job. There was also probing into some attributes that were identified in the literature but were not mentioned by the group members. This was done to see if the factors they raised were consistent with the literature review search for attributes.

Participants were then asked to rank the attributes in order of importance.

After that, a final list of attributes was agreed on. This comprised of 5 variables, *travel time*, *distance from home*, *cost of transport*, *changes in salary* and *the number of job opportunities in an area*. Participants were asked what they thought would be feasible levels for these attributes. This was done to ensure that the levels and scales of the attributes would be realistic when included in the hypothetical job scenarios.

3.4.2 Defining the attributes and their levels

All identified attributes for this study were found to be quantitative in nature. Literature suggests that the levels attributes take should enable individuals to make trade-offs without bias (Kjær, 2005). This section aims at introducing the attributes–variables- used in this study. Each of the attributes is defined and the methods used to calculate the levels for the attributes are discussed.

3.4.2.1 Distance from home-was defined based on the distance in kilometres that individuals within the Cape Town area travel to work and also as given by the focus group

participants. Two additional distances, 5 and 10 kilometres were included to include shorter commutes which are an essential aspect for this discussion. This resulted in 6 key distances which were used as levels for the questionnaire i.e., 5, 10, 15, 20, 25 and 30 kilometre distances.

3.4.2.2 Travel time- was more challenging to define as it relied on knowing the travel speeds of vehicles (minibus, train, bus) during peak periods and using the speed, distance and time relationship to come up with the travel time for each of the distances. A detailed formulation of the travel times is provided in Appendix 1. Looking at the information from the focus group interviews, the travel times were within the ranges mentioned by the participants. Travel time is analysed at two levels, a high and a low value for each of the distances.

3.4.2.3 Cost of transport -was defined as the monthly expenditure dedicated to transport. This is a variable of interest as it speaks to the issue of affordable transport. To calculate monthly public transport costs², Metrorail, Golden Arrow and the City of Cape Town data was used. Twenty-two working days were assumed.

For the lower middle income group which are private car users the average cost per kilometre using the Automobile Association (AA) calculations was used. The survey was carried out in August (2013), using fuel prices for July the monthly cost of fuel was calculated. Cost of transport is analysed at 2 levels for each distance for both income groups. A detailed description of the calculations is provided in Appendix 2.

3.4.2.4 Change in Salary -was defined using the views of participants of the focus group discussions. The participants were asked to indicate an increase in salary that would

² Fares for trips using either the Metrorail, Golden Arrow bus service and the minibus taxis for the different distances were used to find the transport cost

make them consider taking a new job. The values for the salary increases were developed within the ranges mentioned by participants. This variable takes 3 levels.

3.4.2.5 Number of Job Opportunities- to find the number of jobs available within each distance, literature was reviewed (Proctor and Del Mistro 2013; (Del Mistro and Maunganidze 2012)) to identify the spread of work trips within each commuting distance. The work trips were then used as proxies for the number of workers within a given radii. Using data on the rate of turnover of workers within each income band (Proctor and Del Mistro 2013), a proxy of the number of jobs advertised in each commuting distance was found.³ A detailed explanation of the construction of the job opportunities is found in the Appendix 3.

3.5 Experimental design and choice sets

This section describes the steps taken until the final questionnaire was developed. This includes the experimental design and the pairing of the choice sets.

Using the defined variables and the levels, the experiment would have $6^1 * 2^3 * 3^1$, i.e. A total of 144 choice sets. This is referred to as a full factorial design. Given that it is impossible- due to possible cognitive burden- to present a respondent with all the choice sets, experimental design techniques were used to reduce the design to a fractional factorial design (Kjær, 2005). For the generation of the fractional factorial design, the statistical package R-Studio⁴ was used. This produced an orthogonal design that required 36 experiments. Furthermore, in designing the experiment, attention was taken such that two key aspects were observed i.e.

³ As an add on, number of jobs advertised represents future job opportunities that are available to individuals within a chosen location or commuting radius.

⁴ <http://www.r-project.org/>

- Orthogonality⁵– what this means is that there should be minimal correlation between the levels of attributes that appear in a design (Sawtooth Software, Inc., 2013)
- Level Balance⁶- each level of an attribute should appear an equal number of times within a design (Sawtooth Software, Inc., 2013).

The tables below provide a list of the attributes used and the levels taken by each of the variables.

Table 5: Attributes levels for the Low Income Group

Distance from Home	code	5	10	15	20	25	30
Travel Time	1	15	25	40	50	65	75
	0	10	20	25	35	40	50
Cost Of Transport	1	300	400	750	680	840	1350
	0	200	260	500	460	560	900
Change In Salary	0	1000	1000	1000	1000	1000	1000
	1	900	900	900	900	900	900
	2	700	700	700	700	700	700
Number Of Jobs Advertised	1	8	17	27	33	31	38
	0	7	15	22	27	37	32

Table 6: Attributes Levels for the Lower Middle Income

Distance from Home	code	5	10	15	20	25	30
Travel Time	1	20	35	55	70	90	110
	0	10	25	35	50	60	70
Cost Of Transport	1	250	500	750	1000	1250	1500
	0	170	330	500	660	850	1000
Change In Salary	0	1000	1000	1000	1000	1000	1000
	1	1400	1400	1400	1400	1400	1400
	2	1900	1900	1900	1900	1900	1900
Number Of Jobs Advertised	1	1	3	4	4	4	5
	0	2	2	3	4	5	4

⁵This is identified by using the correlation between the different variables, a correlation matrix is provided in the Appendix 6

⁶The table for level balance will be provided in the Appendix 4

3.5.1 Construction of choice sets

As mentioned earlier, the experimental design produced thirty-six experiments. A review of literature on the construction of efficient designs was carried out to inform on how the choice sets could be paired (Street, et al., 2005). The design was initially blocked into 18 pairs and further on into 2 blocks of 9⁷ pairs. This means that a respondent is faced with a set of 9 choice sets.

3.6 Formulating the Questionnaire

The questionnaire consisted of five sections. Section 1 gathered information on the respondents current travel patterns. In section 2, respondents were asked to make a choice in a job search context between two scenarios plus a status quo (i.e. the choice experiment was an “unforced choice”). Section 2 started with a warm up question which consisted of a choice pair example. The interviewer went through the example with the respondents to help them understand how to carry out the exercise. Additionally the warm up question was used to explain to the respondents the definition of each attribute as intended by the researcher. An example of how the 9 choice sets were presented to respondents is given in figure 3 below.

Q1a) Which of the following 2 options would you prefer?

	Scenario 1		Scenario 2	
Factors to consider	30 Kilometres from Home		5 Kilometres from Home	
Travel time	50	Minutes	10	Minutes
Cost of Transport	950	Rand Per Month	220	Rand Per Month
Change in Salary	500	Rand per Month	1000	Rand per Month
Number of Jobs Advertised	32	Per Month	8	Per Month

Please tick the scenario you prefer: Scenario 1 OR Scenario 2

b) Given the above options, would you rather stay in your current situation? YES OR NO

Figure 3: An example of the Stated Preference choice pair

⁷ The blocked choice sets are provided in appendix 5

Section 3 asked respondents to rank the variables using a four point importance scale. Section 4 comprised of questions that asked the respondents to identify the location of what they considered as an ideal work location. They were also asked to state the possible travel time, cost of transport and commuting distance for the ideal location. The final section consisted of questions that gathered socio-demographic information. The final research tool consisted of four principal questionnaires, two for the low income and two for the middle income group.

3.6.1. Piloting the Questionnaire

The questionnaire went through a piloting phase which aimed at testing the wording and general readability of the research tool. Twelve questionnaires were distributed to pilot all four versions of the questionnaires. Six questionnaires were given to the low income group (3 version 1 and 3 version 2) and 6 to the lower middle income group (3 version 3 and 3 version 4). The questionnaire tested well with both income groups. However, from the pilot changes needed to be made to the wording in section 4. It was found that some respondents found it difficult to answer the questions and hence some questions had to be rephrased. Because it took around 30 minutes to answer the questionnaire in the pilot, it was concluded that blocking the choice pairs again was not necessary. After piloting and making the necessary corrections, the final questionnaire was developed. A sample of the blank questionnaire is provided in Appendix 7.

3.7 Main Survey

This section provides a description of the techniques used to identify the sample size. It further explains the interviewer training, respondent recruitment process, the data collection process and impediments encountered in the data collection phase. Respondents were

selected based on the NHTS 2003 data. Individuals in the R3000-R6400 (low income) and R6401-R12800 ⁸(lower middle) income band closely fit the study criteria.

3.7.1 Sampling

The sampling frame consists of 459536⁹ (STATSSA, 2011). The level of precision expected is 95%. The Yamane (1967) method was used to calculate the sample size using equation 1 below.

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

From 1, the required sample size is given as,

$$n = \frac{459536}{1+459536(0.05^2)} = 400 \text{ respondents} \quad (2)$$

To validate the sample size and its appropriateness for DCE, literature on sampling for discrete choice was reviewed. Discrete choice literature suggests that a minimum sample of 50 individuals per sub-group be used (Ryan et al, 2008; Mangham, 2007; Hensher et al, 2005; Scott 2001). The chosen sample size of 400 was found to be suitable. The sample was split into 200 low income and 200 lower middle income respondents.

3.7.2 Training of Interviewers

Twenty interviewers went through a training session. The training session comprised of interviewers being familiarised with the interviewer guide and explaining to the criteria for screening respondents for the survey. It also consisted of alerting the interviewers of what they could and could not do during the interviews with respect to helping the respondents come up with answers. Emphasis was made that their role was to assist and not to answer the questionnaire for the respondents. The training session took 2 hours.

⁸ The 2003 income ranges were converted to 2013 prices..

⁹ This figure was identified through SuperCross software package

3.7.3 Survey Administration Mode

The questionnaire was paper based and was answered by the respondents with the help of trained interviewers. The role of the interviewers was to help respondents in the event that they did not understand the wording or how to go through the choice scenario exercise. However the example in section 2 (choice scenario) equipped respondents to easily go through the choice scenarios.

3.7.4 How the Sampling Points were identified

The AMPS (All Media Products Survey) suburb listing was used. This was chosen after consultation with the data collection company. Sampling suburbs were drawn from the list and matched to the expected profile in terms of income. Suburbs that showed a high probability of finding respondents using the criteria were selected. A limit of 10 interviews per sampling point was mandated and for the door to door interviews, respondents visited every 8th house. No more than 1 member per household could be interviewed, nor could neighbouring households be interviewed. For areas where door to door interviews were not feasible, interviewers could recruit respondents by going into shopping malls or other areas within the designated suburbs and used the screening guide to identify respondents.

3.7.5 Data Limitations

The ideal sample would have comprised of employed and unemployed respondents. Initially it was envisaged that it would be easy to recruit unemployed individuals given the high unemployment rates. However, once field work began, most of the unemployed individuals were either unwilling or unavailable for interviewing. A decision was made after 5 days of field work to discard employment status as a recruiting quota. Completed surveys consisted

of 409 questionnaires, of these, 400 were found to be usable. The data was entered into excel in a format to be imported into LIMDEP¹⁰ for data analysis.

3.8 Estimation Procedure

This section provides the theoretical derivation of the utility maximisation model using a combination of literatures namely, Koppelman and Bhat, 2006; World Bank Publications, 2013.

3.8.1 Discrete Choice Model Estimation

Discrete choice experiments methods borrow their theoretical underpinnings from utility maximisation theory.

3.8.1.1 Basic Utility Maximisation Theory

The idea is that individuals seek to maximise their utility. From the choice scenarios, an individual chooses a scenario that provides the greatest utility. Essentially what this implies is that individual utility can be represented using a random utility model. One of those models is based on McFadden (1974).

3.8.1.2 Conceptualising Utility Maximisation within a Job Choice Framework

The underlying premise of utility maximisation is that a respondent n is faced with J possible jobs and they must choose one that has the highest utility. For this thesis, they are described as scenarios and a respondent will choose a scenario if and only if,

$$P(U_{ni} > U_{nj}, \forall i \neq j \in J) \tag{3}$$

What the above suggests is that, respondent's (n) utility function (U) can be represented by two distinct parts,

¹⁰ LIMDEP is statistical package with an NLOGIT package built into it to allow for statistical analysis and for the purposes of this thesis discrete choice analysis. <http://www.limdep.com/>

- A deterministic part V_{ni} which is a function of m job attributes ($X_1 \dots X_m$). Furthermore, each of these attributes can be weighted ($\beta_1 \dots \beta_m$).
- A stochastic element ε_{ni} , which represents influences at an individual level that are unobservable which may be an indications of variations in tastes. From the above, the utility representation can be written as in equation 6.

$$V_{ni} = \alpha_1 + \beta_1 X_{1ni} + \beta_2 X_{2ni} + \dots + \beta_m X_{mni} \quad (4)$$

$$U_{ni} = V_{ni} + \varepsilon_{ni} \quad (5)$$

$$U_{ni} = \alpha_1 + \beta_1 X_{1ni} + \beta_2 X_{2ni} + \dots + \beta_m X_{mni} + \varepsilon_{ni} \quad (6)$$

Given the above, the chosen scenario is evaluated based on all the other rejected options, the probability that respondent (n) chooses scenario i over scenario j can be represented by the following,

$$P_{ni} = \Pr[U_{ni} > U_{nj}] \text{ where } \forall i \neq j \in J \quad (7)$$

$$P_{ni} = \Pr[V_{ni} + \varepsilon_{ni} > V_{nj} + \varepsilon_{nj}] \text{ where } \forall i \neq j \in J \quad (8)$$

$$P_{ni} = \Pr[\varepsilon_{ni} - \varepsilon_{nj} > V_{nj} - V_{ni}] \text{ where } \forall i \neq j \in J \quad (9)$$

3.9 Multinomial Logit

By making the assumption that the error terms in (9) follow a Gumbel distribution a multinomial model in a discrete choice framework can be estimated. Under the Gumbel distribution, it is assumed that the cumulative distribution of the error terms can be closely approximated to the normal distribution. The relationship is shown in fig 4.

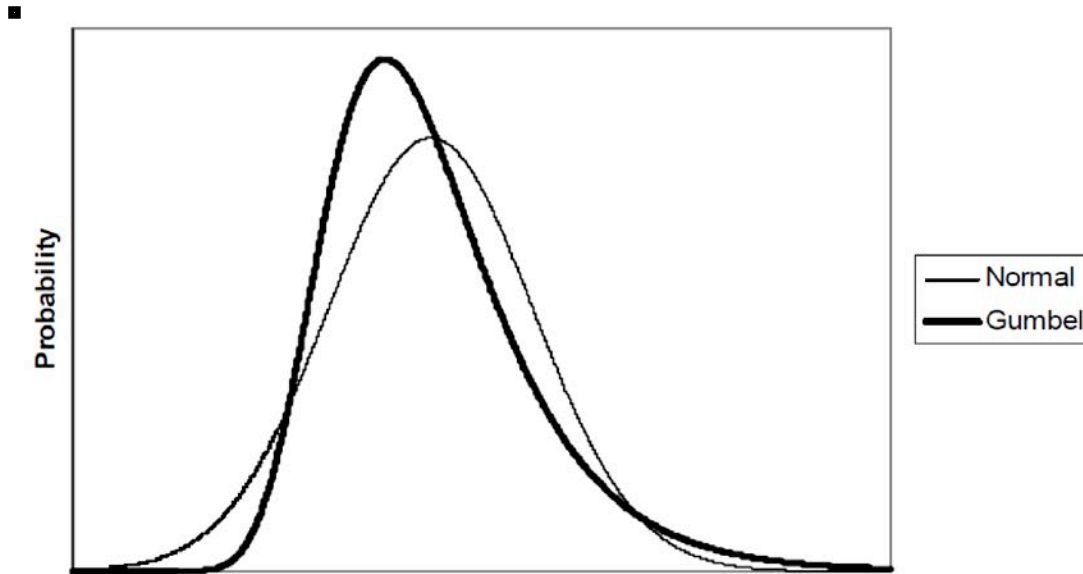


Figure 4: Probability Density functions of for the Gumbel and Normal Distributions (same mean and variance)

Source: (Koppelman and Bhat, 2006)

The error terms are further assumed to be independently and identically distributed (IID) (McFadden, 1974); a multinomial logistic model can be derived and is given in equation 10 below.

$$Pr(i) = \frac{\exp(v_i)}{\sum_{j=1}^J \exp(v_j)} \quad (10)$$

Where: $Pr(i)$ is the probability of the decision-maker choosing alternative i and

V_j is the systematic component of the utility of alternative j .

For the purposes of this research, the decision making utility equation of the form in (6) is used for modelling purposes.

CHAPTER 4

Description of the Data and Findings

4.1 Introduction

The central aim of this research is to bring the notion of choice into a job choice context and in doing so argue that an increase in job catchment sizes does not imply an increase in utility but that utility increases until a point is reached where utility begins to decrease. This chapter maps out how the data analysis was carried out and the different aspects within the data set that were looked into. It also provides the results that came out in the analysis. Several models for each subgroup will be presented and a “best fit” model is selected for each group. Additionally, the criterion that is used to select the “best fit” model is briefly discussed basing it on both theoretical arguments and literature on similar applications. This forms the foundation to introduce the statistical findings used in arguing for the above mentioned hypothesis.

4.2 Description of Data

The final sample for analysis consisted of 400 respondents. The sample consisted of an equal split (200) between the low and lower middle income respondents. The selection of respondents was based on income groups (previously defined). AMPs were used to help identify the suburbs that would result in a high respondent rate. To achieve the required sample size, 500 respondents were approached leading to an 80% response rate.

4.2.1 Socio-Demographic Characteristics of Respondents

Descriptive characteristics were calculated for the sample. The ages of the respondents ranged from 19 to 65 years. The median age ranges were, 36-44 and 46-54 in the low and lower middle income groups respectively. 50.5% of the respondents were male and 49.5 % female, this shows a good spread in gender for the survey. The data also showed that Indians were under represented, with the remaining races taking an almost equal share each. All of the respondents were employed.

Table 7: Characteristics of the Sample

Characteristics	n=400
Median Age Low income	36-44
Median Age Lower middle income	46-54
Sex: Male	202
Female	198
Have you thought of changing your job?	
Yes	156
No	244
Would you take a salary decrease?	
Yes	58
No	342
Mean level of Education	
Below Matric	110
Matric	166
Tertiary	124

The questionnaire also contained close ended questions in addition to questions on socio-demographic characteristics. A brief representation of responses to the questions is provided in Table 1 above. These questions aided in getting an understanding of an influence of these factors on individual decisions.

4.3 Results from semi-structured questions

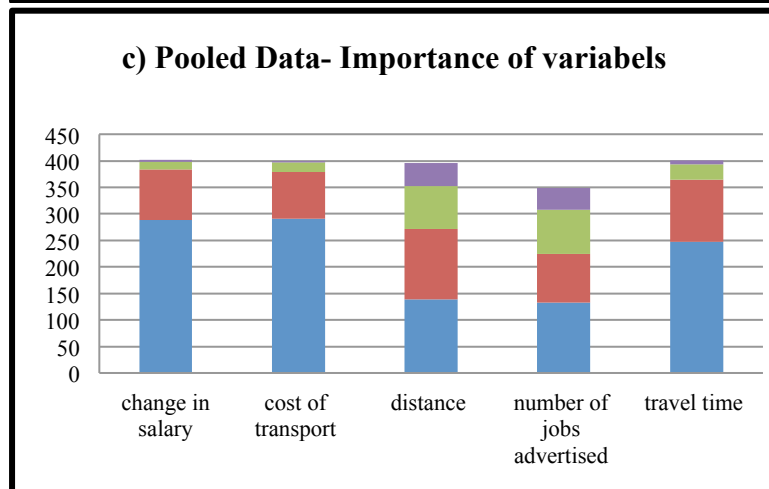
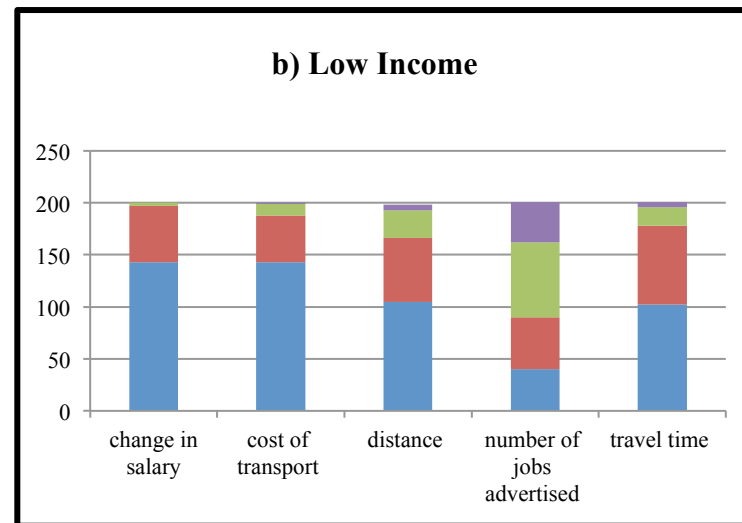
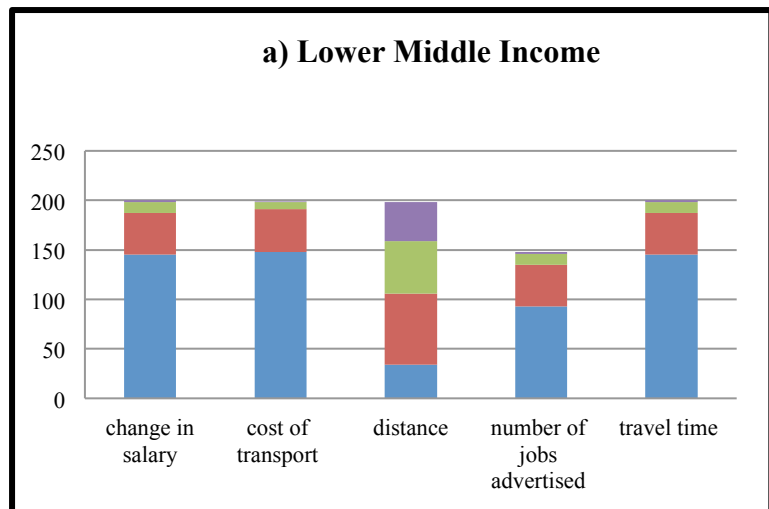
4.3.1 Views on Salary Decrease

One fundamental aspect to observe was the willingness of respondents to take a salary decrease. Willingness to take a salary decrease was probed by asking the respondents to relate to situations where they had previously looked for a job. The questions asked was, “Are you willing to take a salary decrease to work in the ideal location? This gave the respondents an opportunity to visualise locations they had previously considered as ideal work locations with regards to transport costs, travel time and proximity to other daily activities. Out of the 400 respondents, 58 indicated that they were willing to take a salary decrease for an opportunity to work in the ideal location. Additionally, the data also shows that among the respondents who indicated they would take a decrease in salary, the stated decrease in salary was not substantial and in most cases the amount is equivalent to what they are currently spending on transport costs per month. 352 respondents indicated that they were not willing to take a salary decrease to work in the ideal work location.

4.3.2 Perceptions on different attributes

Five variables were used to describe the hypothetical jobs scenarios. The importance of these variables in job search was elicited using a 4 point importance scale. The results are presented in figure 5. From figure 5, respondents from both income groups showed that change in salary and costs of transport are the top most important variables. Respondents from the low income group indicated distance as most important more frequently than in the lower middle

income groups. Additionally, the number of respondents in the lower middle income view the number of jobs advertised in a month and travel time as important more frequently than in the low income group.



- not important
- slightly important
- important
- most important

Figure 5: Importance of Variables

Panel C in fig 5 shows the pooled data, change in salary and costs of transport are viewed as the top most important variables by the respondents. Travel time in the pooled data was still perceived to be most important by many of the respondents. Only a few individuals rated change in salary as not important.

4.3.3 Travel times and Distances Comparisons

Fig 6 shows the commuting times and travel distances for the low and lower middle income groups.

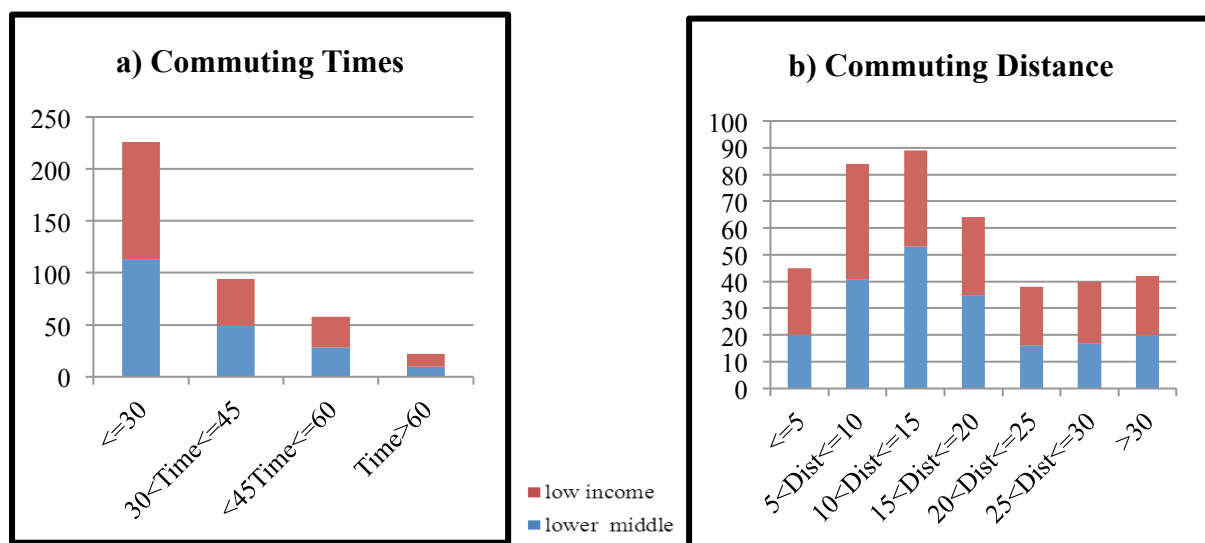


Figure 6: Commuting Time and Distance Comparisons

Over 50% of all respondents travel less than 30 minutes to work. For both income groups, the most frequent commuting distance is between 10km and 15 km. However, 173 out of 400 respondents travel distances greater than 15 kilometres.

4.3.4 How many people thought of changing their jobs, or take a salary decrease.

It was also important to evaluate whether the respondents had thought of changing their jobs or if they would take a salary decrease to work in locations they considered convenient. Fig 7 shows the responses to the questions.

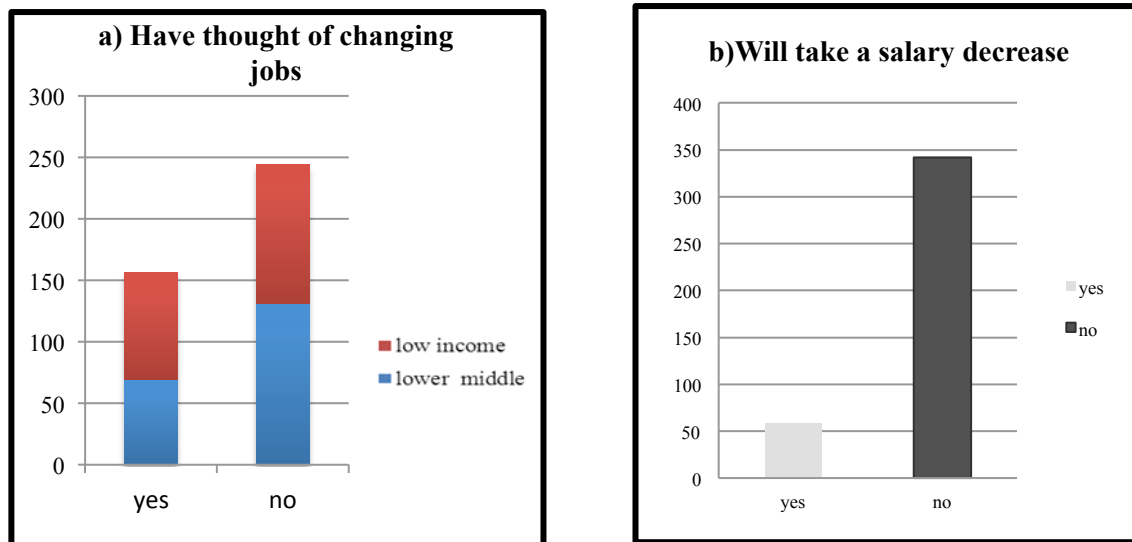


Figure 7: Individuals who thought of changing their jobs, willing to take a salary decrease

Compared to the low income group more people (65.5%) in the lower middle income group indicated that they had not considered changing their jobs 6 months prior to the survey. Furthermore, the number of respondents who indicated that they were willing to take a salary increase was low (14.5% of the total sample), in that respect no distinction was made between the low and the lower middle income for this particular analysis. The results are shown in fig 7 panel b.

4.3.5 People spending more than 10% of income on transport per month

From the sample, it was found that most respondents spend more than 10 % of their income on transport. This characteristic was observed to be more frequent among the lower middle income group. This was a rather interesting finding given that the lower income respondents were recorded to have shorter commutes compared to the low income. The number of respondents who are within the 10% benchmark is high for the low income group compared to the lower middle income. These results are presented in Fig 8.

Additionally, an analysis was carried out to understand the transport costs associated with the ideal locations. Current commuting costs for respondents were compared to commuting costs they would incur if they were working in a location of their choice (ideal location). The aim

was to try and identify the difference in transport costs between the two scenarios and evaluate whether the preferred location would result in most respondents incurring transport costs within the 10% benchmark.

From the graph in panel (b) of fig 8, there is a substantial decrease in monthly transport costs in the ideal location from the current situation. This is an encouraging result in a context where a reduction in transport costs is a fundamental issue. For the low income group, the number of respondents spending over 10% of income is almost close to zero in the ideal situation. For the lower middle income respondents, there is also a remarkable decrease in the monthly transport costs. The number of individuals spending more than 10% on transport costs for the lower middle income drops by almost 53%.

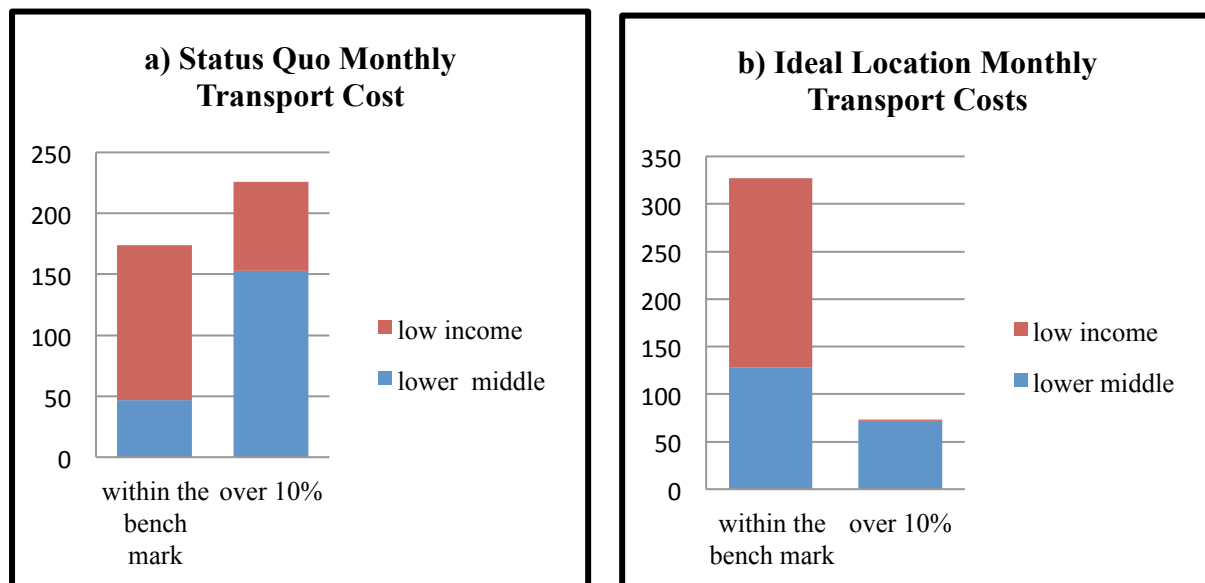


Figure 8: Monthly income dedicated to transport

4.4 Results from the Discrete Choice Experiment (DCE)

All 400 respondents answered the discrete choice experiment section. Four versions of the questionnaires were used and these were split between 100 respondents in each income group.

4.4.1 Status Quo Analysis

The choice experiment consisted of a third alternative which was the opt-out or status quo making it an ‘unforced choice’ experiment. Analysis of how the status quo performed in relation to alternatives 1 and 2 was carried out. The combined discrete choice exercise responses from both income groups show that, 30% of the time, the status quo was chosen in the lower middle income group and 27% of the time in the low income group. The alternatives 1 and 2 were chosen 20% and 23% of the time by the lower middle and low income groups respectively. Figure 9 shows the number of times the status quo was chosen by the low and lower middle income group. There were no distinguishing characteristics between alternatives 1 and 2, hence they are combined and labelled as 1&2 in figure 9.

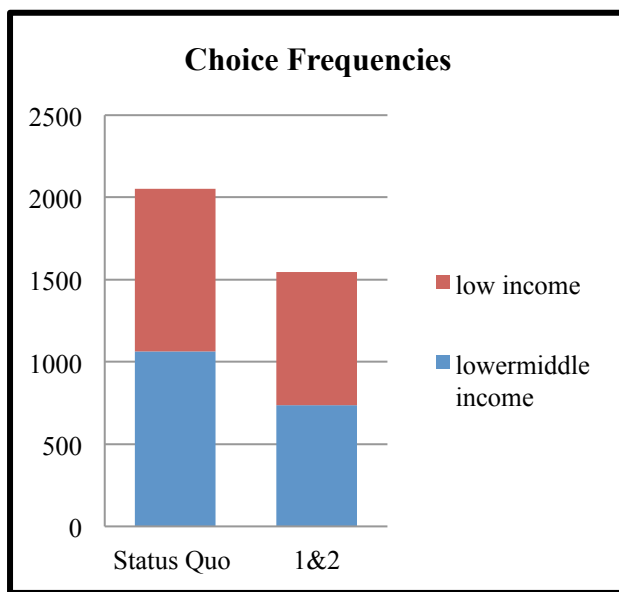


Figure 9: Status Quo versus Alternative 1 and 2

Several plausible explanations can be given to explain the high frequency of the status quo relative to alternatives 1 and 2; these are discussed in Chapter 5.

4.4.2 Econometric Model Analysis

The data is analysed based on the assumption of a multinomial logit function. The multinomial logit (MNL) was used to analyse the data due to its statistical flexibility and the underlying assumptions from which the model is derived. The logit function is composed of

the utility for each scenario or alternative and this is used to derive the part worth utilities for each of the variables or attributes.

The experiment was structured such that two forms of analyses could be carried out,

1. An analysis of the forced choice (using alternative 1 and 2) case.
2. An analysis of the unforced choice (using alternative 1, 2 and the status quo as a 3rd and opt out alternative) case.

For the income groups, the above mentioned analyses were carried. As indicated previously, 400 respondents were surveyed. These were split into 200 lower middle income and 200 low income group respondents. The key differentiating characteristics between the samples was the level of income and the mode of transport to work. These two data sets were analysed separately to remove possibilities of combining groups with incompatible characteristics.

For each of the sub groups, the econometric model estimation, i.e., the probability that one of the alternatives (1, 2, or the status quo) is observed for each choice set for a respondent takes the form,

$$(P_{ni} = 1) = \alpha_1 + \beta_1 X_{1ni} + \beta_2 X_{2ni} + \dots + \beta_m X_{mni} + \varepsilon_{ni} , \quad (11)$$

similar to that expressed in equation 7. The econometric package LIMDEP 7 NLOGIT was used to estimate the models.

4.4.2.1 Establishing the a Priori expectations of the variables and how they influences Utility

Literature and economic theory informed on the behaviour of the variables hence their expected signs.

A total of five core variables plus socio-demographic characteristics were used in the analysis.

- *Distance*- the influence of distance on utility is expected to be negative. This means that as commuting distance increases, the utility is expected to decrease. Six dummy variables were created for distances to represent the six commuting distances in the questionnaire. This was done to decompose the influence of distance across six catchment sizes with the hope of identifying the catchment size that provided the greatest part worth utility. Furthermore, dummy variables were used to capture non-linear characteristics. The effects of longer commuting distance might dominate that of shorter commutes, by creating dummy variables for all catchment areas, the effect of distance can be estimated for various distances. With that in mind, it is possible to observe positive utility for some commuting distances and negative utility for others.
- *Travel time*- is expected to have a negative sign, as the travel time increases, for an alternative, the attractiveness of that alternative is reduced.
- *Cost of transport*- is expected to have a negative sign. Individuals are expected to be more sensitive to high transport costs and hence the contribution to the total utility is expected to be negative.
- *Change in salary*- change in salary was defined as the additional salary a respondent gets in each scenario. It is therefore expected that change in salary will have a positive sign and a positive effect on an individual's utility.
- *Number of job opportunities*-is represented by job opportunities that become available every month within an area. This variable is expected to take a positive sign thus having a positive effect on an individual's utility. .

4.4.2.2 Criteria used to choose the “best fit” model

Several models were estimated by trying out different combinations of variables until one mode that better represents (“best fit”) the behaviour of respondents. To ensure that variables were not included randomly into the models a priori expectations, economic theory and the

level of significance were used to inform on the variables to include. The acceptable adjusted rho squared for this type of analysis lies between 0.2-0.4 (Hens her et al., 2005). A 5% level of significance was used, however in some cases a 10% level was also acceptable.

One of the fundamental aspects for this research is to analyse the influence of individual distances on utility. The approach taken was to create dummy variables for each of the commuting distances and these represent catchment sizes. From here on, catchment size and distance are used interchangeably with,

Catchment 1 is less than or equal to 5 km (DIST1)

Catchment 2 is less than or equal to 10km (DIST2)

Catchment 3 is less than or equal to 15km (DIST3)

Catchment 4 is less than or equal to 20km (DIST4)

Catchment 5 is less than or equal to 25km (DIST5)

Catchment 6 is less than or equal to 30km (DIST6)

4.4.3 Summary of Models and the Type of Analysis Carried out

Several statistical analyses where carried out. Table 8 provides a preview of the type of analyses carried out. A brief description of the analysis and the section discussing the analysis is provided in the table.

Table 8: Preview of Estimated Model Variants, Type of Analyses and the Sections in which they are discussed

Type of analysis	Forced choice	Unforced choice	Forced choice	Unforced choice
Regression analysis to find the “best fit” models	4.5.1.1	4.5.3.1	4.5.1.3	4.5.4.3
Analysis of the alternatives specific constant (ASC)	×	4.5.3.1	×	4.5.3.1
Importance of Attributes – Monetary worth	4.5.2.1	×	4.5.2.2	×
Impact of Catchment Size and Utility	4.6.1	4.6.3	4.6.1	4.6.3
Impact of Number of Jobs and Utility	4.6.2		4.6.2	
Analysis of Willingness to take / not take a salary decrease	4.7.1		4.7.2	
Influence of income on Job Decisions	4.8.1	×	4.8.1	×
Influence Age on Job Decisions	4.8.2	×	4.8.2	×
Influence of Gender on Job Decisions	4.8.3	×	4.8.3	×

4.5 Estimated models and choosing the “best fit” model for each income group

In the beginning of this chapter, descriptive statistics for the data were provided as well as some results on the qualitative sections of the questionnaire. This section will describe some of the models that were estimated in the analysis and then conclude by identifying the models that best fit each of the income groups.

4.5.1 “Forced choice” models for the low and lower middle income groups

Main effects models were estimated to understand the impact of individual attributes. The first model to be estimated comprised of all variables. It was also important to verify if the willingness to take a salary influenced decisions; a dummy variable was created to capture this aspect. It took a value of 1 if individuals were willing to take a salary decrease and zero

otherwise. This was introduced to estimate one main effects model. The resulting coefficient for the dummy was not found to be statistically significant. It was concluded that taking a salary decrease was not an influencing factor and hence the dummy variable was excluded in the analysis. In all cases, attributes entered into the utility function using a linear specification. Selected results from some selected main effects “forced choice” models for both income groups are presented in Table 8.

Table 9: Selected "Forced" Choice Models

	LOW INCOME						LOWER MIDDLE INCOME					
	Model 1		Model 2		Model 6		Model 1		Model 2		Model 4	
Log likelihood Base model	-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66	
Log likelihood Choice model	-819.21		-811.25		-811.87		-805.93		-792.31		-794.82	
Rho-squared	0.34		0.35		0.35		0.35		0.36		0.36	
Number of Observations	3600		3600		3600		3600		3600		3600	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.087	0.0001					-0.048	0.1300				
Travel Time	-0.014	0.0264	-0.021	0.0037	-0.023	0.0005	-0.015	0.0244	-0.026	0.0004	-0.017	0.0047
Cost of transport	-0.001	0.0000	-0.001	0.0197	-0.001	0.0014	-0.002	0.0004	-0.002	0.0008	-0.001	0.0112
change in salary	0.001	0.0000	0.002	0.0000	0.002	0.0000	0.000	0.2226	0.001	0.0313	1.976	0.0000
Number of jobs Advertised	0.012	0.3269	0.015	0.3539			-0.003	0.8503	-0.032	0.1343		
DIST1			2.113	0.0013	1.528	0.0000			0.064	0.9466	-2.428	*
DIST2			2.013	0.0001	1.561	0.0000			0.192	0.7974	1.681	0.0000
DIST3			1.343	0.0022	0.939	0.0000			-0.604	0.3062	0.575	0.0191
DIST4			1.211	0.0000	1.007	0.0000			0.152	0.6899	0.892	0.0000
DIST5			0.125	0.4492					-0.242	0.4074		
DIST6			-5.805	*	*	*			1.438	*	*	*
DIST5a					-4.034						0.281	0.09733

* this represents the missing p-value for the base dummy

4.5.1.1 Analysing the forced choice models for the low income respondents

Table 8 provides some of the selected main effects models from the data analysis. The model that contained all variables was compared to all subsequent models for the low income groups. Models 1, 2 and 6 had a good rho-squared, however, the number of jobs advertised in Model 1 is not statistically significant at either 5 % or 10% and hence the model was discarded as a “best fit”. Dummy variables¹¹ were introduced to Model 2 to capture the influence of the different commuting distances.

¹¹ For each of the estimated models, one dummy variable was excluded. The β value for this dummy is calculated using $1 - \sum_1^n \beta$

From the estimation of Model 2, number of jobs advertised and the dummy for distance 5 were not statistically significant. From the two estimated models, number of jobs advertised was not significant; it was dropped from the subsequent models. For Model 6 a new dummy variable called distance 5a was created which comprised of all distances greater or equal to 25km. This was based on the assumption that distances greater or equal to 25 had similar effects on utility. These commuting distances represent relatively longer commutes. This assumption was made based on the behaviour of the dummy variables from preceding models. For Model 6 all variables we found to be statistically significant at the 5% level of significance and the variables have the expected signs. This model was chosen as the “best fit” for the low income group. Appendix 8 provides all estimated models for the low income groups.

4.5.1.2 “Best fit” model for the “forced” choice for the low income

Model 6 was selected as the “best fit”. This consisted of travel time, cost of transport, change in salary and dummy variables DIST2, DIST3, DIST4, and DIST5a. The rho-squared for the model is 0.35.

From the results, the model is given by,

$$\begin{aligned}
 U_{LI} = & -0.023 * \text{Travel Time} - 0.001 * \text{Cost of Transport} + 0.002 * \text{Change in Salary} \\
 & + 1.528 * \text{DIST1} + 1.561 * \text{DIST2} + 0.939 * \text{DIST3} + 1.009 * \text{DIST4} \\
 & - 4.034\text{DIST5a}
 \end{aligned}$$

Where: U_{LI} is the utility for the low income group.

DIST1, DIST 2, DIST 3, DIST 4, DIST5a are dummy variables for distances of 5, 10, 15, 20, >=25 km respectively.

4.5.1.3 Analysing the “forced” choice models for the lower middle income respondents

Like in the case of the low income group, the first model to be estimated included all variables. This was used as a gauge for all successive models. In addition to the rho-squared, the significance of variables and the behaviour of variables as defined earlier were also used to inform on the “best fit” model. Out of the estimated models, Model 1, 2 and 4 were selected for the lower middle income groups. Model 1 (main effects only) consisted of all the variables that were used in the questionnaire. From the results in Table 8, the behaviour of number of jobs advertised was inconsistent with a priori expectation; it also had a poor level of significance. Although the expected signs for distance and change in salary were consistent, these variables were found not significant at either the 5 or 10% level of significance. Dummy variables were introduced in Model 2 to try and capture the influence of different commuting distances on utility. Besides the high rho-squared value, most variables were found not significant at either the 5 or 10 % level. Model 4 was concluded to be the “best fit” for the lower middle income group. All variables have the expected signs and are mostly significant at 5% with the dummy variable for distance (at 30km) being significant at 10 %. Appendix 8 provides all estimated models for the lower middle income respondents.

4.5.1.4 “Best fit” model for the “forced” choice case for the lower middle income group

From the presented models for the lower middle income groups, Model 4 was concluded to be the “best fit” model with a rho-squared of 0.36. The model takes the form shown below.

$$U_{LMI} = -0.017 * \text{Travel time} - 0.001 * \text{Cost of Transport} + 1.976 * \text{Change in Salary} \\ - 2.428DIST1 + 1.681 * DIST2 + 0.575 * DIST3 + 0.892 * DIST4 + 0.281 \\ * DIST5a$$

Where: U_{LMI} is the utility for the lower middle income group.

DIST1, DIST2, DIST3, DIST4, DIST5a are dummy variables for distances of 5, 10, 15, 20 and ≥ 25 km respectively.

4.5.2 Importance of attributes in monetary terms for the Low and Lower middle income groups

This section explains the monetary value that individuals place on attributes. The inclusion of a monetary value in this case (cost of transport) accommodated the calculation of this aspect. This can be estimated as the reciprocal of the coefficients of interest to the negative of the monetary attribute (World Bank Publications, 2012).

This is estimated by the equation,

$$WTP_{xm} = -\frac{\frac{\partial U}{\partial x_m}}{\frac{\partial U}{\partial x_i}} = -\frac{\beta_m}{\beta_1} \quad (12)$$

What the above equation implies is that the WTP for a particular attribute x_m is calculated as the amount of money that a respondent has to forgo to get a higher level of the attribute. Based on the “best fit” models estimated for the low and lower middle income groups, and using the cost of transport as the monetary reference value (x_1), the values for the β s can be substituted in equation 12. For selected attributes, the monetary worth of each attribute is calculated.

4.5.2.1 Value of Travel time and Distance for the low income Respondents

For the low income group the implied value computed for each attribute is given by:

Value of Traveltime_{LI} = $-\frac{-0.023}{-0.001} = -R23$, this implies that respondents equate additionally time dedicated to a work trip with R23 per trip.

The implied value of travel distance is only calculated for the distances that have the highest part worth utility (absolute). In that regard, the implied value for distance is calculated for

DIST5a (commuting distance ≥ 25 km) and DIST3 (commuting distance of 5 km). The values computed for the distances are given by:

Value of DIST5a_{LI} = $-\frac{-4.034}{-0.001} = -R4034$ per month, this implies that travel distance of greater than 25km is worth of R4034 per month. For a commuting distance of 5 km, the implied value is given by:

Value of DIST3_{LI} = $\frac{0.939}{-0.001} = R939$ per month, this implies that respondents attach a cost of R939 for a commuting distance 5 km.

4.5.2.2 Value of Travel time and Distance for the lower middle income Respondents

For the lower middle income group the implied value computed for each attribute is given by:

Value of Travel_{LMI} = $\frac{-0.017}{-0.001} = -R17$ per trip.

For travel distance, the implied value is calculated for the distance of 5km (DIST1) and for distances greater or equal to 25km. These two commuting distances provide the largest and lowest absolute part worth contribution to utility. The implied value computed for each distance is given by:

Value of DIST1_{LMI} = $-\frac{-2.428}{-0.001} = -R2428$ per month

For distances greater or equal to 25 km, the implied value is given by:

Value of DIST5a_{LMI} = $-\frac{0.281}{0.001} = -R281$ per month.

A detailed explanation of what the monetary values of the attributes reflect is given in chapter 5.

4.5.3 “Unforced choice” models for the low and lower middle income groups

Several models were estimated for the “unforced choice” case for the low and lower middle income group. All estimated models are presented in Appendix 9. The utility parameter estimates are presented in Table 9. The first model that were estimated for each of the income groups were the main effects model. This comprised of all the variables that were used in the design of the experiment. This is referred to as Model 1 in both the low and lower middle income groups. Model 1 performed badly in both cases with regards to the rho-squared, expected sign of number of jobs advertised and the level of significance of distance.

An alternative specific constant was also introduced. This is used to capture the status quo effect. Several explanations have been put forward for the inclusion of the ASC (see Meyerhoff and Liebe, 2006). One such explanation is to measure the inertia to move or measuring the utility associated with staying in the current situation or moving. Adamowicz et al., (1998) explained that a negative and significant coefficient of the ASC shows the loss in utility associated with leaving the current situation. On the other hand, a positive and significant ASC represents the utility that respondents get from staying in the current situation i.e. not changing. For the purposes of this research, ASC will be explained as suggested by Adamowicz et al., (1998).

4.5.3.1 Analysing the “unforced choice” models for the low income respondents

From the chosen models, Model 2 was estimated and this included all the 5 variables plus an alternative specific constant (ASC) for the status quo. The rho-squared for this model was still low and below the expected range. Dummy variables were created and they represented commuting distances of 5, 10, 15, 20, 25, 30km. Model 8 which had all variables and the ASC was estimated. This excluded the dummy for distance of 5km. The results from this model show that for some variables the resulting utility parameters are not statistically significant at the 5 or 10% level. Model 9 was estimated by excluding the ASC; this did not

show any improvement from Model 8. All variables that were constantly found as not significant (travel time and change in salary) in the preceding models were dropped from estimating Model 12. This model performed better with regards to the behaviour of variables and the significance of the variables, however the rho-squared was still slow. Model 12 was concluded to be the “best fit” for the low middle income group.

Table 10: Unforced choice models for the low and lower middle income groups

	Model 1		Model 2		Model 8		Model 9		Model 12		Model 1		Model 2		Model 3		Model 13		Model 14	
Log likelihood Base model	-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1977.50		-1977.50		-1977.50		-1977.50		-1977.50	
Log likelihood Choice model	-1610.61		-1610.58		-1579.10		-1592.75		-1579.90		-1569.58		-1555.60		-1494.80		-1529.50		-1496.40	
Rho-squared	0.18		0.18		0.20		0.19		0.20		0.21		0.21		0.24		0.23		0.24	
Number of Observations	5400		5400		5400		5400		5400		5400		5400		5400		5400		5400	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.005	0.398	-0.005	0.448							-0.016	0.001	-0.020	0.000						
Travel Time	-0.008	0.004	-0.008	0.005	-0.003	0.212	-0.005	0.022			-0.011	0.000	-0.011	0.000	-0.005	0.005	-0.008	0.000	-0.005	0.003
Cost of transport	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000	0.000	0.335	0.000	0.074	0.000	0.428				
change in salary	0.000	0.026	0.000	0.150	0.000	0.758	0.000	0.019			0.000	0.000	0.000	0.010	0.001	0.000	0.000	0.000	0.001	0.000
Number of jobs Advertised	-0.028	0.000	-0.029	0.000	-0.013	0.031	-0.026	0.000	-0.013	0.016	-0.057	0.000	-0.035	0.000	-0.011	0.103	-0.058	0.000		
DIST1					4.221	*	0.235	0.079	4.400	*					1.466	0.000	0.833	0.000	1.605	0.000
DIST2					-0.291	0.003	-0.034	0.772	-0.301	0.002					0.965	0.000	0.759	0.000	1.020	0.000
DIST3					-0.431	0.000	-0.100	0.361	-0.444	0.000					0.472	0.000	0.240	0.047	0.512	0.000
DIST4					-0.449	0.001	-0.017	0.883	-0.495	0.000					0.482	0.000	0.620	0.000	0.442	0.000
DIST5					-1.204	0.000	-0.714	0.000	-1.254	0.000					-0.493	0.001	-0.397	0.005	-0.521	0.000
DIST6					-0.847	0.000	1.631	*	-0.906	0.000					-1.892	*	-1.054	*	-2.059	
ASC			-0.050	0.796	0.351	0.083			0.274	0.006			1.057	0.000	2.041	0.000			2.359	0.000

*represents the p-value for the omitted dummy variable

4.5.3.2 “Best fit” for the “unforced choice” case for the low income respondents

Model 12 was concluded to be the “best fit”, with a rho-squared of 0.20. The resulting model is given by,

$$U_{LI} = 0.274ASC - 0.001 * \text{Cost of Transport} - 0.013 * \text{Number of Jobs} + 4.400 * \text{DIST1} \\ - 0.301 * \text{DIST2} - 0.444 * \text{DIST3} - 0.495 * \text{DIST4} - 1.254 * \text{DIST5} \\ - 0.906 * \text{DIST6}$$

Where: U_{LI} is the utility for the low income group,

ASC is the alternative specific constant,

DIST represents dummies for distances of 5, 10, 15, 20, 25 and 30km respectively.

4.5.3.3 Analysing the “unforced choice” case for the lower middle income respondents

For model 1, the cost of transport was found to be not statistically significant and the rho squared was also very low. To try and improve the model, an ASC was introduced to Model 2. However this did not significantly improve the model as indicated by a very low rho-squared. Dummy variables were introduced to try and distribute the effect of distance to respondent’s preferences. Model 3 was estimated and it improved on Model 2. However, the level of significance of cost of transport and number of jobs advertised were outside the expected boundaries. A model that excluded cost of transport, number of jobs and the ASC was also estimated, all remaining variables were found to be significant. Given the attractiveness of reporting the ASC in the “unforced choice” cases, Model 13 was not considered to be a “best fit” model. Model 14 was estimated, this introduced back into the equation the ASC and all included variables were found to be significant at the 5 % level of significance. For the lower middle income, Model 14 was chosen as the “best fit” model.

4.5.3.4 “Best fit” model for the “unforced” choice for the lower middle income group

Model 14 was concluded to be the “best fit” model for the lower middle income group with a rho squared of 0.24. The resulting model is as shown below,

$$U_{LMI} = 2.539ASC - 0.005 * \text{Travel Time} + 0.001 * \text{Change in Salary} + 1.605 * \text{DIST1} \\ + 1.020 * \text{DIST2} + 0.512 * \text{DIST3} + 0.442 * \text{DIST4} - 0.521 * \text{DIST5} \\ - 2.059\text{DIST6}$$

Where: U_{LMI} is the utility for the low income group,

ASC is the alternative specific constant,

DIST1, DIST2, DIST3, DIST4, DIST5 and DIST6 are dummy variables for distances of 5, 10, 15, 20, 25 and 30 km respectively.

All variables for this model were found to be statistically significant.

4.6 Utility with respect to the different Catchment Sizes (commuting distances)

This section reports results on the impact of catchment size or commuting distance on utility. For the two income groups, the relationship between utility and distance is analysed for the “forced choice” case and the “unforced choice” cases.

4.6.1 Impact of Catchment Size and Utility: “Forced” Choice case for the low and lower middle income respondents.

Figures 10 and 11 show the utility attained for each commuting distance for the “forced choice” case for respondents in each of the income groups.

0 shows the utility for the low income respondents, the results show that utility is high and positive for shorter commuting distance but as distance increases the utility decreases and becomes negative after a commuting distance of about 21km. Still, there are some respondents who were observed to commute more than 21km.

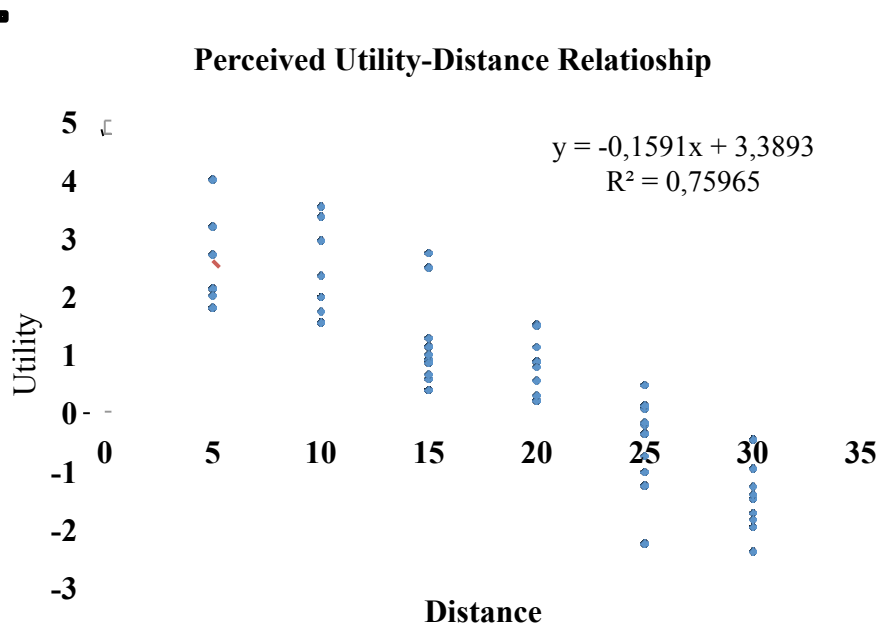


Figure 10: Responsiveness of Utility to changes in distance for the low income

An analysis for the lower middle income respondents was carried out and is presented in figure 11. The diagram shows that respondents in the lower middle income group have positive utilities for distances just around 10 kilometres and beyond that the utility becomes negative.

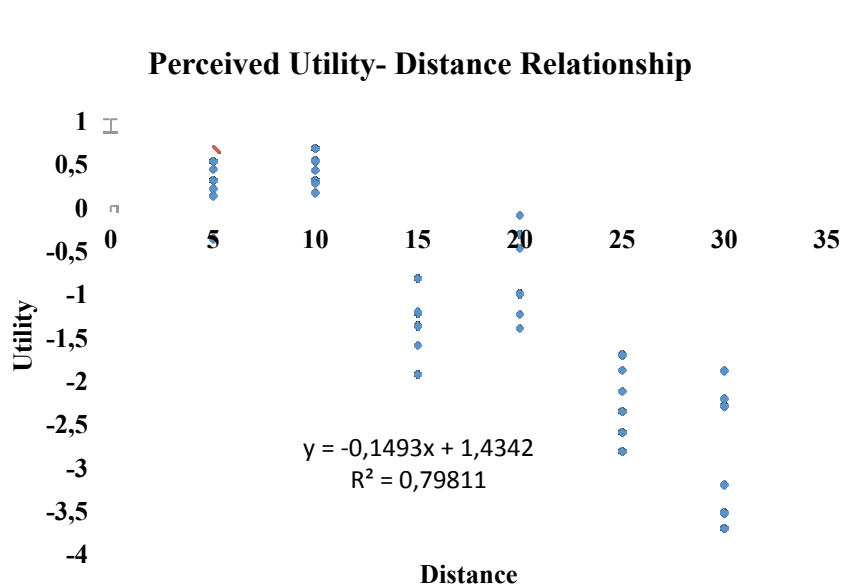


Figure 11: Responsiveness of Utility to changes in distance for the lower middle income

The fundamental aspect presented in the diagrams is that utility decreases with an increase in distance. This aspect is discussed further to better understand the provision of choice and how this impacts utility.

4.6.2 Impact of Number of Jobs and Utility for the low and lower middle income respondents.

The central aim of this discussion is to investigate the impacts of a reduction in trip end choices to employees. This is seen as a starting point in understanding the amount of accessibility that cities should provide. With that in mind analysing the impact of number of jobs available on utility is vital in this discussion. The fundamental aspect is to find linkages between the number of jobs advertised per month, catchment size and the utility. Appendix 3 provides the relationship between the number of jobs advertised per and each catchment size. By finding these linkages, this discussion hopes to find a catchment size hence the size of the proposed sub-city that provides “sufficient” accessibility. The relationship between utility and the number of jobs advertised for the low and the lower middle income respondents are provided in figure 12 and 13 respectively.

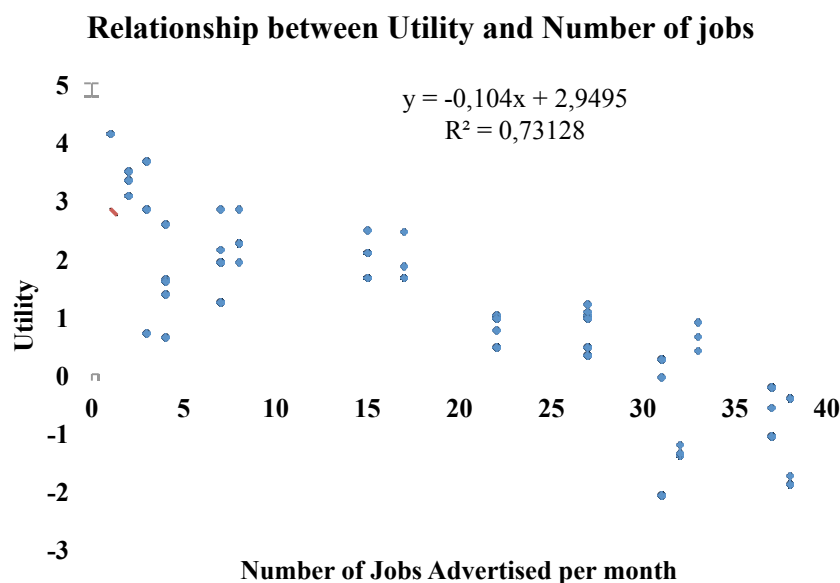


Figure 12: Impact of the Number of Jobs Advertised on Utility for the Low income respondents

For the low income individuals, figure 12 shows that as the number of jobs advertised increases, there is a decrease in the amount of utility that respondents attain. Though figure 12 does not provide a perfect fit, at this point it closely presents the relationship that this discussion is trying to present. Negative utilities are experienced when the number of jobs that open up is close to 30 jobs per month.

For the lower middle income figure 13 shows that the highest utility is achieved when individuals are presented with 3 new job openings per month. The diagram shows a negative relationship between utility and the number of jobs advertised.

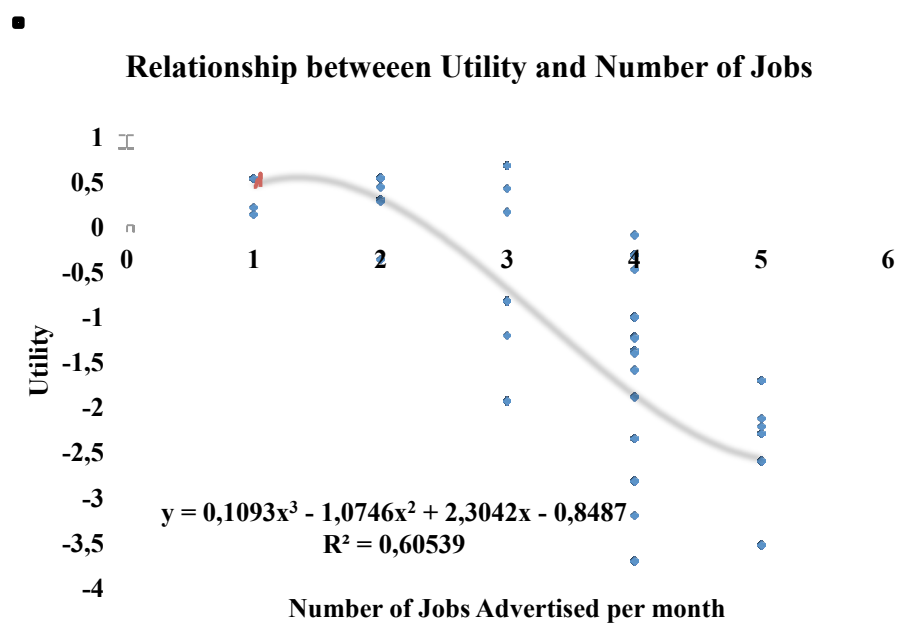


Figure 13: Impact of the Number of Jobs on Utility for the Lower Middle income respondents

Figure 13 provides a close representation of the responsive of utility to the number of jobs advertised. A step further is taken to relate the number of jobs advertised and the catchment size to establish whether they can aid in defining the sizes of the suggested sub-cities. This further discussed in Section 5.3.4.

4.6.3 Impact of Catchment Size and Utility: “Unforced Choice” case for the low and lower middle income respondents

An analysis of the relationship between utility and catchment size for the “unforced” choice scenario was carried out for both income groups. Due to the presence of the status quo as a valid choice option, the utilities that emanated from the unforced choice analyse are different from the forced choice scenario. In that respect, the responsiveness of utility to changes in catchment size is analysed. The results that came out of the analysis of the utility and distance relationship are presented in fig 14 and 15 below for the “unforced choice” cases for the low and lower middle income groups respectively.

■

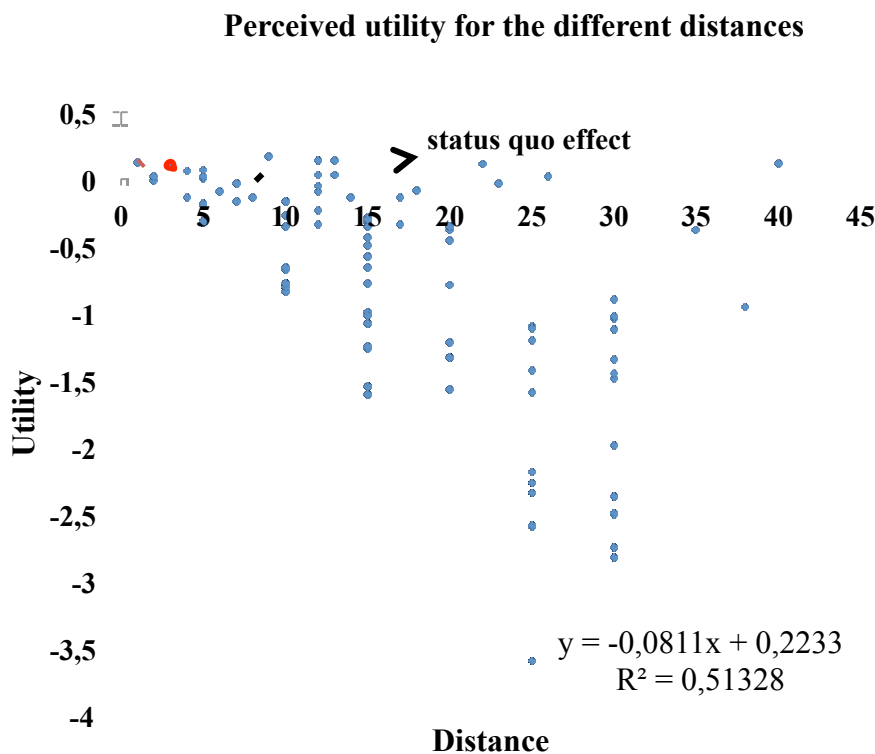


Figure 14: Responsiveness of Utility to changes in distance for the low middle income

The results show that the relationship between utility and distance for the “unforced choice” is highly negative for respondents. However, the diagram indicates that there is a downward trend in utility yielded as distance increase. Data points for possible status quo effect are

shown in the diagram. These data points represent the status quo, and the levels of utility being achieved by respondents in the current situation. The overall finding shown by this diagram is that there is a decrease in utility as the catchment size increases. This was the same relationship found in the “forced choice” case. Additionally, combining this finding and the magnitude of the ASC in the regression analysis shows a huge influence of the current situation to overall utility.

A similar analysis was done for the lower middle income for the “unforced choice” case. The results are presented in the diagram below.

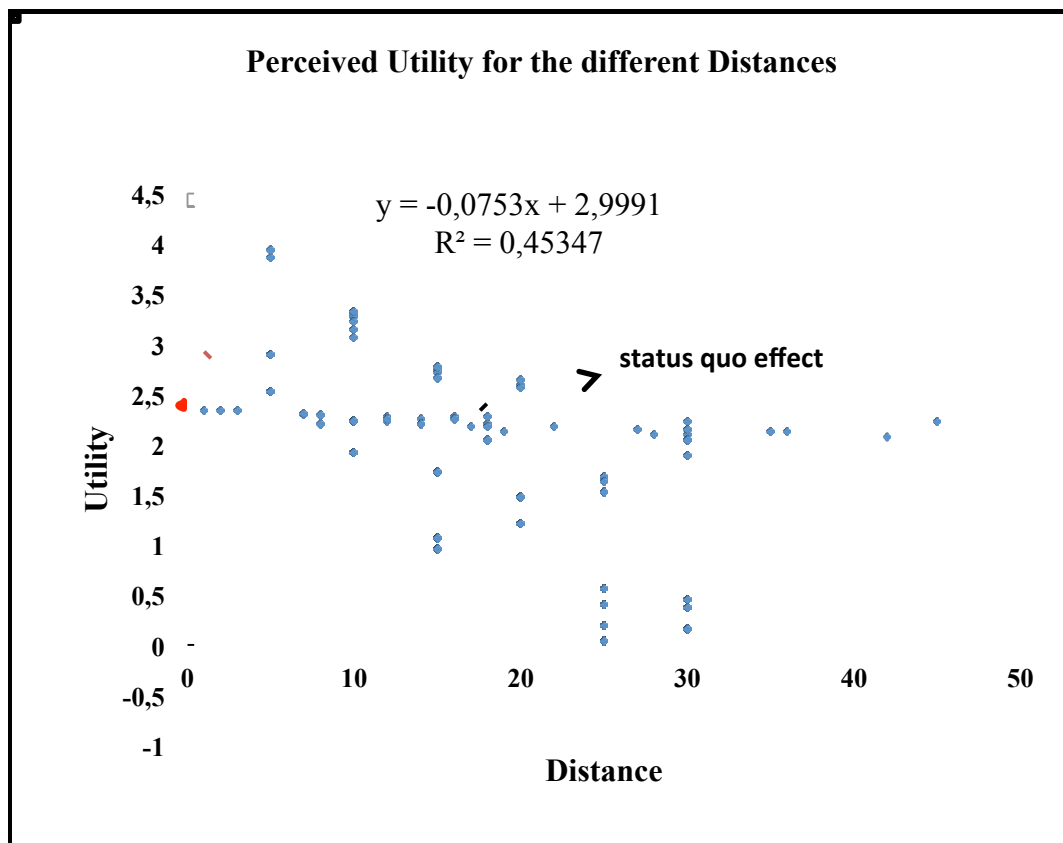


Figure 15: Responsiveness of Utility to changes in distance for the lower middle income

The results show a positive utility for respondents. However, the magnitude of the utilities appears to decline with an increase in distance. For this group of respondents utility is positive for all distances but relatively low for longer distances. A downward trend in the utility is observed with an increase in distance. The diagram also shows the data points for

the status quo and the utility attained for the distances, the results show that there is potential to improve on the status quo for respondents.

One important result flowing from the analysis of the “forced” and “unforced” cases is that with an increase in catchment size or commuting distances, there was a decrease in utility. It is important to note that the commuting distance at which negative utility sets in for the “forced” and “unforced” choice cases varies for both income groups. This may be attributed to the status quo effect and how it is viewed relative to the proposed scenarios (alternative 1 and 2). This will be discussed further in chapter 5.

4.7 Analysis of data for willingness to take/ not take a salary decrease

This part of the discussion focuses on the results for respondents depending on their responses to willingness to take a salary decrease. The aim is to try and evaluate if preferences among these two groups of respondents are different and to also capture whether this is a possible source of inertia. The data for the 400 respondents was split into 2 groups, those willing to take a salary decrease (58 respondents) and those not willing to take a salary decrease (342 respondents). The “forced” choice models results are presented in Table 10 below. Appendix 10 provides all estimated models for this analysis.

Table 10: "Forced Choice" models for willingness to take a salary decrease to work in an ideal location

	Yes I would take a salary Decrease						No I wont take a salary Decre					
	Model 1		Model 2		Model 4		Model 1		Model 2		Model 4	
Log likelihood Base model	-978.03		-978.03		-978.03		-2027.46		-2027.46		-2027.46	
Log likelihood Choice model	-660.38		-665.61		-656.70		-1295.39		-1283.43		-1294.36	
Rho-squared	0.32		0.33		0.33		0.36		0.37		0.36	
Number of Observations	1412		1412		1412		2925		2925		2925	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.0817	0.0019					-0.0554	0.0031				
Travel Time	-0.0037	0.5794	-0.0104	0.1424			-0.0178	0.0004	-0.0242	0.0000		
Cost of transport change in salary	-0.0013	0.0010	-0.0012	0.0037	-0.0011	0.0022	-0.0017	0.0000	-0.0015	0.0000	-0.0016	0.0000
Number of jobs Advertised	0.0004	0.1775	0.0007	0.0279	0.0005	0.1050	0.0006	0.0024	0.0010	0.0000	0.0006	0.0062
	-0.0036	0.7992	-0.0191	0.2793			0.0016	0.8752	-0.0171	0.1970		
DIST1			1.3823	0.0676	2.4220	0.0000			0.6839	0.2050	2.2590	0.0000
DIST2			1.3209	0.0232	2.0565	0.0000			0.7922	0.0579	1.8973	0.0000
DIST3			0.4896	0.3225	1.1456	0.0000			0.1611	0.6511	1.1119	0.0000
DIST4			0.7172	0.0103	1.0135	0.0000			0.5466	0.0061	1.0208	0.0000
DIST5			0.1358	0.5080	0.3070	0.0810			-0.0812	0.5808	0.2523	0.0478
DIST6			-3.0458		-5.9445				-1.1025		-5.5413	

The table makes a distinction between people who indicated that they were willing to take a salary decrease if they were to work in the ideal location. The ideal location was defined as a location that provided an individual with affordable transport, convenience in transport access among other aspects. In the questionnaire, respondents were asked to state the work location that they had previously identified as ideal in their job search.

4.7.1 Data Analysis for Respondents willing to take a salary decrease

Several models were estimated for respondents that were willing to take a salary decrease. From the estimated models, Model 1, 2 and 4 performed better. They were compared to identify the “best fit” model. Besides having an attractive ρ^2 , Model 1 and 2 performed badly with regards to the significance of the variables. Model 4 was estimated and this has dummy variables for distance, cost of transport and change in salary. The estimated model had a high ρ^2 and all coefficients were found to be statistically significant at either 5 or 10 % level of significance.

4.7.1.1 “Best fit” model for respondents willing to take a salary decrease

Model 4 was concluded to be the “best fit” model with a ρ^2 of 0.33. All variables have the expected signs. The dummy variable for the distance of 30 km was excluded and the β value is found as explained in footnote 12. For respondents who are willing to take a salary decrease, the model is as shown below.

$$\begin{aligned}
 U_{YSD} = & -0.011 * \text{Cost of Transport} + 0.0005 * \text{Change in salary} + 2.4220 * \text{DIST1} \\
 & + 2.0565 * \text{DIST2} + 1.1456 * \text{DIST3} + 1.0135 * \text{DIST4} + 0.3070\text{DIST5} \\
 & - 6.5226\text{DIST6}
 \end{aligned}$$

Where: U_{YSD} is the utility for respondents willing to take a salary decrease’

DIST1, DIST2, DIST3, DIST4, and DIST5 are dummy variables for distances of 5, 10, 15, 20, 25, 30 km respectively.

4.7.2 Analysing data for respondents not willing to take a salary decrease

From the estimated models, Models 1, 2 and 4 performed better. Model 1 contained all the variables identified in the study. All the variables had the expected signs and all coefficients were found to be statistically significant. However, investigating the effect of different commuting distances is essential and hence, dummy variables were introduced in Model 2. For this model, some dummy variables and the number of jobs advertised performed badly. Given that, number of jobs was omitted in estimating Model 4. In this model all variables had the expected signs and were significant at the 5% level.

4.7.2.1 “Best fit” model for people not willing to take a salary decrease

For respondents who were not willing to take a salary decrease, Model 4 was considered to be the “best fit”. Like in the case of respondents willing to take a salary decrease, distance has a greater influence on the utility. The resulting utility function for respondents not willing to take a salary decrease is given by the equation below.

$$U_{\text{NSD}} = -0.0016 * \text{Cost of Transport} + 0.0006 * \text{Change in salary} + 2.2590 * \text{DIST1} \\ + 1.8973 * \text{DIST2} + 1.1119 * \text{DIST3} + 1.0208 * \text{DIST4} + 0.253\text{DIST5} \\ - 5.5413\text{DIST6}$$

Where; U_{NSD} is the utility for respondents willing to take a salary decrease’

DIST1, DIST2, DIST3, DIST4, DIST5 and DIST6 are dummy variable for distances of 5, 10, 15, 20, 25 and 30 km respectively.

4.8 Influence of Income level, Gender and Age on Job Attributes

It was also important to analyse the data to identify variations between age, gender and income to observe if different socio-demographic characteristics influenced preferences. This section estimates the models that factor in the influence of income, age and gender on the

utility. This was done to evaluate whether these variables influence respondent decisions. This will be done for the “forced choice” case for both income groups.

4.8.1 Influence of income on Job Choice decisions

As mentioned earlier, the data for the low and lower middle income groups was analysed separately, hence the findings are used to identify the preference by income category. Reference will be made to Table 9, to identify the preference of attributes by the different income groups.

Looking at the “best fit” models for the low and lower middle income group, the part worth utility for the travel time for respondents in the low income group is higher (-0.023) compared to the lower middle income group (-0.0017). These magnitudes indicated that the decrease in utility associated with commuting times is higher for the low income group.

Transport costs are valued the same by the respondents in both income. The preference for an increase in salary is however higher in the lower middle income group compared to the low income.

Analysis of the commuting distances shows that, the low income respondents have a higher preference for shorter commuting distances whereas the lower middle income preferences tend to vary between the different commuting distances, this is shown by the magnitudes of the part worth utilities for each of the commuting distances.

4.8.2 Effect of age on Job Choice decisions

Five age categories were used in this study. To evaluate the influence of age on preference, dummy variables were created for each of the age groups.

Dummy variables for the age ranges 18-24, 25-34, 45-54 were found to be significant implying that age played a role in influencing decisions for the above mentioned age groups.

Additionally, the results show that job choice decisions are greatly affected by age in the 45-54 age compared to any other age group. The influence is also high among the 25-34 age group respondents. Given that the 55-64 age group was the omitted dummy, it is difficult to evaluate whether age influences decisions among this group of respondents as its level of significance is not observable.

4.8.3 Effect of gender on Job Choice decisions

An analysis of gender and how it influences preference was carried. Dummy variables were created for males and females; these dummy variables were found to be significant in both cases. The results suggest that gender plays a role in influencing preferences. The weighting of gender in influencing preference was found to be higher among female respondents compared to males. Women have been observed in literature to define themselves as home makers and they prefer work locations that do not result in conflict between their work and family life (Konrad, et al., 2000). This could be a plausible explanation for the significance of gender in determining preferences.

4.8.4 Conclusion

This chapter presented the results from the data analysis. Descriptive statistics for the data were provided. An analysis of the data from the semi-structured questions was carried out to understand how respondents valued attributes. Several models were estimated for the “forced” and “unforced” choice cases. “Best fit” models were identified for each of the income groups for the two cases. Cost of transport was consistently found in all the estimated models. Influence of socio-demographic characteristics of gender, income and age were analysed. There was also an investigation into the willingness to pay for job attributes by both income groups.

Chapter 5

Discussion of Results

5.1 Introduction

The previous section estimated models for the low and lower middle income respondents. The study recruited respondents from selected suburbs of Cape Town to investigate the effects of an increase in choice on utility. The background for this study is that “transport poverty” is a pressing issue; unless interventions that move us from a “business as usual” path are implemented, the marginalised groups will continue to sink into a cycle of ever increasing transport expenditure. This section looks at the results that came from the study. The first step is to understand the results and link them to the current commuting trends in a Cape Town context and expand this to identifying what the results may mean for growing cities. Additionally the findings will also help in arguing why the current city structures are not sustainable from a transport affordability perspective.

The working hypothesis for this thesis is that an increase in choice does not continuously yield an increase in utility but that as choice increases the rate of increase in utility decreases until utility reaches a maximum and thereafter the benefits are negligible. The foundation for this discussion is based on the argument of the effects of “too much” choice (Schwartz, 2004). This thesis borrowed from the same formulation by arguing that there is catchment area (commuting distance) that provides individuals with “sufficient” choice such that they can maximise utility and beyond that point, the benefits of an increase in catchment size become negligible. This notion was presented in figure 1. The hope is that by analysing and

discussing the findings from this study, this maybe a starting point in addressing the issue of accessibility and perhaps identify the amount of accessibility that cities should provide.

5.2 Outcomes from the Semi-structured questions

The results from the semi-structured questions showed that change in salary and transport costs were the most important attributes for the low and lower middle income groups. In the current work locations some respondents are spending more than 10% of their income on transport. This can be attributed to the long commutes as home locations are in the peripheries. The ideal locations were characterised by shorter commutes relative to the current location. The results on the comparison of transport costs show a remarkable shift in transport expenditure with almost all individuals spending within the 10% bench mark on transport costs in the preferred work location. The average commuting time for the ideal location is around 20 minutes; represents a reasonable one way commuting time expressed in the focus groups. Furthermore, respondents indicated that their chosen ideal work location would enable them to either walk to work or have a shorter commuting. This is an encouraging finding especially in a context where a reduction in transport cost is a crucial aspect. What this finding suggests is that city structures that have short “radii” have the potential to result in transport cost savings which are essential within the public transport affordability debate.

5.3 Findings from the “forced” choice analysis

The identified “best fit” models estimated that an increase in travel time results in a decrease in utility for respondents. The noted decrease in utility given by the part worth utility of travel time for both income groups shows that for both income groups, time is an important resource. The results also indicate that transport cost is equally valued by both income groups. This is consistent with the results from the focus groups and the qualitative analysis.

An examination of the influence of change in salary for the two income groups, showed that respondents in the lower middle income groups have a propensity to choose a job that provided them with an increase in salary compared to the low income as shown by the coefficients of change in salary 0.02 and 1.976 for the low and lower middle income respectively. A plausible explanation for the difference in importance of salary increase for the two groups might be that the lower middle income group is comprised of respondents in skilled professions where there is room for bargaining for salary whereas low income respondents are semi-skilled workers which limits the possibility for bargaining. Essentially it might be possible that for most of these respondents, getting a salary is sufficient for them especially in a Cape Town context where unemployment is a concerning issue; at 23.8% at the end of 2012 (City of Cape Town, 2012). However the fundamental lesson that comes out from the findings on salary change is that, if salary increase is sufficient to cover the negative utilities from high transport costs, respondents are attracted to such opportunities.

5.3.1 On the effect of catchment size on utility for the low income respondents

Different catchment sizes were also observed to have different utilities for the two income groups. As discussed in Chapter 4, dummy variables were created to isolate the effect of commuting distance across all the 6 catchment sizes. Respondents in the low income focus group stipulated that commuting distances were very long and that they had to wake up early to make it in time for work. The result suggests that for the low income respondents, shorter commuting distances are highly preferred compared to longer distances. It was observed that commuting distance of 5 and 10km (catchment 1 and 2) provided greater utility compared to the other commuting distances. For most of the respondents, shorter commuting distances provide an opportunity to walk to employment centres. This is consistent with some of the findings that came from the semi-structured questions where respondents indicated that if they could work close to home, they would be able to save on transport costs and use the

money for other household needs. Results further show that at commuting distances of around 21km disutility from travel sets in. However an analysis of the current commuting trends shows that some respondents are commuting beyond catchment 5 which has been observed to result in negative utilities. This indicated that individuals are unaware of the implications of travelling longer distance except for the monetary costs they incur and time they spend when travelling. This finding makes the case for intervention using policy to limit the extent to which individuals travel as it has been observed to result in negative impacts. In the health sector, there are government interventions that have been consistently implemented to ensure that individuals make rational choices (Ménard, 2010; Rajan, 2012). The same approach can be taken in a job choice framework either through limiting the amount of accessibility individuals are given by employing alternative city structures as proposed in this study.

5.3.2 On the effect of catchment size on utility for the lower middle income respondents

For the lower middle income, negative utilities are experienced for the 5 km commute and positive for longer commutes. One possible explanation for these findings is that respondents in this income category are in relatively skilled professions and employment for these individuals is located in large employment centres; these are normally located in the CBD which in this particular context are more than 5km from most residential areas. Essentially, catchment 1 is unattractive for this group of respondents.

Positive utilities were observed for catchment 2, 3 4 and 5, these findings are however unexpected as the expectation was that utility would decrease with distance. However, the part worth utilities for each catchment size decreases as the catchment size increases i.e. from 1.681 to 0.281 between 10 and 25km. To some extent there is consistency in the behaviour of utility with the increase in catchment size. It is important to note that catchment 4 is somewhat an outlier as the part worth utility is higher than catchment 3. It would be

interesting to investigate further the underlying effects that may result in catchment 4 having a higher part worth utility compared to catchment 3.

5.3.3 Monetary Worth of each Catchment Size per Income Group

Monetary equivalence for each commuting distance/ catchment size was calculated. The calculations are presented in Table 11. The table shows the monetary value attached to a part worth loss or gain in utility for each catchment size for both income groups. What the results show is that catchment 2 which represents a 10km commuting distance has the largest monetary positive value. An interesting issue would be to look at whether the 10km commute keeps respondents within the 10% bench mark on transport cost for both income groups.

Table 11: The monetary value of Utility for each Catchment number

Catchment Number	Low income	Lower middle income
1	R 1,528	-R 2,420
2	R 1,561	R 1,681
3	R 939	R 575
4	R 1,009	R 892
5&6	-R 4,034	R 281

Catchment 5&6 has the lowest monetary worth value for respondents in both income groups. For the low income respondents, this catchment size is associated with a disutility indicating that it is not worth to travel the distance to go for work. It has however been observed that there some respondents commute more than 30 km to work which is a worrying issue. This is a crucial point in policy interventions that are aimed at educating individuals to be aware of the impact of longer commutes. Monetary costs incurred in commuting are clear to individuals, but when we begin to discuss utility, there is more than just the monetary expenditures and this is very important especially where individuals seek to balance their work and family life. There are some social costs that are embedded in travel patterns and

travel behaviour and these costs utilises resources that could otherwise be used for other lucrative endeavours.

5.3.4 The Importance of Linking Catchment Sizes, Number of Jobs and Utility

Thus far, the discussion has isolated the relationship between utility and the number of jobs advertised in a month and the catchment size. Three possible linkages are suggested,

1. The relationship between utility and number of jobs advertised per month. This relationship was discussed in Section 4.4.1
2. The number of jobs advertised per month and catchment size. This relationship is discussed in Appendix 3.
3. The relationship between catchment size and the number of jobs in the catchment area. In this current discussion, determining this relationship is difficult given the unavailability of data on the number of jobs for each income level within different catchment sizes. However an insight into this relationship is crucial in identifying catchment sizes that provide sufficient access to opportunities.

It is pertinent to appreciate that these three components are tied together and that they form the basis of understanding “sufficient” accessibility. The argument is that if sufficient opportunities can be provided within a particular catchment size, there is no need for access to a larger catchment area. Three key findings form the foundation in this discussion on the extent of accessibility that cities should provide.

- The discussion on the monetary worth of each catchment size for both income groups showed that catchment 2 has the highest monetary worth; in this discussion, it can be construed that catchment 2 is the prime catchment size.

- The relationship between catchment size and utility showed that positive utilities were observed for catchment 1, 2, 3, 4 for the low income and catchment 1 and 2 for the lower middle income.
- The relationship between number of jobs advertised per month and utility showed that positive utilities were attained when respondents in the low income were presented with 20 jobs and when respondents in the lower middle income were presented with 3 jobs.

The common relationship being presented by these findings is the decrease in utility that is associated with an increase in more options.

Based on these findings, sufficient provision of opportunities can be achieved if the number of jobs that result in,

- 20 jobs being advertised per month for the low income
 - 3 jobs being advertised per month for the lower middle,
- can be provided within catchment 2.

5.4 Findings from the “unforced choice” analysis

The “unforced” choice case analyses provided a more nuanced view of respondents’ preferences in that it allows respondents to compare proposed alternatives to their current situation. By incorporating the ASC in the analysis, this allows for an evaluation on the attractiveness of the status quo relative to the proposed scenario. This evaluates the extent of inertia to move for respondents and the circumstances under which individuals may be willing to change.

5.4.1 On the “unforced choice” findings for the low income respondents

Looking at the model for the low income group, the results show that cost of transport, number of jobs advertised and the catchment size dummy variables have negative signs except for the dummy DIST1 (5km) and were found to be statistically significant. This finding resonates with some literature findings (Bertolini et al., 2005) which indicated that that travel time and travel costs are important in developing communities as they influence the ability of individuals to participate in economic and other related activities

Besides the significance of the number of jobs advertised it had a negative sign which was not consistent with a priori expectations. A plausible explanation for the inconsistency is that there might be a possibility that respondents perceive frequent job openings as an indication of low wages which may result in high turnover rates

Catchment size of 30km (DIST6) provides the largest negative influence on utility showing that respondents are more sensitive to a distance of 30 km compared to the other distances. This finding indicates that if larger commuting distances were introduced into the model, this would result in even larger disutility. This is a concerning finding given that there are some respondents in the low income group who were observed to be commuting more than 30km to work. For respondents commuting these distances, there is a perceived value associated with this commute and the costs that cannot be defined in terms of time and transport cost respondents may not be aware of them.

5.4.2 On the “unforced choice” findings for the lower middle income respondents

For the lower middle income, the model included travel time, change in salary and the distance variables. As in the case of the low income, respondents were found to have a preference for their current situation. The importance of travel time and distance becomes different in this model. When offered the status quo as a valid option, respondents begin to conceptualise the value of travel time and costs associated with each catchment area. What

this leads to is that catchment 1, 2 and 3 are identified as the most preferred and larger catchments become less attractive because of longer distances. Tying these findings to the qualitative survey questions, the general finding is that distance and commuting costs greatly influence the decision of where individuals work. The semi-structured responses showed that the current city structures do not permit the need to reduce the costs of travel or the length of the work commute. This emerged in the comparison between respondents commuting costs for the current work location and the ideal locations where it was observed that in the ideal location, the transport costs could be reduced such that almost all respondents would be incurring transport costs that fall within the 10% bench mark.

5.5 The significance of the Alternative Specific Constant

As mentioned earlier, the ASC was introduced to capture utility associated with changing or not changing from the current situation. The status quo in the models for the low and lower middle income respondents were found to be positive and statistically significant. This suggests that there is positive utility being achieved in the current situation and this makes respondents unwilling to change. Within this context, it is possible to come up with a combination of attributes that make the proposed scenarios more attractive than the current situation, it is only then that change can be instigated among respondents. This is an opportunity to begin to fully understand the benefits and costs of reducing catchment sizes as we would have evaluated the current state with the proposed alternatives.

5.6 On the willingness to take a salary decrease to work in the ideal location

In the study, respondents were asked if they would take a salary decrease to work in their ideal location. The responses that came out of the semi-structured questions show that most people were not willing to take a salary decrease. Models were estimated to try and understand the influence of attributes on the two groups of respondents. For the estimated

models a consistent finding for both groups (those willing to take a salary decrease and not willing to take a salary decrease), is that the decision to take a salary decrease is not influenced by distance (catchment size).

For respondents willing to take a salary decrease, the acceptable salary decrease is very low such that the extent of willingness to take a salary decreases may be volatile to small changes in salary. In that respect, the general conclusion was that a salary decrease was not an option for respondents as the stated decrease was equivalent to their current transport costs. However what comes out from this finding still points to the issue of transport costs and how they are crucial in influencing work locations. Amongst some of the reasons mentioned for unwillingness to take a salary decrease, respondents constantly indicated that cost of living was so high and if there was a way of reducing transports costs they would take such opportunities. This supports the findings from the estimated models where an increase in salary was shown to have a positive influence on utility.

5. 7 On the influence of income and age on utility

Analysis on in the influence of income on the preference of attributes was carried out. As mentioned earlier, the data for the two groups of respondents was analysed separately, comparison per income group can therefore be carried out using the estimated parameters in Table 8.

Willingness to pay values for selected attributes for the income groups were calculated. The WTP for time is R23 per trip for the low income which is higher than for the lower middle which is R17 per trip. This may be attributed to the need for more time by people in the low income to access public transport services. The monetary value attached to each catchment size shows that catchment 1 is more attractive to individuals in the low income. This finding is not surprising given that people in the low income groups were found to prefer shorter

distances as it enabled them to walk. This catchment size represents low commuting costs and travel time, resources that are valued more by people in the low income respondents.

Research has shown that the influence of attributes varies between people with different socio-demographic characteristics. The results show that people in the, 25-34, 35-44 and 55-64 place a higher value on transport costs. The willingness to pay for transport cost is high for these age groups compared to the 18-25 age groups. A possible explanation for this finding is the extent of responsibilities that each of these groups have. One would expect that people in the 18-24 age group are just out of school and may have fewer responsibilities compared to the other age groups.

The findings on the influence of age on time suggest that the value of time is higher for the 25-34, 35-44 and 55-64, again this point to the issue of responsibilities. Additionally, the analysis on distance also shows that the 18-24 value distance less than any of the other income groups. The core finding from the influence of socio-demographic characteristics is the income and ages have a great influence in job decisions.

5.8 Potential Sources of error for the study

Inspite of the encouraging results from this study, there are a number of sources of uncertainty with regards to estimation methods. Within the Cape Town context, the data for the number of jobs advertised per month is not easily available; the data used in this analysis was based on proxies of work commutes. This may have potentially over or under represented the actually number of jobs advertised in a month.

Additionally for the lower middle income respondents, cost of transport was defined as the amount spent on fuel for work related travel per month. However, most respondents indicated that they just fill their tank and use the car for work and other activities. This may have resulted in inflated fuel costs for the status quo for this group of respondents.

5.9 Summing up the findings

This section discussed the findings of the study and relating them to the set objectives. The influences of age, income and gender on utility were discussed to identify the difference in preference using these socio-demographic indicators. Additionally, it provided possible explanations for the findings by relating it to the characteristics of the respondents in the groups. One finding that is crucial to this discussion is the influence of catchment size on utility. The results show that an increase in catchment size leads to a decrease in utility for all income groups. Additionally the relationship between the number of jobs advertised per month and utility was analysed, the results suggest that as the number of job opportunities increases, utility decreases.

The next section discusses further the findings by exploring the benefits that can accrue from a reduction in catchment size and understanding how unsustainable the current city structures are especially in a landscape where transport costs continue to be a problem.

Chapter 6

General Conclusion: Impacts of Reducing Catchment Size to Employees

6.1 Introduction

The primary objective of this discussion is to begin to understand how much accessibility cities should provide. This was done by evaluating the importance of choice within a job choice framework. From the onset of this discussion, the central aim was to evaluate the perceived costs and benefits that arise from having choice within a job search context. This section recaps on the foundations of the hypothesis and ties the findings from the data analysis to the aims of this research. Understanding these findings and how they relate to the current trends in commuting and the existing city structures is essential if interventions are to be effective and applicable within growing developing cities. The section discusses the results and their applicability to developing cities where transport costs are soaring. “Transport poverty” and its presence within the global South context calls for interventions that make travel to work affordable for the urban poor. A suggested solution which is the focus of this research is evaluating the level of accessibility that cities should provide to individuals. This forms the debate on reducing the negative impacts associated with increased choice. The hope is that the conclusions drawn from this discussion would initiate a further interest in understanding the level of job accessibility that is “sufficient” for individuals and use this as an influence in the growth and form of cities especially to reduce work related commuting distances.

The suggested solution as mentioned entails sub-city structures that have “sufficient” internal accessibility and limited external mobility. Population and size of cities of the developing

countries is expected to double in the next 25 years (Del Mistro and Proctor, 2012). In that respect, this study proposes that, future growth be redirected such that there is a reduction in commuting distances which may result in a balance between jobs and housing.

With the aid of the findings from this research, this chapter argues why the proposed intervention maybe beneficial in a context where affordable transport is a serious concern and can potentially be exacerbated by global trends in oil prices and the sprawl of cities.

6.2 Towards Policy and Accessibility to Jobs

The working hypothesis was that the provision of choice to individuals within a job choice framework does not continue to yield positive utility, instead there is a point where choice is sufficient and beyond that, there are costs associated with more choice.

6.2.1 Unattractiveness of the current city structures in relation to work commutes

To address the objectives of this research, it was essential to evaluate the current city structures against the need for affordable commuting to understand the sustainability of current work commutes. Emphasis has been made on the role of peripheral residential locations for the marginalised groups and how this compounds long commutes and high cost of transport. The results from a comparison of the current and ideal situations showed that the commuting costs and distances for the current situation and the ideal locations are very different. A reduction in monthly transport costs and commuting distances in the ideal situation was observed. What this finding suggests is that a move towards city structures that allow for shorter commutes may result in transport cost savings. It can therefore be construed that there are significant successes that can be achieved if policy aims at reducing work related commuting distances. This addresses one of the objectives of this study by showing that a reduction in work commutes is a plausible solution to a reduction in transport costs. Using the results from the semi-structured questions, it was observed that when working in

the ideal location, almost all respondents in the low income category would be spending within the 10% bench mark on transport costs. For the lower middle income group, there was a notable decrease in the monthly transport costs. However, the decrease was lower compared to the low income groups. One of plausible explanations for this characteristics is that these respondents already have shorter commutes compared to the low income hence it is very difficult to change the monthly transport costs.

What the above findings allude to is that affordable transport is an issue that can be solved if strategies that involve land-use transport integration are implemented such that there is cohesion between housing and job availability. With the projected upward trajectory in city sizes, urban sprawl is inevitable unless interventions are implemented that locate this new growth as this will lead to even greater disparities between housing and jobs.

Additionally, one of the issues that came from the research was that public transport accessibility is a serious issue as more time is dedicated to work related activities which reduce the time left for family and other social activities. Time and money are the costs that people are aware of; it is therefore the role of policy to create awareness on how job decisions influence these variables and other social costs that emanate from the housing and job decisions individuals make.

Further, policy may play a role of educating and alerting individuals to their spatial choices on housing and jobs and how they influence their commuting patterns hence transport expenditure. However, this is only applicable in a context where historical inheritance –such as apartheid- has not positioned residential locations for the marginalised in the peripheries which make shorter commutes difficult.

6.2.2 On the cost of “too much” choice

Recapping on the literature of “too much” choice, three aspects stood out, choice is such that, in small quantities, it is *beneficial* but as the amount of choice increases, the *benefits increase at a decreasing rate* and eventually it reaches a *satiation point* and thereafter results in negative effects. For some global South cities, the transport systems provide great accessibility and mobility and this creates the impression that the current employment pool is beneficial, this was shown to be counter-intuitive in the present study. This aspect was successfully shown in this research where a decrease in utility was observed with an increase in catchment size. If there is a possibility that “sufficient” options are provided and allow individuals to maximise utility, then there is no need to provide more choice as there are no more benefits that are derived. This is where policy comes into play. A supportive policy framework that makes it easy to understand job search dynamics especially by marginalised groups is a crucial aspect in this discussion. Research in the health sciences has shown that interventions that have libertarian paternalism characteristics have potential in guiding people to make the right choices (Ménard, 2010). In a job choice framework, city restructuring might appear draconian in that, it could make it difficult to access other employment nodes. The question to be addressed is how much accessibility should cities provide? Understanding the concept of accessibility and linking it to the job search context may go a long way in contributing towards sustainable job choices.

Given the current debate on “low carbon development” and transport affordability, the focus should be on accessibility, in that regard, the amount of accessibility provided for individuals should be such that they have access to “sufficient” opportunities. From evaluating the monetary value attached to each catchment sizes; it was observed that catchment 2 i.e. a distance of 10km provided the most value in utility for both income groups. An investigation

of the transport costs associated with this catchment size could be a foundation in initiating debate and also understanding the ideal size for the proposed sub-cities.

The results from this study show that for the low and lower middle income groups, people begin to experience negative utilities for commuting distances of around 21 km and 13km respectively. However, looking at the current commuting trends, there is a vast majority of people commuting to work beyond catchment 4 and 3 for the low and lower middle income groups respectively. This further makes the point that providing “sufficient” accessibility maybe a means to making work commutes affordable and one of the ways is the proposed city restructuring strategy.

Shorter commutes we observed to have a higher willingness to pay value compared to larger catchment sizes. What this means is that for most individuals, shorter commutes are more preferred. As long as sufficient opportunities are provided within small catchment sizes, there is potential to successfully limit the trip end choices available to employees without resulting in negative effects.

Furthermore, the findings from the analysis of the relationship between the number of jobs advertised per month showed that, 20 jobs per month to low income respondents and 3 jobs per month to the lower middle income represent “sufficient” opportunities. What this suggests is that it is possible to limit the negative impacts that may emanate from a reduction in the workplace pool. What is essential is identifying a catchment size that results in the provision of the above job opportunities per month. Due to the unavailability of data of jobs at each income level for the catchments establishing a linkage between the number of jobs advertised per month and catchment size was difficult in this study. This would have been a fundamental aspect in determining the actual catchment size that provides “sufficient” accessibility.

If policy can provide sufficient access within the sub-cities, this means any additional costs that emanate from seeking out more trip end choices are solely the responsibility of the individual. Essentially policy would have fulfilled its mandate to provide access to opportunities.

6.3 Policy Recommendations

In the course of this research, there were some aspects that were beyond the scope of this study but are areas that can be useful for policy. The reviewed literatures shed some light on the role of policy and how it can be used to direct individual travel behaviour. More research could be carried out in the area of travel choices and employment search to make people aware of how their job choices can make it possible to travel at an affordable cost.

Additionally, there is need for more research on the concept of whether jobs follow people or people follow jobs. Findings from this possible area of research may aid in better placing housing relative to jobs and where possible the implementation of policies that allow for some form of “churning” mechanism in the housing and job market.

Research needs to be carried out to identify sectors that have the largest potential in growth, this helps in positioning policy such that there are forward looking with regards to the location and supply of labour for potential industrial locations. Banister (1999) proposed that one of the means to avoid job-housing disparities is to ensure that with every growth of new industry, there should be simultaneous provision of housing. If there is room for housing and industry location policy to be structured such that there are jobs close to residential areas with no jobs this is a possible way to negotiate the issue of transport costs.

While this was not possible in the current study, a step further can be taken to investigate the notion of inertia. The aim would be to evaluate whether the proposed scenarios in job choices or policy intervention in line with the proposed scenarios will indeed result in people taking

alternative actions in their job choices which may potentially result in benefits through transport costs and travel time savings.

References

- Adamowicz, W., Boxall, P., Williams, M. and Louviere, J., 1998. Stated Preference Approaches for Measuring Passive Use Values: Choice Experiments and Contingent Valuation. *American Journal of Agricultural Economics*, 80(1), pp. 64-75.
- Alonso, W., 1964. Location and Land Use: Towards a General Theory of Land Rent". 1 Ed. Cambridge: Harvard University Press.
- Aleskerov, F., Bernard, M. and Denis, B., 2007. Preference, Utility and Choice in Classic Models . In: *Utility Maximisation, Choice and Preference*. s.l.:Springer, pp. 17-47.
- Armstrong, M. and Sears, B., 2001. The New Economy and Jobs/Housing Balance in Southern California. , s.l.: Southern California Association of Governments.
- Bamberg, S., Ajzen, I. and Schmidt, P., 2003. Choice of Travel Mode in the Theory of Planned Behavior: The Roles of Past Behavior, Habit, And Reasoned Action. *Basic And Applied Social Psychology*, Volume 25, Pp. 175-188.
- Banister, D., 1999. Planning More to Travel Less: Land Use And Transport. *Town Planning Review* , 70(3), p. 313.
- Barber, A., 1998. Recruiting employees: Individual and organizational perspectives. Foundations for Organisational Science. *Sage Publications*.
- Barber, B., Heath, C. and Odean, T., 2003. Good Reasons Sell: Reason-Based Choice Among Group and Individual Investors on the Stock Market . *Management Science*, P. 475–498.
- Baumeister, R and K. Vohs, 2003. Will Power Choice and Self Control. In: G. Loewenstein And D. Read, Eds. *Time And Decision: Economic And Pyschological Perspectives On Intertemporal Choice*. New York: Russell Sage Foundation, Pp. 201-216.
- Beach, L. R. and Mitchell, T. R., 1987. .Image theory: Principles, goals and plans in decision making. *Acta Psychologica*, Volume 66, pp. 201-220.
- Behling, O., Labovitz, G. and Gainer , M., 1968. College recruiting: A theoretical base. *Personnel Journal* , Volume 47, pp. 13-19.
- Behrens, R., Diaz-Olvera, L., Plat, D. and Pochet, P., 2004. Meta-Analysis of Travel of the Poor in West and Southern African Cities. Istanbul, *World Conference of Transport Research*.
- Behrens, R. and Del Mistro, R., 2006. Shocking Habits: Methodological Issues in Analysing Changing Personal Travel Behaviour Over Time. *Kyoto, 11th International Conference on Travel Behaviour Research*.

- Behrens, R., Del Mistro, R., Lombard, M. and Venter, C., 2007. The Pace of Behaviour Change and Implications for TDM Response Lags and Monitoring : Findings of a retrospective commuter travel survey in Cape Town. *Proceedings 26th Annual Southern African Transport Conference, SATC.*, Pretoria, South Africa.
- Behrens, R. and Del Mistro, R., 2010. Shocking Habits: Methodological Issues in Analyzing Changing Personal Travel Behavior Over Time. *International Journal of Sustainable Transportation*, 4(5), pp. 253-271.
- Bender, K. A., Donohue, S. M. and Heywood, J. S. (2005). Job Satisfaction and Gender Segregation. *Oxford Economic Papers*, 57, pp. 479–96.
- Bennett, J. and Blamey, R. K., 2001. The Choice Modelling Approach to Environmental Valuation. Cheltenham: Edward Elgar Publishing Limited.
- Berger, J., Draganska, M. and Simonson, I., 2007. The Influence of Product Variety on Brand Perception and choice. *Marketing Science*, 26(4), pp. 460-472.
- Bériault, R., 2007. *Google Scholar*. [Online] Available at: http://scholar.google.co.za/scholar?q=Peak+Oil+and+the+Social+Consequences+of+its+Decline&btnG=&hl=en&as_sdt=0%2C5 [Accessed 13 08 2012].
- Bertolini, L., le Clercq, F. and Kapoen, L., 2005. Sustainable Accessibility: a Conceptual Framework To Integrate Transport and Land Use Plan-Making. Two Test-Applications In The Netherlands and a Reflection on the Way Forward. *Transport Policy*, 12(3), pp. 207-220.
- Bhattacharya, C. B., Sen, S. and Korschun, D., 2008. 'Using Corporate Social Responsibility to Win the War for Talent'. *MIT Sloan Management Review*, 49(2), pp. 37-44.
- Billings, R. S. and Marcus, S. A., 1983. Measures of Compensatory and Noncompensatory Models of Decision Behavior: Process Tracing Versus Policy Capturing. *Organizational Behavior and Human Performance*, 31(3), pp. 331-352.
- Breheeny, M. J., 1978. The Measurement of Spatial Opportunity in Strategic Planning. *Regional Studies*, Volume 12, pp. 463-479.
- Brownstein, A. L., 2003. Biased Predecision Processing. *Psychological Bulletin*, 129(4), pp. 545-568.
- Bryant, L. D., Bown, N., Bekker, H. L. and House, A., 2007. The Lure of 'Patient Choice. *British Journal of General Practice* ., Volume 57, p. 822–826.

- Buliung, . R. N. and Kanaroglou, . P. S., 2002. Commute Minimization in the Greater Toronto Area: Applying a Modified Excess Commute. *Journal of Transport Geography*, 10(3), pp. 177-186.
- Bundorf, M. K. and Szrek, H., 2010. Choice Set Size and Decision Making: The Case of Medicare Part D Prescription Drug Plans. *Medical Decision Making*, 30(5), pp. 582-593.
- Bundy, P. and Norris, D., 1992. What Accounting Students Consider Important in the Job Selection Process. *Journal of Applied Business Research*, 8(2), pp. 1-6.
- Butler, R. and Joinson, S., 2010. In *Digital Photography Review*. [Online] Available at: <http://www.dpreview.com/reviews/canoneos60D> [Accessed 9 May 2012].
- Cable, D. and Judge, T. A., 1996. Person-Organization Fit, Job Choice Decisions, and Organizational Entry. *Organizational Behavior and Human Decision Processes*, Volume 67, pp. 294-311.
- Cable, D. and Judge, T. A., 1997. Interviewers' Perceptions of Person-Organization Fit and Organizational Selection Decisions. *Journal of Applied Psychology*, Volume 82, pp. 562-577.
- Cao, X. J., Mokhtarian, L. P. and Handy, L. S., 2009. Examining the Impacts of Residential Self-Selection on Travel Behaviour: A Focus on Empirical Findings. *Transport Reviews*, 29(3), pp. 359-395.
- Carless, S., 2005. Person-Job Fit Versus Person-Organization Fit As Predictors of Organizational Attraction and Job Acceptance Intentions: a longitudinal study. *Journal of Occupational and Organizational Psychology*, Volume 78, pp. 411-429.
- Carroll, L. S., White, M. P. and Pahl, S., 2011. The Impact of Excess Choice on Deferral of Decisions to Volunteer. *Judgment and Decision Making*, 6(7), p. 629-637.
- Cervero, R., 1989. Jobs-Housing Balancing and Regional Mobility. *Journal of the American Planning*, 55(2), pp. 136-150.
- Cervero, R. 1996. California's Transit Village Movement. *Journal of Public Transportation* 1,1: 103-130
- Cervero, R. and Carolyn, R., 1996. Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods. *Transport Policy*, 3(3), pp. 127-141.
- Cervero, R. and Duncan, M., 2006. Which Reduces Vehicle Travel More: Jobs-Housing Balance or Retail-Housing Mixing? *Journal of the American Planning Association*, 72(4), pp. 475-490.

- Chakwizira, J., Bikam , P., Dayomi , M. A. and Adebeyejo, T. A., 2011. Some Missing Dimensions of Urban Public Transport in Africa: Insights and Perspectives from South Africa. *The Built and Human Environment Review*, 4(2), pp. 56-84.
- Chapman, D S; Uggerslev, K L; Carroll, S A; Piasentin, K A; Jones, D., 2005. Applicant Attraction to Organizations and Job Choice: A Meta-Analytic Review of the Correlates of Recruiting Outcomes *Journal of Applied Psychology*, 90(5), pp. 928-944.
- Charron, M., 2007. From Excess Commuting to Commuting Possibilities: more extension to the concept of excess commuting. *Environment and Planning A* , Volume 39, pp. 1238-1254.
- Chernev, A., 2003. When More Is Less and Less Is More: The Role of Ideal Point Availability and Assortment in Consumers Choice. *Journal of Consumer Research* , Volume 30.
- Chimanikire, P., Mutandwa, E. and Gadzirayi, . C. T. M., 2007. Factors affecting Job Satisfaction among academic Professionals in Tertiary Institutions in Zimbabwe. *African Journal of Business Management*, 1(6), pp. 166-175.
- City of Cape Town , 2010. Draft Analysis of the Cape Town Spatial Economy: Implications for Spatial Planning, Cape Town: City of Cape Town.
- City of Cape Town, 2012. City Statistics: Statistics for the City of Cape Town - 2012, Cape Town: City of Cape Town.
- Clark, W. A., Huang, Y. and Withers, S., 2003. Does Commuting Distance Matter? Commuting Tolerance and Residential Change. *Regional Science and Urban Economics*, Volume 33(2), pp. 199-221.
- Connolly, T. and Reb, J., 2012. Regret Aversion in Reason-Based Choice. *Theory and Decision*, pp. 35-51.
- COP 17, UN, 2011. *Report of the Conference of the Parties on its seventeenth, held in Durban from 28 November to*. Durban, UN, Framework Convention on Climate Change .
- Crane, R., 1996. The Influence of Uncertain Job Location on Urban Form and The Journey to Work. *Journal of Urban Economics*, 39(3), pp. 342-366.
- Cron, W. L. and Slocum , J. W. J., 1986. The Influence of Career Stages on Salespeople's Job Attitudes, Work Perceptions, and Performance. *Journal Of Marketing Research*, Pp. 119-129.

- Dargay, J., 2007. The Effect of Prices and Income on Car Travel in the UK. *Transportation Research Part A* , Volume 41, Pp. 947-960.
- Davidsson, P., 1989. Continued Entrepreneurship and Small Firm Growth, *Stockholm: School of Economics, The Economic Research Institute*.
- Davis, R. V. and Lofquist, L., 1984. *A Psychological Theory of Work Adjustment*. Minneapolis: University of Minnesota Press.
- de Clippel, G. and Kfir, E., 2012. Reason-based choice: A bargaining rationale for the attraction and compromise effects. *Theoretical Economics*, p. 125–162.
- Deci, E. L. and Ryan, R. M., 1985. Intrinsic Motivation and Self Determination in Human Behaviour. New York: Plenum.
- Del Mistro, R., 2010. Excess Commuting: Towards Estimating the Cost of Restricting Wasteful Travel. *Abstracts of the 29th Southern African Transport Conference* , Volume 16.
- Del Mistro R and Behrens R, 2006. Variability in traffic streams: A Gateway to successful Travel Demand Management? Kyoto, *11th International Conference on Travel Behaviour Research*.
- Del Mistro R and Maunganidze L, 2012: Travel behaviour in Cape Town: Comparison of the ACET Household Travel Survey and NHTS (2003), *Draft Working paper 01-3*. ACET.
- Del Mistro, R. and Proctor, V., 2012. *How much accessibility do cities in developing countries need or should provide?* Vienna, WCTRS-SIG .
- Deng, T. and Nelson., J. D., 2012. The perception of Bus Rapid Transit: a passenger survey from Beijing Southern Axis BRT. *Transportation Planning and Technology*, 35(2), pp. 201-219.
- Department of Transport, 2003. The First South African National Household Travel Survey, Pretoria: Department of Transport
- Diehl, K. and Poynor, C., 2010. Great expectations?! Assortment size, expectations and Satisfaction. *Journal of Marketing Research* , pp. 312-322.
- Diehl, K. and Zauberman, G., 2005. Searching Ordered Sets: Evaluations from Sequences under search. *Journal of Consumer Research*, 31(4), pp. 824-832.
- Dorsey, B., 2005. Mass transit trends and the role of Unlimited access inTransportation Demand Management. *Journal of Transport Geography*, 13(3), pp. 235-246.

- Douglas, E. J. and Shepherd, D. A., 2000. Entrepreneurship as a utility maximizing response. *Journal of Business Venturing*, 15(3), pp. 231-252.
- Downs, A., 1994. *New visions for Metropolitan America*. Washington, DC: Cambridge.
- Dumreicher, H., Richard, L. S. and Ernest, J. Y., 2000. The Appropriate Scale for Low Energy :Theory and Practices at The Westbahnhof. *Architecture And City Environment, Proceeding Of PLEA*, Pp. 359-363.
- Eagly, A. H., 1987. *Sex Differences in Social Behavior: A Social-Role Interpretation*. , 1987. s.l.:Lawrence Erlbaum Associates, Inc.
- Ellsberg, D., 1961. Risk, Ambiguity and the Savage Axioms. *Quarterly Journal of Economics*
- Englander, M., 1960. A Psychological analysis of Vocational choice: Teaching. *Journal of Counseling Psychology*, Volume 7, pp. 257-264.
- Eriksson, L., Jörgen, . G. and 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), pp. 15-26.
- Ewing, R. and Stoker, P., 2012. *Workforce Housing App*. [Online] Available at: <http://www.arch.utah.edu/cgi-bin/wordpress-etplus/wp-content/uploads/2012/10/Workforce-Housing-App.pdf> [Accessed 06 12 2012].
- Fasolo, B., Hertwig, R., Huber, M. and Ludwig, M., 2009. Size,Entropy,and Density: What is the Difference that makes the Difference Between Small and Large Real World Assortments? *Psychology and Marketing*, Volume 26, pp. 254-279.
- Flaherty, K. E. and Pappas, . J. M., 2002. The Influence of Career Stage on Job Attitudes: Toward a Contingency Perspective. *The Journal of Personal Selling and Sales Management*, pp. 135-143.
- Frost, M. and Linneker, B., 1998. Excess or Wasteful Commuting in a Selection of British Cities. *Transport Research Part A*, 32(7), pp. 529-538.
- Fujii, S., Gärling, T. and Kitamura, R., 2001. Changes in drivers' Perceptions and use of Public Transport during a freeway closure: Effects of Temporary structural change on Cooperation in a real-life social dilemma. *Environment and Behavior*, Volume 33, pp. 796-808.
- Garling, T. and Axhausen, K. W., 2003. Introduction: Habitual travel choice. *Transportation* , Volume 30, p. 1–11.
- Gärling, T. and Schuitema., G., 2007. Travel Demand Management targeting reduced private car use: Effectiveness, public acceptability and political feasibility. *Journal of Social Issues*, 63(1), pp. 139-153.

- Gatewood, R. D., Gowan, M. A. and Lautenschlager, G., 1993. Corporate Image, Recruitment Image, and Initial Job Choice Decisions. *Academy of Management Journal*, Volume 36, pp. 414-427.
- Gauthier , A. and Weinstock , A., 2010. Africa: Transforming Paratransit into BRT. *Built Environment* , 36(3), pp. 317-327.
- Giuliano, G., 1991. Is Jobs-Housing Balance a Transportation? *Transport Research Record* , Volume 1305, pp. 305-312.
- Giuliano, G. and Small, A. K., 1993. Is the journey to work explained by urban structure? *Urban Studies* , 1500(30), p. 1485.
- Goldstein, N., 2001. Inside Influence Report: Is Your Company Offering Too Much? When More Is Less. In *Cibbarelli C., Gordon B. (Eds.), Influence at work.*, s.l.: s.n.
- Gottlieb , P. D. and Lentnek , B., 2001. Spatial Mismatch is not Always a Central-City Problem: an Analysis Of Commuting Behaviour in Cleveland, Ohio and its suburbs. *Urban Studies*, Volume 38, pp. 1161-1186.
- Graham, R. G. and Leung, K., 1987. Management motivation in Hong Kong. *The Hong Kong Manager*, pp. 17-24.
- Grant, M. A. and Schwatz, B., 2011. Too much of a good thing: The challenge and Opportunity of inverted U. *Perspectives on Psychological Science*, 6(1), pp. 61-76.
- Gul , A., Khan , K. and Zafar, R., 2009. Relationship between Perceived Employer Branding and Intention to Apply: Evidence from Pakistan. *European Journal of Social Sciences*, Volume 18.
- Guler, B., Guvenen, F. and Violante, . G. L., 2009. Joint-search theory: New opportunities and new frictions. *National Bureau of Economic Research*, Volume 15011.
- Gutek, B. A., Cohen, A. G. and Konrad, A., 1990. Predicting social-sexual behavior at work: A contact hypothesis. *Academy of Management Journal*, 33(3), pp. 560-577.
- Hall, J., Viney, R., Haas, M. and Louviere, J. J., 2004. Using Stated Preference Discrete Choice Modelling to Evaluate Health Care Programs. *Journal of Business Research* , Volume 57, pp. 1026-1032.
- Hamilton, B.W., (1982) Wasteful Commuting, *Journal of Political Economy*, 90, pp. 1035-1053.
- Hanley , N. and Wright, E. R., 2001. Choice Modelling Approaches: A Superior Alternative for environmental Valuation? *Journal of Economic Surveys*, 15(3), pp. 435-462.
- Hanson, S. and Pratt., . G., 1991. Job search and the occupational segregation of women. *Annals of the Association of American Geographers*, 81(2), pp. 229-253.

- Haynes, G. A., 2009. Testing the Boundaries of the choice overload Phenomenon: The Effect of the number of options and time pressure on decisions difficulty and satisfaction. *Psychology and Marketing*, 26(3), pp. 204-212.
- Healey, M., 2012. *The Globe and Mail*. [Online] Available at: <http://www.theglobeandmail.com/report-on-business/small-business/sb-marketing/sales/limit-consumer-choice-and-watch-the-money-roll-in/article4435603/> [Accessed 10 July 2012].
- Hedesström, T. M., Svedsäter, H. and Gärling, T., 2004. Identifying Heuristic Choice Rules in the Swedish Premium Pension Schemes. *The Journal of Behavioral Finance*, 5(1), pp. 32-42.
- Hensher, D. A. and Golob, T. F., 2008. Bus Rapid Transit systems – A Comparative Assessment. *Transportation*, 35(4), pp. 501-518.
- Hensher, D., Rose, D. J. and Greene, W., 2005. Applied Choice Analysis: A Primer. Cambridge: University Press.
- Highhouse, S., Beadle, D., Gallo, A. and Miller, L., 1998. Get 'Em While They Last! Effects of Scarcity Information in Job Advertisements. *Journal of Applied Social Psychology*, Volume 28, pp. 779-795.
- Hiscock, R., Macintyre, S., Kearns, A. and Ellaway, A., 2002. Means of transport and Ontological security: Do cars provide Psycho-Social benefits to their users? *Transportation Research Part D: Transport and Environment*, 7(2), pp. 119-135.
- Hoogstra, G. J., Florax, R. J. and van Dijk, J., 2005. Do 'jobs follow people' or 'people follow jobs'? A metaanalysis of CarlinoMills studies. *45th Congress of the European Regional Science Association*.
- Hoogstra, G. and Van Dijk, J., 2004. Explaining Firm Employment Growth: Does Location Matter? *Small Business Economics*, Volume 22, pp. 179-192.
- Horner, M. W., 2002. Extensions to the concept of excess commuting. *Environment and Planning A*, 34(3), pp. 543-566.
- Horner, M. W., 2008. Optimal Accessibility Landscapes? Development of a New Methodology for Simulating and Assessing Jobs Housing Relationships in Urban Regions. *Urban Studies*, 45(8), pp. 1583-1602.
- Horner, W. M. and Mefford, N. J., 2007. Investigating Urban Spatial Mismatch using Job-Housing indicators to model Home - Work separation. *Environment and Planning A*, Volume 39, pp. 1420 - 1440.
- <http://www.r-project.org/>

- Huber, J., Payne, J. and Puto, C., 1982. Adding Asymmetrically Dominated Alternatives: Violations of Regularity and the Similarity Hypothesis. *Journal of Consumer Research*, pp. 90-98.
- Huberman, G., Iyengar, S. S. and Jiang, W., 2003. How Much Choice is Too Much?: Contributions to 401(k) Retirement Plans. *Pension Research Council Working Paper*, Volume 10.
- Iyengar, S. S. and Lepper, R. M., 2000. When Chooseness is Demotivating: Can one desire too much of a good thing. *Journal of Personality and Social Psychology*, 9(6), pp. 995-1005.
- Jessup, K. R., Veinott, S. E., Todd, M. P. and Busemeyer, R. J., 2009. Leaving the Store Empty-Handed: Testing the too-much-choice effect using decision field theory. *Psychology and Marketing*, 26(3), pp. 299-320.
- Johansson, L. et al., 2003. Goal Conflicts in Political Decisionmaking: A Survey of Municipality Politicians' Views Of Road Pricing. *Environment and Planning C*, 21(4), pp. 615-624.
- Johnson, E. J. and Meyer, R. J., 1984. Compensatory Models of Non-Compensatory Choice Processes: The Effect of Varying Context, *Journal of Consumer Research*, 11(june), pp. 528-541.
- Judge, T. A. and Bretz, R. D. J., 1992. Effects of Work values on Job Choice decisions., 77, 261–271. *Journal of Applied Psychology*, Volume 77, pp. 261-271.
- Jurgensen, C. E., 1978. Job preferences (What makes a job good or bad?) *Journal of Applied Psychology*, 63(3), pp. 267-276.
- Kahneman, D. and Tversky, A., 1974. Judgment under uncertainty: Heuristics and biases. *Science*, Volume 185, p. 1124–1131.
- Kahneman, D. and Tversky, A., 1979. Prospect theory: An analysis of decisions under risk. *Econometrica*, Volume 47, pp. 263-291.
- Kane, L., 2002. The Urban Transport Problem in South Africa and the Developing World: A Focus on Institutional Issues. *Working Paper*, Issue 3
- Keane, J. and de Velde, D. W., 2008. *The Role of Textile and Clothing Industries in the Development of Strategies*. [Online] Available at: <http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/3361.pdf> [Accessed 13 11 2012].
- Kim, S., 1995. Excess Commuting for Two-Worker Households in the Los Angeles Metropolitan Area. *Journal of Urban Economics*, 38(2), p. 166–182.

- Kim, T. K. and Horner, M. W., 2003. Exploring Spatial Effects on Urban Housing Duration., *Environment and Planning A*, Volume 35, pp. 1415-1429.
- Kitamura, R., Shoichiro, . N. and Toshiyuki, Y., 1999. Self-reinforcing motorization: Can Travel Demand Management take us out of the Social Trap? *Transport Policy*, 6(3), pp. 135-145.
- Kitzinger, J. and Barbour, R. S., 1999. The Challenge and Promise of Focus Groups. In: *Developing Focus Group Research: Politics , theory and practice*. London: *Sage*, pp. 1-20.
- Kjær, T., 2005. A review of the Discrete Choice Experiment-with emphasis on its Application in Health care. *Health Economics Papers: Syddansk Universitet*, Issue 1.
- Kolstad, J.R. 2011. How to Make Rural Jobs More Attractive to Health Workers: Findings from a Discrete Choice Experiment in Tanzania. *Health Economics* 20(2): 196-211.
- Konrad, A. M., Ritchie Jr, J. E., Lieb, P., and Corrigan, E. (2000). Sex Differences And Similarities in Job Attribute Preferences: a meta-analysis. *Psychological Bulletin*, 126(4), 593.
- Koppelman, F. S. and Bhat, C. R., 2006.: A Self Instructing Course in Mode Choice Modeling: Multinomial and Nested Logit Models. (2006), s.l.: *Prepared for U.S. Department of Transportation Federal Transit Administration*.
- Korhonen, L. and Heiskanen, E., 2010. Innovative Programmes for Travel Demand.Changing Behaviour, : www.energychange.info.
- Langer, E. J. and Rodin, J., 1976. The Effects of Choice and Enhanced Personal Responsibility for the Aged: A Field Experiment in an Institutional Setting. *Journal of Personality and Social Pyschology* , 34(2), pp. 191-198.
- Larsen, M. M., Pilegaard, N. and Van Ommeren, J. N., 2004. Congestion and Residential Moving Behaviour. *Tinbergen Institute Discussion Paper*, 96(3).
- Lee, B.-K. and Lee, W.-N., 2004. The Effect of Information on consumer choice quality in an on-line environment. *Psychology and Marketing*, 21(3), p. 159–183.
- Levinson, D. M., 1997. Job and Housing Tenure and the Journey to Work. *The Annals of Regional Science*, Volume 31, p. 451–471.
- Liang, S.-C. and Wei, Y.-C., 2009. Why Job Seeker have intent to Apply? Corporate Image and P-O Fit as the Determinants. Kuala Lumpur, Academy of Taiwan Information Systems Research.

- Loo, B. P. and Chow, A. S., 2011. Spatial Restructuring to facilitate Shorter Commutes: An Example of the Relocation of the Hong Kong International Airport. *Urban Studies*, 48(8), pp. 1681-1694.
- Loukopoulos, P. et al., 2005a. Public Attitudes Towards Policy Measures for Reducing Private Car Use: Evidence from a study in Sweden. *Environmental Science and Policy*, Volume 8, pp. 57-66.
- Ma, K. and Banister, D., 2006a. Excess Commuting: A Critical Review. *Transport Reviews: A Transnational Transdisciplinary Journal*, 26(6), pp. 749-767.
- Ma, K.-R. and Banister, D., 2006b. Extended Excess Commuting: A Measure of the Jobs-Housing Imbalance in Seoul. *Urban Studies*, 43(1), pp. 2099-2113.
- Mahony, D. F., Mondello, M., Hums, M. A. and Judd, M., 2006. Recruiting and Retaining Sport Management Faculty: Factors Affecting Job Choice. *Journal of Sport Management*, 20(3), p. 414.
- Mangham, L. J., 2007. Addressing the Human Resource Crisis in Malawi's Health: Employment Preferences of Public Sector Registered Nurses *ESAU: Working Paper*, Volume 18.
- Mark, H. W. and Mefford, J. N., 2007. Investigating Urban Spatial Mismatch using Job-Housing Indicators to Model Home-Work Separation. *Environment and Planning A*, Volume 39, pp. 1420- 1440.
- Markus, H. R. and Schwartz, B., 2010. Does Choice Mean Freedom and Well-Being? *Journal of consumer research*, Volume 37, pp. 344-355.
- McAlister, L., 1982. A Dynamic Attribute Satiation Model of Variety-Seeking Behaviour. *Journal of Consumer Research*, Volume 9, pp. 141-150.
- McFadden, D., 1974. Conditional Logit Analysis of Qualitative Choice Behavior, *In Zarembka, P. Frontiers in econometrics*. ed ed. New York: Academic Press.
- McQuaid, R. W., Malcolm, G. and John, A., 2001. Unemployed Job Seeker Attitudes towards Potential Travel to Work Times. *Growth and Change*, 32(3), pp. 355-368.
- Ménard, J.-F., 2010. A 'Nudge' for Public Health Ethics: Libertarian Paternalism as a Framework for Ethical Analysis of Public Health Interventions? *Public Health Ethics*, 3(3), pp. 229-238.
- Merino-Castello, A., 2003. Eliciting Consumers Preferences Using Stated Preference Discrete Choice Models : Contingent Ranking versus Choice Experiment. *UPF Economics and Business Working Paper*, Issue 705.

- Meyerhoff, J., Liebe, U., 2006. Status Quo Effect in Choice Modelling: Protest Beliefs, Attitudes, and Task Complexity. *Paper Presented at The Third World Congress of Environmental and Resource Economists in Kyoto*, July 2006.
- Meyer, M. D., 1999. Demand Management as an Element of Transportation Policy: using carrots and sticks to influence travel behavior. *Transportation Research Part A*, Volume 33, pp. 575-599.
- Mick, D., Broniarczyk, S. M. and Haidt, J., 2004. Choose, Choose, Choose, Choose, Choose, Choose, Choose: Emerging and Prospective Research on the Deleterious Effects of Living in Consumer Hyperchoice. *Journal of Business Ethics*, 52(2), pp. 199-204.
- Mogilner, C., Rudnick, T. and Iyengar, S. S., 2008. The Mere Categorization Effect: How The Presences of Categories increases choosers perceptions of Assortment Variety and Other Satisfactions. *Journal of Consumer Research*, 30(2), pp. 202-215.
- Molin, E. I. and Timmermans, J. P., 2002. Accessibility considerations in residential choice decisions: accumulated evidence from the Benelux Washington, DC, 82nd Annual Meeting of the Transportation Research Board.
- Montgomery, D. B. and Ramus, C. . A., 2003. Corporate Social Responsibility Reputation Effects on MBA Job choice. *Research Paper*, Volume 1805.
- Murphy, E., 2009. Excess commuting and modal choice. *Transportation Research Part A: Policy and Practice* , 43(8), pp. 735-743.
- Niedzielski, M. A., 2006. A spatially disaggregated approach to commuting efficiency. *Urban Studies* , 43(13), pp. 2485-2502.
- Nkurunziza, A., Zuidgeest, M., Brusse, M. and Van den Bosch, F., 2012. Spatial Variation of Transit Service Quality Preferences in Dar-Es-Salaam. *Journal of Transport Geography*, Volume 24, pp. 12-21.
- O Kelly, M. E. and Lee., W., 2005. Disaggregate journey-to-work data: Implications for Excess commuting and Jobs-housing balance. *Environment and Planning A*, 37(12), pp. 2233-2252.
- Olshavsky, R. W., 1979. Task Complexity and Contingent Processing in Decision Making: a Replication And Extension. *Organizational Behavior and Human Performance*, Volume 24, pp. 300-316.
- Olvera, L. D., Didier , P. and Pascal, . P., 2003. Transportation conditions and Access to services in a context of Urban Sprawl and Deregulation. The case of Dar es Salaam. *Transport Policy*, 10(4), pp. 287-298.

- Olvera, D., Plat, . L. D. and Poch, P., 2008. Household Transport Expenditure in Sub-Saharan African cities: measurement and analysis. *Journal of Transport Geography*, 16(1), pp. 1-13.
- Osborn, D. P., 1990. A reexamination of the Organizational Choice Process. *Journal of Vocational Behavior*, 36(1), pp. 45-60.
- Oulasvirta, A., Hukkinen, J. P. and Schwartz, B., 2009. When More Is Less: The Paradox of Choice in Search Engine Use. *Finance*, pp. 516-523.
- Payne, J. W., Bettman, J. P. and Johnson, E. J., 1993. *The Adaptive Decision maker*. Cambridge : Cambridge University Pres.
- Paterson, J., 2010. Too Much Choice? Behavioural economics does not justify depriving. *Policy* , 11 10, 26(4).
- Paulley, N. et al., 2006. The Demand for Public Transport: the Effects of Fares, Quality of Service, Income and Car Ownership. *Transport Policy*, 13(4), pp. 295-306.
- Penn-Kekana, L, Blaauw, D., Tint, K. S., Monareng, D., and Chege, J. (2005). Nursing Staff Dynamics and Implications for Maternal Health Provision in Public Health Facilities In The Context Of HIV/AIDS. *Frontiers in Reproductive Health*, Population Council.
- Potter, S. and Skinner, M. J., 2000. On Transport integration: a contribution to better understanding. *Futures* , Volume 32, p. 275–287.
- Pounder , . D. G. and Merrill, . R. J., 2001. Job desirability of the High School principalship: A job choice theory perspective. *Educational Administration Quarterly*, 37(1), pp. 27-57.
- Preston, J. and Rajé, F., 2007. Accessibility, Mobility and Transport-related social exclusiom. *Journal of Transport Geography*, Volume 15, pp. 151-160.
- Proctor, V. & Del Mistro, R., 2013. The Cost to Employers of Limiting the Catchment Size from which they Employ Their Staff,. *Rio de Janeiro, World Conference on Transport Research*.
- Priemus, H. P. N. a. D. B., 2001. Mobility and spatial dynamics: an uneasy relationship. *Journal of Transport Geography*, 9(3), pp. 176-171.
- Rajan, R., 2012. *The trouble with libertarian paternalism*. [Online] Available at: <http://www.aljazeera.com/indepth/opinion/2012/04/201241593247850533.html> [Accessed 30 11 2012].

- Reeve, C. L. and Schultz , L., 2004. Job Seeker Reactions to Selection Process Information: In Job Ads. *Reeve, Charlie L., and Lisa Schultz. Job-Seeker Reactions to Selection International Journal of Selection and Assessment* , 12(4), pp. 343-355.
- Robinson, S. and Beutell , N., 2004. Job attribute preferences: are there gender differences. *Journal of the Academy of Organizational Culture, Communications and Conflict*, 8(1), pp. 47-59.
- Rockers PC, Jaskiewicz W, Wurts L, Kruk ME, Mgomella G, Ntalazi F, Tulenko K. Preferences for Working in Rural Clinics Among Trainee Health Professionals in Uganda: A Discrete Choice Experiment. (2012). *BMC Health Services Research* 2012, 12: 212.
- Rolleston, B., 1987. Determinants of Restrictive Suburban Zoning: An empirical Analysis. *Journal of Urban Economics*, Volume 21, pp. 1-21.
- Roux, Y. E., Del Mistro, R. and Mfinanga, D., 2012. Comparative Analysis of Public Transport Systems. *Proceedings of the 31st Southern African Transport Conference*, SATC. , Pretoria, South Africa
- Ryan, M., Gerard, K. and Amaya-Amaya, M., 2008. Using Discrete Choice to Value Health and Health. *Springer*.
- Rynes, S., 1991. Recruitment, Job Choice, and Post-Hire Consequences: A Call for New. *Handbook of Industrial and Organisational Psychology*, Volume 2, pp. 399-444.
- Salon, . D. and Gulyani., S., 2010. Mobility, Poverty, and Gender: Travel ‘Choices’ of Slum Residents in Nairobi, Kenya. *Transport Reviews*, 30(5), pp. 641-657.
- Sawtooth Software, Inc., 2013. *The CBC System for Choice-Based Conjoint Analysis*, Orem, Utah: Swaatooth Software.
- SCAG, 2008. *Regional Transport Plan: making the connections. Travel Management Demand Report.*, California: Southern California Association of Governments.
- Schwartz, B., 1994. The costs of Living: How market freedom erodes the best things in life. In: New York: W W Norton and Co, p. 393.
- Schwartz, B., 2004. *The Paradox of Choice:why more is less*. 1 ed. s.l.:New York: Eco/Harper-.
- Schwartz, B., 2006. *Freedom, Choice and Well-being*. [Online] Available at: <http://static.londonconsortium.com/issue03/> [Accessed 11 May 2012].

- Scheibehenne, B., Greifeneder, R. and Todd, P. M., 2009. What Moderates the too much choice effect? *Psychology and Marketing*, 26(3), pp. 229-253.
- Schwanen, T., Frans, M. D. and Martin, D., 2004. The Impact of Metropolitan Structure on Commute Behavior in the Netherlands: A Multilevel Approach. *Growth and Change*, 35(3), pp. 304-333.
- Scott, A., 2001. Eliciting GPs Preferences for Pecuniary and Non-pecuniary Job Characteristics, *Journal of Health Economics*, Volume 20, pp. 329-347.
- Scott, E. D., 2002. Organizational moral values. *Business Ethics Quarterly*, pp. 33-55.
- Scott, D. M., Kanaroglou, P. S. and Anderson, W. P., 1997. Impacts of Commuting Efficiency on Congestion and Emissions: Case of the Hamilton Census Metropolitan Area, Canada. *Transportation Research D*, 2(4), pp. 245-257.
- Sela, A., Berger, J. and Liu, W., 2008. Variety, Vice and Virtue: How assortment size influences option choice. *Journal of Consumer Research*, Volume 2008.
- Shafir, E., Simonson, I. and Tversky, A., 1993. Reason-based choice. *Cognition*, Volume 49, pp. 11-36.
- Shavelson, R. J., Hubner, J. J. and Stanton, G. C., 1976. Self-Concept: Validation of Construct Interpretations. *Review of Educational Research*, 46(3), pp. 407-441.
- Sheldon, R., Scott, M. and Jones, P., 1993. Exploratory Social Research among London Residents. London, PTRC Education and Research Services.
- Sheridan, J. E., Richards, M. D. and Slocum, J. W., 1975. Comparative analysis of Expectancy and Heuristic models of decision behavior. *Journal of Applied Psychology*, Volume 60, pp. 361-368.
- Simon, H. A., 1956. Rational choice and the structure of the environment. *Psychological Review*, Volume 63, pp. 129-138.
- Simon, H. A., 1978. Rationality and process and product. *American Economic Review*, Volume 68, p. 1-16.
- Simonson, I. and Nowlis, S. M., 2000. The Role of Explanations and Need for Uniqueness in Consumer Decision Making: Unconventional Choices Based on Reasons. *Journal of Consumer Research*, 27(1), pp. 49-68.
- Simons, T. and Enz, C. A., 1995. Motivating hotel Employees. *Cornell Hotel and Restaurant Administration Quarterly*, 36(1), pp. 20-27.
- Siu, V., Tsang, N. and Wong, S., 1997. What motivates Hong Kong's hotel employees? *The Cornell Hotel and Restaurant Administration Quarterly*, 38(5), pp. 44-49.

- Small, . K. A. and Song, S., 1992. Wasteful commuting: a resolution. (1992): 888-898. *Journal of Political Economy*, pp. 888-898.
- Soelberg, P. O., 1967. Unprogrammed decision making ., *Industrial Management Review*, Volume 8, pp. 19-29.
- STATSSA, 2011. *Census 2011*. [Online]
Available at: <http://www.statssa.gov.za/Census2011/Products.asp>
[Accessed 3 5 2013].
- Stead, D., 2001. Relationships between Land Use, Socioeconomic factors, and Travel Patterns In Britain. *Environment and Planning B*, 28(4), pp. 499-528.
- Street, D. J., Burgess, L. and Louviere, J. J., 2005. Quick and easy choice sets: Constructing optimal and nearly optimal Stated Choice Experiments. *International Journal of Research in Marketing*, Volume 22, pp. 459-470.
- Sultana, S., 2002. Job/housing imbalance and commuting time in the Atlanta metropolitan area: exploration of causes of longer commuting time. *Urban Geography* , 23(8), pp. 728-749.
- Svenson, O. and Shamoun, S., 1997. Predecision Conflict and Different Patterns of Postdecision Attractiveness Restructuring: Empirical Illustrations from a Real-Life Decision. *Scandinavian Journal of Psychology*, 38(3), pp. 243-251.
- Tabane, M., 2005. Travel Reduction as a TDM Strategy. *Unpublished BSc (Eng) thesis, Department of Civil Engineering., University of Cape Town*.
- Taylor, S. and Brown, J., 1988. Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*, Volume 103, pp. 193-210.
- Terjesen, S., Vinnicombe, . S. and Freeman, C., 2007. Attracting Generation Y graduates: Organisational attributes, likelihood to apply and sex differences. *Career Development International*, 12(6), pp. 504-22.
- Thorpe, N., Hills, N. P. and Jaensirisak., S., 2000. Public attitudes to TDM measures: a comparative study. 7.4 (2000): 243-257. *Transport Policy*, 7(4), pp. 243-257.
- Tiger Brands , 2011. *Tiger's Profile*. [Online]
Available at: <http://www.tigerbrands.co.za/OurCompany/Default.htm>
[Accessed 29 11 2012].
- Timmermans, H., 2003. The Saga of Integrated Land Use-Transport Modeling: How Many More Dreams Before we wake up? Keynote Paper, Moving Through Nets: The

- Physical And Social Dimension Of Travel. Lurcene , 10th International Conference on Travel Behaviour Research.
- Too, L. and Earl, G., 2010. Public Transport service quality and Sustainable Development: A Community Stakeholder Perspective. *Sustainable Development*, 18(1), pp. 51-61.
- Turban, D. B., Eyring, A. R. and Campion, J. E., 1993. Job Attributes: Preferences Compared with reasons given for Accepting and Rejecting Job Offers. , 66, 71–81. *Journal of Occupational and Organizational Psychology*, Volume 66, pp. 71-81.
- Turban, D. B., Forret, M. L. and Hendrickson, C. L., 1998. Applicant attraction to firms: Influences of organization reputation, job and organizational attributes, and recruiter behaviors. *Journal of Vocational Behavior*, Volume 52, pp. 24-44.
- Tversky, A., 1972. Elimination by Aspects: a theory of choice. *Psychological Review*, 79(4), pp. 281-299.
- Unger, N, Bond., Tami C., Wang, James S., Koch, Dorothy M., Menon, Surabi., Shindell, Drew T., Bauer, Susanne , 2010. Attribution of Climate Forcing to Economic Sectors. *Proceedings of the National Academy of Sciences*, 107(8), p. 3382–3387.
- van Ommeren, J. N. and van der Straaten, W. J., 2008. The Effect of Search Imperfections on Commuting Behaviour:Evidence from Employed and Self-Employed Workers. *Regional Science and Urban Economics*, Volume 38, pp. 127-147.
- van Wee, B., 2002. Land use and transport: research and policy challenges . *Journal of Transport Geography*, 10(4), pp. 259-271.
- Venter, C. and Behrens, R., 2005. Transport expenditure: is the 10% policy benchmark appropriate? *Proceedings of the 24th Southern African Transport Conference*, SATC. , Pretoria, South Africa.
- Verplanken, B. and Wood, W., 2006. Interventions to break and create consumer Habits. *Journal of Public Policy and Marketing*, Volume 25, pp. 90-103.
- Vroom, V., 1964. Work and emotion. New York: Wiley.
- VTPI, 2005a. Victoria Transport Policy Institute- Public Transit. [Online] Available at: <http://www.vtpi.org>. [Accessed 9 11 2012].
- Waddell, P., Berry , B. and Hoch , I., 1993. Housing price gradients: the Intersection of Space and Built Form. *Geographical Analysis* , 25(1), pp. 55-19.
- Waiyan, . L. and Hensher, D. A., 2012. Embedding Decision Heuristics in Discrete Choice Models. A Review. *Transport Reviews: A Transnational Transdisciplinary Journal*, 32(3), pp. 313-331.

- Walters, J., 2008. Overview of Public Transport policy developments in South Africa. *Research in Transportation Economics*, Volume 22, pp. 98-108.
- Wanous, J. P., Keon, T. L. and Latack, J. C., 1983. Expectancy theory and occupational/organizational choice: A review and test. *Organizational Behavior and Human Performance*, Volume 32, pp. 66-86.
- Weitz, J., 2003. Job-worker Balance. Planning Advisory Service Report Number 516. *American Planning Association*, Volume 516.
- White, M. J., 1988. Urban Commuting Journeys are not Wasteful *Journal of Political Economy*, 96(5), pp. 1097-1110.
- Wiersma, U., 1990. Gender differences in Job attribute Preferences: Work-home role conflict and job level as mediating variables *Journal of Occupational and Organizational Psychology*, Volume 63, pp. 231-244.
- Wright, L. and Hook, W., 2007. *Bus Rapid Transit Planning Guide*. 3 ed. New York: Institute for Transportation and Development Policy .
- Yamane, T., 1967. *Statistics*. 2nd ed. New York: Harper and Row.
- Young, I. P., Rinehart, J. S. and Place, W., 1989. Theories for teacher selection: Objective, subjective. *Teaching and Teacher Education*, Volume 5, pp. 329-336.
- Zax, J. S. and John, K. F., 1991. Commutes, quits, and moves. *Journal of Urban Economics*, 29(2), pp. 153-165.

Bibliography

- Adamowicz, W., Louviere, J. and Wi, M., 1994. Combining Revealed and Stated Preference Methods for Valuing Environmental amenities. *Journal of Environmental Economics and Management*, 26(3), pp. 271-292.
- Birol, E., Kontoleon, A. and Smale, M., 2006. Combining Revealed Preferences and Stated Preferences Methods to assess the Private Value of Agrobiodiversity in the Hungarian Home Gardens. Washington D.C, *EPT Discussion Paper: International Food Policy and Research Institute*.
- Cable, D. and Judge, T. A., 1994. Pay preferences and Job search decisions: A person-organization fit perspective. *Personnel Psychology*, Volume 47, p. 317-348.

- Dar-Nimrod, I., Rawn, C. D., Lehman, D. R. and Schwartz, B., 2009. The Maximization Paradox: The costs of seeking alternatives. *Personality and Individual Differences*, Volume 46 , p. 631–635.
- Del Mistro, R. and Behrens, R., 2012. The Impact of Service type and Route Length on the Operating Costs per passenger and Revenue for Paratransit Operations. Results of a Public Cost Model. *Addis Ababa, Conference CODATU XV*.
- Department of Labour, 2013. Basic Guide to Minimum Wages. [Online] Available at: <https://www.labour.gov.za/legislation/acts/basic-guides/basic-guide-to-minimum-wages-domestic-workers> [Accessed 5 5 2013].
- Duncan, M. and Cervero, R., 2007. Which Reduces Vehicle Travel More: Job-worker Balance or Retail Housing Mixing? *Journal of the American Planning Association*, 72(4), pp. 475-490.
- Edward, W., 1954. The Theory of Decision Making. *Psychological Bulletin*, Volume 41, pp. 380-417.
- Healy, M., 2012. Tampon trip proves choice can be bad, Toronto: *The Globe and Mail*.
- Hensher, D. A., 1994. Stated Preference Analysis of Travel Choices: the state of practice. *Transportation*, Volume 21, pp. 107-133.
- Holland, Amsterdam (1978) Cited in Lee, B. H. Y., and Waddell, P. (2010). Residential Mobility and Location Choice: A Nested Logit Model with Sampling of Alternatives. *Transportation*, 37, 587-601.
- Iyengar, S. S., Wells , R. E. and Schawrtz, B., 2006. Doing Better but Feeling Worse : Looking for the "Best" Job Undermines Satisfaction. *Psychological Science*, 17(2).
- Kuhfeld, W., 2006. Construction of Efficient Designs for Discrete Choice Experiments. In: T. Oaks, ed. *The handbook of marketing research: Uses, misuses, and Future Advances*. California: Sage Publications, pp. 312-363.
- Loukopoulos, P., 2005b. Future Urban Sustainable Mobility: Implementing and Understanding the Impacts of Policies Designed to Reduce Private Automobile Usage. *Unpublished doctoral dissertation, Göteborg University, Göteborg, Sweden*.
- Ma, K. R. and Bannister, D., 2007. Urban spatial change and excess commuting. *Environment and Planning Part A*, Volume 39, p. 630–646.
- Masemola, M., van Aardt, C. and Coetzee, M., 2010. Income and Expenditure of Households in South Africa 2008-2009, Pretoria: *Bureau of Market Research*.

- Miaoulis , G. and Michener, R. D., 1976. *An Introduction to Sampling*. Dubuque, Iowa: Kendall/Hunt Publishing Company.
- Mitchell, V. W., Yamin, M. and Walsh, G., 2005. Towards a Conceptual Model of Consumer. *Advances in Consumer Research*, 32(1), pp. 143-150.
- Pearce , D., Ozdemiroglu, E. and Hanley, N., 2002. *Economic Valuation with Stated Preference Techniques Preference Techniques*. London, Department for Transport, Local Government and the Regions.
- Pearmain, D., Swanson, J., Kroes, E. and Bradley, M., 1991. Stated Preference Techniques. A Guide to Practice. *The Hague Consulting Group, Netherlands*.
- Ryan, M. and Gerard., K., 2002. Using Discrete Choice Experiments to value Health Care Programmes: Current Practice and Future Research Reflections. *Applied Health Economics and Health Policy*, 2(1), pp. 55-64.
- Snickars, F., Weibull, J. (eds.) *Spatial Interaction Theory and Planning Models*, pp. 75–96. *North*.
- Sorrell, S. et al., 2009. Global Oil Depletion: An Assessment of the Evidence for a Near-Term Peak in Global Oil Production. *UK Energy Research Centre, London*.
- Swait, J., Louviere, J. and Williams, M., 1994. A Sequential Approach to Exploiting the combined strengths of SP and RP Data: Application to Freight Shipper Choice. *Transportation*, Volume 21, pp. 135-152.
- World Bank Publications, 2012. How to Conduct a Discrete Choice Experiment for Health Workforce Recruitment and Retention in Remote and Rural Areas: *A User Guide with Case Studies*. s.l.:World Bank.
- Young, I. P., Rinehart, J. S. and Heneman, H. G., 1993. Effects of job attributes categories, applicant job experiences and recruiter sex on applicant job attractiveness ratings. *Journal of Personnel Evaluation in Education*, Volume 7, pp. 55-66.
- Zax, J., John, S. and Kain, F., 1991. Commutes, quits, and moves. . *Journal of Urban Economics*, 29(2), pp. 153-165.

Appendices

Appendix 1

Calculation of Travel time

It was assumed that the average travel speeds for bus, train and minibus during peak hours are, 35, 25, 25 km/hr. respectively. This led to an average travel speed for the public transport modes of: $\frac{85}{3}=28.33\text{km/hr}$. This was used to calculate the travel time for each commuting distance. To allow for variation within the data, a low value and high value were calculated by multiplying the travel times with 0.8 and 1.2 respectively. For each of the travel times, they were rounded up or down as people normally work with round numbers when describing time.

For example a commuting distance for the low income of 5 km = $\frac{5}{28.33} * 60 = 10.6$. This implies that the low value for travel time:

$10.6 * 0.8 = 8$ minutes, taking the closes round figure, leads to a travel time of 10 minutes

$10.6 * 1.2 = 12.72$, taking the closes round figure, leads to a travel time of 15 minutes. This is done for all commuting distance for low and lower middle income.

This led to the travel times presented in the table below. For private cars, a peak average speed of 20 km/hr.

		commuting time per distance					
Distance		5	10	15	20	25	30
Public Transport	low	10	20	25	35	40	50
	high	15	25	30	50	65	75
Private Transport	low	10	25	35	50	60	70
	high	20	35	55	70	90	110

Appendix 2

Calculation of Cost of Transport Costs

Monthly transport costs for public transport were calculated using the table below. A 21 working day month was assumed.

Public Transport fares for Cape Town										
Distance (km)	Train				Bus				Minibus-Taxi	
	Metro Plus		Metro		2012	2004	2009	2012	2009	2012
	Single	Weekly	Single	Weekly						
0-<5	5.50	3.90	4.20	2.00	6.00	2.30		6.30	2.50-3.00	6.00
5-<10					6.00			8.40	3.00-5.00	9.00
10-<15					6.00			20.00	4.00-6.00	9.00
15-<20					6.00			15.00	5.00-7.00	20.00
20-<25	8.50	6.60	5.50	2.70	8.50			22.50	6.00-7.00	19.00
25-<35					8.50		14.60	24.00		20.00
35-<50	12.00	8.70	7.30	3.30	12.50			40.00		28.00
50-<60						14.10	20.20			
60-<70	14.50	9.70	8.50	3.80			32.90			

COCT (2006); (Roux, et al., 2012)

Cost of transport for private cars users was based on the AA calculations.

It was assumed that vehicles have an engine capacity of 1.6 thus meaning an AA rate of fuel factor of 7.88 cents. Maintenance costs were not included in the analysis. The survey took place in August so fuel costs for July were used. An average of R 12.8 per litre was used. This led to a fuel factor of R1.008 per kilometre. The calculations for the high and low value were the same as in the case of the public transport users. The resulting transport costs are given below.

private car	commuting cost per distance					
	5	10	15	20	25	30
Low	170	330	500	660	850	1000
High	250	500	750	1000	1250	1500

Appendix 3

Calculation of Number of Job advertised

To get the number of jobs advertised per commuting distance, household work trips per mode and per commuting distance (Del Mistro and Maunganidze 2012). Using this data, it was also assumed that each income group had a given rate of employee turnover. The employee turnovers were taken from (Proctor and Del Mistro, 2013). To get some variation in the data, to get the high value, the number of jobs advertised was multiplied by 1.2.

distance	Low Income					Lower Middle Income				turnover rates
	train	bus	mini bus	total	low value for number of jobs advertised	number of jobs advertised	Private	low value for number of jobs	High value for number of jobs advertised	
5	30	11	127	168	7	8	174	1	2	0.008
10	87	34	234	355	15	17	294	2	3	0.04100
15	180	66	298	544	22	27	389	3	4	1.2
20	238	97	333	668	27	33	451	4	4	
25	271	126	350	747	31	37	489	4	5	
30	280	133	364	777	32	38	506	4	5	

Appendix 4

Level balance of the design

experiment	distance	number of jobs Advertised	Change in salary	travel time	cost of transport
1	2	1	0	1	0
2	2	1	2	0	1
3	1	1	2	1	0
4	4	0	1	1	1
5	5	1	2	1	0
6	4	1	2	1	1
7	0	1	2	0	1
8	0	1	0	0	1
9	1	0	1	0	0
10	5	0	1	0	1
11	2	0	1	1	0
12	1	0	0	1	0
13	3	1	2	0	0
14	3	0	0	0	1
15	5	1	0	0	0
16	0	1	1	1	0
17	1	1	1	0	1
18	5	0	0	1	1
19	0	0	2	1	0
20	4	1	0	1	0
21	2	0	2	0	0
22	4	0	2	0	1
23	0	0	0	0	0
24	4	0	0	0	0
25	3	0	2	1	1
26	3	1	1	1	0
27	3	1	0	1	1
28	1	1	0	0	1
29	3	0	1	0	0
30	1	0	2	1	1
31	5	0	2	0	0
32	2	1	1	0	1
33	2	0	0	1	1
34	0	0	1	1	1
35	4	1	1	0	0
36	5	1	1	1	1

Appendix 5

The blocked design

From the table below, questionnaire version 1, 2, 3 and 4 were obtained. Version 1 and 2 belonged to the low income and version 3 and 4 to the lower middle income. For version 1 and 3 pairs 1 to 9 were used and for version 1 and 4 pairs 10 to 18 were used.

Pair number	Scenario 1	Scenario 2
1	1	16
2	36	4
3	19	6
4	15	25
5	2	21
6	3	30
7	33	18
8	29	35
9	9	22
10	31	8
11	10	27
12	5	32
13	34	20
14	28	14
15	13	11
16	17	26
17	7	24
18	12	23

Appendix 6

Correlation Matrix for Variables

Attributes	distance	travel time	cost of transport	change in salary	Number of jobs advertsed
distance	1				
travel time	0.86	1.00			
cost of transport	0.81	0.81	1.00		
change in salary	0.00	0.16	0.10	1.00	
Number of jobs advertsed	0.74	0.47	0.49	-0.41	1.00

Appendix 7

Research Tool: A blank questionnaire

LOW INCOME QUESTIONNAIRE 1

Date	
Tracking no.	



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

DEPARTMENT OF CIVIL ENGINEERING

The consequences of reducing trip end choices to employees.

Hello. Good day. We are conducting a survey in your area to find out how people choose jobs. Would you mind helping me by completing this survey? The information obtained from this interview is purely for research purposes and will not be used to try and sell you anything. Only aggregate results will be reported.

Having heard the purpose of this study, do I have your consent to continue with this interview?

Yes	No

PART 1: ESTABLISHING THE CURRENT SITUATION

This section is to get an understanding of your current situation in job related activities.

1. Are you currently employed?

Yes	No

2. How long did/does it take you to travel to work? -----minutes.

3. What was/is the distance between your home and your place of work?-----km

4. How much did/do you spend on transport to work each month?-----Rand/month

5. If employed, have you thought of changing your job in the past 6 months?

Yes	No

PART 2: HYPOTHETICAL JOB SEARCH SCENARIOS.

In this section, we want to understand the job attributes that guide you when deciding on which job to take. You will be presented with 9 Questions with two scenarios each. Each scenario is a hypothetical job search which is described in terms of, **distance from home, the time it will take you to travel to work, the amount of money you will spend on transport every month, potential salary increase from what you currently earn and the number of job opportunities that are advertised in the area.**

EXAMPLE: WHICH OF THE FOLLOWING 2 OPTIONS WOULD YOU PREFER?

SCENARIO 1			SCENARIO 2	
FACTORS TO CONSIDER	10 KILOMETRES FROM HOME		15 KILOMETRES FROM HOME	
TRAVEL TIME	40	PER MONTH	15	MINUTES
COST OF TRANSPORT	400	RAND PER MONTH	220	RAND PER MONTH
CHANGE IN SALARY	900	RAND PER MONTH	700	RAND PER MONTH
NUMBER OF JOBS ADVERTISED	7	PER MONTH	10	PER MONTH

PLEASE TICK THE SCENARIO YOU PREFER: SCENARIO 1 OR SCENARIO 2

B) GIVEN THE ABOVE OPTIONS, WOULD YOU RATHER STAY IN YOUR CURRENT SITUATION? YES NO OR YES NO

Q1a). Which of the following 2 options would you prefer?

Scenario 1			Scenario 2	
Factors to consider	15 Kilometres from Home		5 Kilometres from Home	
Travel time	40	Minutes	15	Minutes
Cost of Transport	530	Rand Per Month	220	Rand Per Month
Change in Salary	1000	Rand per Month	700	Rand per Month
Number of Jobs Advertised	7	Per Month	8	Per Month

Please tick the scenario you prefer: Scenario 1 OR Scenario 2

b) Given the above options, would you rather stay in your current situation? YES NO OR YES NO

Q2a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	30 Kilometres from Home	
Travel time	75	Minutes
Cost of Transport	1400	Rand Per Month
Change in Salary	700	Rand per Month
Number of Jobs Advertised	38	Per Month

Scenario 2

25 Kilometres from Home	
65	Minutes
1900	Rand Per Month
700	Rand per Month
31	Per Month

Please tick the scenario you prefer:

Scenario 1	<input type="checkbox"/>	OR	Scenario 2	<input type="checkbox"/>
------------	--------------------------	----	------------	--------------------------

b) Given the above options, would you rather stay in your current situation?

YES	<input type="checkbox"/>	OR	NO	<input type="checkbox"/>
-----	--------------------------	----	----	--------------------------

Q3a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	5 Kilometres from Home	
Travel time	15	Minutes
Cost of Transport	220	Rand Per Month
Change in Salary	500	Rand per Month
Number of Jobs Advertised	7	Per Month

Scenario 2

25 Kilometres from Home	
65	Minutes
600	Rand Per Month
500	Rand per Month
37	Per Month

Please tick the scenario you prefer:

Scenario 1	<input type="checkbox"/>	OR	Scenario 2	<input type="checkbox"/>
------------	--------------------------	----	------------	--------------------------

b) Given the above options, would you rather stay in your current situation?

YES	<input type="checkbox"/>	OR	NO	<input type="checkbox"/>
-----	--------------------------	----	----	--------------------------

Q4a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	30 Kilometres from Home	
Travel time	50	Minutes
Cost of Transport	950	Rand Per Month
Change in Salary	1000	Rand per Month
Number of Jobs Advertised	38	Per Month

Scenario 2

20 Kilometres from Home	
50	Minutes
480	Rand Per Month
500	Rand per Month
27	Per Month

Please tick the scenario you prefer:

Scenario 1	<input type="checkbox"/>	OR	Scenario 2	<input type="checkbox"/>
------------	--------------------------	----	------------	--------------------------

b) Given the above options, would you rather stay in your current situation?

YES	<input type="checkbox"/>	OR	NO	<input type="checkbox"/>
-----	--------------------------	----	----	--------------------------

Q5a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	15 Kilometres from Home	
Travel time	25	Minutes
Cost of Transport	800	Rand Per Month
Change in Salary	500	Rand per Month
Number of Jobs Advertised	27	Per Month

Scenario 2

15 Kilometres from Home	
25	Minutes
800	Rand Per Month
500	Rand per Month
22	Per Month

Please tick the scenario you prefer:

Scenario 1	<input type="checkbox"/>
------------	--------------------------

OR

Scenario 2	<input type="checkbox"/>
------------	--------------------------

b) Given the above options, would you rather stay in your current situation?

YES
<input type="checkbox"/>

OR

NO
<input type="checkbox"/>

Q6a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	10 Kilometres from Home	
Travel time	25	Minutes
Cost of Transport	280	Rand Per Month
Change in Salary	500	Rand per Month
Number of Jobs Advertised	17	Per Month

Scenario 2

10 Kilometres from Home	
25	Minutes
280	Rand Per Month
500	Rand per Month
15	Per Month

Please tick the scenario you prefer:

Scenario 1	<input type="checkbox"/>
------------	--------------------------

OR

Scenario 2	<input type="checkbox"/>
------------	--------------------------

b) Given the above options, would you rather stay in your current situation?

YES
<input type="checkbox"/>

OR

NO
<input type="checkbox"/>

Q7a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	15 Kilometres from Home	
Travel time	40	Minutes
Cost of Transport	800	Rand Per Month
Change in Salary	1000	Rand per Month
Number of Jobs Advertised	22	Per Month

Scenario 2

30 Kilometres from Home	
75	Minutes
1400	Rand Per Month
1000	Rand per Month
32	Per Month

Please tick the scenario you prefer:

Scenario 1	<input type="checkbox"/>
------------	--------------------------

OR

Scenario 2	<input type="checkbox"/>
------------	--------------------------

b) Given the above options, would you rather stay in your current situation?

YES
<input type="checkbox"/>

OR

NO
<input type="checkbox"/>

Q8a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	20 Kilometres from Home	
Travel time	35	Minutes
Cost of Transport	480	Rand Per Month
Change in Salary	700	Rand per Month
Number of Jobs Advertised	27	Per Month

Scenario 2

25 Kilometres from Home	
40	Minutes
600	Rand Per Month
700	Rand per Month
37	Per Month

Please tick the scenario you prefer: Scenario 1 OR Scenario 2

b) Given the above options, would you rather stay in your current situation? YES OR NO

Q9a) Which of the following 2 options would you prefer?

Scenario 1

Factors to consider	10 Kilometres from Home	
Travel time	20	Minutes
Cost of Transport	280	Rand Per Month
Change in Salary	700	Rand per Month
Number of Jobs Advertised	15	Per Month

Scenario 2

25 Kilometres from Home	
40	Minutes
600	Rand Per Month
1000	Rand per Month
31	Per Month

Please tick the scenario you prefer: Scenario 1 OR Scenario 2

b) Given the above options, would you rather stay in your current situation? YES OR NO

PART 3: RATING OF FACTORS CONSIDERED IN JOB CHOICES

Q10) Please rate how important you believe each of the following attributes would be to you when choosing a job.

Factor	Most important	important	slightly important	not important
Distance from Home				
Travel time				
Cost of Transport				
Change in Salary				
Number of Jobs Advertised				

PART 4: PREFERENCE FOR TRAVEL TO WORK

Imagine you had the option to choose where you work.

- 1. What is the location where you would most like to work?-----

- 2. How much would be your cost of transport for this location?-----
Rand/month

- 3. How much time will it take you to travel to work at this location?-----
minutes

- 4. Why do you prefer this location?-----

5a). Are you willing to take a decrease in salary to work in this location?

Yes	No

If No, proceed to Part 5

5b). If YES how much lower should the decrease in salary be? -----
Rand/month

5c). Why? -----

Part 5: DEMOGRAPHIC INFORMATION

1. Gender

Female	Male

2. Race

Black	White	Coloured	Indian

3. Age range

18-24	
25-34	
35-44	
45-54	
55-64	

4. What is your highest level of education?

Below Matric	
Matric/Grade 12	
Tertiary Education	

5. I am going to ask questions on your salary, given the sensitivity of this question I will not ask for the exact amount. In which income band is your salary?

R3000-R4000	
R4001-R6400	
Above R6400	
Would rather not say	
I don't know	

Thank you for participating!

Appendix 8

All estimated forced choice models

low income-forced choice												
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Log likelihood Base model	-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66	
Log likelihood Choice model	-819.2109		-811.2463		-811.6768		-825.6694		-825.6694		-811.8714	
Rho-squared	0.3434		0.34979		0.34944		0.33823		0.33823		0.34929	
Number of Observations	3600		3600		3600		3600		3600		3600	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.0874	0.0001										
Travel Time	-0.0141	0.0264	-0.0207	0.0037	-0.0211	0.0027	-0.0201	0.0032	-0.0201	0.0032	-0.0228	0.0005
Cost of transport	-0.0014	0.0000	-0.0009	0.0197	-0.0010	0.0012	-0.0010	0.0007	-0.0010	0.0007	-0.0010	0.0014
change in salary	0.0013	0.0000	0.0015	0.0000	0.0016	0.0000					0.0016	0.0000
Number of jobs Advertised	0.0121	0.3269	0.0147	0.3539								
DIST1			2.1127	0.0013	1.6527	0.0001	1.5082	0.0002	1.2866	0.0004	1.5276	0.0000
DIST2			2.0135	0.0001	1.6585	0.0000	1.5055	0.0000	1.2839	0.0000	1.5609	0.0000
DIST3			1.3427	0.0022	1.0058	0.0000	1.1898	0.0000	0.9682	0.0000	0.9393	0.0000
DIST4			1.2114	0.0000	1.0627	0.0000	0.9718	0.0000	0.7501	0.0000	1.0066	0.0000
DIST5			0.1249	0.4492	0.1021	0.5329	0.2216	0.1621				
DIST6								-0.2216	0.1621			
Lower income-forced choice												
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Log likelihood Base model	-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66	
Log likelihood Choice model	-805.925		-792.3099		-793.4418		-794.815		-794.8874		-793.4709	
Rho-squared	0.35405		0.36497		0.36406		0.36296		-0.3629		0.36404	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.0478	0.1300										
Travel Time	-0.0153	0.0244	-0.0257	0.0004	-0.0227	0.0011	-0.0165	0.0047	-0.0165	0.0048	-0.0218	0.0002
Cost of transport	-0.0017	0.0004	-0.0017	0.0008	-0.0013	0.0026	-0.0009	0.0112	-0.0009	0.0105	-0.0012	0.0007
change in salary	0.0004	0.2226	0.0009	0.0313	0.0006	0.0949	1.9762	0.0000			0.0006	0.0188
Number of jobs Advertised	-0.0029	0.8503	-0.0318	0.1343								
DIST1			0.0640	0.9466	1.1873	0.0465			1.6943	0.0000	1.3077	0.0001
DIST2			0.1917	0.7974	0.9955	0.0582	1.6808	0.0000	1.3996	0.0000	1.1007	0.0002
DIST3			-0.6037	0.3062	0.0489	0.9027	0.5745	0.0191	0.2967	0.1836	0.1261	0.5997
DIST4			0.1520	0.6899	0.4193	0.2172	0.8917	0.0000	0.6139	0.0002	0.4890	0.0062
DIST5			-0.2422	0.4074	-0.0649	0.8094	0.2810	0.0973				

Appendix 9

All estimated Unforced choice models

LOW INCOME	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9		Model 10		Model 11		Model 12		
Log likelihood Base model	-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		-1974.21		
Log likelihood Choice model	-1610.61		-1610.58		-1559.29		-1590.71		-1592.04		-1592.75		-1581.04		-1589.53		-1580.60		-1579.10		-1579.88		-1579.90		
Rho-squared	0.18		0.18		0.19		0.19		0.19		0.19		0.20		0.19		0.20		0.20		0.20		0.20		
Number of Observations	5400		5400		5400		5400		5400		5400		5400		5400		5400		5400		5400		5400		
Attributes	β	p-value	β	p-value	β	p-value	β	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.0052	0.3983	-0.0048	0.4482																					
Travel Time	-0.0079	0.0039	-0.0078	0.0046	-0.0059	0.0138	-0.0057	-0.0052	0.0297	-0.0055	0.0221			-0.0058	0.0158	-0.0023	0.3495	-0.0031	0.2119						
Cost of transport change in salary	-0.0010	0.0000	-0.0010	0.0000	-0.0010	0.0000	-0.0010	-0.0010	0.0000	-0.0010	0.0000	-0.0010	0.0000	-0.0009	0.0000	-0.0009	0.0000	-0.0009	0.0000	-0.0010	0.0000	-0.0010	0.0000	-0.0010	0.0000
Number of jobs Advertised	-0.0002	0.0260	-0.0002	0.1501	0.0001	0.4846	0.0002			-0.0002	0.0187	-0.0002	0.0215			-0.0002	0.0174	0.0001	0.7576	0.0000	0.8695				
	-0.0276	0.0000	-0.0286	0.0000	-0.0113	0.0911				-0.0255	0.0000	-0.0192	0.0000	-0.0134	0.0244	-0.0203	0.0000	-0.0128	0.0314	-0.0125	0.0357	-0.0129	0.0163		
DIST1					0.4940	0.0031	0.6467	0.6607	0.0000	0.2348	0.0785	-0.2884	0.0031	0.4713	0.0040										
DIST2					0.0883	0.4911	0.1489	0.1633	0.1844	-0.0345	0.7716	-0.4175	0.0000	0.0828	0.5170	-0.2779	0.0046	-0.2908	0.0031	-0.3029	0.0020	-0.3010	0.0020		
DIST3					-0.0301	0.7898	0.0076	0.0282	0.7969	-0.1000	0.3605	-0.4411	0.0002	-0.0290	0.7969	-0.4024	0.0001	-0.4309	0.0000	-0.4467	0.0000	-0.4439	0.0000		
DIST4					-0.0091	0.9379	-0.0405	-0.0437	0.7037	-0.0173	0.8825	-1.1729	0.0000	-0.0039	0.9731	-0.3976	0.0016	-0.4488	0.0005	-0.4986	0.0000	-0.4949	0.0000		
DIST5					-0.7651	0.0000	-0.8084	-0.7753	0.0000	-0.7142	0.0000	-0.8654	0.0000	-0.7442	0.0000	-1.1207	0.0000	-1.2039	0.0000	-1.2610	0.0000	-1.2537	0.0000		
DIST6																-0.8146	0.0000	-0.8466	0.0000	-0.9081	0.0000	-0.9063	0.0000		

Appendix 10

Estimated models for individuals who indicated that they would / would not take a salary decrease

forced choice														
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
Log likelihood Base model	-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66	
Log likelihood Choice model	-660.38		-665.61		-656.19		-656.70		-656.19		-656.19		667.89	
Rho-squared	0.32		0.33		0.33		0.33		0.33		0.33		0.32	
Number of Observations	1412.00		1412.00		1412.00		1412.00		1412.00		1412.00		1412.00	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.08	0.00												
Travel Time	0.00	0.58	-0.01	0.14					-0.01	0.22	-0.01	0.22	-0.03	0.00
Cost of transport	0.00	0.00	0.00	0.00	-0.01	0.22	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
change in salary	0.00	0.18	0.00	0.03	0.00	0.01	0.00	0.11	0.00	0.05	0.00	0.05	0.00	0.00
Number of jobs Advertised	0.00	0.80	-0.02	0.28	0.00	0.05					1.84	0.00		
DIST1			1.38	0.07	2.04	0.00	2.42	0.00	2.04	0.00				
DIST2			1.32	0.02	1.80	0.00	2.06	0.00	1.80	0.00				
DIST3			0.49	0.32	0.91	0.00	1.15	0.00	0.91	0.00				
DIST4			0.72	0.01	0.89	0.00	1.01	0.00	0.89	0.00				
DIST5			0.14	0.51	0.20	0.30	0.31	0.08	0.20	0.30				
DIST6														
DIST1a											-0.20	0.30	0.74	0.00
DIST2a											1.60	0.00	-0.60	0.01
DIST3a											0.71	0.01	0.37	0.03
DIST4a											0.69	0.00	-0.37	0.02
DIST5a														
DIST1a is Distance 5 and Distance 10 combined(if DIST<10 DIST1a=1 otherwise 0)														
DIST2a (if DIST=15 DIST2a=1 otherwise 0)														
DIST3a (if DIST=20 DIST3a=1 otherwise 0)														
DIST4a(if DIST= 25 DIST4a=1 otherwise 0)														

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
Log likelihood Base model	-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66		-1247.66	
Log likelihood Choice model	-1295.39		-1283.43		-1284266.00		-1294.36		-1283.59		-1284.29			
Rho-squared	0.36		0.37		0.37		0.36		0.37		0.37			
Number of Observations	2925.00		2925.00		2925.00		2925.00		2925.00		2925.00		2925.00	
Attributes	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Distance	-0.0554	0.0031												
Travel Time	-0.0178	0.0004	-0.0242	0.0000	-0.0230	0.0000			-0.0229	0.0000	-0.0225	0.0000		
Cost of transport	-0.0017	0.0000	-0.0015	0.0000	-0.0013	0.0000	-0.0016	0.0000	-0.0015	0.0000	-0.0013	0.0000		
change in salary	0.0006	0.0024	0.0010	0.0000	0.0008	0.0001	0.0006	0.0062	0.0009	0.0000	0.0008	0.0000		
Number of jobs Advertised	0.0016	0.8752	-0.0171	0.1970										
DIST1			0.6839	0.2050	1.2430	0.0001	2.2590	0.0000						
DIST2			0.7922	0.0579	1.2046	0.0000	1.8973	0.0000						
DIST3			0.1611	0.6511	0.5295	0.0123	1.1119	0.0000						
DIST4			0.5466	0.0061	0.6973	0.0000	1.0208	0.0000						
DIST5			-0.0812	0.5808	-0.0279	0.8423	0.2523	0.0478						
DIST6									-0.0150	0.2362				
DIST1a									0.8525	0.0554	1.2810	0.0000		
DIST2a									0.9243	0.0069	1.2355	0.0000		
DIST3a									0.2673	0.3717	0.5525	0.0018		
DIST4a									0.6157	0.0001	0.7164	0.0000		
DIST5a														
DIST1a is Distance 5 and Distance 10 combined(if DIST<10 DIST1a=1 otherwise 0)														
DIST2a (if DIST=15 DIST2a=1 otherwise 0)														
DIST3a (if DIST=20 DIST3a=1 otherwise 0)														
DIST4a(if DIST= 25 DIST4a=1 otherwise 0)														
DIST5a(if DIST= 30 DIST5a=1 otherwise 0)														