The Effects of Antecedents and Macro-Social Marketing Strategies in Retention of Women in Science, Technology, Engineering and Mathematics (STEM) Careers in Kenya

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Declaration

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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Approval

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Abstract

The Science, Technology, Engineering and Mathematics (STEM) labour market is plagued with a wicked gender diversity issue attributed to women leaving the field at an alarmingly high rate. This is perturbing since a diverse labour market in STEM is vital to the growth of the economy and general development of nations, as it ensures proper utilization of human capital, enhances creativity and satisfaction within the diverse customer base. It is thus not surprising that this global phenomenon particularly afflicts developing nations, more so in Africa, as women make up only 30% of the STEM labour market. However, there is little evidence from developing nations on the phenomenon since most studies conducted were in 'industrialized countries'. Further compounding this travesty is the notable paucity of literature on the issue of retention within career paths, particularly within STEM. Therefore, this study posits that to retain women in STEM careers it is essential to use a macro social marketing perspective to gain a system wide understanding of the complicated problem in order to create successful multilevel retention strategies. This study therefore implemented a sequential exploratory mixed method design as it sought to establish the career retention intentions, the antecedents of retentions behaviour of women in the STEM labour market in Kenya and how the antecedents influenced retention behaviours. The sequential exploratory mixed method design had an initial qualitative phase of data collection and analysis, followed by a phase of quantitative data collection using a survey tool designed from the qualitative results. The qualitative results comprised eleven antecedents of retention intentions, which were, 'support of family and friends', 'work environment', 'passion', 'sense of belonging', 'work family conflict', 'career mentorship', 'self-efficacy', 'expectation fulfilment', 'perception of societal contribution', 'career sustainability and growth' and 'female role models' . The quantitative data collected using the survey was analysed using descriptive statistics, Pearson's correlation and multiple regressions to validate the qualitative findings. Women in STEM were found to have low retention intentions. A 75.6%of those with low retention intentions were respondents who had less than five years working experience. All the antecedents, except work-family conflict had a positive significant relationship with retention intentions. Work-family conflict had a negative relationship that was not

statistically significant. Furthermore, 'sense of belonging', 'support of family and friends, 'career sustainability and growth', 'expectation fulfilment' and 'passion', explain 78.4% of the variance of retention intentions. It can thus be concluded that the retention of women in STEM careers in Kenya, a developing country, is a concern, a finding that is consistent with similar studies conducted in developed countries. The antecedents and their relationships to each other were further mapped into a behavioural ecological framework and it was determined that relationships existed between several actors from all levels of the system environment and the factors of influence that were raised. this study enhances the discussion on career retention as it not only identifies factors that influence retention in STEM careers, but it also shows, using systems thinking, that the factors and actors in the STEM career system are interrelated. The interrelationships between the antecedents point to multiple root causes of the lack of retention among women in STEM careers in Kenya. Multilevel, system wide interventions that will influence all the relevant players in the system need to be created and implemented for effective change to take place in the STEM career system in Kenya. Furthermore, this study addressed a contextual gap as it contributes to the subject knowledge of career retention among women in STEM in Kenya, a developing country in Africa; previous studies on women in STEM were mainly conducted in developed countries. It also unveils the society level efficacy of macro-social marketing in career management and in a developing country context.

Keywords: Macro social marketing, systems thinking, retention, women, STEM, multilevel interventions.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Although marketing is probably as old as human civilisation itself, the popularity and pervasiveness of marketing is a relatively recent phenomenon (Jones & Shaw, 2002; Mason, 1998; Minowa & Witkowski, 2009; Moore & Reid, 2008; Shaw & Jones, 2005). Bartels(1988), in his seminal work, proposes that the term 'marketing' was first used 'as a noun', that is, as a label for a particular practice, sometime 'between 1906 and 1911' . However, this historical backdrop has been challenged by Brussière (2000) who postulates that people were writing about marketing before 1906. Brussière's review of the publications of the American Economic Association showed that the term marketing was used in 1897. Tamilia (2009), on the other hand, suggests that it was used even earlier than this in the Quarterly Journal of Economics.

Marketing was initially viewed by most scholars as a specialist function that focused on managing decision-making areas that bring about exchanges that satisfy both customers and firms (Grönroos, 2006; Kotler, 1967) . This perspective is founded on a goods-centred model of economic exchange which was developed during the Industrial Revolution (Shaw, 1912). The model has a dominant logic based on the distribution and exchange of "goods" which are usually commodities and manufactured products (Vargo & Lusch, 2004).

However in the past fifty years, marketing science has expanded beyond the exchange of "goods" and managerial issues mostly centred around the primary objective of garnering profits, broadening its perspectives to encompass the satisfaction of the needs of all stakeholders in the business network which also includes the broader society (Greer, Lusch, & Vargo, 2016; Grönroos & Gummerus, 2014). Social marketing as a sub discipline is therefore gaining traction as scholars generally agree that marketing can provide solutions to small and immediate issues such as individual customer satisfaction, as well as solve large, long term societal problems such as poverty, obesity and water shortages (Webster & Lusch, 2013).

The pivotal role that social marketing plays as an effective consumer-oriented approach to enhance behavioural change and improved well-being for individuals, communities,

and society is well documented in extant literature (Kennedy, 2015; Kotler, Roberto, & Leisner, 2006). Macro-social marketing is the use of social marketing techniques in a holistic way to effect systemic change, as opposed to individual level change Kennedy, 2016). Its' tools are commonly used by government agencies and non-profit organisations to facilitate behaviour change in individuals in relation to poverty, health and physical activity, smoking cessation, helmet use, drunk driving prevention, nutrition and environmental conservation (Dholakia, 1984; Kennedy, 2015; Truong & Hall, 2015).

According to Kennedy (2015), our understanding of macro-social marketing interventions that seek to generate societal change, particularly in developing countries is very limited. Thus, there is a burning desire to unveil the society level efficacy of social marketing in various fields and contexts other than public health in Western countries. Such knowledge is important not only because of the extent to which it should impact any behavioural intervention strategy but also because it would enrich the growing literature on social marketing's contribution to engendering societal change other than individual change. Such research would help expand the social marketing discipline and better connect it with other marketing disciplines including macro marketing. By adopting a macro-marketing perspective, social marketing programs can be designed which are compatible with individual as well as collective welfare and which are equitable in their impact on society (Dholakia, 1984b). This study bridges the above gap in literature by using the macro-social marketing perspective to better understand the antecedents of retention among women in Science Technology Engineering and Mathematics (STEM) careers.

1.2 STEM Workforce in Kenya

Courses in Science, Technology, Engineering and Mathematics (STEM) have been offered in East Africa since the inception of Makerere Technical College, the first Higher Education Institution created to serve the East African Region, in 1922 (Inter-University Council for East Africa, 2013; Teferra & Altbach, 2003). Demand for Higher Education courses, both STEM and non-STEM courses, in East Africa increased since then and contributed significantly to the increase in the number of universities,

especially in Kenya(Onsongo, 2007). The surge in demand for higher education, more so after the three nations attained their independence from Britain, was an echo in response to the rising need for a trained workforce that was necessary in the building of a nation (Abagi, Nzomo, & Otieno, 2005; Oketch, 2009).

However, even in the midst of a growing STEM workforce, one of the major challenges Kenya, is facing is gender disparity (Kvasny, Payton, Mbarika, Amadi, & Meso, 2008; Onsongo, 2007). Kenya, in particular, has less than 30% of women making up the STEM workforce (UNESCO Institute for Statistics, 2016). Be that as it may, the underrepresentation of women in STEM fields is not unique to Kenya, rather, it is a global phenomenon that has affected both developed and developing nations (Beede, Julian, & Langdon, 2011; Blickenstaff, 2005; Campion & Shrum, 2004; Diekman, Weisgram, & Belanger, 2015; Onsongo, 2009). However, there is little evidence so far from developing nations, more so in Africa, as research on the phenomenon, has mostly been in the context of western 'industrialized' countries (Beoku-betts, 2004).

Science, technology, engineering and mathematics (STEM) are some of the fields projected to develop the most in the future due to the, innovation fuelled, global economy that is emerging (Syed & Chemers, 2011). The underrepresentation of women in the workforce is therefore perturbing since a diverse labour market in STEM is posited to be vital to the development of nations, as it ensures proper utilization of human capital, since women make up about half of the general population worldwide (Ong, Wright, Espinosa, & Orfield, 2011). Moreover, a diverse labour market enhances creativity and satisfaction within the diverse customer base (Blickenstaff, 2005).

1.3 The Underrepresentation of Women in STEM

Despite nearly attaining equality in several fields that were once considered male dominated, such as law and medicine, women remain a minority group in science, technology, engineering, and mathematics (STEM) occupations and higher education programmes(Diekman, Brown, Johnston, & Clark, 2010). Industry leaders, governments and educators, all around the world, are therefore expending a lot of effort to attract women into STEM lecture rooms and into STEM professions, which are

traditionally male-dominated, by encouraging affirmative action and by introducing diversity management programmes (Beoku-betts, 2004; World Bank, 2002).

Furthermore, a lot of research has been done on factors that influence the recruitment of women into STEM careers (Cheryan, 2012; Diekman et al., 2015; Evans, Coon, & Ume, 2011). Scholars have also carried out extensive studies on factors that influence the participation of women in STEM careers positing that factors such as biology, stereotypes, individual characteristics, gender bias, societal expectations, organisational conditions and goal congruence influence the role that women play in STEM careers (Campion & Shrum, 2004; Garforth, Lisa and Kerr, 2009; Hackett & Betz, 1981; Hilbert, 2011; Jawahar & Hemmasi, 2006). There is, however, paucity of literature on the issue of retention within career paths, particularly within STEM careers despite it being widely acknowledged by scholars that the rate at which women are leaving STEM careers is alarming (Angier, 1995; Diekman et al., 2015).

Research shows that women in STEM are more likely to leave their careers as compared to women in non-STEM careers (George-Jackson, 2011; Morganson, Jones, & Major, 2010).Thus, despite an increase in the number of women enrolling for STEM programmes at higher education institutions, women are leaving the STEM pipeline at every point (Etzkowitz, Kemelgor, & Uzzi, 2000). The 'STEM pipeline', a term used to allude to the STEM career path, is posited to begin at the entry of students into a Higher Education Institution to pursue a STEM course or major and ends ideally, during the retirement of the individual from the STEM workforce after serving at a high ranking position (Robnett, 2015; Syed & Chemers, 2011).

The STEM pipeline seems to lose (leak) women at various points: women, who have been interested in pursuing STEM careers, change their minds and choose other majors when applying to Universities (Angier, 1995; Diekman et al., 2015). Other women change their majors just before graduation after pursuing STEM courses for several years in University (Blickenstaff, 2005). Some elect to have non-STEM related careers after completing a STEM degree (Xu, 2013). While others, who have already started their careers in STEM, leave or drop out of these careers at the point when they should be progressing upwards (Angier, 1995; Blickenstaff, 2005). The limited retention

among women in STEM is therefore one of the major contributors to their underrepresentation. The primary issue of focus in this discussion of the underrepresentation of women in STEM should therefore be that of retention.

1.4 Retention of Women in STEM

The discussion on the retention of women in STEM has been mostly in the context of education institutions with most of the studies focusing on the retention of female students in STEM majors and the factors that influence their retention (Chen, 2013; H. Kim, 2016). The few career retention studies carried out in STEM fields that focussed on women in non-academic STEM careers conducted the study, whilst wearing a micro-perspective lens, focussing on individual behaviour change and issues from an organisational context (employee/job retention) (Stephan & Levin, 2005). However, studies have shown that some employees leave organisations or jobs without necessarily leaving a career path or profession (Diekman et al., 2015)(Diekman, Steinberg, Brown, Belanger, & Clark, 2016; Ly & Turk-bicakci, 2013; Xu, 2013)(Diekman, Steinberg, Brown, Belanger, & Clark, 2016; Ly & Turk-bicakci, 2013; Xu, 2013)(Diekman, Steinberg, Brown, Belanger, & Clark, 2016; Ly & Turk-bicakci, 2013; Xu, 2013)(Diekman, Steinberg, Brown, Belanger, & Clark, 2016; Ly & Turk-bicakci, 2013; Xu, 2013)(Diekman, Steinberg, Brown, Belanger, & Clark, 2016; Ly & Turk-bicakci, 2013; Xu, 2013). Furthermore, literature also holds evidence that the environment also has a significant to play in the retention of women and thus the issue of the retention of women cannot be resolved solely through the actions of women in the STEM careers.

Changing of organisations or jobs within a field during the course of one's career is particularly prevalent now due to the dynamic nature of labour markets which often relates career development to job migration as development opportunities usually necessitate moving to other organisations (Nicholson, 1996). An individuals' career in this generation therefore likely includes work experience in several organisations during the course of their working years rather than spending all their working years in one organisation, as it was in the past (Baruch, 2004). It is thus critical to distinguish between employee/job retention and career retention (which is the macro-perspective, a societal/national perspective, of the retention of a workforce) and not use the terms

interchangeably. Furthermore, given that the issue raising societal concern is the career migration from STEM fields and not job migration within STEM careers, there is a critical knowledge gap concerning retention within STEM careers from a macro-perspective that perceives career paths as systems that are multi-directional, fluid, dynamic and likely encompassing multiple organisations (Baruch, 2004).

Due to the paucity of literature on career retention among women in STEM careers, formative research, the first step in the social marketing framework, will be needed to understand the women in STEM, their perception of their retention behaviour in the STEM career path and the associated antecedents. A mixed methods approach employing the sequential exploratory design was therefore used in this study to identify important variables that influence retention among women in STEM. This is the research design needed when it is necessary to clarify and improve the knowledge of constructs important to a study (Creswell, 2007).

1.5 Problem Statement

In an article published in the New York Times on May 14, 1995, titled 'The Nation; Why Science Loses Women in the Ranks' the metaphor of 'a leaky pipeline' was used to describe the underrepresentation of women in science, technology, engineering and mathematics (STEM) disciplines. Women in STEM are basically in, "a pipe that begins with a high-pressure surge of young women at the source -- a roiling Amazon of smart graduate students -- and ends at the spigot with a trickle of women prominent enough to be deans or department heads at major universities " (Angier, 1995, p. E5).

Despite the significant improvement in the number of women entering STEM professions, the metaphor is still applicable because the number of women reaching high-level positions is still quite low (Etzkowitz, Kemelgor, & Uzzi, 2000). The persistence of women in the STEM disciplines is a complex issue that needs resolving for the successful creation and management of a diverse workforce which is vital due to the development of nations all across the globe (Benschop & Brouns, 2003). In addition to national development, a diverse workforce in STEM, also results in enhanced creativity, heightened consumer satisfaction and proper utilization of human capital (Ong et al., 2011; Syed & Chemers, 2011).

Consequently, this study applied a macro social marketing perspective to the issue of retention among women in STEM careers in Kenya, to better understand the problem and determine the factors that influence retention behaviour from the women in the STEM careers' perspective. Macro social marketing perspective was applied in the following ways: 1) by treating the issue of the retention of women in STEM as a wicked problem, 2) using the marketing principles of product, price, place, promotion, people, partnerships and policy to understand the career system and the retention problem and create multilevel interventions for it, 3) applying a customer centric approach to the study by using the women in STEM, assumed to be the customers, as the respondents, 4) using systems thinking to better understand the STEM career system, 5) by conducting formative research to explore the perspectives of the women in STEM and the factors influencing them.

It is generally agreed amongst scholars that to change the behaviour of human beings, it is necessary to first understand why they behave the way they do (Kotler, 1965; Prestin & Pearce, 2010). Therefore, the first step in behavioural change involves the conducting of formative research which provides in depth understanding of the target market, their perception towards the preferred behaviour and its associated benefits and antecedents or barriers (Carins, Rundle-Thiele, & Fidock, 2016). This study therefore sought to conduct formative research, carried out using sequential exploratory mixed methods research design, to determine the retention intentions and the antecedents of retention intentions from the perspective of women in STEM careers in Kenya. A qualitative study, which involved the collection and analysis of stories and information on women's experiences in STEM careers to identify the conditions, contexts and factors influencing their career retention decisions, was conducted first. Due to the vastness of the STEM pipeline, which extends from the entry of students into a Higher Education Institution to pursue a STEM course or major and ends ideally, during the retirement of the individual from the STEM workforce after serving at a high-ranking position, this study focused on two unique groups of women within the pipeline? The women who had left STEM careers to pursue non-STEM careers and women who had persisted in STEM for at least ten years since people serving longer in particular careers were

unlikely to quit (Cotton & Tuttle, 1986; Lewis & Park, 1989). The two groups provided the study with diverse viewpoints. The resulting themes of the qualitative study were then used as variables for the quantitative tool that was developed for the second phase of the study to assess the generalisability of these variables to a large number of women pursuing STEM careers in Kenya. Systems thinking, one of the strategies of macro-social marketing was then implemented through the mapping of the influences and insights that were raised in the qualitative study into an ecological model. The mapping established the nature of the relationships that exist between the actors, influences and elements in the Kenyan STEM career system. The study therefore explored the effects of antecedents and macro-social marketing strategies in retention of women in STEM careers in Kenya.

1.6 Research Objectives

General Research Objective

To determine the retention intentions and the effects of antecedents and macro-social marketing strategies of retention behaviour among women in the STEM labour market in Kenya.

Specific Research Objectives

Phase One:

1. To explore the factors that have influenced women with more than ten years work experience in STEM fields in Kenya to persist in their careers.
2. To explore the factors that influenced women to leave careers in STEM fields in Kenya to pursue careers in non-STEM fields.
3. To map the relationships that exist between the influences of retention in Kenya's STEM career system.

Phase Two:

4. To validate the factors obtained in the qualitative study through a subsequent survey amongst women currently pursuing STEM careers in Kenya
5. To measure the retention intentions of women in STEM careers in Kenya.

1.7 Research Questions

General Research Question

What are the retention intentions and the effects of antecedents and macro-social marketing strategies on the retention behaviour of women in the STEM labour market in Kenya?

Specific Research Questions

Phase One:

1. What influences the decision of women who have more than ten years work experience in STEM fields in Kenya to persist in their careers?
2. What influences the decision of women to leave their careers in the STEM fields in Kenya to pursue non-STEM careers?
3. How do the influences of retention in Kenya's STEM career system relate to each other?

Phase Two

4. To what extent are the factors from the qualitative study generalizable to the women pursuing STEM careers in Kenya?
5. What are the retention intentions of women in STEM careers in Kenya?

1.8 Scope of the Study

The population of interest was women in Kenya who were in STEM careers and women in Kenya who trained in Science, Technology, Engineering and Mathematics (STEM) disciplines, worked within those disciplines for a while and later quit to either pursue a career in a non-STEM discipline or quit working all together

In the first phase of the research (which was qualitative in design), a sample was drawn from two sub-sets of the population to provide insights and a comprehensive analysis of the experiences of women in STEM and the factors that influence their career retention. The first subset comprised of women in Kenya who trained in Science, Technology, Engineering and Mathematics (STEM) disciplines, worked within those disciplines for some time but later left to either pursue a career in a non-STEM discipline or quit

working all together. The second subset comprised of women currently in science, technology, engineering and mathematics (STEM) careers in Kenya, with more than ten years STEM work experience.

In the second phase of the study (quantitative study) the study targeted women in various STEM careers; working in academic, research and industry institutions.

1.9 Contribution to Knowledge

Kenya is a developing country that is growing especially in the areas of Science, Technology, Engineering and Mathematics (Onsongo, 2009). Furthermore, the global economy has created a market that has diverse clients, therefore diversity among the professionals in STEM is also needed to serve them (Blickenstaff, 2005). This study therefore provides critical policy and practice recommendations that will aid in the development of a stronger gender diverse labour market that the Kenyan government and the organisations operating within it sorely need. These policies will aid in plugging the leaks identified in the STEM pipeline for women.

This study provides a methodological contribution to knowledge since the study employed a sequential mixed methods research design. Most studies on women in STEM, in both Higher Education and Industry, have done either a qualitative study or a quantitative study (Deemer, 2015; George-Jackson, 2011). The use of a sequential exploratory mixed method approach is rare in this field. The sequential exploratory mixed method approach enhanced the quality of research and consequently provided a significant contribution to this area of study since this approach provides a more comprehensive assessment of the phenomenon.

This study therefore contributed theoretically to the field of career management is made in this study as it used a unique way of approaching a career management issue by borrowing the perspective of macro social marketing which applies systems thinking and uses formative research to better understand the issue at hand from the customer's perspective. Additionally, this study enhances the discussion on career retention as it not only identifies factors that influence retention in STEM careers, but it also shows, using systems thinking, that the factors and actors in the STEM career system are

interrelated. Multilevel interventions are therefore needed in resolving retention issues in career systems.

Furthermore, previous studies on women in STEM were mainly conducted in developed countries (Beoku-betts, 2004). This is of concern because factors that are likely to influence the underrepresentation of women in STEM may be different between those in developed and developing countries because living conditions, opportunities and threats differ decisively (Hilbert, 2011). This study therefore addressed this contextual gap as it contributes to the subject knowledge of career retention among women in STEM in Kenya, a developing country in Africa. It also unveils the society level efficacy of macro-social marketing in career management and in a developing country context.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews relevant theoretical literature that focuses on the study's foundational theories and concepts of the macro-social marketing perspective, these are social marketing, the marketing mix, systems theory, and wicked problems. The social marketing framework, marketing principles and social marketing limitations are expounded upon in the first section to generate general understanding on social marketing. To better understand the macro-social perspective, its theoretical framework is then discussed in the next section. The section begins with a discussion on the concept of wicked problems and the use of systems thinking in understanding them. Systems theory is then discussed and used to explain how the macro-social marketing perspective can be used to resolve with wicked problems. Finally, the last section focuses on the theory of reasoned action, touching on its origin and expounding on how it has been used in the study to operationalise and measure retention behaviour among women in STEM careers in Kenya.

2.2 Theoretical Framework

Macro-social marketing, which is the use of social marketing concepts and techniques to better understand and resolve wicked problems so as bring about behavioural change for the good of society(Huff, Barnhart, Mcalexander, & Mcalexander, 2017; Ann-Marie Kennedy, 2017), is the founding theory in this study. This section therefore discusses the key concepts and theories that ground macro-social marketing from section 2.2.1 to section 2.2.6. A discussion of how the macro-social marketing perspective was used in this study is then found in section 2.2.7. 2.2.8 and 2.2.9.

2.2.1 Social Marketing

Social marketing is the use of marketing concepts to influence or change individual behaviour and advance the acceptability of ideas or practices that resolve social problems such as smoking and obesity (Andreasen, 1994; Martam, 2016). It utilises a consumer orientation in the development and implementation of its strategies in order to

realize its goals (Lefebvre & Flora, 1988a). This orientation is supported by the general acknowledgement by scholars that it is necessary to first understand why humans behave the way they do, if behavioural change is to be attained(Carins et al., 2016; Kotler, 1965; Lowe, Lynch, & Lowe, 2015).

Given their consumer orientation, the social marketing framework's first step involves the conducting of formative research which provides in depth understanding of the target market, their perception towards the preferred behaviour and its associated benefits and antecedents or barriers (Carins et al., 2016). Quantitative, qualitative or mixed research methods can be used to develop a detailed profile of factors that influence the behaviour of the target audience (Kotler et al., 2006; Teddlie & Tashakkori, 2006) . The findings of the formative research make it possible for the rest of the social marketing framework steps which are: the creation of the strategies and materials to achieve the intended goals and overcome the barriers, piloting and the eventual implementation of the strategies and materials and the evaluation of the campaign program, to take place effectively and efficiently (Prestin & Pearce, 2010).

2.2.2 Marketing Mix

Social Marketing integrates and develops marketing concepts and technologies with other approaches from social science to influence behaviours that benefit individuals and communities(Andreasen, 1994). The marketing principles of the marketing mix form the main foundation of social marketing as they play a central role in the creation of strategies and campaigns(Lefebvre & Flora, 1988a). The marketing mix was initially introduced by Neil Borden in the 1950s as a list of categories of marketing variables that can be mixed in various ways, depending on the market forces experienced, to achieve profitability or satisfaction(Borden, 1984). Other marketing scholars refined this further and posit that the marketing mix is a set of controllable variables which can be used by organisations or marketers to influence the target market(Grönroos, 1994; Rafiq & Ahmed, 1995).

Despite having gained some consensus on the definition of a marketing mix, there is conflict in extant literature concerning the elements that make up the marketing mix(Rafiq & Ahmed, 1995). There are two major conflicting perspectives: the perspective that the elements of the marketing mix are limited to the major 4Ps (Price, Product, Place and Promotion) and the perspective that aligns to the original argument that holds that the list of elements in a marketing mix may vary in different marketing contexts(David & Martina, 2011; Grönroos, 1994). The 4Ps framework has however been heavily criticised by marketing scholars as too simplistic and insufficient to deal with the increasingly complex marketing forces(Rafiq & Ahmed, 1995). Various modifications have consequently been suggested by scholars to adequately address the uniqueness in various marketing contexts (Grönroos, 1994; Ivy, 2012; Vignali, 2001), clearly indicating a gradual re-adoption of the original argument(Borden, 1984), which this study adopted too, that holds that the marketing mix elements may vary in different marketing contexts.

In social marketing, the traditional 4Ps have been used to make up the mix of ingredients that were used to either sabotage an offending product or in the creation of a social marketing strategy (Kennedy, 2015). The behaviour that is appropriately packaged to meet the needs and wants of the target market, such as retention behaviour, responsible drinking or healthy eating, is the product (Lefebvre & Flora, 1988a). Price is the psychological, social, time, energy or economic cost that the target market needs to pay to obtain the product or take up a behaviour (Kennedy, 2015). Thus, in social marketing the aim is on decreasing the cost of involving a person with the issue or behaviour (Kennedy, 2017) rather than the typical marketing concept of setting prices in order to maximise profits.

Place refers to the response channels and the accessibility and distribution of the product, while promotion refers to the persuasive content and communication strategies that will create product awareness within the target market even as it makes the product, familiar, desirable and acceptable (Kotler & Zaltman, 1971). People refers to the community groups such as the media, support groups or professional associations,

found within the system environment, that are likely to influence the adoption of a behaviour(Luca, Hibbert, & McDonald, 2016). Partnerships refer to the alliances and relationships that can be formed among the actors of a system to deal with a societal issue(Kennedy, 2015). The interdependent nature of actors and elements in a society means that behaviours tend to be co-created and partnerships are therefore critical (Domegan et al., 2016). Policies refer to the regulations that can be created by decision making groups to enforce the adoption of new societal behaviours or norms (Head & Alford, 2015). Policies can enhance the effectiveness and the speed of adoption of new behaviours in a system (Kennedy, 2015).

2.2.3 Limitations of Social Marketing

Behaviour modification of individuals is generally the main goal for most social marketing solutions(Kotler & Zaltman, 1971). These programmes typically involve campaigns aimed to alter the attitudes that enhance unhealthy behaviour and to correct or increase knowledge of the subject in focus(Lefebvre & Flora, 1988a; Truong & Hall, 2015). Additionally, social marketers may provide alternative products to aid in replacing unhealthy behaviours with healthy behaviours (Andreasen, 1994). These solutions are generally successful and effective when the problem is well understood and when its causes are correctly identified and are largely under the control of the individual (Domegan et al., 2016).

Social marketing assumes that it is possible to effectively understand the societal problem and thus create fixed social marketing goals (Andreasen, 1994). Furthermore social marketing, which is an aspect micromarketing, places great emphasis on outcomes(Kotler & Zaltman, 1971). Thus if, the social marketing goals are not attained the programmes are considered ineffective. These assumptions provide a limitation when dealing with complex societal issues such as environmental degradation, obesity or even, poverty (Venturini, 2016). A micro perspective (outcome oriented) of social marketing is too limiting to bring about sustainable and effective changes when dealing with complex issues which are difficult to define and are likely to change unpredictably with each attempt at implementing a solution (Dholakia, 1984b). With such complex

issues, it is essential that a Macromarketing perspective be adopted so that the focus, will be on the process of achieving the outcomes and the outcomes themselves(Wilkie & Moore, 2006).

Furthermore, the underlying assumption that the causes of the social problem are mainly controlled by the individuals in question presents a limitation in the resolution of complex societal problems (Domegan et al., 2016; Layton, 2015). Causes of such societal issues are not fully in the control of the individuals, thus individual behaviour change strategies are likely to be ineffective(Kennedy, 2015). Some studies clearly indicate that some societal issues are brought about by conflict between the individual and their economic, social and physical environments which are all interconnected(Huff et al., 2017; Kast & Rosenzweig, 1972; Layton, 2007; Skyttner, 1996). This study therefore concurs with Domegan et al. (2016) that there is need for a macro (holistic) approach to social marketing that takes a broader systems stance that will better address the messy, complex issues that arise in this highly interconnected world.

2.2.4 Wicked Problems

The discourse around 'wicked' problems was instigated by scholars in the Design and Planning disciplines more than forty years ago(Rittel & Webber, 1973). Emerging complex issues of social policy and urban planning made it difficult to implement the traditional 'rational-technical', 'linear', or engineering approaches as the required levels of goal clarity, information and coordination were difficult to achieve. Wicked problems, sometimes referred to as untamed problems, is a concept that has since been studied and advanced by scholars in public administration, health education, forestry, policy science and business administration disciplines(Head & Alford, 2015; Roberts, 2000; Roux, 2011). They are ill structured and dynamically complex societal problems whose causes and effects are difficult to identify(Bueren, Klijn, & Koppenjan, 2003). Wicked problems are influenced by many dynamic environmental factors and tend to be linked as symptoms or causes of other problems.

These problems also always occur in social context in which the different unique perspectives of the various stakeholders add another layer of complexity(Conklin, 2001). It is therefore difficult to achieve consensus on the problem definition. Furthermore, due to dynamic environmental factors and constantly changing constraints that are generated by the different stakeholders who change their minds, fail to communicate appropriately or even change the rules, the problem itself changes over time (Rittel & Webber, 1973). Attaining the ultimate resolution of wicked problems is thus also difficult to achieve. The information and consequences of the whole system is therefore confusing and solutions are unlikely to be definitive but they could however make the problems become either better or worse(Head & Alford, 2015). Thus, each attempt to create a solution, changes the problem.

Addressing such wicked problems requires in depth deliberation concerning the nature of the issues and exploration of alternative solutions that recognize the unique perspectives and values that surround the problems. However, recognising the unique values and perspectives of the stakeholders will not suffice in addressing wicked problems. The interconnected nature of systems further complicate wicked problems making it difficult to figure out what to change and in what order unless a systems approach is used. The macro-social marketing perspective is therefore an appropriate approach to use to understand and resolve wicked problems as it seeks societal behavioural change rather than individual behavioural change (Kennedy, Kapitan, Bajaj, Bakonyi, & Sands, 2017).

Through the use of macro-social marketing principles and technologies, systems change interventions that are critical in addressing wicked problems can be created and implemented (Layton, 2015). This study therefore holds that societal behavioural change is possible by the application of systems thinking in understanding the problem and in creating multilevel interventions using the marketing concepts of product, place, price, promotion, people, partnership and policy. These behavioural changes will benefit societies rather than individuals or the organisations that create and implement the campaign.

2.2.5 Systems Theory

A system is generally defined as a group of entities that are interrelated directly or indirectly with themselves and the environment (Bertalanffy, 1972; Kast & Rosenzweig, 1972). Information and feedback flow within systems as control mechanisms which regulate, constrain or encourage, the relationships and behavior of actors and processes of the system (Domegan et al., 2016). There are however different notions as to the different types of systems and how the hierarchies are organised within and sometimes between the systems (Kennedy, 2017; Layton, 2015; Mittelstaedt, Kilbourne, & Mittelstaedt, 2006). The three major types of systems are those that occur naturally, through biology, those that are engineered by humans and those that are created by human interactions, social systems, such as religious systems, career systems and governments (Bertalanffy, 1972).

Some scholars posit that systems likely interact with other systems and are organised based on the complexity of the systems (Boulding, 1956b; Skyttner, 1996). The more complex the system, the higher up their placement in the hierarchy. A system is posited to be more complex when it involves numerous actors and open relationships which are constantly evolving due to their behavioural influences (Skyttner, 1996). Social systems, such as marketing systems, are therefore typically considered to be very complex and are thus considered to be above most systems in the hierarchy (Boulding, 1956a).

The ecological framework is a perspective thatfocuses on theorganisation of networks within a system. These frameworks are posited to have entities that are interrelated and interdependent on each other (Boulding, 1956a; Collin, 1997). Thus, nothing takes place that does not influence other elements in the system. The ecological framework has typically been associated with biological and environmental systems such as the central nervous system (Bertalanffy, 1972). Extant literature however recently also linked social systems to the ecological framework (Bronfenbrenner, 1979). It holds that the behavior of human beings occurs within cultural, historical, environmental and

social contexts. Individual behaviours are therefore embedded within ecological systems.

The behavioural ecological framework also holds that social systems are complex as they consist of actors, relationships and processes that are dynamically structured (Skyttner, 1996). It is also further posited that every action or intervention that takes place within the system has consequences that can sometimes be unpredictable. The interdependence and interrelated nature of the actors ensures that most outcomes such as behavioural changes or regulatory changes in the social system ecologies is co-created by the actors (Boulding, 1956a).Thus, to change the outcomes of a system, multiple interventions that target the multiple actors are needed. Macro-social marketing, a perspective that seeks system wide change through multiple interventions, is therefore posited to be an appropriate approach to wicked problems.

Studies of systems, their mapping, the entities that exist in them and their processes, abound in marketing. Macromarketing has a particular interest in determining the impact that a marketing system could have on society (Bech-Larsen & Aschemann-Witzel, 2012; Layton, 2007). Social marketing on the other hand seems to have a unique interest in the impact of a system on a society for the specific purpose of creating behavioural or attitudinal change(Kotler & Zaltman, 1971; Lowe et al., 2015). Macro-social marketing's main objective in extant literature has been on the creation of a holistic approach toward the determination and resolution of wicked problems in societies(Huff et al., 2018; Kennedy, 2015; Layton, 2015). It is therefore concluded that learning of systems, systems analysis, is critical in macro-social marketing as it is the first crucial step in achieving a holistic understanding of a system. Systems analysis can be carried out through systems thinking.

Systems thinking is the application of systems theory through mapping and simulation for the solving of complex problems(Kast & Rosenzweig, 1972).It is especially relevant when dealing with complex, hard to define situations in social systems and it can be used to analyse past events and current problems. Systems thinking provides a

methodology of mapping systems that can be used in the short term and long term in ensuring effective interventions for the wicked problems are created and implemented in the long run (Domegan et al., 2016). The system analysis method, once created, can also be shared with the stakeholders for self-management in the future.

Systems mapping seeks to identify the structure of the systems, its actors, the environment, worldviews, resources, goals, regulatory and control processes (Domegan et al., 2016).It further applies big picture thinking by balancing long term and short term goals as it recognises that elements within a system are dynamic and interdependent (Boulding, 1956a). The first step in systems mapping is therefore figuring out the actors in the system. Once the actors have been identified, the next crucial step is establishing the relationships and social mechanisms that exist in the system such as communication, trust, cooperation and commitment(Kennedy, 2017). Both steps require the participation of the stakeholders. They make it easier to identify actors and the social mechanisms that are missing or broken down if a system is failing. Once these issues have been identified, interventions such as behavioural and changes can be created and implemented.

2.2.6 Systems Change Management

System changes can be informal (through society), formal (through the enactment or change law) and ideological (philosophical) and can filter into social systems in various ways (Domegan et al., 2016).One of the ways changes filter through a system is through the individual level (downstream social marketing). This is posited to be one of the most effective ways of ensuring social change in individuals and the communities that influence them (Kotler & Zaltman, 1971). Individuals interpret and create norms of behaviour within the institutional environments that they belong. These behavioural norms are used to socialise individuals and to form their identity and are therefore used to justify aspects of themselves (Wymer, 2011). Furthermore, individuals tend to influence the adoption of behavioural norms within organisational structures informally through their actions and reactions to cognitive challenges and external normative pressures (Kennedy, 2015).

The second way in which system frameworks can be changed would be through changing the institutional structure and the environmental context (Upstream social marketing)(Kotler et al., 2006). All marketing efforts are therefore directed toward decision making groups, such as organisations, politicians, activists, foundations and media figures, that have influence over the targeted group(Newton, Newton, & Rep, 2016). This could be done through the lobbying for changes in legislation. It could also be done formally through regulatory processes which could impose institutional norms, such as codes of conduct or organisational structures, regardless of the participants' consent (Domegan et al., 2016). Executives of organisations could be persuaded to choose to incorporate the new institutional norms in order to gain legitimacy in the institutional environment. Gaining legitimacy is important for an organisation as it ensures its survival through the availing of adequate resources such as raw materials, supply and distribution channels (Meyer & Rowan, 1977). It also helps an organisation gain good will, confidence and support from other actors in the environment as it distances itself from any negative perceptions of its operations.

Changes could also be through mid-stream social marketing which involves influential groups such as community groups and partner organisations(Russell-Bennett, 2013). The actors mainly involved in mid-stream social marketing generally includes actors from the immediate social environment of the target group such as their friends and family or their local institutions (schools, hospitals, day-care centres) (Luca et al., 2016).These influencers bring about change of behavioural norms through opinion leadership and persuasion. Evidence from other studies confirm that the active participation by the community in behavioural changes or interventions enhance their effectiveness (Russell-Bennett, 2013).

All three methods of introducing change in a social system have been proven to be effective in introducing change in various contexts (Kotler & Zaltman, 1971; Luca et al., 2016; Russell-Bennett, 2013). However, when dealing with complex issues, some scholars do concede that, changes in social system norms need to filter into society in tandem through all three methods: down, mid and upstream social marketing (Domegan

et al., 2016; Kennedy, Kapitan, Bajaj, Bakonyi, & Sands, 2017). A holistic approach ensures effective social change.

2.2.7 The Macro-social Marketing Perspective on Retention of Women in STEM

Macro social marketing is the use of social marketing principles and technologies to influence behaviour that will benefit societies as a whole rather than individuals or the organisations that create and implement the campaign (Kennedy, 2015). Macro-social marketing holds that the best way to resolve complex and persistent societal problems is by approaching its definition and resolution from a systems wide approach(Kennedy, 2017). Therefore, when using the macro-social perspective in understanding and resolving the issue of the retention of women in STEM in Kenya, the ecological framework was used to map the actors, factors that influence retention and their relationships within the career system.

The marketing principles of product, place, price, promotion(Andreasen, 1994), people, partnership and policy(Kennedy, 2015) form the main foundations of macro social marketing. Therefore, in this study, the behaviour that is appropriately packaged to meet the needs and wants of the target market, such as retention behaviour, responsible drinking or healthy eating, is, as in extant literature (Lefebvre & Flora, 1988a), assumed to be the product. Price is held to be the psychological, social or economic cost that the target market needs to pay to obtain the product while place refers to the response channels and the accessibility and distribution of the product(Kennedy, 2015). Promotion, in the study, refers to the persuasive content and communication strategies that will create product awareness within the target market even as it makes the product, familiar, desirable and acceptable (Kotler & Zaltman, 1971). Within a social system, the actors are a critical part in the co-creation process of behaviour. People therefore refers to the community within the social system that is likely to impact the degree and speed of adoption of behavioural change adoptions(Huff et al., 2017). The influence of these communities should be taken into consideration when planning and used as means of enhancing the adoption of the strategies. Partnership refers to the collaborations that the groups and actors within the system could form to co-create new norms and ensure the

diffusion and adoption societal behavioural changes (Sallis et al., 2006). Policy refers to the regulatory frameworks that could be used to influence change at the macro level (Head, 2008). By changing the laws and policies societal changes are likely to be institutionalised in a social system and even more likely to be change the systems of organisations operating within the system (Kennedy, 2015).

The macro-social marketing perspective also uses the social marketing process, as part of its procedures. This study, therefore, in using the macro-social marketing perspective, implemented the first crucial step of the social marketing process, formative research. It is generally agreed amongst scholars that to change the behaviour of human beings, it is necessary to first understand why they behave the way they do (Kotler, 1965; Lowe et al., 2015; Prestin & Pearce, 2010). Therefore, the social marketing framework's first step involves the conducting of formative research which provides in depth understanding of the target market, their perception towards the preferred behaviour and its associated benefits and antecedents or barriers (Carins et al., 2016).

Quantitative, qualitative or mixed research methods can be used to develop a detailed profile of factors that influence the behaviour of the target audience (Kotler et al., 2006; Teddlie & Tashakkori, 2006) . The findings of the formative research make it possible for the rest of the service marketing framework steps which are: the creation of the strategies and materials to overcome the barriers, piloting and the eventual implementation of the strategies and materials and the evaluation of the campaign program, to take place effectively and efficiently (Prestin & Pearce, 2010). This study therefore conducted formative research to determine the factors that influence the retention behaviour of women in STEM careers in Kenya and their perceptions towards retentions. The research provided a detailed list of factors that influence the retention behaviour of women and their perceptions. This information made it possible to identify the social mechanisms that were missing or defective. It was therefore possible to provide prescriptions of effective and efficient strategies and communications that could

be used by the government, universities and corporate organisations to promote retention among women in STEM careers in Kenya.

In addition to applying marketing principles and implementing social marketing processes, one key assumption was held when using the macro-social marketing perspective. It was assumed that the retention of women in STEM is a wicked problem. Wicked problems are complex and difficult to define and resolve due to the dynamic, interdependent and interrelated nature of the relationships amongst the actors in a system (Head & Alford, 2015). The actors tend to have different goals and perspectives, which cause great complications.

2.2.8 Retention of Women in STEM, A Wicked Problem?

The retention of women in STEM careers can viewed as a knotty issue given the numerous actors involved with varying agendas, priorities and perspectives (Beier & Rittmayer, 2008; Glass, Austin, Sassler, Levitte, & Michelmore, 2013; Syed & Chemers, 2011). With different actors holding varying perspectives, causes of wicked problems can be explained in various ways. This is clearly observed in STEM careers where the organisations in STEM that act as employers typically have explained the lack of retention among women as a product of lack of commitment to their jobs (Amon, 2017; Shapiro, Ingols, & Blake-beard, 2014). Some other institutions perceived the lack of retention among women to be caused by their lack of ability to compete with men for similar work opportunities(Etzkowitz et al., 2000; Valentova, Otta, Silva, & Mcelligott, 2017). Some women however stated that conflicting work and life roles were the cause of their lack of retention (Beutell & Greenhaus, 1983; Ford, Moore, & Scott, 2011).These causes are cited from the unique perspectives of the actors and thus cannot usually be judged as right or wrong. They do however point to the retention issue of women in STEM being a wicked problem.

Furthermore, with wicked problems, due to their complex structure and interdependencies, solutions are never absolute (Rittel & Webber, 1973). The interventions that are created and implemented therefore make the problem either better

or worse. Solving individual aspects of the perceived issue of the retention of women in STEM careers has brought about some consequences that were unanticipated. For example, the implementation of affirmative action in getting more women recruited and retained in STEM careers by lowering the entry qualifications and performance expectations marginally. This intervention did succeed in attracting and retaining some women in the STEM fields, it however also caused low self-efficacy amongst the women recruited resulting in some of the women leaving the STEM careers because they did not think they could actually succeed in the career path(Gilbert, Stead, & Ivancevich, 1999; Onsongo, 2009). Resentment from men also arose due to the intervention as they perceived the women as usurpers of the jobs they rightly deserve(Tamale & Oloka-Onyango, 1997). This resentment further aggravated the pre-existing issue of gender bias, increasing hostility and lack of respect amongst men towards their female colleagues, whose sense of belonging took great battering, leading to a greater number of women leaving STEM careers (Deemer, 2015; Drury, Siy, & Cheryan, 2011).

The difficulty experienced in defining and resolving the issue of the retention of women in STEM careers are strong indicators that the retention of women in STEM careers is a wicked problem. Therefore, to better understand and find a way to address the problem, systems thinking is needed. Systems thinking has been lauded in literature as one of the better ways of managing and coping with wicked problems (Boulding, 1956a; Domegan et al., 2016; Venturini, 2016).

2.2.9 Application of Systems thinking in STEM Careers

Traditionally, literature in careers have recognised employees and the organisations providing employment as the main actors in career systems (Dries, Pepermans, & De Kerpel, 2008). Lifelong employment in one institution was the expectation and norm at the time. However, due to the increasingly dynamic labour markets, individuals now tend to have careers that may span several organisations, sometimes in different sectors(Baruch, 2004; Shapiro et al., 2014). With the expansion of the perception career systems as 'boundaryless', the following stakeholders are therefore also considered to be

part of a typical career system: religious institutions, family, friends, other organisations in the industry and in other industries, professional associations, trade unions, national or regional authorities, schools or higher education institutions, alumni organisations (schools, the army), funding bodies and support groups(Baruch, 2004).

In this study, a multilevel behavioural ecological model was developed for showing the actors in STEM career systems. The Behavioural Ecological Model is a theory-based framework that is generally used to determine actors and the multi-faceted environmental and personal factors that influence behaviour in a system (Adams et al., 2006; Young, 1983).

The behavioural ecological model that was developed for this study had five nested levels: Individual, micro system, behavioural setting, meso system and macro system (Figure 2.1). The individual lay in the innermost level of the behavioural ecological model. The character, attitudes and behaviour of the individual were assumed the likely factors to be found at this level.

The micro system level represented the actors that made up the personal social networks of the individual as the family, peers and friends. These actors generally provided social support to the individual.

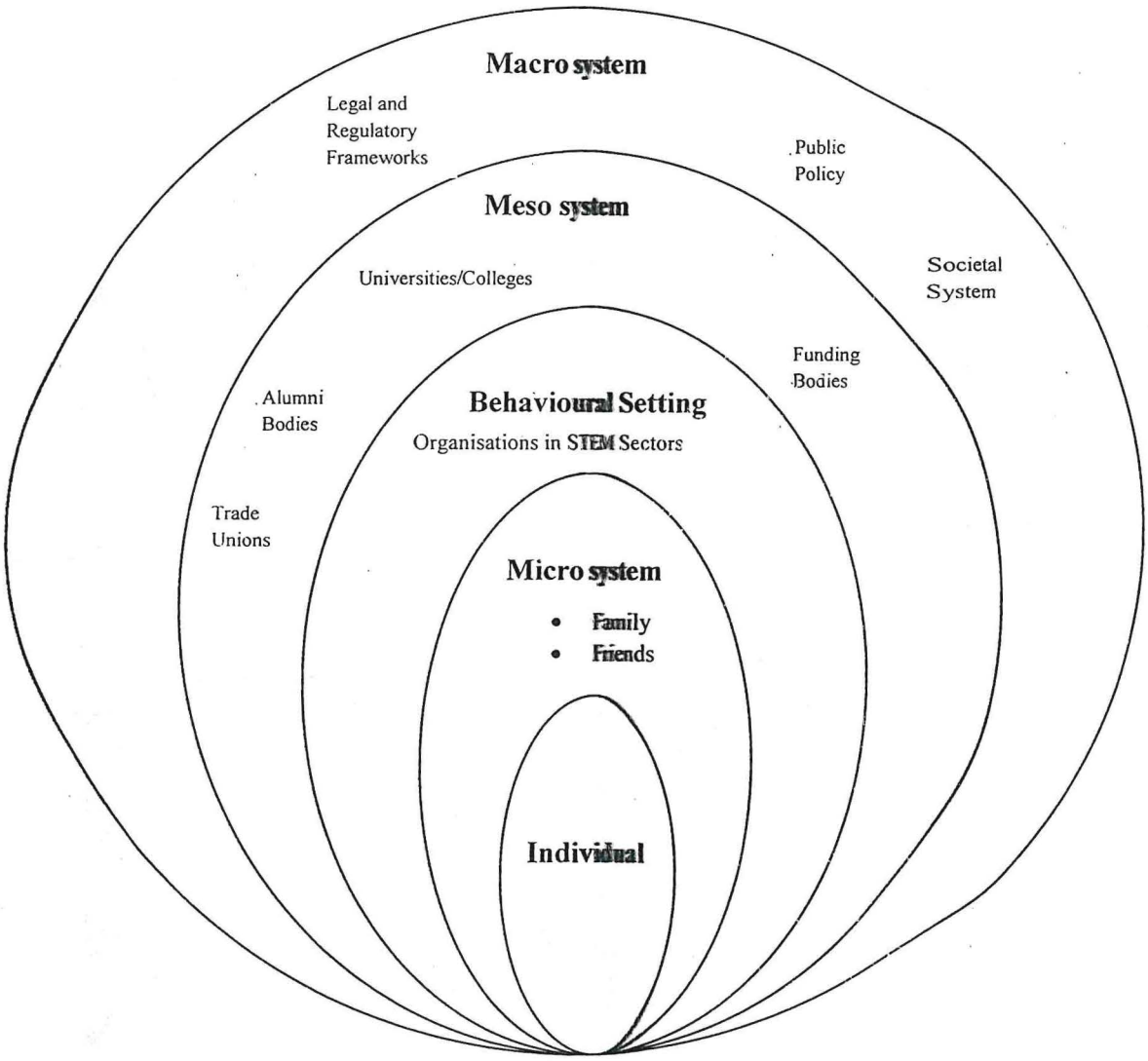
The behavioural setting level represented the various organisations in which the individual could work in, in the course of her career. Each organisation was considered an actor and was assumed to have different actors within it, who played a role in the creation of a unique work environment, culture and set of policies.

The meso system level represented the organisations, actors, institutions, networks and associations that played a part as intermediaries between the other behavioural ecological model levels and actors while the macro system represented the societal structure and the regulatory frameworks and bodies that influenced the entire system.

Research on the retention behaviour of women in STEM in Kenya was conducted to identify the factors that especially influence retention, the interaction between the actors and other elements of the system. The complex ecosystem of STEM careers in Kenya

was then charted using the information gathered from the women in STEM careers in Kenya. This information was used to create a multi-level intervention that utilised as tactics the marketing principles of product, price, place, promotion, people, partnerships and policy.

Figure 2.1: Actor's Map for Career Systems



Source: Current Researcher, 2019

2.3 Empirical Framework

This section discusses the existing literature on career retention in STEM careers. The discussion begins in section 2.3.1 with a general look on studies that have been

conducted on retention, focussing on student retention, an area that seemed to have attracted a lot of interest over the years. The few studies on career retention are then discussed with the gaps in literature which motivated this study being highlighted. Section 2.3.2 contains a discussion on how retention behaviour will be measured using retention intentions. The theory of reasoned action, which is used to operationalise the variable, is discussed in detail.

2.3.1Antecedents of Retention in the STEM Workforce

The discussion on the underrepresentation of women in STEM has focussed significantly on understanding factors that influence women's decisions to engage or join STEM careers. Initially studies focussed on explanatory models that centred on ability, basically exploring whether girls and women have the same talents in mathematics and science as girls and boys and establishing if a difference in ability about explain the underrepresentation of women in STEM (Diekman et al., 2016).A lot of research and policies for a long time focussed on aligning women in STEM more closely to the men by either attempting to adjust the experience of the women in STEM or increasing their level of self-efficacy(Hull-Blanks & Kurpius, 2005; Lent, Brown, & Larkin, 1986). However, most studies over time established that men and women perform at the same level of ability in mathematics and science(Gowen & Waller, 2002; Hill, Corbett, & St Rose, 2010; Valentova et al., 2017). Furthermore, ability-based explanations also failed to explain why women would join certain STEM fields and not others.

Calls for shift in focus in the explanation theory, from ability to motivation, in regards to women in STEM were therefore made by Diekman et.al (2016), who went ahead and created a framework that integrates sociocultural elements such as social roles, beliefs and stereotypes and motivation. One of the main contributions of the framework has been its' focus on women's innate need for communion in their careers. Women have a basic need to work with and help others. Studies on communal goal congruity are however either theoretical in nature (Diekman et al., 2016, 2015) or based on data collected on students (Diekman et al., 2010) but not women currently pursuing careers who are bound to have a unique outlook based on their experience. There is therefore a

gap in existing literature concerning the lack of adequate empirical literature that confirms the communal needs of women in careers and details the unique needs and wants of women for their careers.

A review of literature also revealed that studies concerning retention have mostly been in the context of education institutions. Cabrera et al. (1992; 1993) especially focussed on integrating two existing theories of student persistence and drew the conclusion that environmental factors, support of family and friends, academic experience, social integrations and goal commitment do not merely shape commitments but exert an influence in the socialization and academic experiences of the students. Kim on the other hand contributed to the discussion by exploring the influence of family on the career decisions of Korean students positing that family is a key influencer in career development but the strength of its influence may vary depending on culture. This study clearly highlighted the importance of conducting contextualised studies on career development given the unique environmental factors that likely influence the perception and impact of certain influences. A finding that influenced the direction of this study which focussed on a previously overlooked context, sub-Saharan Africa.

Beoku-Betts (2004) wrote one of the seminal papers in the discussion on retention in STEM when she explored, qualitatively, the influence of racism, gender bias and third world location on the educational goals and outcomes of African women who pursued graduate studies in scientific disciplines at American and European universities between the 1960s and 1990s. However, just like Cabrera et al.(1992; 1993)the study focussed on students' experience in higher education institutions, despite the respondents being women currently pursuing careers in the scientific field in third world countries. However in another paper Beoku-Betts (2005) did focus on women currently pursuing scientific careers, albeit in academia. The study however seemed more focussed on investigating how women who seek and gain entry into academic scientific careers are positioned in the academic hierarchy than on career retention.

Some scholars have, over the years, however been extending the discussion beyond the context of higher education institutions. Xu (2013) and Turk-Bicakci and Berger (2013) conducted studies that uniquely focussed on the transition of students from college to

their chosen career paths, exploring the likelihood of STEM graduates choosing STEM careers after graduation and further explored factors influencing STEM college graduates' choice of occupations. The studies however focussed mostly on factors that influence the choice of working in a career related to the degree major pursued in college and did not contribute much toward the career retention discussion.

Stephan and Levin (2005) who focussed on the influence of marriage, presence of young children, level of formal education, self-employment and gender on career retention in IT and Diekman et al. (2010, 2015) are some of the few studies on career retention that focussed on women in non-academic STEM careers. It is however noted that these studies were mostly conducted in the context of western 'industrialized' countries and there is therefore little evidence so far from developing nations, more so in Africa. Furthermore, with the exception of Beoku-betts, (2004), these studies focussed on variables drawn from theories contextualised in developed countries many years ago. Given the dynamic nature of career development (Baruch, 2004; Nicholson, 1996), this study posited that there is a gap concerning up to date literature on career retention especially in the field of STEM, which is posited to grow the most in the future in developing countries due to globalisation and rapid industrialisation. Furthermore, studies have confirmed that contexts differ decisively especially between developed and developing countries. There was therefore need to conduct a contextualised study on career retention in STEM careers in Kenya which is a developing country in sub-Saharan Africa.

Table 2.1: Literature Review Summary

Authors	Focus of the Study	Main Findings and Factors Studied/Discussed	Sample	Methodology Used	Gaps Identified
Beoku-betts, (2004)	African Women Pursuing Graduate Studies in the Sciences: Racism, Gender Bias, and Third World Marginality	Paper illuminates some of the factors (racism, gender bias and third world location) that shape the educational goals and outcomes of African women who pursued graduate studies in scientific disciplines at western universities between the 1960s and 1990s. The study also addresses the extent to which the women were aware of how these factors affected how they were perceived and mentored by professors, interacted with peer groups, as well as managed the demands of graduate school along with marriage and family relations.	15 African women scientists, almost all of whom are employed in academic institutions in their respective countries	Qualitative study	Study focussed on issues within the context of graduate schools in Europe and America between the 1960s and 1990s. There is therefore a gap in the discussion concerning the experience of women working in scientific disciplines in Third world/developing countries.
Beoku-Betts, (2005)	African Women and Career Advancement in Academic Scientific Careers	The study sought to investigate how women who seek and enter academic scientific careers are positioned in the academic hierarchy and whether their rate of progress is impeded by exclusionary practices in their professional fields. It also examined whether other interacting circumstances such as development issues, colonial legacies, and the influence of patriarchal states and cultures create somewhat different types of constraints and options for women in academic settings.	18 African women in academic scientific careers and representing several English-speaking countries.	Qualitative Study	Focussed on women in academic scientific careers
Cabrera	College	Environmental factors, support of family	University students	Longitudinal	The study sampled

et al., (1993)	Persistence: Structural Equations Modeling Test of an Integrated Model of Student Retention	and friends, academic experience, social integrations and goal commitment do not merely shape commitments but exert an influence in the socialization and academic experiences of the students.	in the United States of America	research study design	university students whose environment and experiences differ decisively with those already working in STEM careers. Furthermore, this study did not seem to focus on the unique population within STEM disciplines.
Diekman et.al (2010)	Seeking Congruity Between Goals and Roles: A New Look at Why Women Opt Out of Science, Technology, Engineering, and Mathematics Careers	Found that STEM careers, relative to other careers, were perceived to impede communal goals. Moreover, communal-goal endorsement negatively predicted interest in STEM careers, even when controlling for past experience and self-efficacy in science and mathematics. Communal goal mediate gender differences in STEM interests.	Psychology students 83% of who were from a European American descent.	Quantitative Study. Used a survey tool.	The study sampled university students whose environment and experiences differ decisively with those already working in STEM careers.
Diekman et. al (Diekman	Understanding Communal Goal Processes	Study had three objectives: 1. Review gender disparities in STEM careers	Studies based on the United States of America population.	Theoretical Study based on meta-analysis of	It does not specifically focus on the retention of women in STEM career,

et al., 2016)	in STEM Gender Gaps	2. Explore existing explanatory models that included self-efficacy, ability, motivation and gender stereotypes and prejudices. 3. Review the foundational logic and evidence of the communal gal processes framework that it is adding to the discussion on the retention of women. The framework integrates sociocultural elements and motivation to understand why women are less likely to engage in STEM. In summary it considers the social roles, career goals, communal opportunities to work with and help others, stereotypes, beliefs and motives as influences of retention behaviour.		existing literature.	rather factors that influence the likelihood to join STEM careers. The study makes a theoretical contribution but lacks primary data. The framework is yet to be tested.
Drury et al., (2011)	When Do Female Role Models Benefit Women? The Importance of Differentiating Recruitment from Retention in STEM	The study conceptually differentiates recruitment from retention and proposes that although female role models may be effective in the retention of women in STEM, female and male role models can be equally effective in recruitment efforts.	Not applicable	Commentary based on Literature Review	Focused on one factor. There is an opportunity for empirical research to be conducted to validate these views.
S. Kim et al., (2016)	Family Influence on Korean	Family influence is a key factor in career development and considerably more so in some cultures than others. Overall,	420 South Korean college students	Quantitative research design. Survey tool	Study used a convenience sample. The study could thus be

	Students' Career Decisions: A Social Cognitive Perspective	results supported the cultural validity of FIS and the hypothesized model. Family informational support, family expectations, family financial support, career decision-making self-efficacy, expectancy of outcome, career preparation behaviour, and career preparation satisfaction were each found to significantly relate to life satisfaction, accounting for 57% of the variance. Implications			constrained by sample characteristics. Although the findings may be relevant to students in other parts of Asia and the Asian-American community given the pervasive importance of collectivism and family in these populations, additional empirical work may be necessary to determine their validity and generalisability in other contexts
Stephan and Levin (2005)	Leaving Careers in IT: Gender Differences in Retention	The focus of this study was on retention, examining factors related to retention and how retention varies by gender. Factors examined were marriage, presence of young children, level of formal education, self-employment and gender.	Data for the study came from the Scientists and Engineers Statistical Data System (SESTAT) compiled by Science Resources Statistics (SRS), National Science Foundation (NSF) in the USA	Multinomial analysis	The study only examines patterns of retention for individuals who qualify to be included in the SESTAT data. The study also has not thoroughly investigated what it means to leave IT and take a job in another occupation. Analysis in the study has also not identified the extent to which the results reflect discrimination.
Xu (2013)	Career Outcomes of	The study examined students' transition from college to their chosen career paths	College Graduates in the USA	Quantitative Research design,	This study focuses mostly on factors that

	STEM and Non-STEM College Graduates: Persistence in Majored-Field and Influential Factors in Career Choices	and identified factors influencing college graduates' choosing an occupation related to ones' undergraduate major. The factors examined were monetary costs of a college degree, pay rate of the jobs available, cultural and social capital, job status, satisfaction with job challenge		Used longitudinal data	influence the choice of working in a career related to the degree major pursued in college. The aspect of retention that was studied was for a period of 10 years after graduation.

Source: Current Researcher, 2019

2.3.2 Measuring Retention Intentions

The theory of reasoned action was developed by Ajzen and Fishbein (1975). It posits that the best indicator of actual behaviour is behavioural intentions (BI), whose antecedents are the social normative perceptions (SN) regarding behaviour and attitudes (A) towards it. Social normative perceptions are the social influences, such as the family members' expectations, on a person's behaviour (Ajzen, 1991) . They are factors that may affect the relationship between behaviour and attitude if the consumers are highly influenced by their social normative perceptions. Social influences, according to Albarracín, Johnson, Fishbein and Muellerleile (2001)have the ability to discourage a consumer from purchasing a product despite him or her having a favourable attitude towards it.

Therefore, based on the theory of reasoned action, the behavioural intention of a person, which predicts their actual behaviour, depends on the attitudes of the person and their subjective norms (Fishbein & Ajzen, 1975). Miller (2002) further posited that the attitude of a person about a certain behaviour combined with the subjective norms about that behaviour, each with its own weight, will bring about a person's intention to practice, or not practice, the behaviour, which will then lead to the actual behaviour. This means that: BI=A+ SN.

The theory of reasoned action has received empirical support in various sectors such as the restaurant industry, healthcare sector, the higher education sector, and in internal marketing too (Albarracín et al., 2001; Ha, 1998; Ibrahim & Vignali, 2005; Miller, 2002; Rust et al., 1996). This is particularly due to its assertion that the best indicator of actual behaviour is behavioural intentions, meaning that behavioural intentions such as those of retention translate directly to persisting behaviour.

This study, therefore measured the retention of women in science, technology, engineering and mathematics careers in Kenya using their Behavioural intentions (retention intentions). These intentions were measured using their attitudes and social normative perceptions concerning persisting in the STEM careers in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in the research. Section 3.2 introduces the philosophical basis of this study by, first, providing a descriptive analysis of positivist and interpretivist philosophies, and second, by providing a basis from which to discuss the quantitative-qualitative debate in relation to research methods. The justification for the philosophical approach that was used in the inquiry is also discussed. Section 3.3 focuses on the research design that was used in the study. The population and sampling procedures was then discussed in section 3.4, while section 3.5 describes how data was collected. Section 3.6 describes the data analysis for the study. Research quality issues such as validity and reliability and ethical considerations conclude the methodology discussion in Sections 3.7 and 3.8 respectively.

3.2 Philosophical Approaches

Positivist and interpretivist philosophies have been identified as two major research philosophies in social science research(Crotty, 1998). Positivists believe in the stability of reality and contend that phenomenon can be studied without interference from an objective viewpoint (Creswell, 2002). In a positivist approach, Crotty (1998) posits that a researcher generally begins with a theoretical framework in place, data collection that either supports or refutes the theory is then carried out, and necessary revisions to the theory are made as additional tests are carried out. According to Creswell (2002), this philosophy is upheld in most quantitative research, as the main assumptions are that observation should be repeatable and the key isolation of phenomenon.

Qualitative studies however tend towards the interpretivist philosophy in which the relativity and multiplicity of reality is assumed(Creswell, 2002). Therefore, rather than predict causes and effects and generalize, it is important for an interpretivist researcher to interpret and understand human behaviour. The motives, meanings and reasons that influence human behaviour are unearthed through the exploration of time and context bound subjective experiences(Crotty, 1998).

Some scholars, however, contend that the two paradigms are not absolute and could therefore be placed in a continuum, with possibility of some overlap (Creswell, 2002). A researcher can therefore hold both quantitative and qualitative assumptions in their study or series of studies. A pragmatic approach to research, in which a researcher is free to choose the techniques, paradigms, procedures and methods from whichever end of the quantitative and qualitative spectrum can therefore be applied in mixed methods research (Feilzer, 2009).

However, the compatibility of qualitative and quantitative approaches has been in question and has led to 'paradigmatic wars' that have been waged since the 1970s(Evans et al., 2011). Nonetheless, despite these wars, several researchers have integrated the methodologies and are now advocating for more mixed methods approach studies (Onwuegbuzie, Bustamante, & Nelson, 2010; Teddlie, 2007; Teddlie & Tashakkori, 2010; Van, 2010). Scholars posit that a mixed methods approach ensures that multiple perspectives can be considered in the course of a study and thus a more complete picture of a phenomenon can be achieved (Denscombe, 2011).Additionally, mixed methods research provides, scholars with opportunities to shore up the weaknesses that each of the paradigms are afflicted with, thus increasing the quality of research process and output(Learning, Fuller, & Learning, 2009).

This study was therefore designed to be a mixed methods study, as it gives fuller picture of the retention conundrum amongst women in STEM in Kenya was needed. The dearth of literature on this retention issue necessitated the adoption of an exploratory approach founded on the constructivist paradigm in which meaning is generated inductively by the researcher in phase one of the study. The constructivist paradigm, holds that there is multiplicity of perspectives as meanings are assumed to be generated subjectively by human beings as they interact with the world(Creswell, 2003). The multiple perspectives will be in the development of a deep understanding of the issue of retention among women in STEM careers in Kenya.

In the second phase of the study, there was need to measure the statistical trends and variables that were uncovered in the data collected during the first phase of the study, a postpositivist philosophy was therefore adopted. Postpositivism assumes that it is not possible to claim that there is an 'absolute truth' when studying the actions and behaviour of human beings(Creswell, 2003). Postpositivist research tends to reduce ideas into a small discreet, numerical set (variables) that can be tested, verified or refined in a bid to understand the world in an objective manner (Crotty, 1998). Therefore, both constructivist, and postpositivist paradigms were used in phase one and two, respectively, of this mixed methods study.

3.3 Research Design

A mixed methods research design involves the combination of quantitative and qualitative approaches(Van, 2010). Several typologies have been propounded by various scholars on the different ways that the quantitative and qualitative approaches have been integrated (Onwuegbuzie et al., 2016; Teddlie & Tashakkori, 2006).Researchers can choose or create a typology based on criteria such as the type of implementation process that will be used, the stage of integration of approaches, the number of phases, the number and priority of the methodological approaches and the functions of the research study (Teddlie & Tashakkori, 2006).

This research implemented the sequential exploratory mixed method design, which involves the collection and analysis of qualitative data in phase one, whose findings were used in the development of a survey instrument that was administered to a sample of the chosen population to see if the qualitative findings can be generalised to the population in phase two.

3.4 Population and Sampling

The population of interest was, women in Kenya, who were currently or have ever been employed in science, technology, engineering and mathematics careers.

In the first phase of the research (which was qualitative in design), a sample was drawn from two sub-sets of the population to provide insights and a comprehensive analysis of the experiences of women in STEM and the factors that influence their career retention. The first subset comprised of women in Kenya who trained in Science, Technology, Engineering and Mathematics (STEM) disciplines, worked within those disciplines for some time but later left to pursue a career in a non-STEM discipline. The second subset comprised of women with more than ten years work experience in science, technology, engineering and mathematics (STEM) careers in Kenya who are still in those careers, since some studies posit that those serving in careers for a long time are unlikely to quit(Cotton & Tuttle, 1986; Lewis & Park, 1989).

Given the lack of a comprehensive sampling frame with both subsets and the subsequent challenge in identifying and reaching the women, the snowballing sampling technique was used in the selection of both samples. For the women still in STEM careers, the researcher reached out to various associations such as the African Women in Science and Engineering (AWSE), Organization for Women in Science for the Developing World (OWSD), Kenya Chapter and African Academy of Sciences. For the women who had left STEM careers, they were reached through Higher Learning institutions. Thirty-two names and contacts were shared of potential respondents by the end of the snowballing process. However, ten of the women were either not from the subsets being sampled or failed to respond to communication from the researcher. Interviews for both subsets were conducted until the point of saturation was achieved. This is based on the recommendation put forth by Creswell (2013) on sample size when collecting data using interviews. Saturation point with the first subset, which comprised of women who left STEM careers to pursue non-STEM careers, was reached after eleven interviews. With the second subset, saturation point was reached after six interviews.

In the second phase of the study (which was quantitative in design), a sample of 204 respondents was drawn from women currently pursuing science, technology, engineering and mathematics (STEM) careers in Kenya. Given the lack of a

comprehensive sampling frame, the snowballing sampling technique was used in the selection of the sample. A link to the survey was sent to the six respondents from the qualitative phase of the study and to women referred to the researcher, who work in research institutions such as KEMRI-Wellcome Trust and Strathmore Energy Research Centre, institutions that have a STEM workforce in Kenya such as hospitals (Mater Hospital, M.P Shah, Aga Khan Hospital Nairobi Hospital), telecommunication organisations (Safaricom) and various associations of women in STEM such as Women in Energy, Busherians in STEM and Safaricom Women in STEM programme. These women were asked to fill out the survey and share the link with their networks of fellow women in STEM in Kenya.

3.5 Qualitative Data Collection and Analysis

Data was collected using individual semi-structured interviews for the first qualitative phase of the study and a survey for the second, quantitative, phase. Phase one of the study sought responses to research question (1), (2) and (3), What factors have influenced the retention decisions of women in science, technology, engineering and mathematics fields in Kenya (those with more than ten years work experience and those who have left the science, technology, engineering and mathematics career path to pursue careers in other non-STEM fields) and how do these factors relate to each other? Guided by the three research questions, two interview guides were created. The guides were created to seek the individual perspectives of the respondents concerning their experience and the factors that influenced their decisions to leave or remain in a STEM career. Pilot testing of the two interview guides were conducted with two women who left STEM careers to pursue non-STEM careers and two women still in STEM careers. Modifications were made to the interview guides based on the recommendations that were made by the participants of the pilot test and the interviewer's experience. The interview guides containing the final list of questions that were used during the interviews are provided in Appendix C and D.

Eleven interviews with women who had left STEM careers to pursue non-STEM careers were conducted before saturation point was reached. Amongst the women still

in STEM careers with more than ten years experience, six interviews were conducted. The seventeen interviews were recorded as audio files and later transcribed by a research assistant for analysis. The transcribed interviews were then uploaded to ATLAS.ti, software that is used to conduct qualitative analysis. Codes were generated (open coding) from the interview transcripts. These codes were then grouped thematically (axial coding) to capture the recurring patterns that cut across the data. Eleven themes emerged from the 44 codes that were initially generated from the 17 transcribed interviews. Documents showing the codes are attached on Appendix F.

3.6 Survey Instrument Creation

The eleven themes that emerged from the seventeen interviews were, 'support of family and friends', 'work environment', 'passion', 'sense of belonging', 'career mentorship', 'self-efficacy', 'expectation fulfilment', 'perception of societal contribution', 'work family conflict', 'career sustainability' and 'female role models' . These eleven themes were used to develop the survey instrument, which was to establish whether the qualitative data could be generalised to the population of women pursuing STEM careers in Kenya. The survey items on retention intentions were based on scales anchored on the theory of reasoned action (Fishbein & Ajzen, 1975). The variables that were used in the survey were based on the themes that emerged from the qualitative data. Measures and scales of the identified variables were then adapted from previous studies and were refined to fit the context of this study. Table 3.1 contains the scales and measures that were used for each of the variables in the study.

Table 3.1: Measures used in the Study

Variables	Indicators	Measures	Scale	Supporting Literature
Retention Intentions	Attitudes towards behaviours Social normative perceptions	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Rust et al. (1996); Fishbein and Ajzen (1975)
Self-Efficacy	Perception of confidence among the respondents in pursuing a career in STEM amidst various challenging situations such as: lack of social support, work-family conflict and negative outcome expectations.	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Hackett and Betz (Hackett & Betz, 1981)
Social support	Perception of tangible and emotional support from: family, friends, colleagues and mentors	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Gloria, Kurpius, Hamilton, and Wilson (1999); King, Mattimore, King, and Adams (1995).
Work-family role conflict	Perception of work tension Time shortage to fulfill all responsibilitiesOverload of familyresponsibilities, Schedule incompatibility Work spillover	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Kelly and Voydanoff (1985)
Expectation fulfilment	Perception concerning the degree to which their	7point Likert scale:	Interval	Bandura (1986); Lent (2006)

	expectations were fulfilled in terms of social approval, monetary benefits, self-satisfaction and challenges such as sexual discrimination and work-family conflict	1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree		
Sense of belonging	Perception that their colleagues, supervisors and clients welcomed Perception that their colleagues, supervisors and clients respected their presence as women, Interactions with colleagues and clients free from conflict and negative effect and interpersonal bonds marked by stability.	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Eisenberger, Huntington, Hutchison, & Sowa (1986); Beoku-Betts (2005)
Perception of societal contribution	Perception of achieving communal goals such as; that the work done contributes significantly towards changing lives, society and helps people and the community	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree,. 6=Moderately Agree 7= Strongly Agree	Interval	Diekman et al. (2010)
Passion	Perception that work is exciting, the likelihood of them pursuing a new interest or passion, outside STEM The willingness to persist in their career in the event of no remuneration.	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Zigarmi, Nimon, Houson, Witt, & Diehl (2011)

Work environment.	Quality of relationships with supervisors, clients and colleagues, Availability of resources and equipment The physical environment.	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Eisenberger, Huntington, Hutchison, and Sowa (1986)
Female role models	Likelihood of the presence of female role models Impact of female role models	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Downing, Crosby, and Blake-beard (2005)
Career mentorship	Extent to which a mentor takes the time to know the goals and aspirations of the women, holds them accountable and keeps them informed about career opportunities	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	August and Waltman (2004)
Career sustainability and growth	Likelihood of advancing in the career, Opportunities to learn and grow as an individual, Future working opportunities and work security	7point Likert scale: 1=Disagree Strongly, 2=Moderately Disagree 3=Slightly Disagree 4=Neither Disagree nor Agree, 5=Slightly Agree, 6=Moderately Agree 7= Strongly Agree	Interval	Jawahar and Hemmasi, (2006); De Vos, (2018)

Source: Current Researcher, 2019

The survey, found in Appendix E, sought to measure the retention intentions of women pursuing STEM careers in Kenya and to establish the strength of the relationships between the antecedents derived from the interviews and the retention intentions from a larger sample of women in STEM careers in Kenya. The questions concerning retention intentions and its antecedents sought to evaluate on a Likert scale of 1 for Disagree Strongly, 2 for Moderately Disagree 3 for Slightly Disagree, 4 for Neither agree nor Disagree, 5 for Slightly Agree, 6 for Moderately Agree and 7 for Strongly Agree, the extent to which the respondents perceived the influence of a given factor. Demographic questions concerning the age, specific STEM career path and the years of work experience in STEM, were also included in the first section of the survey tool.

3.7 Quantitative Data Collection

The second phase of the study focussed on research question (4), to what extent are the factors from the qualitative study generalizable to the women currently pursuing STEM careers in Kenya?, and research question (5), what are the career retention intentions of women currently in science, technology, engineering and mathematics careers in Kenya? Data was collected using the above-mentioned survey tool that was based on the themes that emerged from the qualitative study.

The survey was uploaded and distributed electronically using the Survey Monkey® website. The link was sent to all people known to the researcher to be pursuing a career in STEM. This initial group was asked to fill in the survey and share it widely among their networks to other women in STEM career paths. Two hundred and four responses were collected over a period of three weeks. It was not possible to calculate the standard response rate due to the method used to distribute the surveys and the absence of any comprehensive sampling frame for the population. The coded responses were then exported to SPSS for data analysis.

3.8 Statistical Assumptions Tests

Prior to running the descriptive analysis of all the data collected, including the demographic data, various tests were run to confirm statistical assumptions regarding

the normality, independent observations, linearity, homoscedasticity and multi-collinearity of the data.

3.8.1 Normality Assumption Test

The test for normality was carried out since data analysis was carried out using correlation and multiple regression analysis, both of which are best used when the data is normally distributed. The normality of data was tested using normal probability plots (Q-Q plots) since formal tests of normality such as the Shapiro-Wilks tests are highly sensitive and may pick up unimportant deviations from normality if the sample size is too large (Sainani, 2012). The Q-Q plots for all the independent variables are represented in Figures 3.1 to 3.11 below.

Figure 3.1: Normal Q-Q plot of Work -Family Conflict

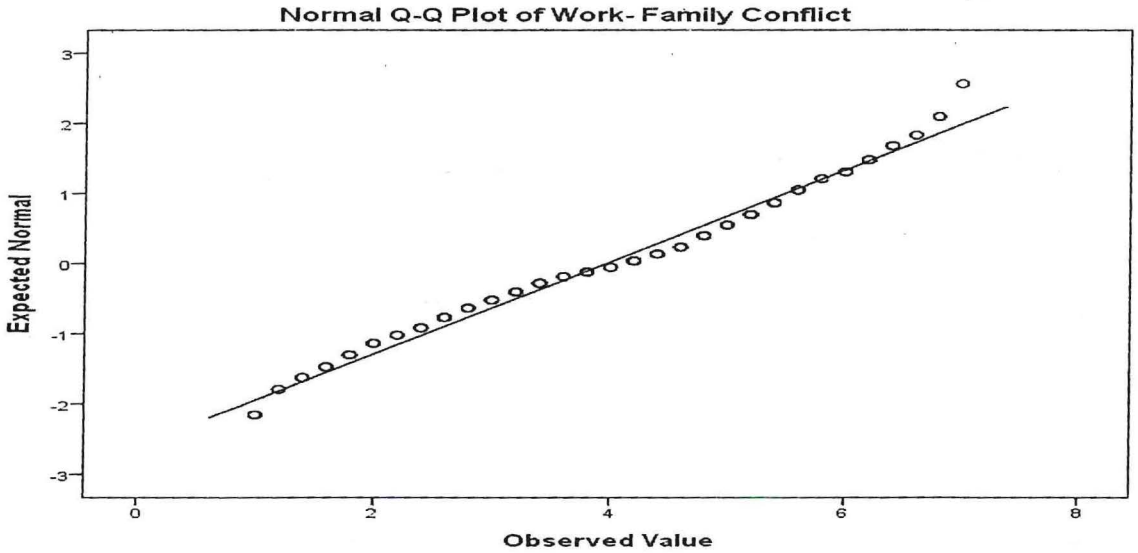


Figure 3.1, in the previous page, contain the Q-Q plot of work-family conflict. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.2: Normal Q-Q plot of Retention Intentions

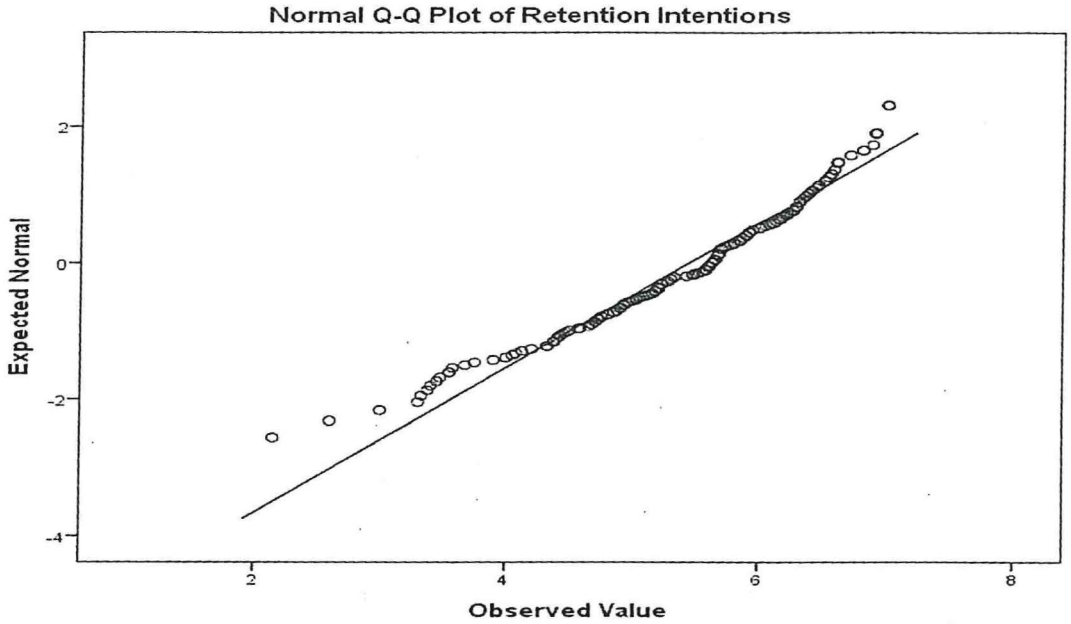


Figure 3.2 above contains the Q-Q plot of retention intentions. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.3: Normal Q-Q plot of Expectation Fulfilment

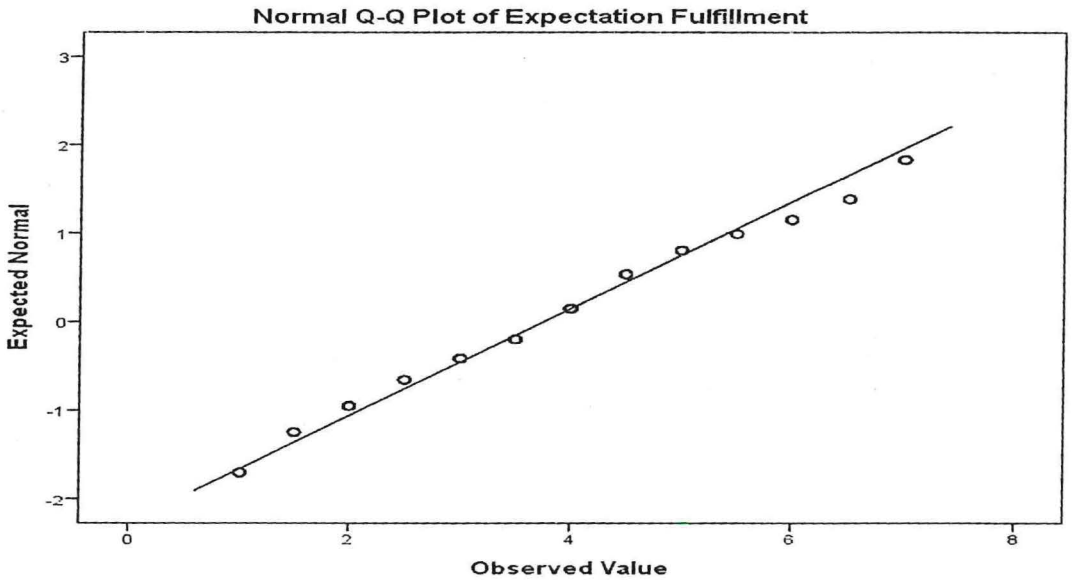


Figure 3.3, on the previous page, contain the Q-Q plot of expectation fulfilment. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.4: Normal Q-Q plot of Passion

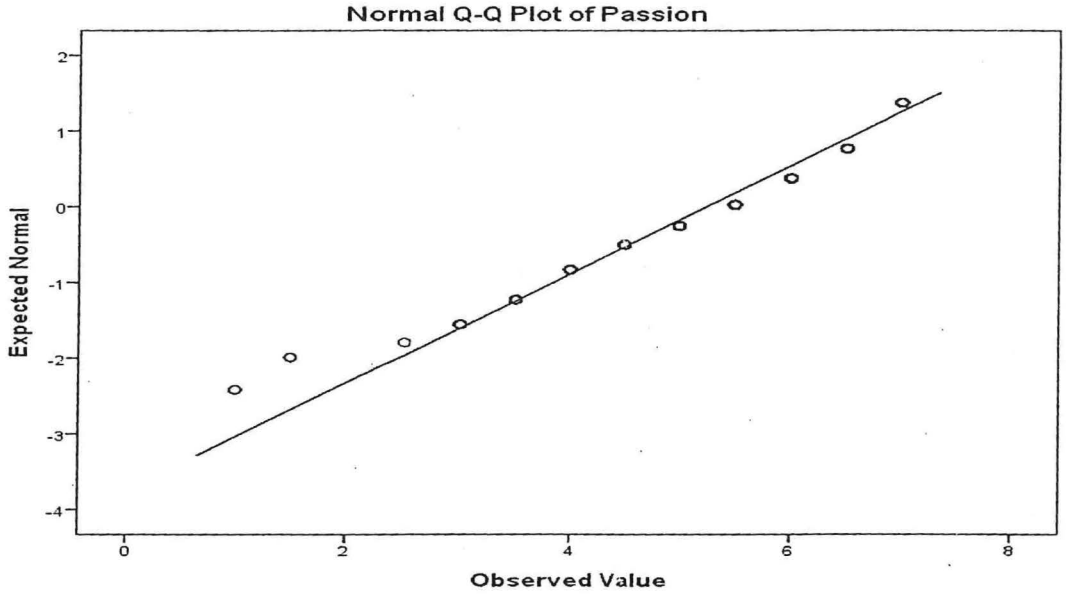


Figure 3.4 above contains the Q-Q plot of passion. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.5: Normal Q-Q plot of Career Mentorship

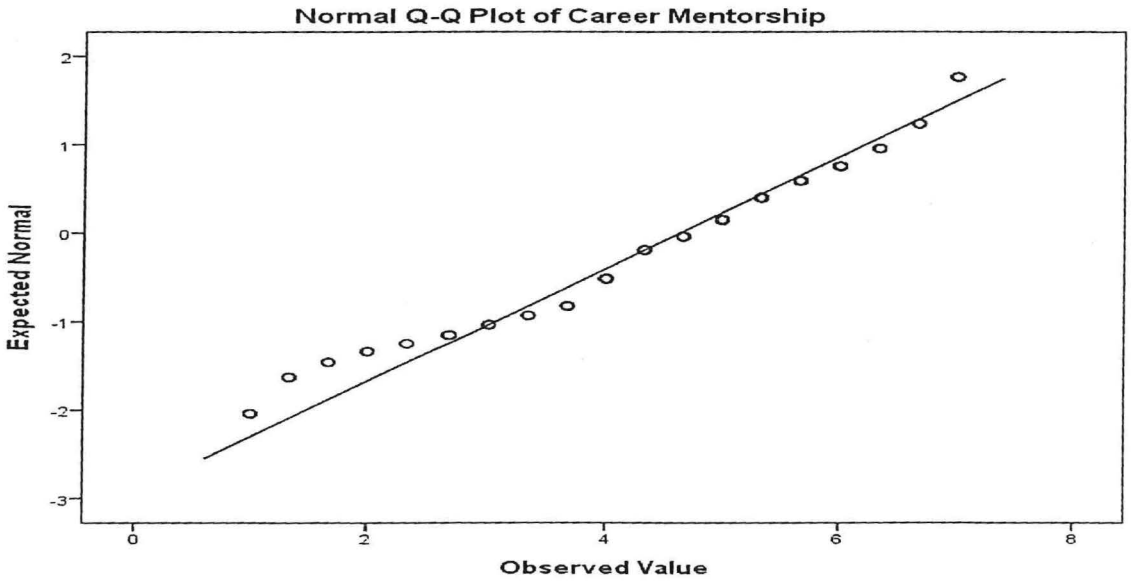


Figure 3.5, above, contains the Q-Q plot of career mentorship. The data points are also clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.6: Normal Q-Q plot of Perception of Societal Contribution

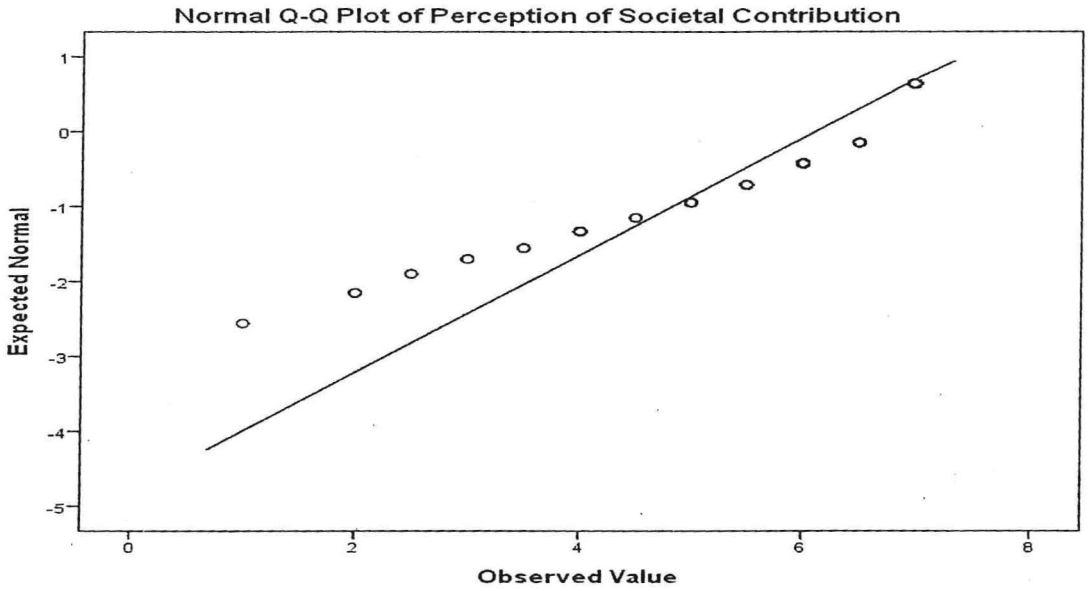


Figure 3.6, above, contains the Q-Q plot of perception of societal contribution. The data points are slightly spread along the line of best fit, demonstrating that the data is slightly skewed but very close to a normal distribution.

Figure 3.7: Normal Q-Q plot of Sense of Belonging

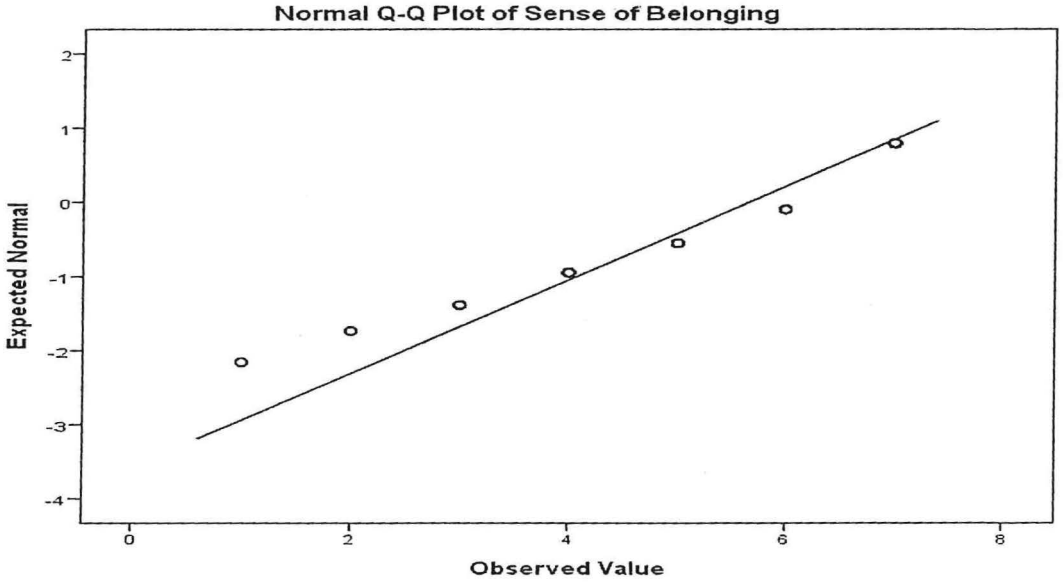


Figure 3.7, above, contains the Q-Q plot of sense of belonging. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.8: Normal Q-Q plot of Self-Efficacy

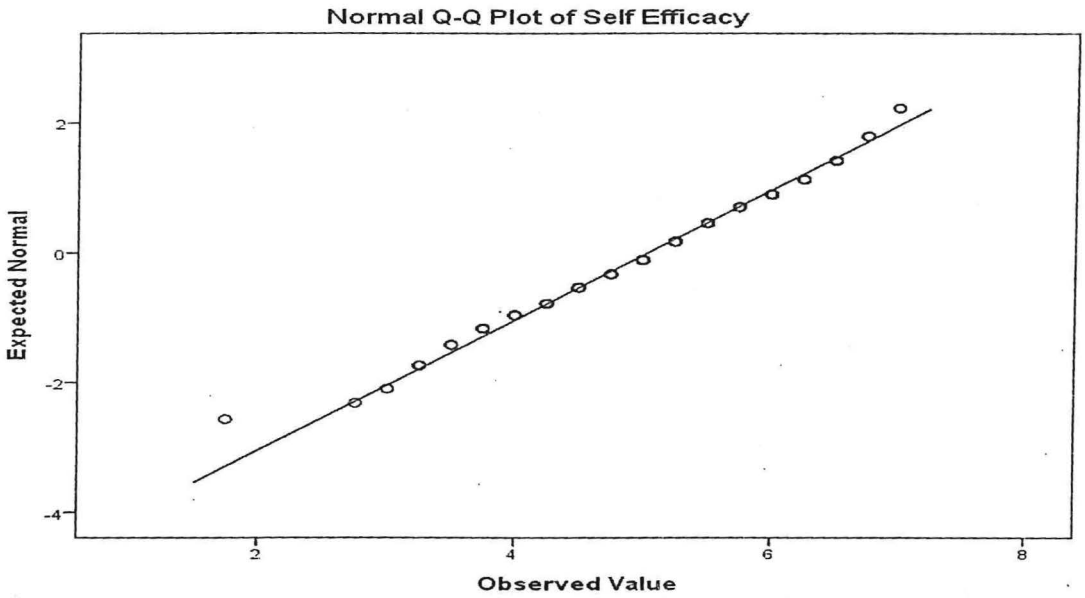


Figure 3.8, above, contains the Q-Q plot of self-efficacy. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.9: Normal Q-Q plot of Work Environment

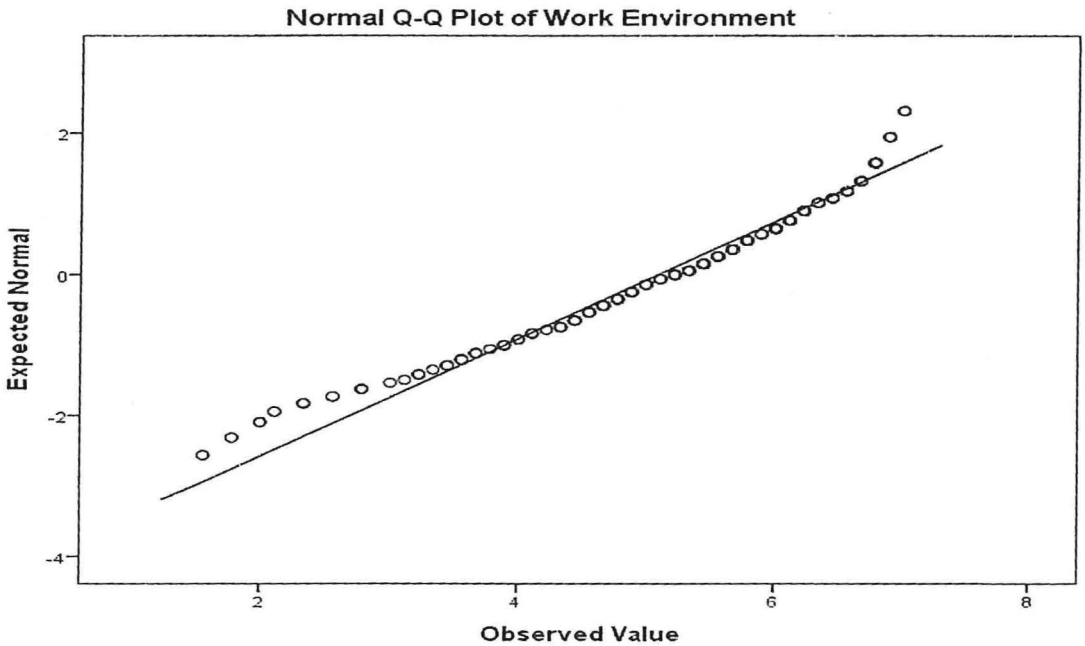


Figure 3.9, above, contains the Q-Q plot of work environment. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.10: Normal Q-Q plot of Support of Family and Friends

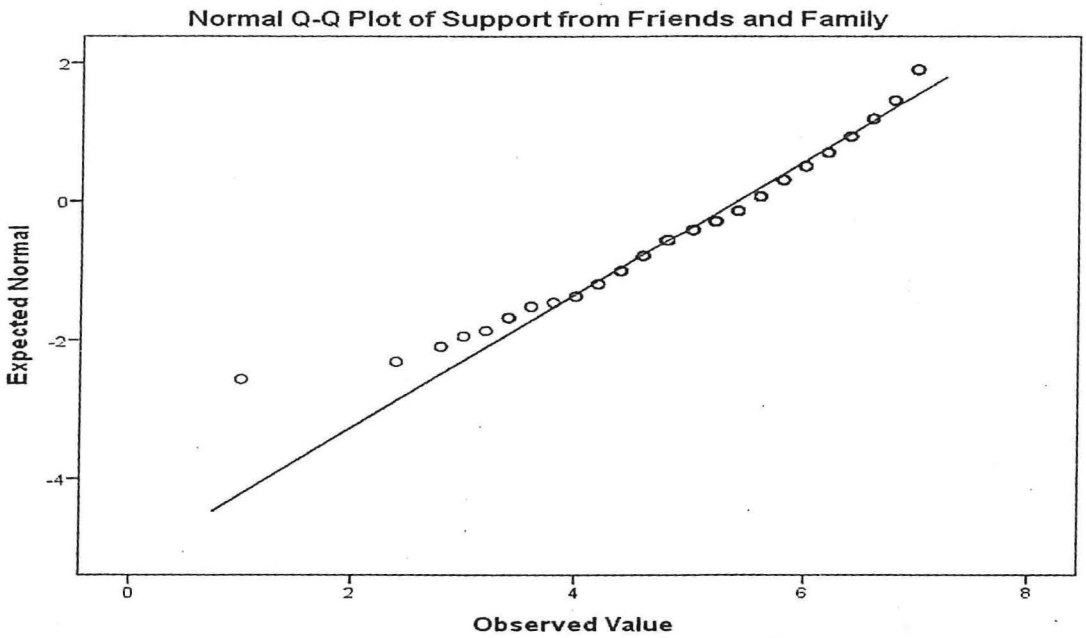


Figure 3.10, above, contains the Q-Q plot of support of family and friends. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.11: Normal Q-Q plot of Female Role Models

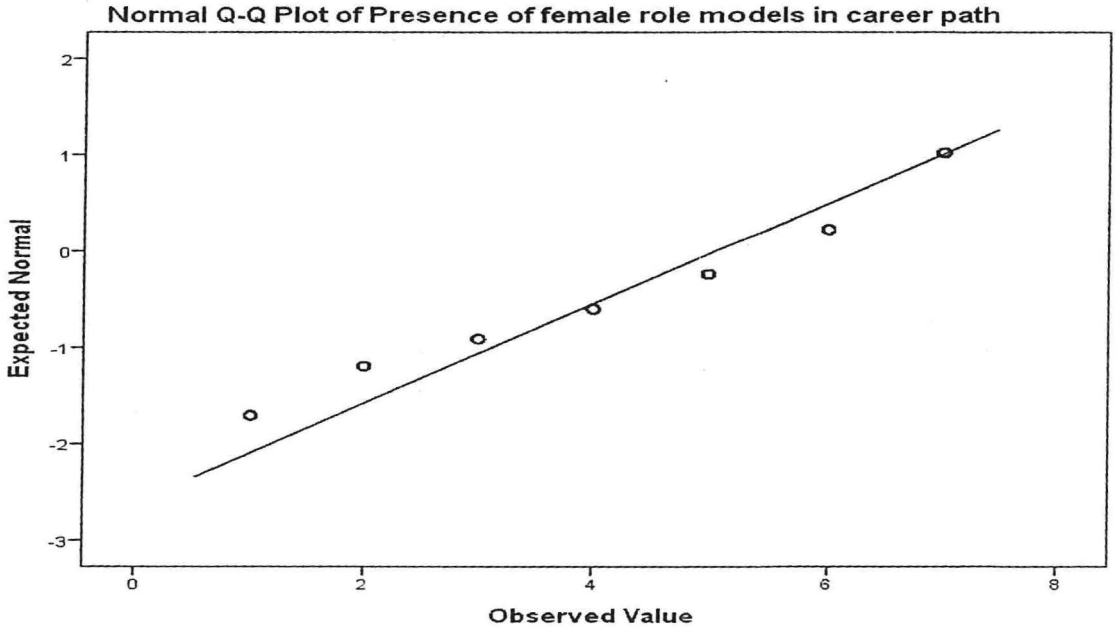


Figure 3.11 contains the Q-Q plot of female role models. The data points are clustered along the line of best fit, demonstrating that the data was normal.

Figure 3.12: Normal Q-Q plot of Career Sustainability and Growth

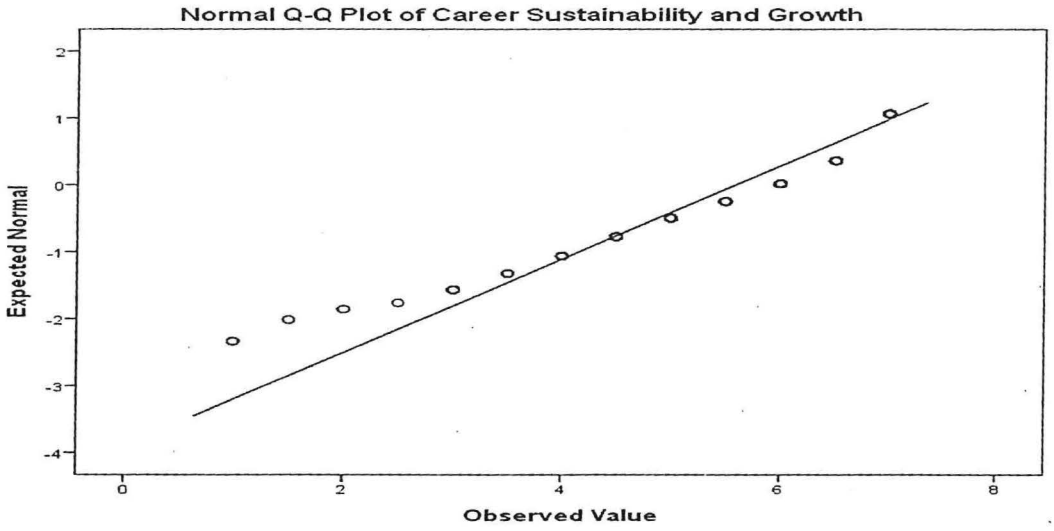


Figure 3.12, above, contains the Q-Q plot of female role models. The data points are clustered along the line of best fit, demonstrating that the data was normal. All twelve variables were therefore confirmed to be normally distributed.

3.8.2 Independent Observations Assumption and Multi-collinearity Test

The Durbin Watson and the Variance Inflation Factors (VIF) tests were employed to test for autocorrelation to confirm that the observations made are independent and Collinearity, respectively. Table 3.2 in the net page contains the results of the tests.

Table 3.2: Durbin Watson and Collinearity Statistics

		Collinearity Statistics	
		Tolerance	VIF
	(Constant)		
	Sense of Belonging	.467	2.139
	Presence of female role models in career path	.795	1.258
	Support from Friends and Family	.744	1.345
	Work Environment	.803	1.245
	Career Mentorship	.688	1.454
	Self-Efficacy	.560	1.785
	Passion	.465	2.151
	Expectation Fulfillment	.653	1.531
	Perception of Societal Contribution	.675	1.481
	Work- Family Conflict	.862	1.160
	Career Sustainability and Growth	.590	1.694
Durbin Watson Statistic: 1.948			

Source: Primary Data

All variables showed no sign of serious multi-collinearity as the variance inflation factors for all the independent variable ranged between 1.160 and 2.51. These figures are significantly less than 10 which is generally assumed to be the acceptable threshold for multi-collinearity(O'Brien, 2007).

There was also no autocorrelation that was detected as the Durbin Watson statistic, which as 1.948, fell within the generally acceptable range of 1.5 and 2.5 (Garson, 2012).

3.8.3 Linearity Assumption

Regression analysis assumes that the data values of the dependent variable for each increment in the independent variable fall along a straight line (linearity), if the other independent variables are held fixed(Osborne & Waters, 2002). It is therefore surmised that the linearity assumption is made since an accurate estimation of the relationship between the dependent and independent variable can only be done using multiple regression if the relationships are linear(Zhang, Cheng, & Liu, 2011). Therefore, to test for linearity, the ANOVA test of linearity was conducted. Table 3.3 below contains the results of the tests.

Table 3.3: ANOVA Test of Linearity

Variables	F	Sig
Sense of Belonging	1.071	0.378
Presence of female role models in career path	0.672	0.645
Support from Friends and Family	1.179	0.272
Work Environment	1.179	0.235
Career Mentorship	1.531	0.088
Self-Efficacy	1.341	0.171
Passion	1.872	0.061
Expectation Fulfillment	0.565	0.855
Perception of Societal Contribution	1.509	0.138
Work- Family Conflict	1.806	0.111
Career Sustainability and Growth	1.028	0.423

Source: Primary Data

All variables indicated linearity in their relationship with the dependent variable, retention behaviour since the significance values of the variables were above 0.05. According to Garson (Garson, 2012), linearity is significant if the F significance value for the linear component is above the critical value (ex.< 0.05).

3.8.4 Homoscedasticity Assumption

Homoscedasticity, which means the relationship under investigation is the same for the entire range of the dependent variable, is a key assumption in regression analysis (Osborne & Waters, 2002). Breusch-Pagan-Godfrey test which is a large sample test for homoscedasticity was therefore conducted to establish whether the regression model will be equally accurate across the whole range of the dependent variable.

Table 3.4: Breusch-Pagan-Godfrey test for Homoscedasticity

	LM	Sig
Breusch-Pagan-Godfrey	2.701	0.105

Source: Primary Data

The test was not significant at $\alpha = 0.05$,thus homoscedasticity can be assumed, as Garson (Garson, 2012) holds that homoscedasticity can be assumed if the significance value for the Breusch-Pagan-Godfrey is above the critical value (ex.< 0.05).

3.9 Quantitative Data Analysis

Upon confirming that the data met all the statistical assumptions as discussed above, a Pearson's correlation analysis was then conducted to evaluate the strength of the relationships between retention intentions and all the antecedents. A multiple linear regression analysis was then conducted to determine test if and how change in the antecedents (the independent variables) predict the change in the level of retention intentions among the respondents. A stepwise method was used in the creation of a regression model that will only contain significant variables using. It is a regression method, which begins with no candidate variables in the model, and variables are added to the model one at a time. After each step in which a variable is added, all independent variables in the model are checked to see if their significance has been reduced below the specified tolerance level (Henderson & Denison, 1989). If a non-significant variable is found, it is removed from the model. Variables are brought in and removed from the model until a stable set of variables is attained. Cross tabulation was then conducted to explore possible relationships between retention intentions and the demographic variables. The stepwise multiple linear regression analysis and cross tabulations were run using the SPSS software.

3.10 Research Quality

To ensure high quality output and a replicable and accurate study, this research study will take the aspects of validity and reliability into consideration. Validity is defined as the extent to which a variable measures what it is supposed to measure (Winter, 2000). In qualitative approaches, validity has been defined as the extent of "accuracy" of the findings as best described by the participants and the researcher. This study therefore utilized the validation strategies propounded by Creswell (2013) of clarifying research bias and providing rich and detailed descriptions in the report so that the reader can make decisions regarding validity independently. Furthermore, internal validity was confirmed using multiple sources of data and multiple methods. Data was collected

from two different groups of women, those who were persisting in their careers and those who had left their STEM careers to pursue non-STEM careers. Eight out of the eleven themes in the study emerged from both groups. All the themes that emerged from the study were also consistent with existing literature. The emergent results were also shared with some of the respondents for feedback to ensure that their perspectives are well captured and that the interpretations were correctly derived from the experiences shared.

The variables that were used in the survey were based on the themes that emerged from the qualitative data. Measures and scales of the identified variables were then adapted from previous studies and were refined to fit the context of this study. The convergent and discriminant validity of all the constructs were verified in the studies from which the scales were adapted(Bandura, 1986; Downing et al., 2005; Eisenberger et al., 1986b; Fishbein & Ajzen, 1975; Gloria et al., 1999; Greenhaus, Parasuraman, & Wormley, 1990; Hackett & Betz, 1981; Jawahar & Hemmasi, 2006; Kelly & Voydanoff, 1985; King et al., 1995; Robert W. Lent, 2006; Zigarmi et al., 2011). Table 3.1 which appears in sectoion 3.6 above, contains a detailed summary of the scales used in the creation of the survey.

The internal reliability was assessed using Cronbach's alpha, and all scales showed values above 0.60: with retention intentions at 0.783; sense of belonging at 0.655, passion at 0.662; work family conflict at 0.842; support of family and friends at 0.650; career mentorship at 0.865; expectation fulfilment at 0.641; career sustainability and growth at 0.679; female role models at 0.638; perception of societal contribution at 0.879; self-efficacy at 0.655; and work environment at 0.810. As it is generally acknowledged in literature that a Cronbach's alpha of 0.60 and above indicates an acceptable level of reliability(Bagozzi & Yi, 2012; Hair, Black, Babin, Anderson, & Tatham, 2006; Komunda & Osarenkhoe, 2012), all the variables had acceptable reliability. Table 3.7 in the next page contains information on the Cronbach's Alpha.

Table 3.7: Cronbach's Alpha

Variables	Cronbach's Alpha	Decision
Retention Intentions	0.783	Reliable
Sense of Belonging	0.655	Reliable
Passion	0.662	Reliable
Work-Family Role Conflict	0.842	Reliable
Support of Family and Friends	0.650	Reliable
Career Mentorship	0.865	Reliable
Expectation Fulfilment	0.641	Reliable
Career Sustainability and Growth	0.679	Reliable
Female Role Models	0.638	Reliable
Perception of Societal Contribution	0.879	Reliable
Self-Efficacy	0.655	Reliable
Work Environment	0.810	Reliable

Source: Primary Data

3.11 Research Ethics

The participation of all the respondents was voluntary and the respondents were free to withdraw from participating in the study at any point. Respondents were assured of no negative consequences for not participating. Prior to obtaining consent, full information on the evaluation, including the purpose and nature of the study was made known to all the respondents to ensure that any consent given was informed. The respondents were also assured that their identity and any personal information shared would be kept confidential. The data collected from this survey was used for education and research purposes only and the information was kept strictly confidential to ensure that the participants face no personal risk upon participating in the study. The proposal for the study was also submitted to an Ethical Review Committee for review and approval, prior to collecting data. Appendix A contains the Ethics Review Approval letter.

CHAPTER FOUR: QUALITATIVE FINDINGS AND DICUSSIONS

4.1 Introduction

The purpose of the study is to determine the factors that influence the retention intentions of women in STEM careers in Kenya. This knowledge is to be used in the creation of a macro social marketing programme that could help in alleviating the societal issue of the underrepresentation of women in STEM career. The first phase of the study was to determine the factors that influence the retention intentions of women from two key groups: women who have persisted in STEM careers for more than ten years and women who have already left STEM careers to pursue non-STEM careers.

Eleven broad themes emerged from the 44 codes that were created from the 17 interviews. The themes were, 'support of family and friends', 'work environment', 'passion', 'sense of belonging', 'career mentorship', 'self-efficacy', 'expectation fulfilment', 'perception of societal contribution', 'career sustainability', 'female role models' and 'sense of belonging'. This chapter has been organised in the following way: the first section discusses common themes that emerged from both groups of women in Kenya who were interviewed. The common themes were " passion", "self-efficacy", "support of family and friends", "career sustainability", "work environment", "work family conflict", "mentorship", and " societal impact". The second section discusses the unique themes that emerged from the transcribed interviews of women who had left STEM careers to pursue non-STEM careers.

4.2 Common Emergent Themes

Forty-four codes were generated during the analysis of all the 17 interviews that were conducted amongst the two sample groups of women who are persisting in STEM careers in Kenya and those that have already left STEM careers to pursue non-STEM careers. Of the 44 codes, the following eight themes emerged in both sample groups: "passion", "self-efficacy", "support of family and friends", "career sustainability", "work environment", "work family conflict", "career mentorship", and " perception of societal contribution". These eight themes also constitute all the main themes that were deduced from the transcribed interviews of women who are still pursuing careers in STEM in Kenya, which had 37 codes generated from them.

4.2.1 Passion

Passion, a concept that has only recently drawn the attention of scholars outside the field of philosophy(Hodges, Troyan, Keeley, & Cns-bc, 2010; Vallerand, Salvy, Mageau, Elliot, & Denis, 2007; Westbrook & Oliver, 2013; Zigarmi et al., 2011), is one of the major influencers of retention that was cited by both sample groups of women. Consistent with extant literature (Cardon, Zietsma, Saparito, Matherne, & Davis, 2005; Robert, Vallerand, & Verner-filion, 2013)., the respondents seemed to define passion as a strong inclination or interest in or enjoyment of work or a career in which they invest energy and time. A respondent who had left a career in Technology posited that:

> I think it is fair to say that if you get a good job that you like something that you are passionate about, something that excites you, something that makes you get up in the morning then you want to stick with it and run with it.

One of the persisting scientists particularly emphasised the role passion plays in her decision to remain in STEM saying:

> In Kenya, it is not easy. In addition, even to climb the ladder to go up. Because, in science you must do research. To do research, you need money. To get this money, you must write a proposal. To write this proposal, you must read. Yes. To be known as a scientist, you must publish. To publish, you must read. Your paper must be rejected, reviewed and returned with corrections. Like now, there is a paper I have been correcting for the last...this is the fourth time. Therefore, if you are not patient along this line you will give up. Moreover, once you give up, I think, that is the publish or perish thing comes in, you know. And we may never make it along this line. Therefore, I would tell the person to be very patient and you must be very passionate. Like other careers. You must be passionate about it.

It also becomes apparent, especially among women who had left the STEM career that the discovery of a new passion or interest influenced their decision on whether to persist in a STEM career. One of the women interviewed who left a career in nursing to pursue a non-STEM career said:

> I got a job doing community development that I enjoyed. I would do that even if they did not pay me and that for me was..."Nursing is not for me". I would say that was what led me to leave.

Another respondent stated that her decision to exit her career in Technology was triggered by her journey of self-discovery:

> I was in a place where I started discovering myself. I just said, "I don't want to be employed all my life. What can I do out of joy?"

It therefore seems that over time, as people grow older, become more self-aware, get exposed to more opportunities, people or activities, they are likely to discover new passions and interests that could lead them to make career changes. The absence or presence of passion for one's career and the discovery of a new passion can therefore influence career retention both positively and negatively.

4.2.2 Support of Friends and Family

The support of friends and family is posited by most respondents in both sample groups as critical for a woman pursuing a career. The multiple roles that women play in society, as a wife, mother, daughter, employee or business owner require support to be provided by friends and family from time to time if balance is to be achieved, just as the literature predicts (Erdwins, Buffardi, Casper, & O'Brien, 2001; Morganson et al., 2010). One of the ladies who was in a Science career for more than ten years before she transitioned to a non-STEM career states:

> I think having a good support system is always critical for a woman. If you are not organized yourself, you will not make it. You must sit at the table, you know. Sitting at the table means making sure your family is taken care of and they are at a good place, then you can sit on the table and sitting on the table just does not mean physically. It means physically and mentally, you are there. Right, so a good support system is important. So you know your spouse and your immediate family, people at home who help you with the children; you should be able to trust that when you are away; you will be away sometimes, nothing is going wrong and everyone is comfortable. Therefore, I think those are key.

One of the respondents who has been in her Science career path for more than twenty years succinctly states:

> If you have a supportive community around you, you are bound to be happy and to hang in there. You must have a supportive community around you: your family, the people around you.

These findings therefore suggest that, consistent with the growing body of literature, for women, career issues must be considered in the context of community and other life roles (Erdwins et al., 2001; Gutek, Nakamura, & Nieva, 1981; Robnett, 2015; Tapia & Kvasny, 2004).

4.2.3 Work Environment

The work environment was stated in this study, as it was in other previous studies (August & Waltman, 2004; Tapia & Kvasny, 2004), as one of the factors that influenced the career decisions of most of the women who were interviewed. Several specific aspects of the work environment were highlighted: support from supervisors and colleagues, the clients, resources and equipment and the physical environment.

Some of the respondents in Technology, Engineering and Medicine career paths provided additional insights into the issue when they stated that gender bias from some of the clients, they dealt with influenced their decisions to leave their STEM career. One of the respondents' who was in the Engineering career path stated:

> Clients tend not to trust women. Yeah, like, I am given this site, then, the client sees it is a girl. That was a problem and I remember the first site I was given, um, the boss is the one who, I came in when the boss had already done the drawings. Therefore, he gave me the drawings told me go just supervise this site. Therefore, there's, whenever there was a problem the client would call the boss first before calling me and I was the Engineer in charge of the site. Moreover, if it were, a guy, in my opinion, they would have just sorted it out there and then. It is something I noticed in sites. Because, where I worked, we were each given sites to handle from scratch. Unless there is a problem, the boss does not intervene. Therefore, the sites that were being handled by guys for some reason

there used to be many problems, but they used to sort it out there. Bu then now with us girls, ah, it has to reach to the boss, like 'You! How could you make such a mistake?' And it is quite demoralising because it's like they think, mistakes always happen in sites, and it's like those clients think, uh, we can't handle anything.

A respondent in Science (medicine) further highlighted the litigious nature of the client as one of the main reasons she decided to stop practicing medicine.

> Everyone is going to court. Therefore, you are always working in fear. Yeah, a decision that is not logical to me I will do it just because I am afraid that if this thing goes the wrong way and I was caught up in the situation, the patient is always right. Therefore, the rate of caesarean section skyrocketed and to me it is an abomination. Why is everyone delivering by caesarean? What life is this? With social media? If someone complains about you on social media, you are finished. Moreover, the patients will never talk about their own part in the fight or in the misunderstanding or in the mess. It is always, "the doctor did, the doctor said". There is no peace anymore and in Kenya, the Doctor is not protected. You are not protected by law; you are not protected by your organizations. You are on your own. So, I decided now I need to leave.

The working relationship with colleagues and supervisors in an organisation was mentioned as one of the influencers of the work environment, as literature predicts (Armstrong-Stassen & Schlosser, 2011; Beoku-Betts, 2005; Eisenberger et al., 1986b). One respondent who is persisting in the Technology career path stated:

> The people I work with are okay. It is important. The people you work with, you must be in a friendly environment.

The physical environment was also highlighted by some respondents as a factor that influences their retention decisions. One of the respondents stated one of her reasons for leaving as:

> I was fed up with the hot sun. I was fed up with being outdoors all the time.

Furthermore, as literature also predicts, the lack of adequate resources and equipment needed to do the work was also highlighted by some respondents as a source of frustration that affects career retention decisions(Campion & Shrum, 2004). One respondent in a Science (medical) career path stated:

> In the public hospitals, you get to help people who really need the health care but there is no equipment, there are no medications. It reached to a point where you would have to send a patient to go buy the medication and gloves and then come back for us to give them the medication. So then that frustration would not help, you enjoy the job.

A different respondent in the science career path stated:

> Being a researcher in Kenya is not easy. Kenya does not give funds for research. Good funding. Moreover, if it is given, it is not very open. You find that there are people who always get them. For other junior people like us it always takes a lot of effort. So, most of my funding comes from abroad. While I feel the country has a lot of need for research. I tend to feel that science is still not given the strength or the support it requires from the country. You find that like in the institution where I work, there are no laboratories. You want to do some practicals with your students. To me that makes me sick. Because personally, I went to an institution where there were laboratories. Now, I am teaching somebody I cannot take to the laboratory. I want this person to be like me one day. They cannot be because I am giving them theory. No practicals. And you know, today, science is very hands-on. Sometimes you imagine mine is just biology, all these, and a bit of practicals. What of someone who is in engineering? And in engineering, you really must get all the hands-on experience. So that to me, that is not satisfying. The work environment for scientists in Kenya is not the best.

Therefore, the work environment, which is the microenvironment, consists of clients, colleagues, supervisors, resources, equipment and the physical environment, which all together influence the retention decisions of women in STEM careers in Kenya.

4.2.4 Self-Efficacy

Consistent with career studies founded on social cognitive theory (Hackett & Betz, 1981; Lent & Brown, 2008), this study highlights lack of confidence in the ability to successfully pursue a career (self-efficacy) as one of the antecedents of retention perceived by the respondents. One of the respondents who left the Engineering career path said:

> So, I would say by the time I was finishing I was like, "I really don't want to practice", but I was not so sure because I did not know what the future was. Then I also, sorry to say, I did not feel very confident by the time I was finishing that "Wow! Now I have the skills equipped to go and apply". I kept feeling like "Gosh would I really make an Engineer really"?

Furthermore, the quality of training and education was cited by some of the respondents as one of the causes of low self-efficacy. A respondent, who left a Mathematics career to pursue a non-STEM career, said the following:

> My issue with my career came from even how it was taught in the University. I do not feel like it was taught- you were just given notes; you go figure it out. Moreover, the lecturers when they come, they come dump information on you. There was really was no teaching. It was getting information, finding a way of converting it into something when you are doing exams and see if you were going to pass.

> There is no linkage really with real stuff because when that happens then you have people appreciating exactly the skills, they are acquiring but without that, disenfranchisement is obviously caused by that gap.

Therefore, according to the perspective of some of the respondents in this study, low self-efficacy, likely due to poor vocational or higher education training has influenced their career retention decisions.

4.2.5 Work-Family Role Conflict

Respondents, who were married and had children, mentioned the multiplicity of their roles as a key factor in their career decision making. As observed in extant literature managing and balancing these roles were a challenge to most respondents and the role conflict they consequently experienced was stated as one of the factors that influence their career decisions(Diekman et al., 2015; Greenhaus & Beutell, 1985). For example, one of the women who left a career in Mathematics did so because her roles in society were increasing and the possibility of finding balance seemed slim:

> I started working in 2010, right after graduation and got married in 2012. And I discovered this thing is not going to work with family. Because, I would leave my husband asleep, go work, come back home, find he has cooked; he got tired of waiting for me and slept. Uh, so, it started taking a toll on me, on my marriage. In addition, being keen on family, I decided this is not the kind of environment I would like to raise my kids. Therefore, I started thinking of how to exit.

Achieving balance in all the roles that the woman carries is therefore considered key and essential by most of the respondents. One of the women persisting in a Mathematics career path attributes her satisfaction and persistence in STEM to having found balance in her roles:

> I am looking at it this way, as a career woman, married with children; you know many a time when women get to career, something goes wrong somewhere. Either the family they break, or the children, uh they are not connected. If I look at myself, yes I'm progressing well in my career but I am still keeping my marriage, uh, I'm in good terms with my husband, I'm in good terms, and we are okay, we support each other and I'm also in good connection with my girls. So, I think, uh in a way I am balancing.

Respondents who persisted in their STEM careers mainly found balance through the societal support they received from their friends and family, a finding that is echoed in extant literature (Erdwins et al., 2001; Miller et al., 2015; Tapia & Kvasny, 2004). However, respondents who had left STEM careers due to role conflict found balance in different ways and in different non-STEM careers. One respondent who left a career in Mathematics to become a baker found balance by changing the location of her workplace:

> I work from home. I have set-up my bakery at a small section of my house. Therefore, I can watch my kids grow. I am practically with them throughout. They can pop into the bakery, see what I am doing and for me that gives me a lot of satisfaction. Yes.

Another respondent who left a career in Technology found balance by establishing a business that allowed her to exercise flexible working hours:

> Do I want to do this all my life? I mean when I am a mother ati I am telling my kids "Woi! I'm held up at work". Even if I get a systems administration job in the bank and then you cannot leave. I thought, "No I just need a more liberating job." I know this career is more demanding. Self-employment for me. I am more. I think it is more demanding. Already in my mind, I feel like it is more demanding than being employed. You are everything in one. You are the accountant. You are the before everything can come into place. Nevertheless, I just told myself no! I need to be liberated. I can plan a meeting at ten and leave my children okay. Now when children come into play the ball game changes.

These findings support the growing literature concerning the departure of women from the traditional linear career path as they create or re-construct careers that better suit them by starting their own establishments and setting their own terms of employment (Shapiro et al., 2014).

4.2.6 Perception of Societal Contribution

Literature shows that women are oriented towards others, in that they want the work that they do to make a difference in society and the world and they prefer a collaborative working environment(Diekman et al., 2010, 2015). It is therefore not surprising that this, communal goal, was stated by respondents in this study as one of the factors that influence their career retention. For example, one of the women who left a Mathematics career stated:

> I felt no satisfaction at the end of any day. Yeah. I did not feel like I had made any impact; I had contributed significantly to anything. Probably I had not got to the point where there was a direct link to the contribution of the company. As in, even if you are at the bottom you are probably churning that information for the next person to use it to do something and something. Therefore, my visibility of the end game was not very clear. So, I did not feel like my job mattered. I did not feel like I wanted to do it for any longer.

Additionally, some of the women who are still in STEM careers state that one of the reasons they stayed is because they felt as though their work was making a difference in society. One of the respondents persisting in the Science career path as a Veterinary Doctor stated:

> What influences me is about helping people and the community; because if we were talking about the money, there are better opportunities to make a lot of money but you get engaged with the community; with the people you are treating for and if I give you an example like today, there is a child; two kids who just came to play with the animals which were in the clinic and you know, they were so happy. Therefore, the mom was telling me "Oh, why don't you have a day clinic where the kids come to play". You know? Therefore, you cannot walk away on that community. People gain a lot of happiness with animals and so I am not really dealing directly with just animals only; I am dealing directly with the person; with the human beings. Yes.

Another respondent in the Science career path echoed similar sentiments:

> I always wanted to do research. You know, have my work read and to change lives. I always wanted to do projects with communities and that is what I am now doing. Planting trees with them, training them on conservation. Therefore, to me, now it is a bit satisfying for me to stay in science.

This study thus seems to affirm the findings of Diekman et.al (Diekman et al., 2016) which show the importance of ensuring that the work women do in STEM should be communally oriented, work that allows them to work with (collaborate)and help others.

4.2.7Career Sustainability and Growth

Sustainability of work in the careers was raised by respondents as a possible influencer of retention. The need for certainty that the career path they were in would guarantee them work or gainful employment and growth opportunities in the future influenced their retention decisions, a finding echoed in existing literature (De Vos, 2018; Jawahar & Hemmasi, 2006). One of the women who left the Science career path stated:

> Because of the uncertainty in donor funding, you always knew you had a job for a limited time. You know, it is a three-year contract, so you create a contract for three years. Therefore, after these three years, you are hoping you get more money. So, when it comes to even planning for your life, finances et cetera long term, that would be very difficult to do. Therefore, moving out of that uncertainty to what I consider a more stable and structured way of doing things where I am also more in control, um I am glad I quit. I think I am much happier where I am doing what I am doing now.

The actual number of years an individual could work in that career path before they are forced to go into retirement was another aspect of career sustainability that they linked to their retention intentions. A respondent who left a career in Engineering stated:

> You know even the future, like sustainability, because right now what I am doing I am like even when I reach 50, 60 I can continue doing what I do, like the Consulting. You can continue being a Contractor even if you are how old vis-a-vis

being in a strict job that's yes maybe very well paying but after a certain time you start worrying "What happens after retirement"? So, for me, I think just the fact that what I am doing can be scaled up and has got some maybe like a longer longevity or something if there is such a thing. That is what drives me.

Similar to Newman(Newman, 2011) , this study found that Women in STEM careers in Kenya seemed to have similar desires with other workforce populations that wanted careers that provided economic security and that engaged them throughout their life-span, well beyond the traditional age of retirement.

4.2.8 Career Mentorship

Mentorship is acknowledged in both extant literature and this study as one of the influencers of career retention (Tapia & Kvasny, 2004). Lack of mentorship has been stated by a respondent as one of the factors or challenges that influenced her decision to leave an Engineering career for a non-STEM one more than ten years ago:

> I do not know if they have changed it, but I think the profession has always had this sort of old boy's sort of club. Therefore, you can imagine how being a young lady, it's. You really do not have someone to handle, to mentor you, because I think I never had that. I never had a mentor really in the Engineering space. That is the challenge.

The lack of mentorship persists. This is supported by the sentiments of one of the respondents still pursuing a Science career:

> So, mentorship is lacking. Along the way, you fumble. You fumble a lot just trying here and there. You meet one person today at a conference says, "Try this". You try. On the other side, you need to grow, someone says, "Try this". You try. You fail. You try this but nobody really. We do not have a system whereby we have scientists who have made it out there; having them come back to spread that word to other people to really help them build their careers. That is why you find that not so many people now are going for science. STEM is not having new students in most of the institutions because everybody thinks, "If I

go for business there's the money there". You know they make the quick money from procurement and all these. Not in science. Because nobody tells you the line, you are supposed to follow. So. Mentorship.

Thus mentorship, which entails the guidance provided by older or more experienced colleagues in the career path for the purpose of dealing with stress and gaining important information that will manage an individual's expectations and provide direction that will likely influence career progress(August & Waltman, 2004), is one of the factors that influence the retention of women in STEM careers in Kenya.

4.3 Emergent Themes Unique to women who left STEM Careers

Forty-four codes related to the retention of women in STEM careers emerged during the analysis of the transcribed interviews of women who had left STEM careers to pursue non-STEM careers. The eleven broad themes that emerged from the 149 codes were, 'support of family and friends', 'work environment', 'passion', 'sense of belonging', 'career mentorship', 'self-efficacy', 'expectation fulfilment', 'perception of societal contribution', 'career sustainability and growth', 'female role models' and 'work-family role conflict'. "Sense of Belonging", "expectation fulfilment" and "female role models" were the only themes that were uniquely identified by the subset comprised on women who left STEM careers to pursue on STEM careers.

4.3.1 Expectation Fulfilment

Several marketing studies have linked Expectation Fulfilment to the retention behaviour of customers in various industries showing that customer expectations that are not fulfilled or managed bring about a lack of retention of customers(Cant, Africa, & Erdis, 2012; Soriano, 2002; Tse & Wilton, 1988). Furthermore, some scholars have posited that marketing solutions can be extended to resolve issues with employees (internal customers) (Saad, Ahmed, & Rafiq, 2002; Varey & Lewis, 1999). It is therefore not surprising that this study determined that expectation fulfilment (a common marketing construct) was also cited as one of the antecedents of career retention.

Many respondents who left STEM careers highlighted the differences between their expectation when joining their STEM careers and the discordant realities they experienced once they started working. This difference between their expectations and the realities they experienced was stated as one of the factors that influenced their career retention decisions. One of the respondents who left a career in Mathematics stated:

> There was a gap between what I thought it was and what it actually was. That was a good recipe for disappointment and disenfranchisement. Because I would go in thinking it is this thing, I discover it is this. That was a sentiment in our class. By the second year or third year everyone was like "What is this we have gotten ourselves into? The way it was explained to me, it was this!" That was a recurring thing.

Some of the respondents, having experienced the expectation discordance, recommended the management and alignment of expectations if women are to persist in STEM, solutions that are consistent with those offered in the extant literature in marketing (Oliver, 1980; Parasuraman, Berry, & Zeithaml, 1991).One of the respondents said:

> When you get that general understanding, people go in knowing; people go in to pursue the degree knowing what it entails. You have a better chance of retaining those people because then again it gives to them what they went out of it. You set the right expectations both in terms of training and in terms of what career you should expect at the end of the day.

Women, upon gaining a keen understanding of the reality on the ground additionally need to and make a conscious decision of accepting "the cost of pursuing a STEM career" if they are to remain in the STEM career path for a long duration of time. One of the respondents who left a Technology career stated:

> Count the cost. Most of the time we go into something blindly; not knowing exactly what it entails. Be a bit proactive. Find out what is studied in this unit.

> What is in the syllabus? Then try and familiarize yourself with "Is this what I see myself doing in life"? On the other hand, "Am I just doing education just because I need to do a degree and I need to get a degree that's why I'm doing this course"? Um, count the cost. Is this what I want to do? Am I excited to learn about it?

One of the respondents' who is in a Science career stated that her initial expectation for the STEM career she chose to pursue was influenced by her peers:

> I had one person whom I always used to look up to and she was a paediatrician. I remember we went once when I was twelve, we had travelled to Egypt and she was in medical school. Therefore, I think she impacted me. Therefore, she had some influence in my small mind at that time.

Expectations for the careers are formed based on information received from various sources such as peers, family and academic institutions (Friedman & Mandel, 2009; Gore & Leuwerke, 2000).

4.3.2 Sense of Belonging

This study also extends the application of belonging to being a influencer of retention, a premise accepted in the extant literature of organisational behaviour (Armstrong-Stassen & Schlosser, 2011), to the context of women in STEM careers in Kenya. Some of the respondents who left or have contemplated leaving STEM careers stated that they felt a lack of belonging in their STEM career path and this was one of the factors that influenced their career retention decision. One respondent who left a career in Technology attributed this lack of belonging to the perception that their colleagues and clients in their careers in STEM did not welcome or respect their presence as women:

> As if being in IT that meant my work description meant fixing people's machines. If they crash or do something. Therefore, I would go to fix someone's machines and they were like "Wait! Are you the one who's going to fix it"? Um, there was that discrimination for they really did not think you could do it even when you knew for

sure you are qualified. Um, yeah there was that bias for "Ah this is a lady. I don't think she can fix this".

Another respondent who left an engineering career stated:

> Guys out there do not respect women par se who are in engineering when they go and give them instructions. Because now, I think there is still a bit of chauvinism even in this modern society of ours.

The lack of respect seems to be rooted in a belief that women cannot do well in STEM careers due to their gender. Extant literature further indicates that these attitudes and beliefs are based on long held societal beliefs that there are certain careers that are best suited for men, who are perceived to have superior intellect and capabilities (Beoku-betts, 2004; Robnett, 2015).

Another respondent posited that her decision to leave a Technology career was influenced by her peers who pointed out that she did not belong in her STEM career path:

> I felt like I was struggling there. Inasmuch as the pay was okay, I felt that it was easier to do other work. My passion really was not there or maybe what I wanted to learn in IT, I did not really get a hang of it. In addition, I had friends who kept visiting my office and they would find me frustrated and tell me "This is not your scene. You have to go into the baking industry". Because then I realized I am more of an art person than a science person.

Support of peers influence an individual's perception of not just their sense of belonging but also their self-efficacy (Robnett, 2015). Belonging can therefore be defined as the perception that colleagues, supervisors and clients welcome or respect the presence of the individuals and it is marked by interactions with colleagues and clients free from conflict and negative effect and interpersonal bonds(Beoku-Betts, 2005; Eisenberger et al., 1986b) . According to the respondents in this study, belonging is influenced by a

persons' perceived character, societal perceptions, level of self-efficacy and the perceptions of one's social network concerning their compatibility with the career.

4.3.3 Female Role Models

Female role models in the career path are perceived in this study to be a 'forecast' of whom, the women looking up to them, will likely be if they progress or persist in the career path. Thus, if women who are further along in the career path do not depict an attractive projection of the future, women are likely to be discouraged about persisting in the career path. One of the respondents who left a career in Quantity Surveying said:

> I tried to look ahead to women who had done Quantity Surveying and were older than I was. One common thing, all of them were divorced or separated. None of them, the ones I knew at that time, none of them had a working family. Therefore, I looked at them, I decided, you know what, I am not sure I want this for myself. Therefore, probably, had there been some, whose marriages worked, who knows, maybe I would have hanged on.

Another respondent who left a career in Actuarial Science echoed similar statements stating:

> Then you can imagine the person who I would consult was this person who had left, and she was saying "Oh I love my new job; it has nothing to do with Actuarial work". Then you are like "Okay, she looked for this joy in this career path for four years; she didn't find it and now she's found it elsewhere. Why should I take any more time to prove what she has already proven? That really there's not much here". Then also talking to other people who would also not focus on Actuarial careers and you know they would tell me "Oh I also did Actuarial for a year or two and I didn't stay". Therefore, nobody at the end of road was telling me "Hold on. Somewhere along the way it will click". Nobody was giving me that hope to persevere or to bid my time.

An absence of female role models that are admired and respected in the STEM career paths has thus been stated as one of the factors that have influenced the decisions of some of the respondents to leave their careers in STEM, a perspective that is supported in literature (Drury et al., 2011; Tapia & Kvasny, 2004).These findings contradict the findings of Downing, Crosby, and Blake-beard (2005) and bolster the argument in other literature that holds that the sense of belonging among women in STEM careers is enhanced when they are able to see and work alongside other women in the seemingly male dominated career path (Deemer, 2015).

4.4 Revisiting Theory

Macro-social marketing was used as the founding theory in this study by of a customer-centric approach that influenced the selection of the respondents and the implementation of formative research to gain insights into the perceptions of the respondents concerning the behaviour in question, retention. The theory also necessitates systems thinking which is done through mapping of actors and influences and the contextualising of the seven Ps of Marketing as propounded by Kennedy(Ann-Marie Kennedy, 2017). Section 4.4.1 consequently covers the mapping of the influences raised by the respondents in the qualitative phase of the study. The influences are mapped within the Actors Map that was created using existing literature as contained in Section 2.2.9 of the study. Section 4.4.2 then contains a discussion of the 7Ps of marketing as contextualised by the qualitative data analysed in this study.

4.4.1 Mapping of the Influences

The factors that were raised by the women interviewed were mapped into the ecological model was used to map the actors typically found in career systems (Figure 4.1). By mapping the factors that influence the retention of women in STEM careers in Kenya into the model, it is clear that retention is a complicated issue that has several root causes. Arrows were drawn to indicate the actors, structures or interactions that are likely the root causes of the lack of retention issues among women in STEM that were cited in the study and in extant literature.

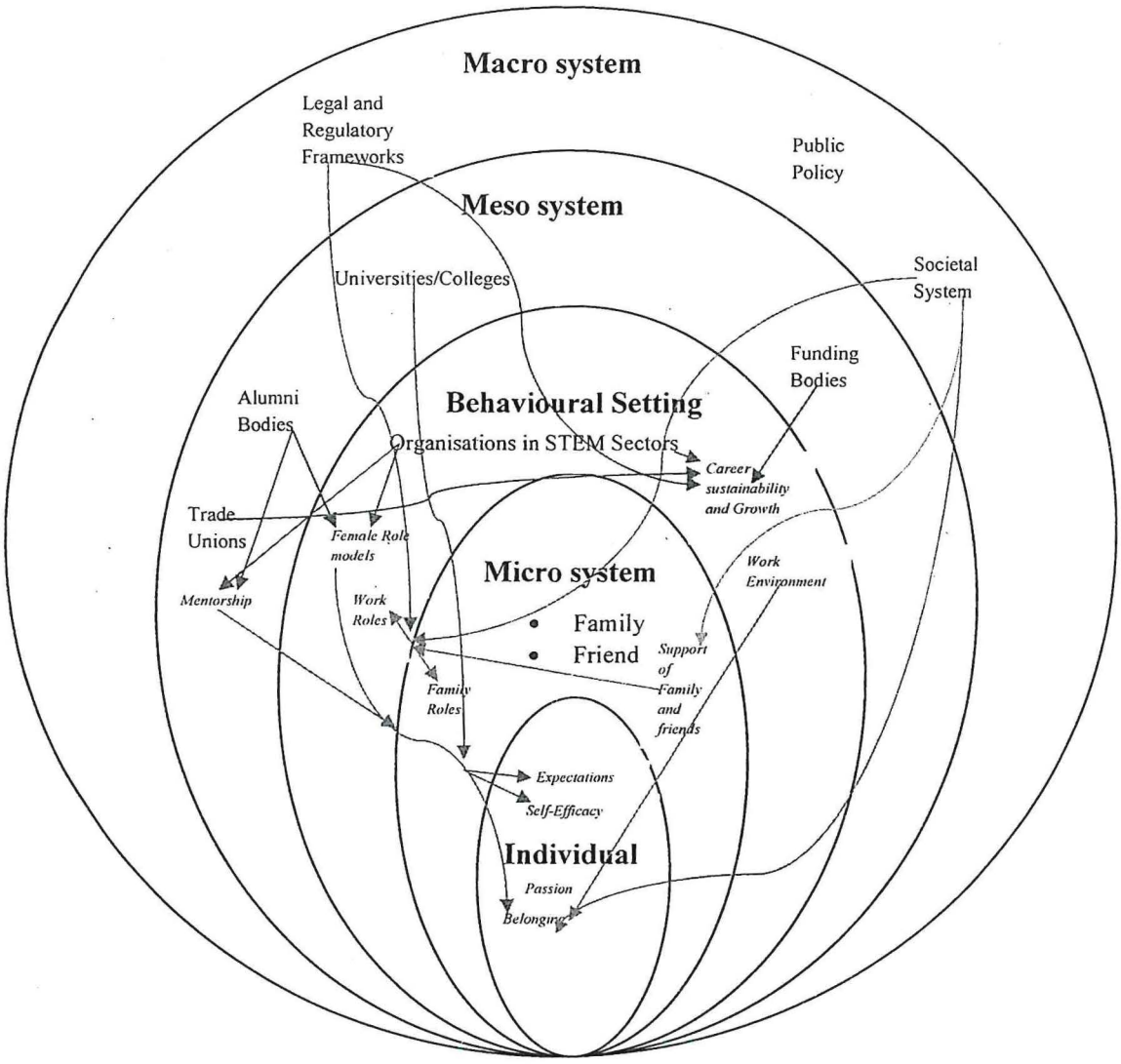
The orange arrows indicate that the expectations and self-efficacy concerning careers in STEM are influenced by information received by individuals from their social

networks, female role models, mentors, academic institutions and perceptions held generally by society concerning the career path (Sections 4.2.4, 4.2.8, 4.3.1 and 4.3.3). The blue and purple arrows show the relationships that Alumni bodies and organisations in STEM careers have in the presence of mentors and female role models.

The orange arrows also indicate that women's lack of a sense of belonging has been attributed in literature and in this study in sections 4.3.2 and 4.3.3 to a persons' perceived character, societal perceptions, a hostile work environment, level of self-efficacy, a deficiency in female role models and the perceptions of one's social network concerning their compatibility with the career.

The green arrows show clearly that support of family and friends (Section 4.2.2), which is influenced by pre-existing societal norms, is one of the main influences that mediate the work-family role conflict. The work environment in an organisation, the organisational policies and the labour laws of the land are also mediating influences in the work family role conflict (Section 4.2.5). Career sustainability and growth, discussed in detail in Section 4.2.7 is also influenced by labour laws, which dictate the legal retirement age, organisational policies and politics and funding bodies, which provide the necessary resources. The relationships are mapped using pink arrows.

Figure 4.1: Map of the Influences and Actors of the STEM Career System in Kenya based on the Qualitative Data



Source: Current Researcher, 2019

The map confirms that the retention of women in STEM careers in Kenya is a wicked problem. The issues raised are interrelated and seem to be because of the actions or lack thereof of numerous actors. Multilevel interventions will be needed to co-create the solutions and social mechanisms needed to enhance the retention behaviour of women in STEM careers in Kenya.

4.4.2 Contextualised Macro-social Marketing Mix

The marketing principles of product, place, price, promotion, people, partnership and policy (Kennedy, 2016) form the main foundations of macro-social marketing. The STEM career was assumed to be product in this study, as it was the system that needed to be appropriately packaged to meet the needs and wants of the target market(Lefebvre & Flora, 1988a), so as to bring about the preferred behaviour, retention. Based on the data provided by the respondents, the needs and wants cited by the respondents in relation to their STEM careers were balance between their career and family roles (as captured in section 4.2.5), support of family, friends, colleagues, mentors and supervisors (as seen in sections 4.2.2, 4.2.3 and 4.2.8), making a positive contribution to society through their work (section 4.2.6), growth and sustainability (section 4.27) and a sense of respect and acceptance by other actors in the STEM careers (as indicated in section 4.3.2). Therefore, STEM career systems need to evolve to ensure the above stated needs and wants of women are satisfied to better encourage retention behaviour of women in STEM careers.

Price, in seminal studies in macro-social marketing, is held to be the psychological, social or economic cost that the target market needs to pay to obtain the product. In this study, work-family role conflict (Section 4.2.5) and a general lack of trust and respect from colleagues and clients (Section 4.2.3 and 4.3.2) are deduced to be some of the main costs of pursuing a STEM career in Kenya. Therefore, to encourage retention behaviour these costs need to be reduced. Place, which is referred to as the response channels and the accessibility and distribution of the product in extant literature (Kennedy, 2016), is therefore deduced in this study to be the organisations which meet the needs and wants of women as discussed above and reduces the cost of pursuing a career in STEM.

Promotion, in macro-social marketing refers to the persuasive content and communication strategies within the target market that will make the product familiar, desirable and acceptable (Kotler & Zaltman, 1971). The study clearly highlights the uniquely strong influence that family, friends, mentors and female role models

(discussed in section 4.2.2, 4.2.8 and 4.3.3) have on women in STEM careers in Kenya. Therefore, when creating communication strategies these groups can be used as a promotional channel as they will likely be very effective. Furthermore, any promotional content should highlight the structures that the organisations or governments will have put in place to ensure their support, progress and sense of belonging in the STEM career path, key needs and wants cited by women in this study in section 4.2.2, 4.2.3, 4.2.8, 4.3.2 and 4.3.3. However, care should be taken to ensure that the persuasive content generates realistic expectations among the women, since expectation dissonance (section 4.3.1) was stated as one of the key influencers of retention behaviour among women in STEM.

Within seminal studies in macro-social marketing, people refers to the community within the social system that is likely to impact the degree and speed of adoption of behavioural change adoptions (Huff et al., 2017). The actors deduced to form a critical part in the co-creation process of retention behaviour of the respondents, based on the data created are family and friends (Section 4.2.2), colleagues and supervisors within the employing organisations (section 4.2.3), mentors (secttion4.2.8) and female role models (section 4.3.3). The influence of these highlighted actors should be taken into consideration when planning and used as means of enhancing the adoption of the strategies.

Partnership refers to the collaborations that the groups and actors within the system could form to ensure the adoption societal behavioural changes (Sallis et al., 2006). The creation of collaborations between the actors mentioned above in the marketing principle of people should therefore be one of the key strategies to be implemented. This is especially key given the inter-relationships highlighted in section 4.4.1 amongst the influences highlighted by the respondents that introduce a layer of complication to the whole issue of retention behaviour among women in STEM careers in Kenya. By working together, these communities will ensure system wide synergy is experienced in the co-creation of new norms and their subsequent diffusion and adoption amongst the actors in the STEM career system.

Finally, policy refers to the regulatory frameworks that could be used to influence change at the macro level (Head, 2008). Given the inter-relationships of the influences within the various environmental levels highlighted in section 4.4.1 systems wide (societal) change is necessary for the behaviour change to be effective. This can be done by changing the laws and policies which will ensure societal changes which will likely be institutionalised in a social system and therefore be even more likely to be change the systems of organisations operating within the system (Kennedy, 2016). Therefore, policies that will institutionalise support that will lead to enhance work-family role balance, improve the work environment and increase the sense of belonging among women, key influences as stated by the respondents, will likely improve the retention behaviour among women in STEM careers in Kenya.

CHAPTER FIVE: QUANTITATIVE FINDINGS

5.1 Introduction

This chapter presents the quantitative findings of the survey. The survey items were created based on the themes that emerged in the qualitative study that was conducted in the first phase of the study. The survey was distributed electronically using the Survey Monkey®. website. A link to the survey was sent to all people known to the researcher, to be pursuing a career in STEM. This initial group was asked to fill in the survey and share it widely among their networks to other women in STEM career paths. A total of 204 responses were received.It was however not possible to calculate a standard response rate given the method used to distribute the survey and the absence of any comprehensive sampling frame for the population. This chapter discusses the survey findings and is organised in the following manner: the first section discusses the demographics of the respondents. Section 2contains the findings of the survey results of the factors that influence retention among women in STEM careers in Kenya and is subdivided into three subsections. The first, second and third subsections focus on the findings of the descriptive, correlation and regression analyses respectively. While section three covers the retention intentions of the respondents as measured by the survey tool.

5.2 Respondent Demographics

In the survey, respondents were required to provide information concerning their age, their specific career path in STEM and their years of experience in the career path. Tables 5.1, 5.2 and 5.3 provide the frequency distributions of the demographics measured.

5.2.1 Age of Respondents

Respondents were asked to indicate their age based on pre-determined distributions of 18-24, 25-34, 35-44, 45-54, 55-64 and 65 and above years. However, five of the 204 respondents did not respond to this survey item. The ages of the respondents are shown on the next page in Table 5.1.

Table 5.1: Age of the Respondents

Age Distributions	Frequency	Percent	Cumulative Percent
1) 18-24 Years	47	23.0	23.6
2) 25-34 Years	114	55.9	80.9
3) 35-44 Years	26	12.7	94.0
4) 45-54 Years	10	4.9	99.0
5) 55-64 Years	2	1.0	100.0
6) 65 +Years	0	0	100.0
Total	199	97.5	
Missing Responses	5	2.5	
Total	204	100.0	

Source: Primary Data

Majority of the respondents, 55.9% were between the ages of twenty-five and thirty-four (25-34) years. Twenty-three percent of the respondents were between eighteen and twenty-four years old, while those between thirty-five and forty-four years made up twelve percent of the respondents. There was no representation of respondents that were sixty-five years and above.

5.2.2 Career Paths in STEM

Respondents were further asked to indicate their specific current career path in Science, Technology, Engineering and Mathematics. The STEM career paths of the respondents are shown below on Table 5.2.

Table 5.2: STEM Career Paths

Career Paths	Frequency	Percent	Cumulative Percent
Science	47	23.0	23.0
Technology	100	49.0	72.1
Engineering	36	17.6	89.7
Mathematics	21	10.3	100.0
Total	204	100.0	

Source: Primary Data

Technology held the highest frequency of respondents (49% of all respondents); while 23% of the respondents indicated that, they were in the Science career path. The

Engineering career path was selected by 17.6% of the respondents while the remaining 10.3% of the respondents indicated that they were in the Mathematics career path.

5.2.3 Years of Work Experience in STEM Careers

Respondents were asked to indicate their years of experience in their respective STEM careers. Table 5.3 below shows the distribution of years of work experience in STEM Career Paths amongst the respondents.

Table 5.3: Years of Work Experience in STEM Career Paths

Work Experience	Frequency	Percent	Cumulative Percent
Less than 1 Year	31	15.2	15.2
1-5 Years	79	38.7	53.9
6-10 Years	63	30.9	84.8
11-15 Years	17	8.3	93.1
16 Years and above	14	6.9	100.0
Total	204	100.0	

Source: Primary Data

Thirty-eight-point seven percent of the respondents indicated that they had been in their STEM careers for a period of 1-5 years while 30.9% of the respondents had been in their STEM career path for 6.10 years. Those that had been in the STEM careers for less than a year made up 15.2% of all respondents, while 8.3% of the respondents had 11-15 years of work experience in STEM careers. The final 6.9% of the respondents indicated that they had more than 16 years' work experience in a STEM career path.

5.3 Retention Intentions of Women in STEM Careers in Kenya

Descriptive statistics were carried out on the dependent variable, Retention Intentions. Table 5.4 below contains the central tendency measures.

Table 5.4: Central Tendency Measures of Retention Intention

Variable	Mean	Median	Mode	Std. Deviation	Skewness	Std. Error of Skewness
Retention Intentions	5.4333	5.6250	5.68	.93677	-.756	.170

Source: Primary Data

The mean of the variable retention intention (Mean=5.433, SD=0.94), displayed in Table 5.4 above indicates that respondents generally have intentions, albeit weak ones, to remain in their STEM career paths. A cross tabulation of the respondent's retention intentions and their years of work experience was then created. Table 5.5 contains the cross tabulation.

Table 5.5: Cross tabulation of Retention intentions and Years of Work Experience in STEM

			Years of work experience in the STEM Career Path					Total
			Less than one year	1-5 Years	6-10 Years	11-15 Years	16 Years and above	
Retention Intentions	1: Strong Intentions to Leave STEM	Count	0	0	0	0	0	0
		Percent	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2: Moderate Intentions to Leave STEM	Count	1	1	0	0	0	2
		Percent	50.0%	50.0%	0.0%	0.0%	0.0%	100.0%
		% of Total	0.5%	0.5%	0.0%	0.0%	0.0%	1.0%
	3: Weak Intentions to Leave STEM	Count	4	2	5	3	1	15
		Percent	26.7%	13.3%	33.3%	20.0%	6.7%	100.0%
		% of Total	2.0%	1.0%	2.5%	1.5%	0.5%	7.4%
	4: Uncertain on whether to leave or remain in STEM	Count	11	20	7	1	2	41
		Percent	26.8%	48.8%	17.1%	2.4%	4.9%	100.0%
		% of Total	5.4%	9.8%	3.4%	0.5%	1.0%	20.1%
	5: Weak Intention to Remain in STEM	Count	9	30	32	8	6	85
		Percent	10.6%	35.3%	37.6%	9.4%	7.1%	100.0%
		% of Total	4.4%	14.7%	15.7%	3.9%	2.9%	41.7%
	6: Moderate Intentions to Remain in STEM	Count	6	24	18	5	5	58
		Percent	10.3%	41.4%	31.0%	8.6%	8.6%	100.0%
		% of Total	2.9%	11.8%	8.8%	2.5%	2.5%	28.4%
	7: Strong Intentions to Remain in STEM	Count	0	2	1	0	0	3
		Percent	0.0%	66.7%	33.3%	0.0%	0.0%	100.0%
		% of Total	0.0%	1.0%	0.5%	0.0%	0.0%	1.5%
Total		Count	31	79	63	17	14	204
		Percent	15.2%	38.7%	30.9%	8.3%	6.9%	100.0%
		% of Total	15.2%	38.7%	30.9%	8.3%	6.9%	100.0%

Source: Primary Data

Forty-one-point seven percent (41.7%) of the respondents indicated that they had weak intentions to remain in STEM careers. Furthermore, 20.1% of the respondents indicated uncertainty concerning remaining in STEM careers. Thus, only 29.9% of the respondents indicated moderate to strong intentions to remain in STEM careers in Kenya. It was also interesting to note that 75.6 % of those respondents who indicated uncertainty concerning their intentions to remain in their STEM careers had less than one year to five years' worth of experience in their STEM careers, as displayed in Table 5.5above.

Further analysis of the retention intentions was carried out to determine whether there is a discernible pattern based on the different STEM disciplines. Table 5.6 contains the cross tabulation between the retention intentions and the STEM career disciplines of the respondents.

Table 5.6: Cross tabulation of Retention intentions and STEM Career Disciplines

			STEM Career Disciplines				Total
			Science	Technology	Engineering	Mathematics	
Retention Intentions	1: Strong Intentions to Leave STEM	Count	0	0	0	0	0
		Percent	0.0%	0.0%	0.0%	0.0%	0.0%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%
	2: Moderate Intentions to Leave STEM	Count	1	1	0	0	2
		Percent	2.1%	1.0%	0.0%	0.0%	1.0%
		% of Total	0.5%	0.5%	0.0%	0.0%	1.0%
	3: Weak Intentions to Leave STEM	Count	4	8	3	0	15
		Percent	8.5%	8.0%	8.3%	0.0%	7.4%
		% of Total	2.0%	3.9%	1.5%	0.0%	7.4%
	4: Uncertain on whether to leave or remain in STEM	Count	8	25	6	2	41
		Percent	17.0%	25.0%	16.7%	9.5%	20.1%
		% of Total	3.9%	12.3%	2.9%	1.0%	20.1%
	5: Weak Intention to Remain in STEM	Count	24	36	15	10	85
		Percent	51.1%	36.0%	41.7%	47.6%	41.7%
		% of Total	11.8%	17.6%	7.4%	4.9%	41.7%
	6: Moderate Intentions to Remain in STEM	Count	9	30	10	9	58
		Percent	19.1%	30.0%	27.8%	42.9%	28.4%
		% of Total	4.4%	14.7%	4.9%	4.4%	28.4%
	7: Strong Intentions to Remain in STEM	Count	1	0	2	0	3
		Percent	2.1%	0.0%	5.6%	0.0%	1.5%
		% of Total	0.5%	0.0%	1.0%	0.0%	1.5%
Total		Count	47	100	36	21	204
		Percent	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	23.0%	49.0%	17.6%	10.3%	100.0%

Source: Primary Data

It was interesting to note that none of the respondents, in the Mathematics career path, indicated an intention to leave their STEM career. 90.5% of the respondents in the Mathematics career path indicated weak to moderate intentions to remain in their STEM careers. The remaining 9.5% of the respondents in the Mathematics career path indicated uncertainty in their career retention intentions. In the Engineering career path 69.5% of the respondents indicated weak to moderate intentions to remain in their careers. It was however noted that 60% of those respondents had weak intentions to remain. Those in the Technology career path also had the highest percentage, 25% within the career path, of respondents indicating uncertainty concerning their retention intentions. In the Science career path, 72.3% of the respondents indicated weak to strong retention intentions to remain in their career path. However, a majority, 70.5%, of those respondents had weak intentions to remain.

Further analysis of the retention intentions was carried out to determine whether there is a discernible pattern based on age. Table 5.7 contains the cross tabulation between the retention intentions and age of the respondents.

Table 5.7: Cross tabulation of Retention intentions and Age of Respondents

			Age of Respondents					Total
			18-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	
Retention intentions	1: Strong Intentions to Leave STEM	Count	0	0	0	0	0	0
		Percent	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2: Moderate Intentions to Leave STEM	Count	0	2	0	0	0	2
		Percent	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
		% of Total	0.0%	1.0%	0.0%	0.0%	0.0%	1.0%
	3: Weak Intentions to Leave STEM	Count	2	8	3	0	0	13
		Percent	15.4%	61.5%	23.1%	0.0%	0.0%	100.0%
		% of Total	1.0%	4.0%	1.5%	0.0%	0.0%	6.5%
	4: Uncertain on whether to leave or remain in STEM	Count	13	23	3	2	0	41
		Percent	31.7%	56.1%	7.3%	4.9%	0.0%	100.0%
		% of Total	6.5%	11.6%	1.5%	1.0%	0.0%	20.6%
	5: Weak Intention to Remain in STEM	Count	18	44	16	4	1	83
		Percent	21.7%	53.0%	19.3%	4.8%	1.2%	100.0%
		% of Total	9.0%	22.1%	8.0%	2.0%	0.5%	41.7%
	6: Moderate Intentions to Remain in STEM	Count	14	34	4	4	1	57
		Percent	24.6%	59.6%	7.0%	7.0%	1.8%	100.0%
		% of Total	7.0%	17.1%	2.0%	2.0%	0.5%	28.6%
	7: Strong Intentions to Remain in STEM	Count	0	3	0	0	0	3
		Percent	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
		% of Total	0.0%	1.5%	0.0%	0.0%	0.0%	1.5%
Total		Count	47	114	26	10	2	199
		Percent	23.6%	57.3%	13.1%	5.0%	1.0%	100.0%
		% of Total	23.6%	57.3%	13.1%	5.0%	1.0%	100.0%

Source: Primary Data

Within the 35-44-year age group, 61.5% of the respondents indicated weak intentions to remain in their STEM careers. This represents the largest proportion of respondents that indicated weak intentions to remain in STEM when compared to the other age groups. To be specific; 38.3% amongst the 18-24-yearage group, 28.6% amongst the 25-34-yearage group, 40% amongst the 45-54-yearage group and 50% amongst those who were 55 and above years old indicated weak intentions to remain in their STEM careers.It was also particularly interesting to note that a higher proportion of the respondents, 31.68%, between the ages of 18-34 years old had moderate to strong intentions to remain in their STEM careers as compared to the respondents who were above 35 years old, of whom only 23.68 % of them indicated moderate to strong intentions to remain in STEM careers.

5.4 Factors that Influence Retention among Women in STEM Careers in Kenya

Eleven factors were drawn from the qualitative data collected and deduced to be antecedents of the retention intentions of Women in STEM careers in Kenya. These eleven factors, support of family and friends, work environment, work-family conflict, passion, career mentorship, self-efficacy, expectation fulfilment, perception of societal contribution, career sustainability and growth, female role models in the career path and sense of belonging were used to create a survey. Respondents were asked to score the survey items concerned with these eleven variables using a seven-point likert scale. The variables were measured using sets of three to eight survey questions whose scores were averaged after coding and the composite scores were used in the rest of the analysis.

5.4.1 Descriptive Analysis

Measures of central tendency were generated and compared to ascertain the degree to which the data conforms to the statistical assumption of normality. The mean, median, mode, standard deviation and skewness values of all variables are presented in Table 5.8 below.

Table 5.8: Descriptive Analysis of All Independent Variables

Variables	Mean	Median	Mode	Std. Deviation	Skewness	Std. Error of Skewness
Support from Friends and Family	5.4010	5.6000	5.60	1.01874	-.796	.170
Work Environment	5.0927	5.2222	5.44	1.20128	-.623	.175
Career Mentorship	4.6275	4.6667	4.00	1.57240	-.521	.170
Self-Efficacy	5.0159	5.0000	5.00	1.01742	-.214	.170
Passion	5.2181	5.5000	7.00	1.39323	-.669	.170
Expectation Fulfilment	3.7402	4.0000	4.00	1.64636	.182	.170
Perception of Societal Contribution	6.0907	7.0000	7.00	1.29050	-1.638	.170
Career Sustainability and Growth	5.5907	6.0000	7.00	1.43251	-1.068	.170
Work -family Conflict	3.9941	3.8000	3.20	1.52587	.133	.171
Female role models	5.0441	6.0000	7.00	1.93057	-.772	.170
Sense of Belonging	5.6422	6.0000	7.00	1.58328	-1.125	.170

Source: Primary Data

Analysis of the data largely demonstrated that the mean, median and mode of each variable deferred from each other. However, the values of asymmetry were within the acceptable range, -2 and +2, to prove normal univariate distribution (George & Mallery, 2003). For this reason, the Pearson's correlation, a parametric test, was used to explore the strength of the relationship between the various antecedent variables and the retention intention variable.

5.4.2 Correlation Analysis

Pearson's correlation was conducted to explore the strength of the relationship between each antecedent and the retention intentions of the respondents. Table 5.9 below shows the Correlation coefficients and the significant values of each antecedent and retention intention

Table 5.9: Correlation Coefficients

		Retention Intentions	Support from Friends and Family	Work Environment	Career Mentorship	Self-Efficacy	Passion	Expectation fulfillment	Perception of Societal Contribution	Sustainability and Growth	Female role models	Sense of Belonging	Work family Conflict
Retention Intentions	Pearson Correlation	1	.677**	.261**	.350**	.363**	.502**	.415**	.369**	.460**	.270**	.697**	.095
	Sig. (1-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.089
Support from Friends and Family	Pearson Correlation	.677**	1	.216**	.354**	.063	.093	.109	.277**	.125*	.235**	.295**	.009
	Sig. (1-tailed)	.000		.001	.000	.184	.092	.060	.000	.037	.000	.000	.452
Work Environment	Pearson Correlation	.261**	.216**	1	.399**	.149*	.173**	.223**	.140*	.132*	.224**	.189**	.085
	Sig. (1-tailed)	.000	.001		.000	.020	.008	.001	.026	.034	.001	.004	.120
Career Mentorship	Pearson Correlation	.350**	.354**	.399**	1	.226**	.273**	.197**	.222**	.156*	.331**	.276**	.075
	Sig. (1-tailed)	.000	.000	.000		.001	.000	.002	.001	.013	.000	.000	.145
Self-Efficacy	Pearson Correlation	.363**	.063	.149*	.226**	1	.402**	.498**	.289**	.478**	.135*	.486**	.283**
	Sig. (1-tailed)	.000	.184	.020	.001		.000	.000	.000	.000	.027	.000	.000
Passion	Pearson Correlation	.502**	.093	.173**	.273**	.402**	1	.346**	.427**	.549**	.289**	.618**	.034
	Sig. (1-tailed)	.000	.092	.008	.000	.000		.000	.000	.000	.000	.000	.317
Expectation fulfillment	Pearson Correlation	.415**	.109	.223**	.197**	.498**	.346**	1	.125*	.342**	.123*	.459**	.125*
	Sig. (1-tailed)	.000	.060	.001	.002	.000	.000		.037	.000	.040	.000	.038
Perception of Societal Contribution	Pearson Correlation	.369**	.277**	.140*	.222**	.289**	.427**	.125*	1	.347**	.265**	.352**	-.110
	Sig. (1-tailed)	.000	.000	.026	.001	.000	.000	.037		.000	.000	.000	.059
Sustainability and Growth	Pearson Correlation	.460**	.125*	.132*	.156*	.478**	.549**	.342**	.347**	1	.268**	.500**	.056
	Sig. (1-tailed)	.000	.037	.034	.013	.000	.000	.000	.000		.000	.000	.215
Female role models	Pearson Correlation	.270**	.235**	.224**	.331**	.135*	.289**	.123*	.265**	.268**	1	.257**	.029
	Sig. (1-tailed)	.000	.000	.001	.000	.027	.000	.040	.000	.000		.000	.341
Sense of Belonging	Pearson Correlation	.697**	.295**	.189**	.276**	.486**	.618**	.459**	.352**	.500**	.257**	1	.126*
	Sig. (1-tailed)	.000	.000	.004	.000	.000	.000	.000	.000	.000	.000		.037
Work family conflict	Pearson Correlation	-.095	-.009	-.085	-.075	-.283**	-.034	-.125*	.110	-.056	-.029	-.126*	1
	Sig. (1-tailed)	.089	.452	.120	.145	.000	.317	.038	.059	.215	.341	.037	
**. Correlation is significant at the 0.01 level (1-tailed).													
*. Correlation is significant at the 0.05 level (1-tailed).													

Source: Primary Data

The analysis reveals that retention intentions had a significant relationship with all antecedents, except work family conflict. The sense of belonging is the only antecedent that had significant relationships with all the other antecedents. Female role models, sustainability and growth, perception of societal contribution, career mentorship and work environment had moderate to weak significant relationship with all other antecedents, except work-family conflict. In fact, only self-efficacy ($r=0.283$, $p<0.05$), expectation fulfilment ($r=-0.125$, $p<0.05$) and sense of belonging ($r=-0.126$) $p<0.05$), seemed to have a significant albeit weak relationship with work-family conflict. Meanwhile, expectation fulfilment and self-efficacy also had significant relationships, ranging from moderate to weak in terms of strength of the relationships, with all antecedents except that of support of family and friends. Passion also had significant relationships, ranging from moderate to weak too in terms of strength, with all antecedents except two; support of family and friends($r=0.093$, $p>0.05$) and work-family conflict ($r=0.034$, $p>0.05$). Support of family and friends had moderate to weak significant relationships with all antecedents apart from self-efficacy ($r=0.063$, $p>0.05$), work family conflict ($r=0.009$, $p>0.05$), expectation fulfilment ($r=0.109$, $p>0.05$) and passion ($r=0.093$, $p>0.05$).

5.4.3 Regression Analysis

A multiple linear regression was then conducted to test if and how change in the antecedents (the independent variables) predicts the change in the level of retention intentions among the respondents. A stepwise method was used in the creation of a regression model that will only contain significant variables using. It is a regression method, which begins with no candidate variables in the model. Variables are added to the model one at a time. After each step in which a variable is added, all independent variables in the model are checked to see if their significance has been reduced below the specified tolerance level. If a non-significant variable is found, it is removed from the model. Variables are brought in and removed from the model until a stable set of variables is attained. The stepwise multiple linear regression analysis was run using the SPSS software.

The variables excluded from the model are contained in table 5.10 below.

Table 5.10: Variables Excluded from the Model

Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
					Tolerance
Work Environment	.018	.498	.619	.037	.906
Career Mentorship	-.016	-.412	.680	-.030	.809
Self-Efficacy	-.009	-.204	.838	-.015	.632
Perception of Societal Contribution	-.002	-.050	.960	-.004	.728
Work family conflict	-.040	1.164	.246	.085	.977
Female role models	-.017	-.457	.648	-.034	.851

Source: Primary Data

The variables that were excluded from the model were all statistically insignificant after controlling for the other variables in the model

The significant variables that formed the regression model were sense of belonging, support of family and friends, career sustainability and growth, expectation fulfilment and passion. The coefficients are obtained from Table 5.11 below:

Table 5.11: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	.540	.207		2.606	.010	.131	.949
Sense of Belonging	.223	.029	.376	7.680	.000	.166	.280
Support from Friends and Family	.488	.032	.540	15.017	.000	.424	.552
Career Sustainability and Growth	.077	.028	.118	2.792	.006	.023	.131
Expectation Fulfilment	.063	.022	.112	2.870	.005	.020	.107
Passion	.065	.032	.096	2.048	.042	.002	.127

Source: Primary Data

The general form of the equation that is therefore best used to predict retention intentions is:

Predicted Retention Intention = 0.540 + (0.223 x sense of belonging) + (0.488 x support of family and friends) + (0.77 x career sustainability and growth) + (0.063 x expectation fulfilment) + (0.065 x passion)

Table 5.12 below contains the Model Summary Table.

Table 5.12: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.885	.784	.778	.44276	1.948

Source: Primary Data

The regression model that was created had a measure of 0.885, which indicates a good level of prediction of the quality of the dependent variable, retention intention. The five independent variables in the model, sense of belonging, support of family and friends, career sustainability and growth, expectation fulfilment and passion, explain 78.4% of the variance in the dependent variable as R squared is 0.784.

Table 5.13 below contains information concerning the goodness of fit of the model.

Table 5.13: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	132.218	5	26.444	134.894	.000
Residual	36.462	186	.196		
Total	168.680	191			

Source: Primary Data

The overall regression model is a good fit for the data as the F-ratio (F (5, 186) =134.894, P<0.0005) in the ANOVA table above (Table 5.9), further indicating that the independent variables statistically significantly predict the dependent variable.

CHAPTER SIX: DISCUSSION OF FINDINGS

6.1 Introduction

The research study sought to determine the retention intentions and its antecedents amongst Women in STEM in Kenya. A sequential exploratory mixed methods research design was used in the study and data was collected in two phases. The first phase of the study was designed to respond to research question one and two, which sought to determine the antecedents of retention as perceived, by women in Kenya with more than ten years work experience in STEM and women in Kenya who had left STEM careers to pursue non-STEM careers, respectively. Eleven themes were drawn from the seventeen interviews that were conducted.

The eleven themes represented the antecedents of retention intentions as perceived by the women who were interviewed. Eight of the themes were perceived by both groups, women who had left STEM careers to pursue non-STEM career and women with more than ten years' experience who were still in STEM careers, as antecedents of retention. The eight themes were, " passion", "self-efficacy", "support of family and friends", "career sustainability", "work environment", "work family conflict", "career mentorship", and " societal impact". Detailed discussions on the themes are in Section 4.2. "Sense of Belonging", "expectation fulfilment" and "female role models" were the only themes that were uniquely identified by the subset comprised on women who left STEM careers to pursue on STEM careers. Detailed discussions on these themes are contained in Section 4.3.

The eleven themes were then used in creating a survey tool that was used in the second phase of the study that sought to generalise the qualitative findings (Research Question 3) and determine the retention intentions (Research Question 4) of a larger sample of women currently in STEM careers in Kenya.

This chapter discusses the findings of the second phase of the study while connecting it to existing theory and research. The first section (Section 6.2) contains the discussion on findings concerning the retention intentions of Women in STEM careers in Kenya. The second section (6.3) focuses on the antecedents of retention intentions among Women in STEM careers in Kenya.

6.2 Retention Intentions of Women Pursuing STEM Careers in Kenya

This study found that the respondents had weak intentions to remain in their STEM careers. The lower the behavioural intentions, the less likely a person will exhibit the expected behaviour in the future (Ajzen & Fishbein, 1980; Ha, 1998; Shimp & Kavas, 2013) . These findings therefore communicate the low likelihood of women exhibiting retention behaviour in STEM careers in Kenya in the future.

Furthermore, a high percentage (75.6%) of women who had had low retention intentions to remain in STEM careers had been pursuing said careers for five or less years (see Table 5.11). This could be interpreted to mean that this group would likely have the highest percentage of women leaving in the future if preventative measures are not taken. If a social marketing campaign were to be created and implemented, the first group in STEM that should be specifically targeted should be the new entrants into the career path.

It should also be noted that 61.5% of women within the age group of 34-45 years old indicated weak intentions to remain in STEM careers. Studies show that women typically place greater emphasis between balancing their roles at home and at work as they age (Mjoli, Dywili, & Dodd, 2013). They are therefore not as eager to prioritise their career especially when parenting young children (Beutell & Greenhaus, 1983). These quantitative findings coupled with the qualitative findings show that the influence of work family conflict seems to vary with different life stages. Interventions can be created to help women manage this phase of their lives by providing support in balancing their roles, mentorship and coaching that will help them make any necessary adjustments and policy changes that will provide the structures necessary to creative a conducive working environment. Flexible work arrangements and parental care leave policies and benefits have been proven to be effective in encouraging the re-entry and retention of women in the labour force after having children in various countries (Ondrich, Spiess, Yang, & Wagner, 2015; Pylkkanen & Smith, 2014). Some of the policies, such as the non-transferable parental leave days for men (daddy days) in countries such as Germany, Sweden, Iceland and Norway, have also brought about an

increase in the participation of men in care giving in the home setup, bringing about a shift in the societal structure (Hegewisch & Gornick, 2011).

This study also noted that respondents in the Mathematics career path seemed to be more inclined towards staying in their careers, as compared to those in the other STEM disciplines, as 90.5% indicated weak to strong intention to remain. Respondents in the Technology career path however seemed to be more uncertain concerning their retention intentions. Interventions especially targeting the technology career path therefore need to be created and implemented urgently to influence those on the fence to remain in their career paths.

6.3 Antecedents of Retention amongst Women in STEM Careers in Kenya

The study determined that the antecedents were all highly interrelated, a finding that supports the macro social marketing perspective that behaviour is influenced by a myriad of interrelated factors within the contextual environment in which it occurs (Huff et al., 2017). Sense of belonging stood out as it had a positive significant relationship with all the antecedents. This can therefore be interpreted to mean that the extent to which a person feels that they belong is highly influential to the retention decisions that are made.

A positive significant relationship between all the antecedents of retentions, except work family conflict, and retention intentions in the context of women in STEM careers in Kenya was also uncovered in the study. Work-family role conflict had a negative relationship with retention intentions but was unexpectedly the only variable that did not have a significant relationship with the dependent variable. This result does not necessarily mean that there is no relationship between work family conflict and retention intention, as lack of significance does not automatically mean a lack of relationship(Onwuegbuzie & Leech, 2004). However, this findings do contradict most of the studies that were conducted in the developed countries (Beutell & Greenhaus, 1983; Diekman et al., 2015; Saltzstein, Ting, & Saltzstein, 2001).Additional studies may be needed to replicate the study in the same population and in other African developing countries to confirm the findings.

In terms of the overall fit of the regression model, as indicated by the R2 that was reported in Table 5.7, five of the eleven antecedents of retention that were used in the survey, can be used to predict 78.4% of the likely variance of the retention intentions of women in STEM in Kenya. The five antecedents are support of family and friends, sense of belonging, expectation fulfilment, passion and career sustainability and growth.

According to the model (Table 5.6), support of family and friends contributed the most towards the retention intentions of women in STEM careers in Kenya and can thus be regarded as the best predictor of the retention intentions in this study. This finding is consisted with the growing literature that widely acknowledges the support of family and friends as a key influencer of retention amongst women(G. A. Adams, King, & King, 1996; Diekman et al., 2015; Syed & Chemers, 2011). In the qualitative phase of this study (Section 4.2.2), family and friends are also considered as a source of influence, which enhance or reduce the perception of belonging, which was identified as the second-best predictor for retention intentions. This finding is consistent with the findings of Drury et al (2011)who also posited that if women do not feel as though they belong in a certain career path they are likely to leave. All this ties in to belonging being a central need in the lives of human beings(Hagerty, Lynch-sauer, Patusky, Bouwsema, & Collier, 1992; Maslow, 1954).

However, women in STEM careers in Kenya could have great support amongst their friends and family and feel as though they belong in their career path, but they would still desire to leave if they perceived that the career path was unsustainable. Literature echoes the description provided in the study of a sustainable career as a career that provides sufficient security to meet economic needs and provides engagement throughout an individuals' life-span, well beyond the traditional age of retirement (Heijden & Vos, 2015; Newman, 2011). This study extends the body of knowledge by empirically linking career sustainability as the third best predictor of retention intentions among women in STEM careers in Kenya, followed closely by passion and expectation fulfilment.

Expectation fulfilment, a construct that also features prominently in the socio-cognitive theory as outcome expectation (Gore & Leuwerke, 2000; R. W. Lent & Brown, 2008),

was also determined in this study to be a good predictor of retention intentions. This finding is also consistent with the marketing theories concerning the key role that expectation plays in the attainment of satisfaction which is linked widely to the retention of customers(Cant et al., 2012; Parasuraman et al., 1991). It can thus be concluded that it is very important to ensure that the expectations of those joining the STEM career paths are as close to the reality on the ground as possible, to ensure that those expectations can be met or exceeded. Expectations that are fulfilled or exceeded are posited to predict the retention intentions of women in STEM in Kenya. Therefore, if a social marketing project were to be created, the marketing messages should be authentic and realistic as inflating expectation will likely lead to less retention intentions in the end.

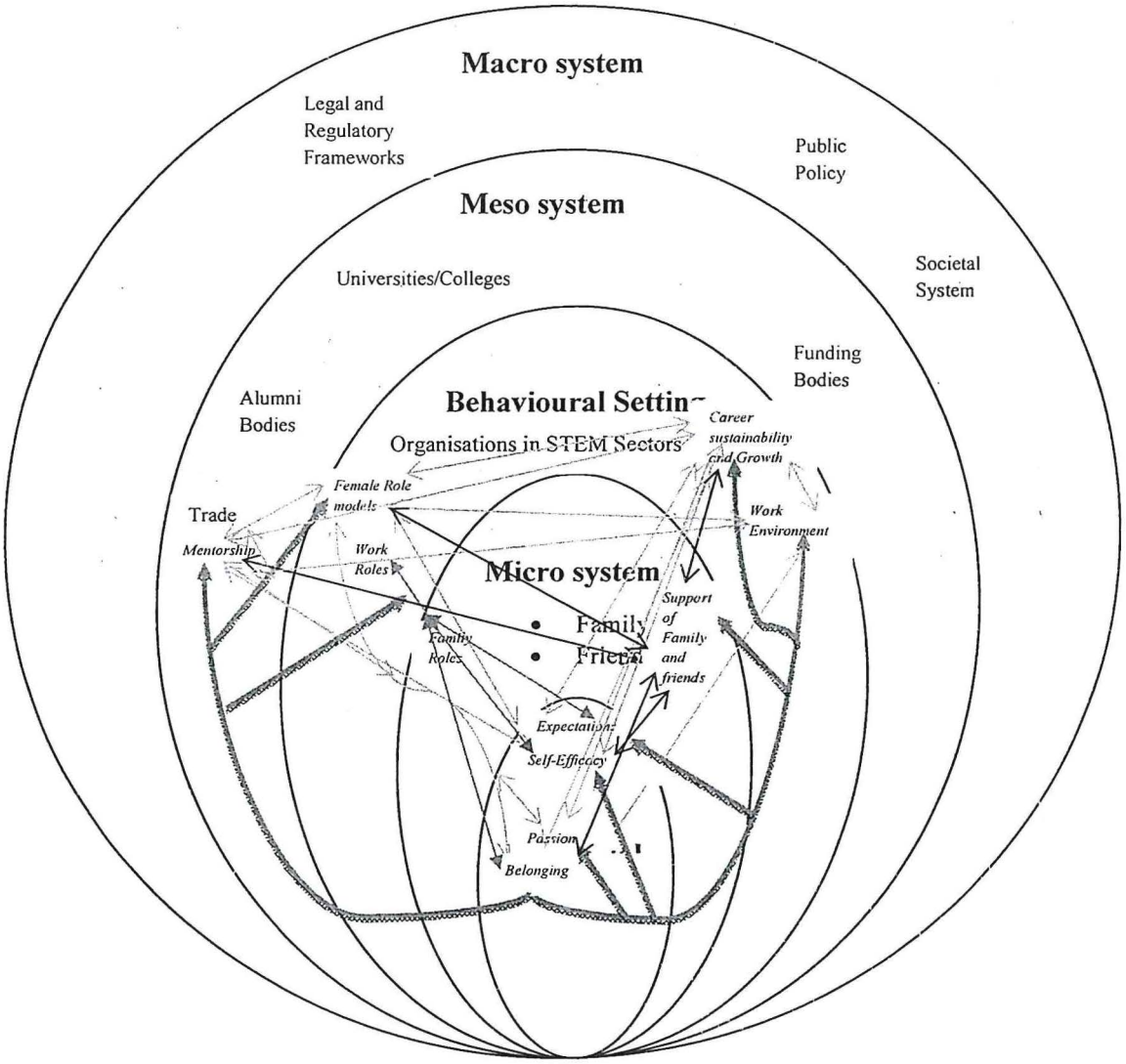
Passion, was confirmed as a predictor in this study, a finding that echoes in the research work done by those in the fields on psychology and entrepreneurship(Cardon et al., 2005; Vallerand et al., 2007). Despite it having been studied for years by philosophers, literature on passion within the field of career management seems limited. The findings in this study therefore likely advance the literature on passion and its relationship to retention intentions in STEM careers among women in a developing country.

The section below discusses in detail the findings on the retention intentions of women in STEM careers in Kenya.

6.4 Revisiting Theory

Macro-social marketing was used as the founding theory in this study and it necessitates the use of systems thinking which is done through mapping of actors and influences as propounded by Kennedy (Ann-Marie Kennedy, 2017). This section consequently contains a discussion on the mapping of the influences and the relationships established using the correlation analysis (detailed findings and discussions contained in section 5.4.2 and 6.3 of the report) that was run on the quantitative data that was collected using the survey tool. The influences are mapped within the Actors Map that was created using existing literature as contained in Section 2.2.9 of the study.

Figure 6.1: Map of the Influences Actors of the STEM Career System in Kenya based on the Quantitative Data



Source: Current Researcher, 2019

The orange arrows show the relationships that all antecedents, except work-family role conflict have with other antecedents. The relationships of work-family conflict, it only has significant correlations with self-efficacy, expectation fulfillment and sense of belonging, are represented by green arrows. The relationships of support of family and friends are represented by black arrows while those of sense of belonging are represented by thick purple arrows.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The purpose of this study was to apply a macro social marketing perspective to the issue of the lack of retention among women in STEM careers in Kenya, in order to better understand the issue, determine the factors that influence retention behaviour from the women in STEM's perspective and propose some interventions. The macro social perspective was implemented through the application of systems thinking to the issue, which using the macro social lens was assumed to be a wicked problem. Formative research, a key step in macro social marketing, was also carried out using an exploratory sequential mixed methods research design, to determine the retention intentions and the antecedents of retention intentions from the perspective of women in STEM careers in Kenya. The influences and insights that were raised in the study were then mapped into a behavioural ecological model to establish the number of levels, actors and elements in the system environment involved in the career system and the nature of their relationships to each other. The mapping established the extent of the complicated and interrelated nature of the problem and provided insight into the multiple likely root influences.

7.2 Conclusions

The retention of women in STEM careers in Kenya is a complex and messy issue that needs multilevel interventions to understand and resolve it. Using systems thinking this study confirmed that there are numerous actors and influences at various environmental levels (macro, meso, organisational and micro) that are contributing to the low retention of women in STEM careers in Kenya. This study further determined that the perceptions shared by the women in STEM careers in Kenya who participated in the study concerning the antecedents of their retention intentions accounted for 78% of the variance in their retention intentions. Therefore, it could be surmised that the behavioural ecological model created based on the insights of women in STEM careers in Kenya has shed significant light on the issue of retention of women in the STEM career system in Kenya.

The retention intentions of women in STEM careers in Kenya were weak, thus deducing that the retention of women in STEM careers in Kenya, a developing country, is a concern, a finding that is consistent with similar studies conducted in developed countries. Multilevel interventions that will provide system wide changes to improve the

STEM career systems need to evolve to ensure the needs and wants of women are satisfied to better encourage retention behaviour of women in STEM careers in Kenya. Based on the findings, the needs and wants cited by the respondents in relation to their STEM careers were established to be the attainment of balance between their career and family roles, support of family, friends, colleagues, mentors and supervisors, making a positive contribution to society through their work, growth and sustainability of their careers and a sense of respect and acceptance by other actors in the STEM careers. The study further established that work-family role conflict and a general lack of trust and respect from colleagues and clients are some of the main costs of pursuing a STEM career in Kenya.

7.2.1 Antecedents of Retention Intention of Women in STEM Careers in Kenya

The following eleven antecedents emerged from the first phase of the study; " passion", "self-efficacy", "support of family and friends", "career sustainability", "work environment", "work family conflict", "career mentorship", "expectation fulfilment", "sense of belonging", "female role models" and " societal impact". The first phase of the study sought responses to research question (1) and (2), What factors have influenced the retention decisions of women in science, technology, engineering and mathematics fields in Kenya (those with more than ten years work experience and those who have left the science, technology, engineering and mathematics career path to pursue careers in other non-STEM fields)?.The findings from both groups of women were consistent with eight of the eleven of the antecedents emerging from both sets of interviews. The eight antecedents were: " passion", "self-efficacy", "support of family and friends", "career sustainability", "work environment", "work family conflict", "career mentorship", and " societal impact". Three additional antecedents emerged from

the group of women who had left STEM careers to pursue non-STEM careers, which were "expectation fulfilment", "sense of belonging" and "female role models".

The following nine conclusions can be drawn from this study. First, women seem to prefer careers that allow them to collaborate and help others in the society. Mentorship, societal impact and female role models that are admired and respected in the STEM career paths have been posited in this study as factors that have influenced the retention of women in STEM. These findings show the importance of ensuring that the work women do in STEM should be communally oriented, work that allows them to work with (collaborate) and help others.

Second, the multiplicity of the women's roles and their conflicting nature were also highlighted in the first phase of this study as a key factor in their career decision making. Third, respondents who had left STEM careers due to role conflict further stated that they found balance in different ways and in different non-STEM careers by starting their own establishments and setting their own terms of employment. Women are therefore departing from the traditional linear career path as they create or re-construct careers that suit them.

Fourth, in the second phase of the study, in response to Research question (4), the findings of the qualitative study were tested amongst a wider sample of the women in STEM careers in Kenya in the form of a survey to determine their generalisability. All the antecedents except work family conflict were found to have a positive and significant relationship with retentions intentions. Five of the antecedents that were determined to predict the change in retention intentions were passion, sense of belonging, expectation fulfilment, support of family and friends and career sustainability and growth

Fifth, the study found that the absence or presence of passion could influence career retention both positively and negatively. This study also made an interesting finding that seemed to link the discovery of a new passion to career retention intentions. Based on the findings, it seems that over time, as people grow older, become more self-aware,

get exposed to more opportunities, people or activities, they are likely to discover new passions and interests that could lead them to make career changes.

Sixth, support of family and friends was unsurprisingly linked to career retention intentions. This study further established that the support of family and friends not only influences career retentions directly but also indirectly. This perceived support was stated as an influence on the respondents' perception of belonging in a STEM career (the second-best predictor of retention intentions in this study) and in the balancing of the multiple roles that women have in society. The uniquely strong influence that mentors and female role models have on women in STEM careers in Kenya was also noted in this study. The actors, together with family and friends, are deduced to form a critical part in the co-creation process of retention behaviour among women in STEM careers in Kenya.

Seventh, the existence of a difference between the expectations of women in STEM careers and the realities they experience is a factor that influences their career retention decisions. Expectations that are fulfilled or exceeded are posited to positively influence the retention intentions of women in STEM in Kenya. Therefore, if a social marketing project were to be created, the marketing messages should be authentic and realistic as inflating expectation will likely lead to less retention intentions in the end.

Eighth, for women to remain in STEM careers, the career path needs to become sustainable and conducive for their growth. This study found that retention intentions in women in STEM careers in Kenya is influenced by the assurance of sufficient security to meet economic needs and the likelihood of remaining engaged in the career throughout their life-span, well beyond the traditional age of retirement (Heijden & Vos, 2015; Valcour, 2015).

Ninth, the apparent interdependence of most of the influences that were highlighted by the respondents adds an aspect of complexity to the problem of retention among women in STEM careers in Kenya. Furthermore, some of the influences highlighted are influenced by elements in varying system ecological levels. For example, a woman's sense of belonging is affected by organisations, personal characteristics, social networks

that are in the micro level of a system, peer mentors existing societal structures that exist at the macro level of a system and associations, support groups and bodies that are generally placed at the meso level of a social system.

7.2.2 Macro-social Marketing Mix for STEM Careers

The marketing mix put forth by Kennedy (2016) comprised of the seven marketing principles of product, place, price, promotion, people, partnership and policy that form the main foundations of macro-social marketing. Given the macro-social marketing lens that was used in the study, STEM careers were assumed to be the product, as it was the system that needed to be appropriately packaged to meet the needs and wants of the target market, so as to bring about the preferred behaviour, retention. The study established that the key needs and wants of women in STEM careers in Kenya were balance between their career and family roles, support of family, friends, colleagues, mentors and supervisors, growth and sustainability and a sense of respect and acceptance by other actors in the STEM careers. It was further determined that women prefer work that allows them to work with (collaborate) and help others. Therefore, STEM career systems need to evolve to ensure the above stated needs and wants, including the embracing of a communal orientation towards work, of women are delivered to better encourage retention behaviour amongst women in STEM careers.

Place, referred to in literature as the response channels and the accessibility and distribution of the product(Kennedy, 2016), is deduced to be the organisations which meet the needs and wants of women as discussed above and reduces the cost of pursuing a career in STEM. Meanwhile, work-family role conflict and a general lack of trust and respect from colleagues and clients are posited to be some of the main costs of pursuing a STEM career in Kenya. These are therefore the price, described in seminal studies in marketing as the economic, social or psychological cost that the target market needs to pay to obtain the product (Lefebvre & Flora, 1988b), of a STEM career.

Promotion, in macro-social marketing, refers to the persuasive content and communication strategies that will make the behaviour familiar, desirable and acceptable within the target market(Kotler & Zaltman, 1971). When creating

communication strategies, family, friends, mentors and female role models, can be used as a promotional channel as they will likely be very effective given the uniquely strong influence highlighted by the women in STEM careers in Kenya. Any promotional content created should generate realistic expectations among the women, as expectation dissonance was determined to be one of the key influencers of retention behaviour among women in STEM. Additionally, promotional contents should focus on assuring women of support, progress, the attainment of communal goals and belonging in the STEM career path, key needs and wants cited by women in this study.

People, one of the three unique marketing principles that are included in the traditional 4Psin macro-social marketing, refers to the community that will impact the degree and speed of behavioural change adoptions (Huff et al., 2017). The influence of the community should be taken into consideration when planning and used to positively influence the adoption of the strategies. The actors deduced to form a critical part in the co-creation process of retention behaviour in STEM careers in Kenya are family and friends, colleagues and supervisors within the employing organisations, mentors and female role models.

Partnership, a second of the unique marketing principles in macro-social marketing, which also includes the traditional 4Ps of marketing, refers to the collaborations that the groups and actors within the system form to ensure the adoption of societal behavioural changes (Sallis et al., 2006). The creation of collaborations between key actors in STEM careers should therefore be one of the key strategies to be implemented especially given the inter-relationships highlighted in the study that introduce a layer of complication to the whole issue of retention behaviour among women in STEM careers in Kenya. Partnerships will ensure system wide synergy in the co-creation of new norms and the subsequent efficient diffusion and adoption amongst actors in the STEM career system.

Finally, given the inter-relationships of the influences within the various environmental levels highlighted by respondents, systems wide (societal) change is necessary for the

retention behaviour change in STEM to be effective. Policies, the seventh marketing principle in macro-social marketing(Head, 2008) and laws can be created or changed to ensure societal changes. Changes by regulatory frameworks influence change at the macro level ensuring institutionalised in a social system and increase the likelihood of change amongst organisations operating within the system (Kennedy, 2016). Therefore, policies that will institutionalise support that will lead to enhanced work-family role balance, improve the work environment and increase the sense of belonging among women, key influences as stated by the respondents, will likely improve the retention behaviour among women in STEM careers in Kenya.

7.2.3 Retention intentions of Women in STEM Careers in Kenya

Women in STEM careers in Kenya have low retention intentions, a finding that is consistent with the reported retention behaviour among women in STEM careers in developed countries (Beede et al., 2011; Ly & Turk-bicakci, 2013; Xu, 2013). It was additionally noted that a large percentage of the women with low retention intentions seemed to be those who had less than five years work experience. This may be attributed to some of the antecedents of retention that were highlighted in the study such as the lack of expectation fulfilment, a lack of sense of belonging and possibly low self-efficacy. It was also noted that 61.5% of women within the age group of 34-45 years old indicated weak intentions to remain in STEM careers. These quantitative findings coupled with the qualitative findings show that the influence of work family conflict seems to vary with different life stages. Interventions can be created to help women manage this phase of their lives by providing support in balancing their roles and mentorship and coaching that will help them make any necessary adjustment in the least destructive way as they go through their mid-life crisis.

This study also noted that respondents in the Mathematics career path seemed to be more inclined towards staying in their careers, as compared to those in the other STEM disciplines, as 90.5% indicated weak to strong intention to remain. Further studies may be needed to understand what aspects of the Mathematics career path seem to engender greater retention intentions as compared to the other STEM careers. Respondents in the

Technology career path however seemed to be more uncertain concerning their retention intentions. Interventions especially targeting the technology career path therefore need to be created and implemented urgently to influence those on the fence to remain in their career paths.

7.3 Recommendations

Based on the findings of this study, the following seven recommendations can be made. First, to retain women in STEM careers the career path needs to change and become sustainable. Sustainable careers are posited in literature to possess the flexibility to evolve to suit the changing needs and interests of individuals in the workforce, to provide sufficient security to meet economic needs, reduce the cost of pursuing STEM careers (lack of balance on their work and family roles) and to engage them throughout their life span, well beyond the traditional age of retirement. Therefore, the workforce would have the needed security concerning their future and the discovery of new interests and passions would not necessarily be a bad omen for the retention of the workforce as their STEM careers could change to accommodate their new interests.

The creation of sustainable careers would involve the implementation of changes by organisations, governments, education or training institutions and the individuals in the career path (Valcour, 2015). This study and literature highlighted the important role that women can play in the creation of sustainable careers by departing from the traditional linear career path as they create or re-construct careers that better suit them by starting their own establishments and setting their own terms of employment (Shapiro et al., 2014). The self-management and development of careers seems to provide women with the flexibility of sustainable careers. Thus, some of the macro social marketing campaigns could focus on encouraging and enabling women to proactively manage their own careers in the STEM career paths, rather than rely on the traditional paths and role expectations of existing organisations and governments.

Second, the multiple roles that women play in society, as a wife, mother, daughter, employee or business owner require support to be provided by friends and family from time to time if balance is to be achieved, just as the literature predicts (Erdwins et al., 2001; Morganson et al., 2010). These findings therefore suggest that, consistent with the

growing body of literature, for women, the consideration of career issues and the creation and implementation of any macro social marketing programmes must be done in the context of community and other life roles (Erdwins et al., 2001; Gutek et al., 1981; Robnett, 2015; Tapia & Kvasny, 2004).

Third, given that a large percentage of the women in STEM with less than five years of experience and those between the ages of 34-45 years exhibited low retention intentions, it would be prudent to design social marketing campaigns to encourage their retention. Additionally, when creating a social marketing programme to enhance retention behaviour among women in STEM careers, it is crucial to ensure that the communication messages create expectations that are consistent with the reality. Expectation dissonance would curtail any success of encouraging retention behaviour (Parasuraman et al., 1991).

Fourth, the factors that influence retention intentions have been proven interrelated, clearly confirming that the retention of women in STEM careers is a wicked problem. This study therefore recommends the creation of multi-level interventions when addressing the retention issue among women in STEM careers in Kenya. In implementing a multi-pronged approach, these interventions will improve the retention rates effectively and efficiently.

Fifth, to successfully create and implement multi-level interventions. This study recommends the creation of partnerships between key actors in the STEM career system. The creation of collaborations between the actors should therefore be one of the key strategies to be implemented. By working together, these communities will ensure system wide synergy is experienced in the co-creation of new norms and their subsequent diffusion and adoption amongst the actors in the STEM career system.

Sixth, the changing the laws and policies which will ensure societal changes which will likely be institutionalised in a social system and therefore be even more likely to change the systems of organisations operating within the system is recommended. Policies that will institutionalise support that will lead to enhance work-family role balance, improve the work environment and increase the sense of belonging among women, key

influences as stated by the respondents, will likely improve the retention behaviour among women in STEM careers in Kenya.

Seventh, when creating communication strategies family, friends, mentors and female role models of women in STEM career in Kenya can be used as a promotional channel as they will likely be very effective. Furthermore, any promotional content should highlight the structures that the organisations or governments will have put in place to ensure their support, progress and sense of belonging in the STEM career path, key needs and wants cited by women in this study. However, care should be taken to ensure that the persuasive content generates realistic expectations among the women, since expectation dissonance was stated as one of the key influencers of retention behaviour among women in STEM.

7.3.1 Multi-level Interventions

The following specific interventions recommended are based on the findings of this study and are focused on decision making groups (upstream social marketing, the women in STEM careers in Kenya (downstream social marketing) and influential groups such as community groups and partner organisations such as professional associations (midstream social marketing. Two major interventions are suggested. The first intervention is the amendment of laws and policies by decision-making bodies that will go a long way in reducing the conflict that exists between work roles and family roles and in creating an environment in career systems that encourage the entrance and retention of women in STEM careers. The second intervention uses both midstream and downstream social marketing in the creation of training and coaching workshops that seek to equip women with knowledge, skills and support needed to navigate STEM careers. Table 7.1 represents a summary of the actors, influencers and the main goal of the interventions, the desired changes.

Table 7.1: Recommended Multi-level Interventions for STEM Careers in Kenya

	Influencers	Actors Targeted in the Intervention	Desired Changes
Upstream Social Marketing	• Professional Associations • Alumni Bodies • Trade Unions • Media • NGOs	• Organisations providing employment • Governments	• Labour laws • Business Practices and Policies
Midstream Social Marketing	• Women in STEM careers in Kenya • Professional Associations • Family and friends of women in STEM careers • Organisations providing employment • Universities/Colleges	• Society • Family and friends of women in STEM careers • Professional Associations • Organisations providing employment	• Increased support of women in their balancing their family and work Roles • Increased mentorship
Downstream Social Marketing	• Professional Associations • University/Colleges • Organisations providing employment • Family and Friends • Female role models in STEM careers in Kenya	• Women in STEM careers in Kenya	• Increased sense of Belonging • Retention Behaviour

Source: Current Researcher, 2019

In upstream social marketing, we recommend influential groups such as the trade unions, the professional associations, non-governmental organisations focussed on enhancing gender equality in the STEM workforce and influential women currently pursuing STEM careers to collaborate towards this initiative. The partnership will aggregate resources and their influence, and will therefore likely enhance the effectiveness of the advocacy and lobbying to the decision making groups (the central and county governments, parliament and the Ministry of Labour) to agitate for the enactment and enforcement of laws and policies that ensure the provision of childcare facilities, paid care-related (either parental or elder care) leaves and flexible work arrangements.

In downstream social marketing, we recommend the creation of formal training and coaching workshops to be organised and run by female leaders in STEM careers. The workshops should aim to equip women in STEM careers with the knowledge, skills and support (through coaching, formation of peer networks and mentorship) needed to navigate and succeed in a male dominated career path. This programme should also enhance women's understanding of the complex factors that influence them in the STEM career system they are involved in and the great value they bring to the career path. This knowledge and self-awareness will go a long way in enhancing their sense of belonging, their perception of societal contribution and their level of self-efficacy. Their perceptions of the STEM career path will also be more realistic ensuring that their expectations are well managed and thus reducing incidences of dissonance. The intervention incorporates mentorship, the active participation of female role models, peer social support and expectation management key factors that this study has confirmed are influencers of retention behaviour. A similar intervention has been implemented in the United States and the initial results show that participants in the programme are all still in STEM careers (Oosten, Buse, & Bilimoria, 2017).

This intervention also creates partnerships with other actors in the organisations providing employment and in the meso system of the career systems such as Universities, Non-Governmental Organisations with an interest in the STEM workforce, Professional Associations and alumni bodies. By working together, structures are

created, and synergies are formed making it easier to fund and manage the project, identify and connect female role models in STEM with other women in the career path in a good learning environment.

7.4 Limitations of the Study

The major strength of this study was the use of the sequential exploratory mixed methods research design as it allowed the inherent strengths of both the quantitative and qualitative studies to be realised and the weaknesses shored up(Teddlie & Tashakkori, 2006).

However, one of the limitations of the study was related to the sampling method used in both phases of the study, the snowballing method, which could have led to the exclusion of potential study participants. This sampling technique, however, made it possible for this study to gain access to respondents who were difficult to reach due to the lack of a comprehensive database. Furthermore, the respondents in the qualitative study were more willing to share their personal stories and perspectives based on the trust that was established by virtue of the Researcher being referred to them by someone they knew.

Another limitation was that data collection solely relied on what the respondents chose to share, one of the weaknesses of self-reporting. The uniqueness of the study population would also limit the transferability and generalisability of the findings to other contexts or populations. However, by focusing on the local context, in-depth knowledge of the unique perspectives on women in STEM careers in a developing African country was gained. These findings therefore contribute towards the attainment of a comprehensive understanding of the retention of women in STEM careers globally.

7.5 Areas for Further Study

Additional studies are needed to help inform on women's perceptions of the perceived opportunity costs of pursuing STEM careers. Knowledge of these opportunity costs may help inform the retention intentions of women in STEM, as women would be able to form and adjust their expectations appropriately. An in-depth investigation, in future studies, of the specific causes of low retention intentions that were especially exhibited

in this study among women in the early phases of their STEM careers might also prove important.

There is paucity in extant literature on passion as an influencing factor in career management. Additional studies therefore need to be conducted on the influences of passion for one's career. In-depth understanding on how the development of a new passion takes place and what or who influences the process should also be conducted. These studies will go a long way in figuring out effective interventions that may be effective in influencing the retention behaviour of women who base their career decisions on passion.

Future studies should aim to conduct systems analyses in the STEM career path from the multiple perspectives of the other actors in the system such as the organisations that provide employment and the funding bodies. These studies would provide a clearer perspective and understanding of the complex internal structures of the STEM career path.

Finally, future studies should also consider the development and implementation of macro social marketing programmes focussed on the creation and enhancement of retention behaviour among women in STEM careers in Kenya. Findings of this study will provide some understanding of the target market and their perceptions.

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APPENDICES

Appendix A: Ethics Review Approval

Strathmore UNIVERSITY

3rd September 2018 SU-IRB 0187/18

Lucy Ngugi
Strathmore University
P.O Box 59857-00200
Nairobi

Email: lngugi@strathmore.edu

Dear Lucy,

REF Student No. 072017 Protocol ID: SU-IRB 0187/18
RETENTION OF WOMEN IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) LABOUR MARKETS IN KENYA

We acknowledge receipt of your application documents to the Strathmore University Institutional Ethics Review Committee (SU-IERC) which includes:

1. Research Proposal version 2 dated 18th July 2018
2. Participant Information and Consent form version 2 dated 18th July 2018
3. Research Questionnaires version 2 dated 18th July 2018
4. CV for Investigator
5. Research Budget
6. Conflict of Interest Declaration

The committee has reviewed your application, and your study *"Retention of Women in Science, Technology, Engineering and Mathematics (STEM) Labour Markets in Kenya"* has been granted approval.

This approval is valid for one year beginning 3rd September 2018 until 2nd September 2019.

In case the study extends beyond one year, you are required to seek an extension of the Ethics approval prior to its expiry. You are required to submit any proposed changes to this proposal to SU-IERC for review and approval prior to implementation of any change.

SU-IERC should be notified when your study is complete.

Thank you

Sincerely,

Amina Salim
Regulatory Affairs Fellow

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC)
04 SEP 2018
TEL +254 (0)703 034 000
P. O. Box 59857 - 00200
NAIROBI - KENYA

Appendix B: Participant Information Sheet and Consent Form

Title of Study: *Unlocking the Retention Conundrum of Women in Science, Technology, Engineering and Mathematics (STEM) Labour Markets in Kenya using a Macro Social Perspective*

Investigator: *Lucy Nguti*

Institutional Affiliation: *Strathmore University-Strathmore Business School*

Dear Respondent,

You have been asked to participate in this study on the retention of women in science, technology, engineering and mathematics (STEM) labour markets in Kenya.The purpose of this project is to study the retention intentions and the factors influencing retention intentions of women in STEM careers

Do I have to take part in the study?

No. Taking part in this study is optional and the decision rests completely on you. If you decide to participate, you will be asked to participate in a 30-minute, face-to-face, tape-recorded interview. You are free to decline to take part in this study at any time without giving any reasons.

Who is eligible to take part in this study?

1. Women in Kenya who trained in Science, Technology, Engineering and Mathematics (STEM) disciplines, worked within those disciplines for some time but later quit to either pursue a career in a NON-STEM discipline or quit working all together.
2. Women with more than ten years work experience in science, technology, engineering and mathematics (STEM) careers in Kenya, are eligible to take part in the 40-minute, face-to-face, tape-recorded interview.

What will taking part in this study involve for me?

You will be approached by the researcher and requested to take part in the study. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through the interview, as agreed.

Are there any risks or dangers in taking part in this study?

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way without your express permission.

Are there any benefits of taking part in this study?

The information will be used to provide critical policy and practise recommendations that will aid in the development of a strong gender diverse workforce that Kenya and the organisations operating in them, sorely need. These policies will aid in reducing the number of women leaving STEM careers.

What will happen to me if I refuse to take part in this study?

Participation in this study is voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation. Non-participation will not result in penalty or loss of any kind. You may refuse to participate in the entire study or any part of the study.

Who will have access to my information during this research?

All research records will be stored in securely locked cabinets. That information may be transcribed into our database, but this will be sufficiently encrypted, and password protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

Whom can I contact in case I have further questions?

You can contact me, Lucy Nguti, a PhD Candidate in the School of Management and Commerce, Strathmore University via email (lnguti@strathmore.edu), or phone (+254

720 107 014). You can also contact my supervisor, Prof. Ruth Kiraka, at the School of Graduate Studies in Strathmore University, Nairobi, or by e-mail (rkiraka@strathmore.edu) or by phone (+254 703 034 220).

If you want to ask someone independent anything about this research, please contact:

The Secretary–Strathmore University Institutional Ethics Review Board, P. O. BOX 59857, 00200, Nairobi, email ethicsreview@strathmore.edu Tel number: +254 703 034 375

Participant's Consent

I, _____, have had the study explained to me. I have understood all that I have read and have had explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Participation in the research study. Please tick the boxes that apply to you;

☐ I AGREE to take part in this research

☐ I DON'T AGREE to take part in this research

Storage of information on the completed questionnaire

☐ I AGREE to have my interview or completed questionnaire stored for future data analysis

☐ I DON'T AGREE to have my interview or completed questionnaire stored for future data analysis

Participant's Signature:

_____ Date: _____/_____/_____

DD / MM / YEAR

Participant's Name (Optional):

_____ Time: _____/_____

HR / MN

Investigator's Pledge

I, _____ (Name of person taking consent) certify that I have followed the Standard Operating Procedures for this study and have explained the study information to the study participant named above, and that she has understood the nature and the purpose of the study and consents to the participation in the study. She has been given opportunity to ask questions which have been answered satisfactorily.

Investigator's Signature:

_____ Date: _____/_____/_____

DD / MM / YEAR

Investigator's Name:

_____ Time: _____/_____

HR / MN

Appendix C: Interview Protocol for Women who Quit STEM Careers

Interview #_____

Date_____/_____/_____

Script

Welcome and thank you for your participation today. My name is Lucy Nguti and I am a Doctoral Candidate at Strathmore University conducting my thesis in fulfilment of the requirements for a doctoral degree in Marketing and Management. This interview will take about 40 minutes and will include 8 questions regarding your experiences and what might affect your retention intentions as woman pursuing a career in Science, Technology, Engineering and Mathematics. I would like your permission to tape record this interview, so I may accurately document the information you convey. If at any time during the interview you wish to discontinue the use of the recorder or the interview itself, please feel free to let me know. All your responses are confidential. Your responses will remain confidential and will be used to develop a better understanding of how you and your peers (other women) view your careers in STEM and what might influence your intentions to remain or leave those careers. The purpose of this study is to increase our understanding of women pursuing careers in STEM and their unique experiences and perspectives.

At this time, I would like to remind you of your written consent to participate in this study. I am the responsible investigator, specifying your participation in the research project: **Unlocking the Retention Conundrum of Women in Science, Technology, Engineering and Mathematics (STEM) Labour Markets in Kenya using a Macro Social Perspective.** You and I have both signed and dated each copy, certifying that we agree to continue this interview. You will receive one copy and I will keep the other under lock and key, separate from your reported responses. Thank you.

Your participation in this interview is voluntary. If at any time you need to stop, take a break, or go back to a previous question, please let me know. You may also withdraw

your participation at any time without consequence. Do you have any questions or concerns before we begin? Then with your permission, we will begin the interview.

1. Please tell me, how you came to pursue a career in STEM?
    a. Probe 1: Who or what influenced your decision to pursue a career in STEM?
    b. Probe 2: How did they influence you?

2. Tell me about your experience as a woman in your STEM career.

3. What caused you to leave your career in STEM? Tell me more about that.
    a. Probe 1: What specific circumstances led up to the situation?
    b. Probe 2: What factors influenced your decision to leave?

4. What career path are you on now?
    a. Probe: What has your experience been so far?
    b. How would you compare this experience to your experience in the career in STEM?

5. How long has it been since you left?

6. Has your view changed? Would you consider going back to that career path?

    a. If yes, what or who is influencing your decision to go back?
    b. If no, what or who is influencing your decision to stay out?

7. Thinking about your career satisfaction, on a scale of 1 to 5 with 1 being low and 5 being high, how would you rate your **GENERAL** career satisfaction when you were in STEM? (circle response):

    1 2 3 4 5

    a. Probe: What are you basing this rating on? Why 1,2,3,4,5?

8. Thinking about your career satisfaction, on a scale of 1 to 5 with 1 being low and 5 being high, how would you rate your **CURRENT** career satisfaction in your new career? (circle response):

    1 2 3 4 5

    a. Probe: What are you basing this rating on? Why 1,2,3,4,5?

9. What advice would you give women who are just starting their STEM careers, if they want to have a long and satisfying career in STEM?
    a. Probe: What do you think will influence their decisions to leave or stay?

Appendix D: Interview Protocol for Women persisting in STEM Careers

Interview #_____

Date_____/_____/_____

Script

Welcome and thank you for your participation today. My name is Lucy Nguti and I am a Doctoral Candidate at Strathmore University conducting my thesis in fulfilment of the requirements for a doctoral degree in Marketing. This interview will take about 40 minutes and will include 8 questions regarding your experiences and what might affect your retention intentions as woman pursuing a career in Science, Technology, Engineering and Mathematics. I would like your permission to tape record this interview, so I may accurately document the information you convey. If at any time during the interview you wish to discontinue the use of the recorder or the interview itself, please feel free to let me know. All your responses are confidential. Your responses will remain confidential and will be used to develop a better understanding of how you and your peers (other women) view your careers in STEM and what might influence your intentions to remain or leave those careers. The purpose of this study is to increase our understanding of women pursuing careers in STEM and their unique experiences and perspectives.

At this time, I would like to remind you of your written consent to participate in this study. I am the responsible investigator, specifying your participation in the research project: **Unlocking the Retention Conundrum of Women in Science, Technology, Engineering and Mathematics (STEM) Labour Markets in Kenya using a Macro Social Perspective**. You and I have both signed and dated each copy, certifying that we agree to continue this interview. You will receive one copy and I will keep the other under lock and key, separate from your reported responses. Thank you.

Your participation in this interview is voluntary. If at any time you need to stop, take a break, or go back to a previous question, please let me know. You may also withdraw

your participation at any time without consequence. Do you have any questions or concerns before we begin? Then with your permission, we will begin the interview.

1. Please tell me, how you came to pursue a career in STEM?
    a. Probe 1: Who or what influenced your decision to pursue a career in STEM?
    b. Probe 2: How did they influence you?

2. Tell me about your experience as a woman in your career.

3. As you look back on the years you have been in this STEM career, has there been a time you considered leaving your STEM Career? Tell me more about that.
    a. Probe 1: When did the incident happen?
    b. Probe 2: What specific circumstances led up to the situation?

4. Has your view changed? Do you still want to leave your career?

    a. If yes, what or who has influenced your decision to leave?
    b. If no, what or who has influenced your decision to persist?

5. Thinking about your career satisfaction, on a scale of 1 to 5 with 1 being low and 5 being high, how would you rate your **CURRENT** career satisfaction? (circle response):

    1 2 3 4 5

6. What advice would you give women who are just starting their STEM careers, if they want to have a long and satisfying career in STEM?
    a. Probe: What do you think will influence their decisions to leave or stay

Appendix E: Study Survey

Introduction

Dear Respondent,

As a woman in a Science, Technology, Engineering or Mathematics (STEM) career, you have been asked to participate in this study on the retention of women in science, technology, engineering and mathematics (STEM) labour markets in Kenya. The purpose of this project is to study the retention intentions and the factors influencing retention intentions of women in STEM careers

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way without your express permission. The information will be used to provide critical policy and practice recommendations that will aid in the development of a strong gender diverse workforce that Kenya and the organisations operating in them, sorely need. These policies will aid in reducing the number of women leaving STEM careers.

Please note that taking part in this study is entirely optional and the decision rests completely on you. You are free to decline to take part in this study at any time without giving any reasons. If you do decide to participate, the questionnaire will take approximately eight minutes to fill out.

Should you have any additional questions, you can contact me, Lucy Nguti, a PhD Candidate in the Strathmore University Business School via email (lnguti@strathmore.edu) , or phone (+254 720 107 014). You can also contact my supervisor, Prof. Ruth Kiraka, at the School of Graduate Studies in Strathmore University, Nairobi, or by e-mail (rkiraka@strathmore.edu) or by phone (+254 703 034 220).

Sincerely,
Lucy Nguti

Section A: Customer's Profile

Kindly tick where appropriate

1. Age of the respondent:
    a. 18- 24 years old ()
    b. 25-34 years old ()
    c. 35-44 years old ()
    d. 45-54 years old ()
    e. 55-64 years old ()
    f. 65+ years old ()

2. I am currently pursuing a career in.....
    a. Science (Biochemistry, Physics, Biology, medicine etc.) ( )
    b. Technology (IT, Telecommunications, informatics etc.) ( )
    c. Engineering (Civil, Electrical, Mechanical Engineering) ()
    d. Mathematics (Statistics, Applied Math, Biomathematics) ()

3. How long have you been working in the Science, Technology, Engineering and Mathematics (STEM) Career path?
    a. Less than one year
    b. 1-5 Years
    c. 6-10 Years
    d. 11-15 Years
    e. 16 Years+

SECTION B: Assessment of Retention Intentions

Indicate the extent to which you agree or disagree, with the statements below concerning your STEM Career:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Uncertain	Slightly Agree	Moderately Agree	Strongly Agree
1. If I had to do it all over again, I would still choose my STEM career							
2. I have been actively looking for alternative non-STEM career paths to take							
3. I intend to work in my STEM career path until I retire no matter what challenges I face							
4. I feel attached to my STEM career; I have positive emotional ties to it							
5. My friends and family discourage me from pursuing my STEM career							

6. My family talks positively to other people concerning my STEM career							

SECTION C: Factors that influence Retention Intentions

i. Indicate the extent to which you agree or disagree, with the statements below concerning your work and family

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Uncertain	Slightly Agree	Moderately Agree	Strongly Agree
7. I must spend too many odd hours (very late nights and early mornings, weekends) working							
8. My career makes me tense and stressed							
9. My career takes too much time away from family, parenting and household duties							
10. Family responsibilities affect my career negatively							

11. My career affects my relationships with family and friends negatively							

ii. Indicate the extent to which you agree or disagree, with the statements below concerning Societal Support, Belonging, Mentorship and Role Models:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Uncertain	Slightly Agree	Moderately Agree	Strongly Agree
12. I feel comfortable asking friends or members of my family for advice concerning a problematic situation in my career							
13. When I'm having a difficult period (week/month) at work, my family members try to do more of the work around the house							
14. I look to family members or friends for reassurance about my career when I need it							

15. My family and friends have a positive attitude towards my choice of career							
16. Friends and members of my family enjoy hearing about my achievements in my career							
17. My family talks positively to other people concerning my STEM career							
18. I feel like I really belong in this career							
19. I do not feel respected by my colleagues at work							
20. My mentor(s) take(s) the time to learn about my career goals and aspirations							
21. My mentor(s) care(s) about whether I achieve my career goals							
22. My mentor(s) keep(s) me informed about different career opportunities for me in the industry							

23. I have female role models that mentor me							
24. I have female role models in my career that I admire							

iii. Indicate the extent to which you agree or disagree, with the statements below concerning Passion, Expectation Fulfilment, Perception of societal contribution and Career sustainability:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Uncertain	Slightly Agree	Moderately Agree	Strongly Agree
25. I can succeed in the Science, Technology, Engineering or Mathematics (STEM) career that I am in							
26. I feel well trained for the STEM career I am in							
27. I can succeed in my career even when my family or life responsibilities increase							
28. I can succeed in my							

career without support from family and friends							
29. I knew exactly what I was getting into when I chose this STEM career							
30. There is a gap between what I thought this STEM career was (expectations) and what it is(reality)							
31. I feel that the work I do contributes significantly towards changing lives or society							
32. My job gives me an opportunity to help people and the community							
33. I find my work in STEM exciting							
34. If I develop a new interest or passion, outside STEM, I will pursue it							
35. I enjoy my work; I would do it even if no one paid me to do it							

36. The work that I do is sustainable, I can do it for many years							
37. There are opportunities for growth for me in this STEM career path							
38. I feel as though I should be farther along in my career progression							

iv. Indicate the extent to which you agree or disagree, with the statements below concerning the work environment:

	Strongly Disagree	**Moderately Disagree**	**Slightly Disagree**	**Uncertain**	**Slightly Agree**	**Moderately Agree**	**Strongly Agree**
39. Work is the greatest source of my stress							
40. My colleagues at work encourage me when I am overwhelmed by my work							
41. When I have a problem at work, my colleagues try to help me							
42. My clients appreciate the work I do for them							

43. Clients do not trust that I am able to serve them effectively							
44. The physical working environment (offices or field) is good							
45. I enjoy working with the people at work							
46. My employer is supportive of my personal growth and development							
47. I am happy with the overall stability and security of my job							
48. My supervisor and I have a good working relationship							
49. I am satisfied with the culture at my workplace							

Appendix F: Summary of Themes and Codes

Themes	Number of Quotations	Codes
Self-Efficacy	11	1. Perception of own future performance at work 2. Perception of training adequacy 3. Perception of likelihood to succeed
Support of Family and Friends	28	1. Moral support from family 2. Peer influence 3. Assistance managing family roles
Work Environment	34	1. Physical working environment, 2. Relationship with colleagues 3. Relationship with supervisors, 4. Relationship with clients, 5. Organizational politics 6. Perception of organizational support 7. Adequacy of funding and resources 8. The quantity of human interaction
Work- Family Conflict	36	1. Long or odd working hours 2. Increase of responsibilities or roles in the family 3. Societal role expectations 4. Family expectations 5. Too much work travel 6. Work stress 7. Work Flexibility
Career Sustainability and Growth	24	1. Age bias 2. Opportunities of working beyond retirement age 3. Income security 4. Job security 5. Opportunities for career growth and progression 6. Challenging work
Sense of Belonging	13	1. Respect from colleagues and clients 2. Perception of fitting in

Career Mentorship	18	1. Existence of mentors 2. Guidance from mentors 3. Encouragement from mentors
Female role models	5	1. Presence of women succeeding in the field, 2. Presence of women successfully balancing their career and family roles 3. Women in the field supporting other women
Perception of Societal Contribution	22	1. Perception making a societal impact through their work 2. Solving people's problems 3. Bringing people joy and happiness through their work
Expectation Fulfillment	10	1. Expectation dissonance concerning the kind of work 2. Expectation dissonance concerning the work environment
Passion	40	1. Interest for the work, 2. Excitement for the work 3. Willingness to work for free 4. Discovery of a new interest/passion
Total	241	44 Codes

Appendix G: Similarity Index Report

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