FACTORS AFFECTING ADOPTION OF E- LEARNING TECHNOLOGY IN KENYA

BY

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UNITED STATES INTERNATIONAL UNIVERSITY-AFRICA

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FACTORS AFFECTING ADOPTION OF E-LEARNING TECHNOLOGY IN KENYA

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A Research Project Report Submitted to the Chandaria School of Business in Partial Fulfillment of the Requirement for the Degree of Masters in Business Administration (MBA)

UNITED STATES INTERNATIONAL UNIVERSITY-AFRICA

SUMMER 2018
STUDENTS DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University-Africa for academic credit.

Signed: ________________________  Date: ________________________

Kingori Rhoda Mbithe (ID: 632538)

This project has been presented for examination with my approval as the appointed supervisor.

Signed: ________________________  Date: ________________________

Dr. Joseph Ngugi Kamau

Signed: ________________________  Date: ________________________

Dean, Chandaria School of Business
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ABSTRACT

Internet penetration in Africa has been accelerated, with Kenya at the forefront at over 89.5% penetration, this penetration has led to an increase in knowledge repository for Kenyans to choose from and as a result E-learning has steadily increased not only in tertiary institutions but in informal learning as well. Facebook and YouTube are some of the web based tools, – that are listed as having potential applications for teaching and learning. As a result, it is essential to understand the challenges faced in the adoption of e-learning technology. The overall purpose of this study was to investigate the factors affecting adoption of e-learning technology in Kenya with a focus on three key factors, self-efficacy, objective usability and system accessibility.

This study used explanatory/hypothesis research design to investigate the factors which affect adoption of e-learning technology in Kenya. An explanatory research design was fit to the study because it will helped to ascertain not only the relationship between the different variables, but measure the effect and strength of each independent variable on the dependent variable which was the technology adoption. The target population was social media (Facebook) users in Kenya. According to Internet World Statistics there are over 6.2 million Facebook subscribers in Kenya as of June 2017. This study focused on 200 social media users in Nairobi who were interested in e-learning or have ever learned online. They were sampled by geographic cluster, simple random sampling technique with a focus on Nairobi. Online questionnaire was used by Google form and 93% responded.

In the first objective of self-efficacy, the correlation result revealed positive correlation between perceived ease of use with self-efficacy (r=0.441, p<0.05) and perceived usefulness with self-efficacy(r=0.337, p<0.05). On the CFA, there was a strong model equation but on the SEM it was not. The path coefficient for the relationship between SE and adoption of e-learning was weak. In the second objective, the correlation result revealed positive correlation between perceived ease of use with objective usability (r=0.598, p<0.05) and perceived usefulness with SE (r=0.456, p<0.05). Based on SEM, the path coefficient for the relationship between objective usability and adoption of e-learning was significant. Without any latent/intervening variable, OU and PEOU was positive and significant at the 0.05 level (βeta=0.938, T-value =3.658, p<0.05). The
positive relationship indicates that one unit increase in OU will result in 0.938 increases in PEOU.

In the last objective of system accessibility, the correlation result revealed positive correlation between perceived ease of use with system accessibility \( (r=0.441, p<0.503) \) and perceived usefulness with system accessibility \( (r=0.514, p<0.05) \). The path coefficient for the relationship between system accessibility and adoption of e-learning was weak and not significant hence dropped from the model. The research established that self-efficacy had little to no effect on adoption of e-learning technology in Kenya. Objective usability was the strongest factor affecting the adoption of e-learning technology while system accessibility had correlation but was not strong enough to impact the model and as such impact the adoption of e-learning technology in Kenya was weak. These findings provided some useful insights for governments, potential instructors or educators, e-learning platforms and policy makers. This recommends and highlights the need to shift from the metropolitan areas to the rural areas in order to get a holistic view of the e-learning environment in Kenya.

This research shed light on objective usability as a strong factor on perceived ease of use and perceived usefulness and as such on the adoption of e-learning technology in Kenya. Based the responses received and the SEM analysis further research should focus on the two variables of system accessibility and self-efficacy involving a larger number of variables to examine, as well as larger numbers of respondents to support the factor analysis. Research should also focus on attitude and behavioral intention and their interaction with perceived ease of use and perceived usefulness. The research needs to now shift from the metropolitan areas to the rural areas in order to get a holistic view of the e-learning environment in Kenya.
DEDICATION

This work is dedicated to my supportive family and supportive friends who have been my accountability partners as I work on this thesis.
ACKNOWLEDGEMENT

Over everything else I want to thank God for bringing me this far and keeping me in health and joy as I pursue my life and this MBA. I would like to appreciate my brother Kenneth Minire who has been my support both financially and emotionally through this journey. I would also like to thank my mother and sister who have been my greatest cheerleaders through my university education. I would also like to acknowledge friends and the USIU fraternity who have enabled me to achieve my educational goals.
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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>PEOU</td>
<td>Perceived Ease of Use</td>
</tr>
<tr>
<td>PU</td>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>OU</td>
<td>Objective Usability</td>
</tr>
<tr>
<td>SE</td>
<td>Self Efficacy</td>
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<tr>
<td>SA</td>
<td>System Accessibility</td>
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<tr>
<td>SD</td>
<td>Standard Deviation</td>
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<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

E-learning can be defined as the use of computer network technology, primarily over an intranet or through the Internet, to deliver information and instruction to individuals (Welsh, Wanberg, Brown, & Simmering, 2003). Since the 1960s, e-learning has evolved in different ways in business, education, the training sector, and the military and currently means different things in different sectors. In the tertiary-school sector, ‘e-leaning’ refers to the use of both software-based and online learning, whereas in business, higher-education, the military and training sectors, it refers solely to a range of on-line practices (Campbell, 2004). E-learning has evolved over the years as technology briskly changes and upgrades; knowledge has become accessible to everyone around the world as long as they have a device and internet. It has created accessibility in learning for even those who have either visual or hearing impairment or disability, Batanero et al. (2014) reflected on e-learning platforms and objects having visual, audio and text variations adapted to different student needs including those with disability.

Along the global stage there has been a lot of research and documentation on the adoption of e-learning in tertiary institutions because that was the first area in which adoption of technology helped enhance the way in which instructors teach and students learn. Numerous studies have shown that learning could be easier and more efficient, if it is supported by ICT and above all if hypermedia systems and applications are available (Debevc et al., 2007). As awareness continues Western and European tertiary institutions and research institutes are investigating adoption to a deeper level, not only focusing on adoption as it is, but the ways in which to improve adoption of this new form of pedagogy. Tarus, Gichoya and Muumbo (2015) considered a shift in pedagogy necessary especially for e-learning adoption, Costabile et al. (2005) concluded that in order to go deeply into aspects concerning pedagogical approach and content semantics, experts of education science and domain experts are to be involved.

As university administrators continue investing in information and communication technologies (ICTs) such as the Internet, learning management systems (LMS) (Macharia & Nyakwende, 2009), students and individuals are briskly turning to social media platforms and alternative e-learning platforms to learn informal or life skills. According
to Bosch (2009), if one considers the large numbers of students on Facebook often actively participating in discussions and groups, it cannot be ignored as a potential educational tool—compared to university course sites. This introduces the aspect of m-learning, a variation of e-learning but accessed through the mobile phones (Brown, 2003). Because of affordability of devices, the uptake of m-learning especially from social media sites has increased drastically. Brown (2003) presented on the role of m-learning in Africa. In this research he highlighted that adoption of mobile technology in Africa is one of the highest in the world ergo, the usability component is strong in m-technology and the potential for the meshing of online learning in mobile will be efficient and effective with great potential for adoption.

In the west (Europe and the America’s) three years ago, engaging academics in the use of technologies in education was a relatively new priority within the higher education sector (King & Boyatt, 2014) and this priority has only increased over the next three years. The rise of informal learning platforms like Udemy.com, Lynda.com among others has shifted the perception of e-learning from just tertiary education. These online learning platforms as well as social media sites like Facebook and YouTube have dramatically increased the pool of knowledge people can draw from and adoption of e-learning technology has steadily increased, even if the untapped potential remains.

As we narrow down into Africa, several studies focus on the adoption of e-learning in tertiary institutions. Though adoption is slower, Africa is not getting left behind in this age of e-learning. According to Buabeng-Andoh (2012) realizing the effect of ICT on the workplace and everyday life, today’s educational institutions try to restructure their educational curricula and classroom facilities, in order to bridge the existing technology gap in teaching and learning. As this gap continues to close, Africa is briskly adopting social media sites and alternative e-learning platforms due to the increase in internet penetration, with countries like Kenya, Ghana and Nigeria at the fore front (Internet world Stats, 2017). In Kenya e-learning platforms like AMI (Africa Management Institute) and Zydii.com are slowly gaining momentum and users, following briskly after tertiary e-learning. The e-learning system acceptance has gained enormous attention by the higher education institutions in developed countries. However, developing countries are still lacking to reap maximum benefits of the cutting edge technology (Rehman, 2014). Due to the undoubted benefits, e-learning is gaining popularity in the developing
countries as well. However, developing countries are still at the rudimentary stage of e-learning adoption

As e-learning is embraced across the globe there are several factors which affect the adoption of technology in education. Most of these factors vary based on the focus of study but all are reviewed under the context of the TAM (Technology Acceptance Model). TAM is a model developed by Fred D. Davies Junior in 1989 which helped people research and understand the effect of external factors on Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of the technology (Davies, 1989). The PEOU and PU affect the attitude toward use of the tech and as a result the actual system use. This has become an essential standard in the research on adoption technology. This model is readily adopted because external factors can be contextualized to an organization, community or country.

Davies (1989) narrowed down the focus and did research on the determinants of his model in his paper on ‘Perceived usefulness, perceived ease of use, and user acceptance of information technology’. In this research he was able to determine the perceived ease of use and perceived usefulness is strongly correlated to current usage of technology. Venkatesh and Davies (1997) worked on experimenting and creating a viable tool to discover and accurately measure the determinants of adoption of technology.

Most, if not all of the studies which focus on the adoption of e-learning technology utilize TAM or a revised model to understand the factors which affect adoption of e-learning. Different papers and research identified a variance of factors affecting the perception of technology. King and Russell (2014), identified institutional infrastructure, staff attitudes and skills, and perceived student expectations as factors affecting adoption of e-learning, in Nigeria, Urhiewhu and Emojorho (2015) identified several factors like epileptic power supply; non-availability of online databases; inadequate number of computers to access digital information resources; inadequate bandwidth; Network problems among others. In Kenya it emerged that implementation of e-learning faces a number of challenges which include but are not limited to inadequate ICT, e-learning infrastructure, financial constraints. Expensive and inadequate Internet bandwidth, lack of operational e-learning policies, lack of technical skills on e-learning and e-content development by teaching staff, among others (Tarus, 2011) were also factors which arose. Factors like affordability of technology, internet penetration, electricity and access are some of the issues which
cause adoption of e-learning technology to be lower in East Africa in comparison to the western world (Hennessy, et al., 2010)

From 2014 onwards, the research evolved and no longer just focused on infrastructure and accessibility but factors like self-efficacy, attitude and objective usability. This can be contributed to the rapidly increasing internet penetration in Africa, thus the infrastructure (especially in terms of bandwidth) becomes more stable and the access to internet makes people more comfortable with online content. Zainab et al. (2015) carried out a study on e-training adoption in the Nigerian civil service and discovered that the combined role of perceived cost, computer self-efficacy, technological infrastructure, internet facilities, power supply, organizational support, technical support and government support is critical for e-training adoption in developing countries, particularly in Nigeria. Kiget, Wanyembi and Peters (2014) evaluated the usability attributes of user-friendliness, learnability, technological infrastructure and policy. Their work highlighted the fact that while adoption is key, efficient adoption is more important. Adoption is one thing but continues use is essential, if usability of e-learning system is bad, learners fail in their attempt to use the system (Kiget et al., 2014).

The evolution of the research into adoption of e-learning technology is a reflection of the increased use of these systems in tertiary institutions among others. This is essential because the narrative changes and a need to understand latent as well as external variables rises and the contribution to the field becomes more viable.

The common denominator in terms of external factors affecting e-learning especially in Africa is the infrastructure, technology, bandwidth and in tertiary institutions, pedagogy. The literature is incredibly built around tertiary institutions and the technology adoption model (TAM) (Davies, 1989), this creates great context when trying to understand e-learning adoption, but there is still a gap in understanding the adoption of e-learning especially in regards to individuals. Even though decisions about integration of technology are commonly at a higher level, such as a school or tertiary level, it is the individuals’ adoption patterns that illustrate a successful implementation. Therefore, it is essential to understand such aspects of the process (Straub, 2009), why does an individual choose to adopt a technology, especially if it is not a tertiary requirement?
1.2 Statement of the Problem

There have been various studies done on adoption of technology enhanced learning and the factors which affect its adoption. According to Butler and Martin (2002), who examined the factors affecting the adoption of technology in teaching and learning; the findings revealed that many factors affect the rate of adoption, including an innovations characteristic and various economic sociological, organizational and psychological variables. According to Tarus (2011), implementation of e-learning is still at the infancy stage in most Kenyan public universities due to many challenges related to implementation. These challenges range from technological, organizational and pedagogical challenges. In Tarus, Gichoya and Muumbo (2015) it emerged that implementation of e-learning in Kenya faces a number of challenges which include but are not limited to inadequate ICT and e-learning infrastructure, financial constraints, expensive and inadequate Internet bandwidth, lack of operational e-learning policies, lack of technical skills on e-learning and e-content development by teaching staff, lack of interest and commitment among the teaching staff, and longer amount of time required to develop e-learning courses.

Most studies in Kenya and internationally focus on the factors affecting e-learning within the environment of schools. Tarus et al. (2015) focused on Moi University, a tertiary level school, where as Butler simply focuses on tertiary universities like Illinois State University (Sellbon & Butler, 2002). Whereas these findings give the researcher context it raises the question of the gap for research toward adoption for e-learning technology in Kenya for individuals and not just within tertiary institutions. With Kenya’s internet penetration at 89.5% (Internet world Stats, 2017) even those without formal/tertiary education have access to soft skills and variety knowledge and e-learning platforms.

This study investigated the factors affecting adoption of e-learning in Kenya with a focus on informal education. The variables which the study focused on based on the context of previous works and the gaps this research needs to fill were self-efficacy, objective usability and system accessibility.

1.3 General Objective

The purpose of the study was to investigate the factors affecting the adoption of e-learning technology in Kenya.
1.4 Specific Objectives

1.4.1 To establish the effect of self-efficacy on adoption of e-learning technology in Kenya

1.4.2 To find out how objective usability affects adoption of e-learning technology in Kenya

1.4.3 To investigate the effect of system accessibility on adoption of e-learning technology in Kenya.

1.5 Significance of the Study

1.5.1 Governments

This study was significant in providing government with clarity in areas of improvement and training for youth development and how they can make e-learning more accessible for a well-rounded generation.

1.5.1 Potential Instructors

This was significant in aiding instructors and educators on the format and style required for content creation and user interface taking into consideration the infrastructure (or hardware) and related variables.

1.5.2 E-learning Platforms

This study was significant for upcoming platforms to mold their strategy to fit the African context and the predominant variables affecting adoption.

1.5.3 Policy Makers

Policy makers will be able to recognize areas of improvement and subsidizing strategies to help in the adoption of e-learning technology in Kenya.

1.6 Scope of the Study

This study focused on Nairobi Kenya which has a large percentage of youth who have a higher probability of utilizing the internet and be exposed to the new wave of e-learning in both tertiary and informal sectors.
1.7 Definition of Terms

1.7.1 E-learning

E-learning can be defined as the use of computer network technology, primarily over an intranet or through the Internet, to deliver information and instruction to individuals (Welsh et al., 2003).

1.7.2 Technology Acceptance Model

TAM is an information systems theory that models how users come to accept and use technology (Davies, 1989).

1.7.3 Perceived Ease-Of-Use (PEOU)

Davies defined this as the degree to which a person believes that using a particular system would be free from effort (Davies, 1989).

1.7.4 Computer Self Efficacy

Individuals' beliefs about their abilities to competently use computers in the determination of computer use (Compeau & Higgins, 1995).

1.7.5 Objective Usability

Objective usability concerns aspects of the interaction not dependent on users’ perception; on the contrary these measures can be obtained, discussed, and validated in ways not possible with subjective measures (Hornbaek, 2006).

1.7.6 System Accessibility

System accessibility refers to a situation where anyone, regardless of their personal characteristics and type of environment, is able to access the information provided through the Learning Objects (LO) (Batanero, Karhu, Holvikivi, Oton, & Amado-Salvatierra, 2014).

1.8 Chapter Summary

E-learning is revolutionizing not only tertiary education but informal education as well. The adoption of e-learning in formal education has undergone growth, but has not lacked challenges, some of which are – pedagogy, technology, infrastructure, financial
constraints and bandwidth (especially as we narrow down into Africa). There has been a variety of research on e-learning in tertiary education and this creates context and a foundation to help fill the gap on adoption of e-learning technology. My research sought to fill the gap by focusing on the determinants in the TAM (Technology Acceptance Model). The scope of this research was Nairobi Kenya and the research was mixed methodology of literature review and data collection. It is essential to note that the Technology Adoption Model by Davies (1989) was the model of choice and was utilized to analyze adoption of e-learning technology. The following chapter is the literature review on the three factors affecting adoption of technology; computer self-efficacy, objective usability and system accessibility.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction
This chapter reviewed existing literature that identifies the three variables which this research focused on; computer self-efficacy, objective usability and system accessibility. Each of the factors elaborated on represents a specific objective of the study.

2.2 The Effect of Self-Efficacy on Adoption of E-learning Technology
Self-efficacy, also referred to as personal efficacy, is confidence in one's own ability to achieve intended results (Omrod, 2008). This theory has its roots in the school of psychology it basically explains a person’s belief in their own capacity, do they believe they can accomplish the task? Albert Bandura defined self-efficacy as one's belief in one's ability to succeed in specific situations or accomplish a task (Bandura, 1997). He believed that one's sense of self-efficacy can play a major role in how one approaches goals, tasks, and challenges. Whereas his work focused on human social behavior, it left the gap for the application of the Social Cognitive Theory in the adoption of technology. According to Schwarzer and Luszczynska (2005), self-efficacy influences the effort one puts forth to change risk behavior and the persistence to continue striving despite barriers and setbacks that may undermine motivation.

As we continue to understand self-efficacy we must now begin to understand it as it conforms to the world of Technology. There is quite a bit of literature as it pertains to the ‘digital age’. Compeau and Higgins (1995) described computer-efficacy as individuals' beliefs about their abilities to competently use computers in the determination of computer use. They investigated how computer self-efficacy affected the adoption and use of computers for a Canadian company. In this research computer self-efficacy was found to exert significant influence on individuals' expectations of the outcomes of using computers, their emotional reactions to computers (affect and anxiety), as well as their actual computer use (Compeau & Higgins, 1995). This study remains relevant as the adoption of computers – which are a channel for e-learning- is still lagging in the African context. In this literature they also referenced Hill, whose research not only covered the adoption use of computers but the use of this technology to enroll for computer courses (Hill, Smith, & Mann, 1987).
Venkatesh and Davies (1997) narrowed down the Technology Adoption Model by focusing on one of the main determinants of adoption; Perceived ease of use. In this literature they conducted three experiments to determine if Computer self-efficacy, among the three other determinants actually affected the PEOU (perceived ease of use), which heavily affects adoption. Data from the three experiments spanning 106 subjects and six different systems supported the hypothesis that an individual’s ease of use is anchored to her or his general computer self-efficacy at all times (Venkatesh & David, 1997). This research was incredibly important because it helped to create an accurate tool to test PEOU as well as highlighting the need to improve computer self-efficacy and aid in technology adoption.

According to Straub (2009), individuals construct unique yet malleable perceptions of technology that influence their adoption decisions. As he looked at adoption of technology, he utilized not only the TAM model but, Rogers’s innovation diffusion theory, the Concerns-Based Adoption Model, and the United Theory of Acceptance and Use of Technology. As he discussed TAM, he asked an essential question ‘does perceived ease of use equal self-efficacy?’ this contributed greatly to the literature because where as he did not dismiss the relationship between perceived ease of use and self-efficacy he clearly outlined the distinction. He highlighted that perceived ease of use is a judgment about the qualities of a technology, but self-efficacy is a judgment about the abilities of an individual (Straub, 2009).

According Hsia, Chang and Tseng (2012) most high-tech firms have implemented e-learning systems to effectively train and up skill employees with practical and valuable knowledge in order to sustain competitive advantage in the global competitive environment, they cannot afford to be lax. They analyzed technology adoption using locus of control and computer self-efficacy. In their work they emphasized that less research has integrated the two control-related personality traits into one model to understand their effect on user acceptance of e-learning (Hsia, Chang, & Tseng, 2012). One of their main hypothesis was; compared to individuals with low computer self-efficacy, those with high computer self-efficacy tend to use IT more frequently and are more likely to perceive IT use as effort-free(Compeau & Higgins, 1995). In the literature and research, it was discovered that computer self-efficacy is an antecedent of perceived ease of use and behavioral intention to use e-learning system (Hsia, Chang, & Tseng, 2012).
Saade and Kira (2009) investigated the relationship between anxiety and perceived ease of use, perceived usefulness and how computer self-efficacy affects this relationship within the context of e-learning. The research is incredibly relevant in that it creates a verifiable relationship between anxiety and computer self-efficacy; use of technology sometimes has unpleasant side effects, which may include strong, negative emotional states that arise not only during interaction but even before, when the idea of having to interact with the computer begins (Saade & Kira, 2009). In the end Saade and Kira (2009) concluded that analysis results seem to suggest that computer self-efficacy does play an important role in mediating the anxiety-perceived ease of use relationship for learning management system (e-learning) usage or adoption.

Alenezy, Karim and Veloo (2010) also investigate the role of computer anxiety, computer self-efficacy and a new angle of internet experience on influencing students to use e-learning. Their scope is Saudi Arabia. This research adds value by tying together not only the computer self-efficacy but the internet, which is an essential element in e-learning. The authors build from the Technology Acceptance Model (Davies, 1989), the empirical breakdown is very efficient and contributes greatly to the literature. The research proved the hypothesis that computer self-efficacy influences students’ intention to use E-learning while the hypothesis that internet experience will influence students’ intentions was rejected (Alenezi, Abdul Karim, & Veloo, 2010).

Tarhini, Hone and Liu (2013) analyzed the factors affecting student’s acceptance of e-learning environments or web based learning in developing countries with a focus on Lebanon. This literature contributed significantly due to the fact that they utilized the Technology Acceptance model (Davies, 1989). They did not specifically address Self-efficacy but the model utilized to quantitatively measure PEOU and PU were molded by self-efficacy questions. And they concluded that perceived ease of use directly affects students’ behavioral intention to adopt certain technology (Tarhini, Hone, & Liu, 2013).

Hayashi et al. (2004) had some very interesting insight as they focused not only on the adoption of e-learning technology, but the aspect of continuous learning and usage of the system. Their main hypothesis was that success of an e-learning program in information technology (IT) may require users to be equipped with a certain degree of computer self-efficacy and affect for information systems. These factors may, in turn, influence the satisfaction level of online learners and their intention to continue using the e-learning
system (Hayash et al., 2004). In a conclusion similar to Zainab et al. (2015) they concluded that as a moderating factor, computer self-efficacy does not have significant influence on learning outcomes.

Boateng et al. (2016) investigated the determinants of E-learning adoption in developing countries, they theorized that findings from developed countries on ELA (E-Learning Adoption) cannot be used as a basis for developing countries. Their scope was the adoption of the E-learning in the University of Ghana and they focused on the relationship between computer self-efficacy (CSE), perceived ease of use (PEOU), perceived usefulness (PU) and attitude towards use (ATTU). Their study revealed that CSE had a direct effect on PEOU. However, a test conducted between CSE and ATTU was found not to be significant (Boateng, Mbrokoh, Boateng, Senyo, & Ansong, 2016). This was in contrast to several studies by Sam et al. (2005) and Zhang and Espinoza (1998) among others whose hypothesis proves that self-efficacy has a positively direct influence on attitude towards use. This definitely contributed greatly to the literature due to the contrasting result.

Zainab et al. (2015) carried out a study on e-training adoption in the Nigerian civil service. The research highlights e-learning within the context of business and informal training, taking a different direction to the usual e-learning in the formal education system. The researchers discovered that the combined role of perceived cost, computer self-efficacy, technological infrastructure, internet facilities, power supply, organizational support, technical support and government support is critical for e-training adoption in developing countries, particularly in Nigeria (Zainab, Bhatti, Pangil, & Battour, 2015). In their research they referenced Lee (2006) who showed that mandatory usage of electronic learning system is necessary in technology adoption- in order to build computer self-efficacy. Furthermore, he also observed that computer self-efficacy has a significant influence on technology adoption (Ching, 2006).

Zainab, Bhatti and Alshagawi (2017) investigated computer self-efficacy and the technology acceptance model (TAM) constructs have in e-training adoption in the Nigerian civil service. This was an interesting contribution because of the referral of e-learning specifically as e-training. In their research they worked to determine the effects of computer-self efficacy as well as other TAM constructs on perceived ease of use and perceived usefulness. In their research they concluded that Computer self-efficacy was statistically insignificant through PEOU, this differed from the conclusions of earlier
research by Zainab et.al (2015). In addition, PEOU had an indirect effect through PU. Therefore, only PU of the TAM constructs indicated strong predictive strength in e-training adoption (Zaniab, Bhatti, & Alshagawi, 2017).

Lwoga and Komba (2015) investigated not only the initial usage of web based learning but the continued e-learning usage in Tanzania. This literature contributes greatly to understanding perceived ease of use and perceived usefulness as it relates to East Africa. The results showed that actual usage was determined by self-efficacy, while continued usage intentions of web-based learning system was predicted by performance expectancy, effort expectancy, social influence, self-efficacy, and actual usage (Lwoga & Komba, 2015). Within the same line as Macharia and Nyakwende (2009) highlighted other challenges for e-learning adoption as; infrastructure barrier and weak ICT policies. They also highlighted LMS user interface which was not user friendly and technical support, limited skills, lack of awareness, resistance to change, and lack of time to prepare e-content and use the e-learning system (Lwoga & Komba, 2015).

Macharia and Nyakwende (2009) studied the link between external/ environmental factors and the Technology Acceptance Model by Davies (1989) in the Kenyan higher education context. This research contributed greatly to the literature because it emphasized the importance of PEOU (perceived ease of use) and PU (perceived usefulness) while outlining certain gaps; ‘TAM’s belief constructs are only partial mediators of the effects of environmental differences. Perhaps most importantly, they underline the potential for greater explanations of usage behavior when one is considering the direct effects of external variables’ (Macharia & Nyakwende, 2009). This clearly justifies digging into self-efficacy which is a behavioral determinant of Perceived Ease of Use.

2.3 The Effect of Objective Usability on Adoption of E-learning Technology

There are two types of usability measures in technology; the subjective and objective usability. This section will focus on the literature around objective usability. According to Hornbaek (2006), objective usability concerns aspects of the interaction not dependent on users’ perception; on the contrary these measures can be obtained, discussed, and validated in ways not possible with subjective measures. Basically, objective usability is independent of user experience and this can be measured to give a broader and clearer picture. Objective usability is one of the antecedents of PEOU -perceived ease of use (Venkatesh & David, 1997), ergo it is essential to understand how it affects the adoption...
of technology as it contributes to the technology acceptance model – TAM by Davies (1989).

Venkatesh and Davies (1997) worked on testing perceived ease of use of technology utilizing three antecedents, with objective usability being one of them. They theorized that ease of use will be affected by objective usability of a specific system, but only after direct hands on experience with the system (Venkatesh & David, 1997). This work contributes greatly to the literature in that it not only identifies objective usability but also experiments on the effect of direct experience on objective usability. Their experiment for objective usability was applied utilizing Card, Moran and Newell (1980) Key Stroke Model. This model measures how well a system allows one to perform a task and this is predominantly measured by the time taken to achieve a certain task. Their research presented that when users come into contact with systems which have an objective usability that is lower than their own computer-self efficacy they are more likely to reject the system (Venkatesh & David, 1997).

Zaharias and Poulymenakou (2006) studied the essential relationship and interplay between usability and instructional design. In this literature they highlight the factor of usability with a focus not only on the system, but the characteristics. According to them the increasing diversity of the learners’ population, the broad scope of their learning needs, the decreasing tolerance of learners’ frustration and the diversity of their learning tasks, impose that the human-centered design paradigm must be applied in e-learning design (Zaharias & Poulymenakou, 2006). This mirrors the epithet of Venkatesh and Davies (1997) who mirrored the sentiment that there should be a focus on both the system and the system characteristics. The researchers focused on a case study of e-learning design and implementation in the organizational context and not tertiary. The emphasis was on learner-centered design and there was no clear distinction between objective and subjective usability, simply an allusion in the descriptions and the experimentation tools utilized.

Park and Wentling (2007) once again lump objective usability into computer usability, the separation of the terms is alluded to, as subjective usability is discussed under attitudes (computer self-efficacy and attitudes) perceived ease of use and perceived usefulness. In this case it was safe to assume that computer usability referred to objective usability. Their research intended to explore the relationship between the factors
associated with e-learning, particularly computer attitudes, computer usability, and transfer of training in workplace learning (Park & Wentling, 2007). In their work usability can be defined as the degree to which learners are able to easily and effectively use the computer learning system to perform learning tasks (Carey, 1991; Shackel, 1997). They concluded that usability has a significant direct effect not only on adoption but transfer of training from what they learn.

As one reviews the work of Chin, Tsui, Lee (2016), one begins to notice the trend in literature from 2005 onwards, phrases like design factors, usability design guidelines and knowledge bases become more prominent. The focus shifts from usability with the basis of the technology to a focus on usability in terms of design and characteristics. In this research they argue that usability properties are fundamental to the design of e-learning systems, and should be regarded as a means not only to scale e-learning systems to wider contexts, but also to customize the design of learning activities so that improvements can be made in a well-rounded manner (Chin, Tsui, & Lee, 2016). The research was applied research and results aided in creating an interactive e-learning platform for the almost isolated Bario tribe in Malaysia. This helped light the way discovering relevant research on usability of e-learning platforms.

Costabile et al. (2005) contributed to this literature greatly, as their research focused not only the effect of usability on e-learning adoption, but the necessity to measure it. According to them the design of its interface should take into account the way students learn and also provide good usability so that student’s interactions with the software are as natural and intuitive as possible. The issue of pedagogy and its connection to the usability was also highlighted. This was similar to the research by Tarus, Gichoya and Muumbo (2015) which considered a shift in pedagogy necessary especially for e-learning adoption. They concluded that in order to go deeply into aspects concerning pedagogical approach and content semantics, experts of education science and domain experts are to be involved (Costabile et al., 2005). E-learning adoption is not only about the usability of the system, but the usability of the content as well.

According to Shackel (2009) as computers become cheaper and more powerful, it seems certain that usability factors will become more and more dominant in the acceptability decisions made by users and purchasers. In this research Shackel highlights the
importance not only of the objective computer usability but of the design and user interface. He set his basis from Nicholls (1979):

The “end” user at the “terminal” was often the last person to be considered in the design of the system. It is important to develop a new view of computing systems, and to look at the user in a different light . . . taking this view of computing, the center of a system is the user.

He highlighted the usability variables as; effectiveness, learnability, flexibility and attitude (Shackel, 2009). He concludes by determining that while defining and evaluating usability is important it must be done thoroughly and skillfully if good design for usability is to be achieved.

Torun and Tekedere (2015) not only looked at adoption e-learning technology and the usability, but looked closely at the technical aspects of the system usability. In their work one of the most relevant literature focused on Human Computer Interaction (HCI) and usability. They concluded that the ‘user’ factor must be taken into consideration while devising a system, because when a system is being developed, the fact that the system in question has been arranged to comply with the user is of importance in terms of the functionality of that system (Torun & Tekedere, 2015).

Lopes, Miguel and Creissac (2012) also looked at usability but from the point of view of evaluation of usability methods. They highlighted the fact that for e-learning platforms the usability issues are related with the relationship/interactions between user and system in the user's context (Lopes, Miguel, & Creissac, 2012). Interestingly they outlined the logic that different e-learning platforms created for different needs should have contextual usability features. To them, usability is based on the different designs and functionalities.

Whereas most literature focused on usability in terms of the design, pedagogy, user interface and content, Davids et al. (2014) was incredibly interesting and shed light on the effect of improving usability of an e- learning platform and the direct effect this has not only adoption, but continuous use. They emphasized the fact that optimizing the usability of e-learning materials is necessary to reduce extraneous cognitive load and maximize their potential educational impact (Davids, Chikte, & Halperin, 2014). Their research was based on a practical experiment or trial, this mirroed the practicality of the research by Torun and Tekedere (2015).
Zaharias (2009) followed a similar theme in the literature regarding objective usability and that is quality not only of design but content. In her work she moves a further step and highlights usability as not standing alone, but being stronger because on intrinsic motivation. In this case learning environments should foster intrinsically learning motivation (Zaharias, 2009), basically the design and usability features should motivate the e-learning students to not only take the course, but complete the courses as well. She highlighted the fact that most e-learning platforms are occupied with usability for adoption, but does not look at the continuity and engagement levels.

Hennessy et al. (2010) reported on developing the use of IT and communication technology to enhance teaching and learning in East African schools. This review of literature is incredibly diverse and sheds light on the gap of knowledge on objective usability due to a plethora of environmental factors which affect the African schools (Hennessy, et al., 2010). In the report factors like affordability of technology, internet penetration, electricity and access are some of the issues which cause adoption of e-learning technology to be lower in East Africa than the western world (Hennessy, et al., 2010). The research though broad, does not cover objective usability of the e-learning technology which has been implemented to date as per some of the initiatives mentioned. This would be able to shed light on the individuals’ reactions and experiences with the implemented technology.

Kiget, Wanyembi, and Peters (2014) focused on adoption of e-learning technology at a Kenyan University which had adopted MOOCs to supplement physical learning. Their study used the case study approach. As they looked at adoption they focused on the aspect of usability. The usability attributes evaluated were user-friendliness, learnability, technological infrastructure and policy (Kiget, Wanyembi, & Peters, 2014). Their work was very interesting and contributed to the general literature because while adoption is key, in their work efficient adoption is more important. Adoption is one thing but continues use is essential, if usability of e-learning system is bad, learners fail in their attempt to use the system (Kiget et al., 2014). They not only tested the student interaction with the system, but the teachers loading the course content. The study concluded that learnability (is it easy to learn to use) of e-learning systems was affecting its usability.
2.3.1 Mobile Learning

As we narrow down into Africa, Male and Pattinson (2011) investigate socio-cultural perspective towards quality e-learning applications. Their main research concentrates on East Africa and African countries. They revert to the usual theme of tertiary institutions, but with a twist for high school students. This research contributes greatly to the literature because it touches not only on computer usability but mobile technology usability; m-learning. The paper shows how interface design can positively enhance the quality defining characteristics of learning in an e-learning environment (Male & Pattinson, 2011). In the research it was determined that it is essential that e-learning systems are designed to assist learners or users achieve their societal aspirations not just emphasizing on successful utilization of the technology, because in these cases success is measured by the usability.

Brown (2003) presented on the role of m-learning in Africa. In this research he highlighted that adoption of mobile technology in Africa is one of the highest in the world ergo, the usability component is strong in m-technology and the potential for the meshing of online learning in mobile will be efficient and effective with great potential for adoption. “Mobile learning should prove to be a useful tool for blended training that employs face to face remote methods” (Nyiri, 2002). Whereas this presentation did not go deeply into the objective usability, it highlighted the potential for m-learning in Africa and the high rate of mobile technology adoption.

2.4 The Effect of System Accessibility on Adoption of E-learning Technology

According to Batanero et al. (2014) System accessibility refers to a situation where anyone, regardless of their personal characteristics and type of environment, is able to access the information provided through the Learning Objects. In this case the learning object would be e-learning technology. Similarly, Tarus, Gichoya and Muumbo (2015), highlighted system accessibility as an essential element in the challenges which face implementation and adoption of e-learning in Kenyan universities. In their work system accessibility is one of the main reasons for e-learning because of the ease of access, yet infrastructure like internet coverage, bandwidth and technology can be a hindrance to accessibility (Tarus, Gichoya, & Muumbo, 2015).
Whereas most of the literature uncovered focuses on adoption of e-learning within the formal education context, Calisir et al. (2014) focused on e-learning adoption for blue collar employees in an automotive industry. They not only focused on perceived ease of use and perceived usefulness, but how system accessibility affected the two and as a result adoption of the e-learning technology. Interestingly they not only focused on peoples’ interactions and enabling infrastructure, but the system quality as well, to them system accessibility is one of the measures of system quality (Calisir, Gumussoy, Bayraktaroglu, & Karaali, 2014). If all factors are held constant is the system simple to access? This was their main premise as they interrogated system accessibility.

Park, Nam and Cha (2011) utilized system accessibility as one of the independent variables in their model. They focused on the behavioral intention to use m-learning technology by university students in institutions of higher learning. In their work accessibility played a great role in enabling this form of e-learning, with SA having a strong effect on both Perceived Ease of Use and Perceived Usefulness and ergo their behavioral intention. The study was in Asia, but reflected on similar accessibility issues in Africa where adoption of mobile technology in Africa is one of the highest in the world ergo (Brown, 2003). Mobile learning should prove to be a useful tool for blended training that employs face to face remote methods (Nyiri, 2002); mobile phones make accessibility to e-learning technology more efficient, especially in a market with positive mobile access.

According to Masud and Huang (2012) access plays an important role in the adoption of e-learning technology, with a focus on cloud computing. According to this work, cloud computing allows quicker and more consistent access to e-learning technology. This work was a new twist on e-learning adaptation as other researchers focused on the systems and internet access more than the cloud storage factors. Infrastructure like internet coverage, bandwidth and technology can be a hindrance to accessibility (Tarus et al., 2015) as such Masud and Huang (2012) also discuss government policies and essential infrastructure.

Debevc et al. (2007) shed an interesting light on the work surrounding accessibility. They focused on a case study of a project applied in Slovenia for those with hard of hearing and deaf people and the work was a report reflecting results of the e-learning project. In their work e-learning was utilized to create more learning accessibility, but at the same time the e-learning systems we designed to necessitate ease of access and impact. In their
work, accessibility was not just about the technical aspect of the platform, but the delivery of the content (Debevc et al., 2007); this highlighted an interesting angle to assessing accessibility. It is more than just accessing the system but once accessed, can they access the content?

Lee, Hsiao and Purnomo (2014) work was very interesting in that they looked at accessibility as one of the system characteristics which are essential to adoption of e-learning technology in Indonesian universities. Whereas Debevc et al. (2007) looked at accessibility in regard to the content and technological design, Lee, Hsiao and Purnomo (2014) looked at accessibility from an infrastructure point of view observed that students in Indonesian universities continue to encounter connectivity problems similar to other developing countries. Their study suggested system characteristics that support e-learning activities (learning content and technology accessibility) are critical in increasing students’ behavioral intention to adopt e-learning systems (Lee, Hsiao, & Purnomo, 2014).

In their work ‘towards the design of personalized accessible e-learning environments’ Brahim et al., (2013) discussed system accessibility and the importance in adoption of e-learning technology. Their paper highlighted their vision in designing an environment supporting eLearning accessibility. In order to ensure offering content in formats tailored to individual users based on their personal preferences. Their study reflected results similar to Debevc et al., (2007) where system accessibility is not only based on infrastructure but content as well. In their case their research highlighted the factor of personalization of e-learning experience creating more ease of access for different audiences or individuals. They concluded that e-learning accessibility ensures that resources can be used by all learners regardless of environmental or technological constraints, and allows individual learning styles and preferences to be accommodated (Brahim et al., 2013).

Batanero et al. (2014) contributed greatly to this literature due to their approach to accessibility research and its effect on adoption of technology. In their study they looked at the relationship between accessible learning objects and accessible web content, they did this by contrasting and comparing to certain ISO standards for each of the variables. Similar to the study by Debevc et al. (2007) they reflected on learning objects having visual, audio and text variations adapted to different student needs including those with
disability. They went a step beyond that and specified that learning objects need metadata to allow students to return to the specified requirement they needed in the first place. In their work their recommendations focus on web content, but also on user interface and navigation, which now leans toward objective usability. They highlighted three accessibility levels of A, AA and AAA (Batanero et al., 2014). These levels progressed from making sure people can access the web systems, to making sure they do not have serious problems accessing the systems and finally ensuring they do not have some issues accessing the system. All this needs to be taken into consideration by the developers of the platform. Batanero et al. (2014) concluded that there needs to be balance between the standards of the learning objectives as well as the web content to allow for optimum accessibility for all students.

Cooper, Colwell and Jelfs (2007) contributed greatly to the literature due to the clear linkage between usability and accessibility. Former literature only alluded to this, but from the beginning they declared that accessibility and usability are intrinsically linked (Cooper, Colwell, & Jelfs, 2007). They highlighted the need to constantly evaluate accessibility and usability in order to ensure ease of use and adoptability of the e-learning resources. In their research they concluded that Accessibility and usability are intrinsically linked. The lower the level of accessibility of a resource for an individual, the less usable it will be for them. In the worst case they will not be able to use it at all. Conversely, improved accessibility for disabled users promotes usability for all (Cooper, Colwell, & Jelfs, 2007).

Varonis (2015) focused on key legislation and cases in which accessibility for those with disabilities was not adequate and the resulting effects, as well as the importance of design in course development which will allow for accessibility without having to make exceptions because all the basis were covered in the first place. She concluded that given the challenges of creating accessible content that provides equivalent information to all learners, faculty and course designers can implement the principles of Universal Design to enhance the learning environment for all students and ensure they are in compliance with guidelines and regulations (Varonis, 2015). This compliance is facilitated by emerging standards for accessible content and emerging technologies for making content accessible to all without the need for special accommodations. Her work reflected that of Debevc et al. (2007) whose work reflected on learning objects having visual, audio and text variations adapted to different student needs including those with disability.
Alkhattabi, Neagu and Cullen (2010) approached accessibility from the angle of quality. Their work focused on an information quality framework for e-learning systems. They proposed 14 information quality attributes grouped in three quality dimensions: intrinsic, contextual representation and accessibility. Similar to the work of Batanero et al. (2014), their focus on accessibility is not just on system design, but delves into the content and the effect on accessibility. In their framework accessibility is mainly described as ‘accessibility data quality’ and refers to the quality aspects concerned into accessing distributed information (Alkhattabi, Neagu, & Cullen, 2010). There were 4 dimensions to guaranteeing accessibility; access security, availability, response time and accessibility itself. This contributed greatly to the literature, due to the clarity of the proposed model and the importance given to accessibility.

Similarly, Ramayah, Ahmad and Chiun-lo (2010) focused on the role of quality factors in not only adoption, but continuous use e-learning systems in Malaysian Universities. In this work, system accessibility played an essential role in the quality of an e-learning technology. They stated that despite the popularity of the Internet, many people resist using it due to the slow response time, caused by poor design of the web sites or simply heavy traffic on the Internet, and lack of system accessibility (Ramayah, Ahmad, & Chiun-Lo, 2010). They concluded that reliability and accessibility of e-learning system thus, can be said to have a certain influence in the usage of it.

Tarus, Gichoya and Muumbo (2015) as well as most authors focus on system accessibility as the infrastructure, internet, computer and laptops, while Calisir et al (2014) focus on the e-learning system quality. Whereas this is all well and good the aspect of mobile learning is essential with Africa at the fore front of mobile use, not everyone has a computer but most have a mobile phone. Mobile technologies have the power to make learning even more widely available and accessible than we are used to in existing e-learning (Brown, 2003). This makes one ask the question of whether the e-learning platforms are easily accessible on mobile.

According to Urhiewhu and Emjoroh (2015), one of the major factors which affect the adoption of technology for digital information resources is lack of system access. Basically there are an inadequate number of computers to access digital information sources. In this study of university students from Edo Nigeria, the system accessibility was in the form of resources provided by the universities to enable students to access the
digital resources effectively. Yet this is quite the gap. This contributes to the literature, iterating access as one of the factors which can affect the adoption of technology for forms of e-learning.

Njenga and Fourie (2010), shed light on a varied way to think of system accessibility. In this work accessibility is mainly in reference to internet access with which the e-learning platforms can be accessed. As he highlights this challenge in the adoption of e-learning technology he also highlights a critical factor which ruffles some feathers, ‘accessible information does not turn automatically into meaningful knowledge without the assistance of a teacher or an expert (Njenga & Fourie, 2010). Once again this context is skewed to formal higher education.

As Brown (2003) presented on the role of m-learning in Africa. His research highlighted that adoption of mobile technology in Africa is one of the highest in the world and as such system accessibility is strong in m-technology and the potential for adoption by a large number of Africans is an upcoming reality. He based his arguments on the evolution of social media networks and the accessibility of mobile devices. He concluded that mobile learning should prove to be a useful tool for blended training that employs face to face remote methods.

2.5 Chapter Summary

This literature review section aided the understanding of the three variables of computer self-efficacy, objective usability and system accessibility and how the interrelated relationships between the three affect Adoption of e-learning technology. The technology acceptance model played a great role in forming the basis of the arguments which were then tested and measured in different environments and situations around the world. The literature from African cases was not as prominent as that of European and Asian cases, which solidified the basis of this thesis- to provide and aid in filling the gap for relevant measures and literature for Africa.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this study was to investigate factors affecting adoption of e-learning technology in Kenya. This chapter describes the research design, target population, sampling design, data collection methods, research procedures and data analysis methods that were used in this study.

3.2 Research Design

According to Krishnaswami and Satyaprasad (2010) research design is a logical and step by step plan prepared for directing a research study. It specifies the objectives of the methodology and the techniques to be utilized for achieving the objectives set out in the study. Sreejesh, Mohapatra and Anusree (2014) noted that there are three major types of research designs, such as exploratory, descriptive and causal research designs. Exploratory design is one in which little is known about the topic, in this case a lot of preliminary experiments need to occur. A descriptive study is undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in a situation (Sekran, 2003). Explanatory studies on the other hand go beyond descriptive observation, this type of research focuses on the cause and effect relationship between variables. (Sreejesh, Mohapatra, & Anusree, 2014).

This study used explanatory research design to investigate the factors which affect adoption of e-learning technology in Kenya. Studies that engage in hypotheses testing usually explain the nature of certain relationships, or establish the differences among groups or the independence of two or more factors in a situation (Sekran, 2003). An explanatory research design is fitting for this study because it will help us ascertain not only the relationship between the different variables, but measure the effect and strength of each independent variable on the dependent variable which in this case is technology adoption.

3.3 Target Population

Target population is the aggregate of elements about which we wish to make inferences (Satyaprasad & Krishnaswami, 2010). According to Cooper and Schindler (2014) a target population is those people, events, or records that contain the desired information for the
study that determine whether a sample or a census should be selected. Basically, this is the population from which the sample is taken. This study focused on social media (Facebook) users in Kenya. According to Internet World Statistics there are over 6.2 million Facebook subscribers in Kenya as of June 2017 (Internet world Stats, 2017).

3.4 Sampling Design

The sampling design is comprised of several variables; the sampling frame, sampling technique and finally sampling size. According to Cooper and Schindler (2014) the sampling design is the method and process used to form a specific population and therefore it is the procedure that a researcher goes through while selecting items for the study sample.

3.4.1 Sampling Frame

Sreejesh et al. (2014) define the sample frame as the list of population elements or members (individuals or entities) from which units to be sampled are selected. This study focused on social media users in Nairobi who are interested in e-learning or have ever learned online.

3.4.2 Sampling Technique

A sampling technique is the name or other identification of the specific process by which the entities of the sample have been selected. Basically, the way in which a sample is selected. There are a variety of sampling techniques are available and they may be classified by their representation basis and element selection techniques (Cooper & Schindler, 2014). A sample can be selected in two ways from a population-through probability sampling, or through non-probability sampling (Sreejesh, Mohapatra, & Anusree, 2014).

According to Sekaran (2003), in probability sampling, the elements in the population have some known chance or probability of being selected as sample subjects. In non-probability sampling, the elements do not have a known or predetermined chance of being selected as subjects. According to Sreejesh et al. (2014) a sample that is selected using probability sampling techniques will be sufficient for getting effective results.

This study utilized the geographic cluster, simple random sampling technique with a focus on Nairobi. According to Cooper and Schindler (2014) the simple random sample is
considered a special case in which each population element has a known and equal chance of selection. This worked for the sample due to the unrestricted nature.

**Table 3.1: Clusters**

<table>
<thead>
<tr>
<th>Facebook Group</th>
<th>Follower Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Limu</td>
<td>3,800</td>
</tr>
<tr>
<td>Zydii</td>
<td>4,700</td>
</tr>
<tr>
<td>Edtech Nairobi</td>
<td>1,300</td>
</tr>
<tr>
<td>Personal Page</td>
<td>791</td>
</tr>
<tr>
<td><strong>Total Population</strong></td>
<td><strong>10,591</strong></td>
</tr>
</tbody>
</table>

**3.4.3 Sample Size**

The sample size is an essential aspect of any empirical study in which the goal is to make deductions about a population from a sample. According to Sekaram (2014) the need for choosing the right sample for a research investigation cannot be overemphasized. We know that rarely will the sample be the exact replica of the population from which it is drawn, which is why it is essential to get correct. Cooper and Schindler (2014) note that cost and resources also need to be considered in the determination of sample size. The study focused on clusters of Kenyan Facebook groups with an interest or focus on e-learning. This study adopted the formula adopted by Cochran (2014) to determine the sample size:

\[ n_0 = \frac{Z^2pq}{e^2} \]

Where: e is the desired level of precision (i.e. the margin of error), p is the (estimated) proportion of the population which has the attribute in question, and q is 1 – p. With the assumption of 85% of the population have interacted with an e-learning platform, so p = 0.85. 95% confidence, (gives us Z values of 1.96) and at least 5 percent—plus or minus—precision. The q value is 1-0.85=0.15

\[ \frac{(1.96)^2 (0.85) (0.15))}{(0.05)^2} = 196. \]
Total sample size is 196.

3.5 Data Collection Methods

This study used a questionnaire to collect data from social media users in Nairobi who have an interest in e-learning. According to Rowley (2014) questionnaires refer to documents that include a series of open and closed questions to which the respondent is invited to provide answers. The questionnaire was divided into several sections and aimed to first capture the demographic information, followed by the questions focusing on the variables and research objectives. The questionnaires were self-administered online. The responses were through a 5 level Likert scale with a range from 1 to 5 where; 1- strongly agree, 2-agree, 3-neutral, 4 disagree, 5-strongly disagree.

3.6 Research Procedure

According to Cooper and Schindler (2014) the research procedures used should be described in sufficient detail to permit another researcher to repeat the research. This includes the permissions, pilot study (if any), reliability of instruments, validity of the instruments, administration of the elements and ethical considerations.

Permission to conduct the research was granted in stages. The first stage is permission granted from the research supervisor, followed by the Dean, Chandaria School of Business.

According to cooper and Schindler (2014) Reliability is concerned with estimates of the degree to which a measurement is free of unplanned or unstable error. Reliable instruments can be used with confidence that temporary and situational factors are not interfering. Basically, how consistent is the tool? This is essential for replicability and sustainability of research. There are two types of reliability; internal and external reliability. Internal consistency of data can be established when the data give the same results even after some manipulation (Sreejesh, Mohapatra, & Anusree, 2014). There needs to be homogeneity in all the factors and elements (Sekran, 2003). External reliability simply focuses on replication of the study.

One of the best measures of reliability is Cochran’s alfa. According to Sekran (2014) Cronbach’s alpha is a reliability coefficient that indicates how well the items in a set are positively correlated to one another. Cronbach's alpha is computed in terms of the
average inter-correlations among the items measuring the concept (Tavakol & Dennick, 2011). The closer Cronbach’s alpha is to 1, the higher the internal consistency reliability.

According to Cooper and Schindler (2014) even when an experiment is the ideal research design, it is not without problems. There is always a question about whether the results are true. This is where validity comes in, how true are the results after use of the tool? Validity can be measured through several methods like face validity- unified agreement by expert on validity of tool, content validity- relevant variables for measurement, and construct validity- degree of measurement instrument to logically connect the fundamental theory. Criterion-related validity is the degree to which a measurement instrument can analyze a variable that is said to have a criterion (Sreejesh, Mohapatra, & Anusree, 2014). A good example would be if you can measure the length of a room using a tape measure, you should also be able to do so using a ruler and string. The tool developed by Davies (1989) has been the basis of research for perceived ease of use and technology adoption for the last 28 years. It is simply adapted to fit different scenarios, but it is replicable.

According to Rowley (2014) one of the main advantages of questionnaires is the ability to make contact with and gather responses from a relatively large number of people in dispersed and possibly remote locations. The questionnaires for this study were self-administered. In self-administered studies, the interviewer’s main role is to inspire participation as the participant completes the questionnaire on his or her own(Cooper & Schindler, 2014). According to Sekran (2014) modern technology is now playing a major role in data collection, giving more flexibility. Questionnaires have the advantage of gaining data more efficiently in terms of researcher time, resources, energy, and costs. This study utilized an e-questionnaire created on Google forms and was distributed different channels of social media including Facebook.

Ethics in research has to do with the manner in which the researcher approaches the research, basically their behavior in regards to the rights of their respondents. (Sekran, 2014; Cooper & Schindler, 2014). According to Cooper and Schindler (2014), the objective of ethics in research is to ensure that no one is harmed or suffers adverse consequences from research activities. Ethical behavior permeates each step of the research process- data collection, data analysis, reporting, and dissemination of information on the Internet, if such an activity is undertaken (Sekran, 2003). Research
misconduct includes ‘fabrication, falsification or plagiarism in the process of carrying out the research. This research was done without any pressure from the researcher; respondents chose whether to fill the questionnaires’ and the rate at which they completed was solely based on their time and willingness.

3.7 Data Analysis Methods

Data analysis involves data preparation, descriptive statistics and inferential statistics. According to Cooper and Schindler (2014) Data analysis is the methods used to analyze the data and describes data handling, preliminary analysis, statistical tests, computer programs, and other technical information.

There are several stages of data preparation. If there are blank responses they have to be handled in some way, the data coded, and a categorization scheme has to be set up. The data will then have to be imputed, and some software program used to analyze them (Sekran, 2003). According to Cooper and Schindler (2014) it is during this step that data entry errors may be revealed and corrected. I went through the process of data coding and validation, handling of the blank responses as well as non-varied responses.

Descriptive statistics are measurements which illustrate the center, spread and shape of distributions and are helpful as the first stage for the description of prepared data. They help to summarize the data in a simple and visual way (Cooper & Schindler, 2014). According to Sekran (2014) descriptive statistics such as maximum, minimum, means, standard deviations, and variance were obtained for the interval-scaled independent and dependent variables. Basically they help us with the measures of central tendency. This sort of analysis may describe data on one variable, two variables or more than two variables. Accordingly it is called univariate analysis, bivariate analysis and multivariate analysis respectively (Krishnaswami & Satyaprasad, 2010).

According to Cooper and Schindler (2014) includes the estimation of population values and the testing of statistical hypotheses. In inferential statistics we might be interested to know or infer from the data through analysis (1) the relationship between two variables (e.g., between advertisement and sales), (2) differences in a variable among different subgroups (Sekran, 2003). There are several inferential tests including; correlation, analysis of variance and regression. In this research I utilized structural equation model, which is a multivariate statistical analysis method, this is due to the latent factors in the technology acceptance model (Davies, 1989).
3.8 Chapter Summary

The chapter managed to clearly describe the methodology that the study used to reach the objective of the study. The research methodology was expounded in sections which include; research design, target population, sampling design, sampling frame, sampling technique, sample size, data collection, research procedure, and data analysis methods. Chapter four will discuss data analysis and presentation of study findings.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

The purpose of this study was to investigate the factors affecting the adoption of e-learning technology in Kenya. This chapter presents the data analysis results, interpretation and presentation, and the findings from the research study that were analyzed using the SPSS version 20 and SPSS AMOS version 25.

4.2 Response Rate

The study focused on the factors affecting the adoption of e-learning technology in Kenya. A total of 196 respondents were expected to participate in the study electronically by use of Google questionnaire. The researcher managed to get a response rate of 186 by the time of closure of study. This gave a response rate of 95%. The response rate helps to produce accurate useful results that represent the target population.

Table 4.1: Response Rate

<table>
<thead>
<tr>
<th>Questionnaires</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responded</td>
<td>186</td>
<td>95</td>
</tr>
<tr>
<td>Did not respond</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>196</td>
<td>196</td>
</tr>
</tbody>
</table>

4.3 Demographic Characteristics

This section discusses the results of the general information about the respondents. This includes the gender, age bracket, marital status, education background, and if the respondents have ever learnt something online.

4.3.1 Gender of Respondents

Figure 4.1 presents the gender of the respondents; 55% of the respondents were female and 45% of the respondents were male. The findings indicate female who participated in the study were slightly more than male.
4.3.2 Age Bracket

Figure 4.2 indicates the age bracket of the respondents; 58% of the respondents who constituted the majority were in the age bracket of 26-32 years. They were followed by those who were in the age bracket of 18-25 years at 22%, 33-40 years were 16% while lastly, 4% were above 40 years.

Figure 4.2: Age Bracket
4.3.3. Level of Education

The respondents were asked to indicate their level of Education. As shown on figure 4.3, 59% were undergraduate while the remaining 41% were postgraduates.

![Figure 4.3: Level of Education](image)

4.3.4 Marital Status

The respondents were asked to indicate their marital status. Majority indicated they were single (74%) and the remaining 26% indicated they were married. Figure 4.4 shows this.

![Figure 4.4: Marital Status](image)
4.3.5 Online Learning

The study focused on adoption of online learning hence only respondents from those who were online was significant. When asked to state if they had learnt something online, 99% stated they had while only 1% stated s/he had not as indicated on figure 4.5.

![Online Learning Pie Chart](image)

**Figure 4.5: Online Earning**

4.4 Descriptive Analysis of Study Variables

4.4.1 Independent Variables

The independent variable of study was clustered into three sectors based on the research questions; self-efficacy (SE), objective usability (OU) and system accessibility (SA). The presentation of the descriptive shows all the variables were highly rated as agreed and strongly agreed as indicated on table 4.2.

On SE, ‘I feel confident finding information on e-learning (online learning) systems’ was highly rated as strongly agreed at 47.1% and agreed at 39.3%. The second question ‘I have the necessary skills for using an e-learning (online learning) system’ was highly rated as strongly agreed at 44.3% and agreed at 40.7%.

Response on OU was also similar as follow ‘Once I use an e-learning system, I can easily remember how to navigate it’ was highly rated as strongly agreed at 36.4% and agreed at 46.4% and ‘E-learning (online learning) systems save me time’ was highly rated as
strongly agreed at 34.3% and agreed at 47.1%. However, the question on ‘Most e-learning (online learning) systems are easy to use’ was rated differently with agreed at 45.0% and neutral at 26.4%.

On SA, the response were; ‘I can access e-learning (online learning) systems on my mobile phone’ was highly rated as strongly agreed at 29.8% and agreed at 38.3%. While the question on ‘I have no difficulty accessing and using an e-learning (online learning) systems in Kenya’ was ranked differently with agreed at 39.4% and neutral at 26.6%.

**Table 4.2: Descriptive of Independent Variables**

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE1</td>
<td>I feel confident finding information on e-learning (online learning) systems</td>
<td>3.6</td>
<td>1.4</td>
<td>8.6</td>
<td>39.3</td>
</tr>
<tr>
<td>SE2</td>
<td>I have the necessary skills for using an e-learning (online learning) system</td>
<td>2.9</td>
<td>1.4</td>
<td>10.7</td>
<td>40.7</td>
</tr>
<tr>
<td>OU1</td>
<td>Most e-learning (online learning) systems are easy to use</td>
<td>4.3</td>
<td>10.7</td>
<td>26.4</td>
<td>45.0</td>
</tr>
<tr>
<td>OU2</td>
<td>Once I use an e-learning system, I can easily remember how to navigate it.</td>
<td>2.9</td>
<td>2.1</td>
<td>12.1</td>
<td>46.4</td>
</tr>
<tr>
<td>OU3</td>
<td>E-learning (online learning) systems save me time.</td>
<td>4.3</td>
<td>3.6</td>
<td>10.7</td>
<td>47.1</td>
</tr>
<tr>
<td>SA1</td>
<td>I have no difficulty accessing and using an e-learning (online learning) systems in Kenya.</td>
<td>3.7</td>
<td>13.3</td>
<td>26.6</td>
<td>39.4</td>
</tr>
<tr>
<td>SA2</td>
<td>I can access e-learning (online learning) systems on my mobile phone</td>
<td>4.3</td>
<td>9.6</td>
<td>18.1</td>
<td>38.3</td>
</tr>
</tbody>
</table>

**4.4.2 Latent Variables**

The study had two latent variable of study which were treated as intervening variables. The two variables were attitude (ATT) and behavioral intention (BI) to indulge in e-learning. The response on attitude were positive as follow: ‘Studying through e-learning is a good idea’ rated highly as agree at 41.4% and strongly agreed at 30.0%. ‘Studying
through e-learning is a sensible idea’ was also rated highly as agreed at 43.6% and strongly agreed at 33.6%. Lastly ‘I have positive thoughts toward e-learning’ was rated highly as agreed at 47.9% and strongly agreed at 37.1%. Questions on BI response were: ‘I intend to check announcements from e-learning (online learning) systems frequently’ was rated highly as neutral at 34.3% and agreed at 29.3%. Similarly, the lastly question ‘Intend use e-learning (online learning) systems quite a bit’ was rated highly as agreed 38.6% and neutral at 27.9%. Table 4.3 presents the output.

Table 4.3: Descriptive of Latent Variables

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATT1</td>
<td>.7</td>
<td>5.0</td>
<td>22.9</td>
<td>41.4</td>
<td>30.0</td>
</tr>
<tr>
<td>ATT2</td>
<td>.7</td>
<td>.7</td>
<td>21.4</td>
<td>43.6</td>
<td>33.6</td>
</tr>
<tr>
<td>ATT3</td>
<td>1.4</td>
<td>2.1</td>
<td>11.4</td>
<td>47.9</td>
<td>37.1</td>
</tr>
<tr>
<td>BI1</td>
<td>8.6</td>
<td>13.6</td>
<td>34.3</td>
<td>29.3</td>
<td>14.3</td>
</tr>
<tr>
<td>BI2</td>
<td>5.0</td>
<td>7.1</td>
<td>27.9</td>
<td>38.6</td>
<td>21.4</td>
</tr>
</tbody>
</table>

4.4.3 Dependent Variables
The descriptive of the dependent variables were presented on table 4.4 as follow. Question on Perceived ease of use (PEOU) were ‘I find e-learning (online learning) systems easy to use’ which was highly rated as agreed at 53.6% and strongly agreed at 20.7%. ‘Learning how to use an e-learning system is easy for me’ was highly rated as agreed at 51.4% and strongly agreed at 27.1%. Lastly ‘It is easy to become an expert at using an e-learning (online learning) system’ was highly rated as agreed at 39.3% and neutral at 27.1%.

There were three questions on Perceived usefulness (PU), ‘E-learning (online learning) would improve my learning experience’ was highly rated as agreed at 42.1% and strongly agreed at 36.4%. ‘I can use e-learning (online learning) to increase my personal and professional skills’ was highly rated as agreed at 40.7% and strongly agreed at 50.7% and
lastly ‘E-learning could make it easier to study course content (instead of physical classes)’ was highly rated as strongly agreed at 32.1% and neutral at 27.1%.

Table 4.4: Descriptive of Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEU1 I find e-learning (online learning) easy to use.</td>
<td>3.6</td>
<td>5.0</td>
<td>17.1</td>
<td>53.6</td>
<td>20.7</td>
</tr>
<tr>
<td>PEU2 Learning how to use an e-learning system is easy for me.</td>
<td>2.1</td>
<td>4.3</td>
<td>15.0</td>
<td>51.4</td>
<td>27.1</td>
</tr>
<tr>
<td>PEU3 It is easy to become an expert at using an e-learning (online learning) system.</td>
<td>.7</td>
<td>8.6</td>
<td>27.1</td>
<td>39.3</td>
<td>24.3</td>
</tr>
<tr>
<td>PU1 E-learning (online learning) would improve my learning experience</td>
<td>1.4</td>
<td>2.9</td>
<td>17.1</td>
<td>42.1</td>
<td>36.4</td>
</tr>
<tr>
<td>PU2 I can use e-learning (online learning) to increase my personal and professional skills.</td>
<td>.7</td>
<td>.7</td>
<td>7.1</td>
<td>40.7</td>
<td>50.7</td>
</tr>
<tr>
<td>PU3 E-learning could make it easier to study course content (instead of physical classes)</td>
<td>1.4</td>
<td>12.9</td>
<td>27.1</td>
<td>26.4</td>
<td>32.1</td>
</tr>
</tbody>
</table>

4.5 Inferential Analysis

The inferential analysis conducted was in three folds. The first covers the statistical tests required to identify which model best fits the data. The second covers the factor analysis and last part covers the Structure equation model (SEM) that answered the hypothesis of study.

4.5.1 Normality Test

Skewness and kurtosis statistics were used to test the normality of the items of the variables and results were shown in table 4.5. Skewness and kurtosis statistics in the range -2.0 and + 2.0 imply satisfaction of normality. All the items in the tool followed a normal distribution.
Table 4.5: Normality Test Using Skewness and Kurtosis Statistics

<table>
<thead>
<tr>
<th></th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE1</td>
<td>-1.689</td>
<td>3.338</td>
</tr>
<tr>
<td>SE2</td>
<td>-1.514</td>
<td>2.903</td>
</tr>
<tr>
<td>OU1</td>
<td>-0.650</td>
<td>0.111</td>
</tr>
<tr>
<td>OU2</td>
<td>-1.347</td>
<td>2.432</td>
</tr>
<tr>
<td>OU3</td>
<td>-1.373</td>
<td>2.006</td>
</tr>
<tr>
<td>SA1</td>
<td>-0.577</td>
<td>-0.170</td>
</tr>
<tr>
<td>PEU1</td>
<td>-1.090</td>
<td>1.470</td>
</tr>
<tr>
<td>PEU2</td>
<td>-1.065</td>
<td>1.570</td>
</tr>
<tr>
<td>PEU3</td>
<td>-0.393</td>
<td>-0.444</td>
</tr>
<tr>
<td>PU1</td>
<td>-0.953</td>
<td>1.038</td>
</tr>
<tr>
<td>PU2</td>
<td>-1.360</td>
<td>3.046</td>
</tr>
<tr>
<td>PU3</td>
<td>-0.373</td>
<td>-0.886</td>
</tr>
<tr>
<td>ATT1</td>
<td>-0.579</td>
<td>-0.054</td>
</tr>
<tr>
<td>ATT2</td>
<td>-0.584</td>
<td>0.310</td>
</tr>
<tr>
<td>ATT3</td>
<td>-1.196</td>
<td>2.264</td>
</tr>
<tr>
<td>BI1</td>
<td>-0.310</td>
<td>-0.494</td>
</tr>
<tr>
<td>BI2</td>
<td>-0.665</td>
<td>0.133</td>
</tr>
</tbody>
</table>

4.6 Measurement Model

The hypothesized relationship was estimated using structural equation model (SEM). The first stage explores the data through exploratory factor analysis (EFA). The second stage computes the confirmatory factor analysis (CFA) that estimates the measurement model on multiple criteria such as internal reliability, convergent, and discriminant validity. The analysis were done using AMOS version 25.

4.6.1 Exploratory Factor Analysis

Exploratory factor analysis was used to refine the variables in the study. It covers the factor loading matrix, communalities and total variance extracted by principal
components analysis (PCA) method. The KMO measure of Sampling Adequacy measure was .871 which shows the sample was adequate for factor (values closer to 1 are better). Bartlett’s test of Sphericity show a Chi-Square of 1821.883 with associated significant P-value of 0.000<0.05. this shows the items were statistically significant in measuring SE, SA, OU, BI, ATT, PU and PEU. The Kaiser Meyer-Olin Measure of Sampling Adequacy, Bartlett’s Test of Sphericity and communalities tests shows the data collected was good for factorability as indicated on table 4.6.

**Table 4.6: KMO and Bartlett’s Test**

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>.871</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>1821.883</td>
</tr>
<tr>
<td>Df</td>
<td>153</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

**4.6.2 Total Variance Explained**

Table 4.7 indicates six factors were developed from the variance with the Eigen values greater than .8 and presents 74.1% of the cumulative samples of square loading. The four factors were pulled out based on kaiser’s criterion. They were further expounded on the pattern matrix.
Table 4.7: Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total % of Variance</td>
<td>Cumulative %</td>
<td>Total % of Variance</td>
</tr>
<tr>
<td>1</td>
<td>7.559</td>
<td>41.996</td>
<td>41.996</td>
</tr>
<tr>
<td>2</td>
<td>1.702</td>
<td>9.455</td>
<td>51.450</td>
</tr>
<tr>
<td>3</td>
<td>1.315</td>
<td>7.305</td>
<td>58.755</td>
</tr>
<tr>
<td>4</td>
<td>.965</td>
<td>5.360</td>
<td>64.114</td>
</tr>
<tr>
<td>5</td>
<td>.940</td>
<td>5.225</td>
<td>69.339</td>
</tr>
<tr>
<td>6</td>
<td>.855</td>
<td>4.748</td>
<td>74.087</td>
</tr>
<tr>
<td>7</td>
<td>.703</td>
<td>3.903</td>
<td>77.990</td>
</tr>
<tr>
<td>8</td>
<td>.625</td>
<td>3.472</td>
<td>81.463</td>
</tr>
<tr>
<td>9</td>
<td>.544</td>
<td>3.020</td>
<td>84.483</td>
</tr>
<tr>
<td>10</td>
<td>.506</td>
<td>2.811</td>
<td>87.294</td>
</tr>
<tr>
<td>11</td>
<td>.443</td>
<td>2.460</td>
<td>89.753</td>
</tr>
<tr>
<td>12</td>
<td>.400</td>
<td>2.224</td>
<td>91.977</td>
</tr>
<tr>
<td>13</td>
<td>.329</td>
<td>1.828</td>
<td>93.805</td>
</tr>
<tr>
<td>14</td>
<td>.306</td>
<td>1.699</td>
<td>95.504</td>
</tr>
<tr>
<td>15</td>
<td>.266</td>
<td>1.478</td>
<td>96.982</td>
</tr>
<tr>
<td>16</td>
<td>.225</td>
<td>1.251</td>
<td>98.233</td>
</tr>
<tr>
<td>17</td>
<td>.195</td>
<td>1.084</td>
<td>99.317</td>
</tr>
<tr>
<td>18</td>
<td>.123</td>
<td>.683</td>
<td>100.000</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.
4.6.3 Pattern Matrix

Communality measures the percent of variance in a specified variable explained by all the combined factors and is interpreted as the reliability of the indicator. A low value for communality (less than 0.32) shows that the specific variable does not fit well with other variables hence extracted. In this study, all the factors had a higher value of greater than .6 hence indicating they were strong and fit with other variables. From the pattern matrix, all the six variable of study were extracted as indicated on table 4.8. The factors were; ATT, SE, OU, PEU, PU, and BI. All the factor loadings were greater than 0.5, an indication that the measures were well loaded. (See table 4.8)
Table 4.8: Communalities and Pattern Matrix

<table>
<thead>
<tr>
<th></th>
<th>ATT</th>
<th>SE</th>
<th>OU</th>
<th>PEU</th>
<th>PU</th>
<th>BI</th>
<th>Communal ity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE1</td>
<td>.939</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.772</td>
</tr>
<tr>
<td>SE2</td>
<td>.958</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.808</td>
</tr>
<tr>
<td>OU1</td>
<td></td>
<td>.598</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.631</td>
</tr>
<tr>
<td>OU2</td>
<td></td>
<td>.722</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.709</td>
</tr>
<tr>
<td>OU3</td>
<td></td>
<td>.737</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.712</td>
</tr>
<tr>
<td>SA1</td>
<td></td>
<td></td>
<td>.596</td>
<td></td>
<td></td>
<td></td>
<td>.540</td>
</tr>
<tr>
<td>SA2</td>
<td></td>
<td></td>
<td>.875</td>
<td></td>
<td></td>
<td></td>
<td>.642</td>
</tr>
<tr>
<td>PEU1</td>
<td></td>
<td></td>
<td></td>
<td>.564</td>
<td></td>
<td></td>
<td>.782</td>
</tr>
<tr>
<td>PEU2</td>
<td></td>
<td></td>
<td></td>
<td>.767</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEU3</td>
<td></td>
<td></td>
<td></td>
<td>.916</td>
<td></td>
<td></td>
<td>.754</td>
</tr>
<tr>
<td>PU1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.635</td>
<td></td>
<td>.691</td>
</tr>
<tr>
<td>PU2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.613</td>
<td></td>
<td>.684</td>
</tr>
<tr>
<td>PU3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.994</td>
<td></td>
<td>.766</td>
</tr>
<tr>
<td>ATT1</td>
<td>.941</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.810</td>
</tr>
<tr>
<td>ATT2</td>
<td>.891</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.842</td>
</tr>
<tr>
<td>ATT3</td>
<td>.771</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.803</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.881</td>
<td>.821</td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.830</td>
<td>.801</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

4.6.4 Confirmatory Factor Analysis.
Confirmaotory factor analysis (CFA) was done to measure the reliability and validity of the item measurements developed from the EFA. This was done using AMOS version 25 to measure the model fitness. The CFA model is shown in figure 4.6;
Figure 4.6: Confirmatory Factor Analysis Model for Study Variable
4.6.5 Model fits for CFA Model

Table 4.9 presents the model fit measurement statistics for the overall measurement model for study variables. The fit statistics indices were within the satisfactory range therefore the CFA model fit the data adequately.

Table 4.9: Model Fits for CFA Model

<table>
<thead>
<tr>
<th>Measure</th>
<th>CMIN</th>
<th>DF</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>PCLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>145.871</td>
<td>89</td>
<td>1.639</td>
<td>0.914</td>
<td>0.959</td>
<td>0.058</td>
<td>0.201</td>
</tr>
<tr>
<td>Threshold</td>
<td>--</td>
<td>--</td>
<td>Between 1 and 3</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
<td>&lt;0.08</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Interpretation</td>
<td>--</td>
<td>--</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

4.6.6 Construct Reliability

Construct reliability was assessed using the Cronbach’s alpha reliability and variance on the estimates. The variance of all the estimates were all less than .5 hence minimal while the Cronbach’s alphas values were all above the 0.7 indicating that all the variables in the study were reliable as indicated in table 4.10.

Table 4.10: Construct Reliability

<table>
<thead>
<tr>
<th></th>
<th>Estimates</th>
<th>SE</th>
<th>Cronbach’s alphas</th>
<th>Item removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEU</td>
<td>.358</td>
<td>.088</td>
<td>0.726</td>
<td>PEU2</td>
</tr>
<tr>
<td>PU</td>
<td>.406</td>
<td>.099</td>
<td>0.741</td>
<td>None</td>
</tr>
<tr>
<td>SE</td>
<td>.538</td>
<td>.094</td>
<td>0.823</td>
<td>None</td>
</tr>
<tr>
<td>BI</td>
<td>.723</td>
<td>.126</td>
<td>0.765</td>
<td>None</td>
</tr>
<tr>
<td>OU</td>
<td>.349</td>
<td>.096</td>
<td>0.714</td>
<td>OU2</td>
</tr>
<tr>
<td>ATT</td>
<td>.480</td>
<td>.065</td>
<td>0.885</td>
<td>None</td>
</tr>
</tbody>
</table>
4.6.7 Convergent Validity.

To evaluate convergent validity, the inter-item correlation matrix was used as indicated on table 4.11. In all the values, the matrix was more than .32 and less than .90 indicating the measurement scales revealed satisfactory measurement validity.

Table 4.11: Inter-Item Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>PEU</th>
<th>PU</th>
<th>SE</th>
<th>BI</th>
<th>OU</th>
<th>ATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEU</td>
<td>1.000</td>
<td>.422</td>
<td>.441</td>
<td>.465</td>
<td>.598</td>
<td>.503</td>
</tr>
<tr>
<td>PU</td>
<td>.422</td>
<td>1.000</td>
<td>.337</td>
<td>.452</td>
<td>.456</td>
<td>.608</td>
</tr>
<tr>
<td>SE</td>
<td>.441</td>
<td>.337</td>
<td>1.000</td>
<td>.259</td>
<td>.374</td>
<td>.383</td>
</tr>
<tr>
<td>BI</td>
<td>.465</td>
<td>.452</td>
<td>.259</td>
<td>1.000</td>
<td>.465</td>
<td>.490</td>
</tr>
<tr>
<td>OU</td>
<td>.598</td>
<td>.456</td>
<td>.374</td>
<td>.465</td>
<td>1.000</td>
<td>.540</td>
</tr>
<tr>
<td>ATT</td>
<td>.503</td>
<td>.608</td>
<td>.383</td>
<td>.490</td>
<td>.540</td>
<td>1.000</td>
</tr>
</tbody>
</table>

4.6.9 Correlation Coefficient.

Table 4.12 indicates the correlation coefficients. PEOU and PU were positively correlated with other independent variables. PUOE correlation results were; with SE (r=0.441, p<0.05), with BI (r=0.465, p<0.05), with OU (r=0.598, p<0.05), and with ATT (r=0.503, p<0.05).

For PU, the correlation response were; with SE (r=0.337, p<0.05), with BI (r=0.452, p<0.05), with OU (r=0.456, p<0.05) and lastly with ATT (r=0.514, p<0.05). This further shows the strength of the correlation is high for PEOU with the independent variables than PU with the independent variables as indicated on table 4.12.
Table 4.12: Correlation Coefficient

<table>
<thead>
<tr>
<th></th>
<th>PEU</th>
<th>PU</th>
<th>SE</th>
<th>BI</th>
<th>OU</th>
<th>ATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEU</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>.422**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>.441**</td>
<td>.337**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI</td>
<td>.465**</td>
<td>.452**</td>
<td>.259**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OU</td>
<td>.598**</td>
<td>.456**</td>
<td>.374**</td>
<td>.465**</td>
<td>1</td>
<td>.540**</td>
</tr>
<tr>
<td>ATT</td>
<td>.503**</td>
<td>.608**</td>
<td>.383**</td>
<td>.490**</td>
<td>.540**</td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

4.7 Structural Estimation Model (SEM)

![Figure 4.7: Structural Model for the Relationship of the Study Variables](image-url)
4.7.1 Model Fits for Structural Model

The model fit was determined by CMIN/DF, GFI, CFI, RMSEA and PCLOSE. As indicated on table 4.13, the model was weak for prediction of the effect between the independent, latent and dependent variables. The model result was not within the required range of measure on GFI, RMSEA and PCLOSE hence the model was weak.

Table 4.13: Model Fits for Structural Model

<table>
<thead>
<tr>
<th>Measure</th>
<th>CMIN</th>
<th>DF</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>PCLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>183.210</td>
<td>92</td>
<td>1.991</td>
<td>0.897</td>
<td>0.935</td>
<td>0.073</td>
<td>0.09</td>
</tr>
<tr>
<td>Threshold</td>
<td>--</td>
<td>--</td>
<td>Between 1 and 3</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
<td>&lt;0.08</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Interpretation</td>
<td>--</td>
<td>--</td>
<td>Excellent</td>
<td>Good</td>
<td>Excellent</td>
<td>Good</td>
<td>Poor</td>
</tr>
</tbody>
</table>

To further understand the model, Standardized Residual Covariances (Group number 1 - Default model) showed a significant difference on measure of variables. For a good model, the standardized residual covariance measure is normally distributed; with standard deviation (SD) between -2 to 2 absolute values. As indicated on table 4.14 extracted from standardized residual covariance table, the SD of SE1 and SE2 values were higher than -2 or +2 hence excluded from the model. Find on appendix II the full table.
Table 4.14: Standardized Residual Covariances (Group number 1 - Default model)

<table>
<thead>
<tr>
<th></th>
<th>ATT1</th>
<th>ATT2</th>
<th>ATT3</th>
<th>OU1</th>
<th>OU3</th>
<th>SA2</th>
<th>BI1</th>
<th>BI2</th>
<th>SE1</th>
<th>SE2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATT1</td>
<td>0.515</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT2</td>
<td>0.891</td>
<td>0.636</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT3</td>
<td>0.554</td>
<td>0.649</td>
<td>0.629</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OU1</td>
<td>-0.359</td>
<td>0.195</td>
<td>0.378</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OU3</td>
<td>0.631</td>
<td>1.034</td>
<td>1.488</td>
<td>0.053</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA2</td>
<td>-0.506</td>
<td>-1.029</td>
<td>0.006</td>
<td>0.34</td>
<td>0.426</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td>1.221</td>
<td>-0.156</td>
<td>1.492</td>
<td>0.31</td>
<td>-0.327</td>
<td>1.671</td>
<td>0.315</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>2.259</td>
<td>1.364</td>
<td>2.736</td>
<td>-0.037</td>
<td>-0.027</td>
<td>-0.101</td>
<td>0.4</td>
<td>0.349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE1</td>
<td>2.768</td>
<td>2.316</td>
<td>2.155</td>
<td>5.297</td>
<td>3.225</td>
<td>2.341</td>
<td>1.276</td>
<td>2.642</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SE2</td>
<td>2.168</td>
<td>3.009</td>
<td>2.193</td>
<td>5.41</td>
<td>4.4</td>
<td>2.281</td>
<td>1.012</td>
<td>1.551</td>
<td>0.004</td>
<td>0</td>
</tr>
<tr>
<td>PU1</td>
<td>0.939</td>
<td>0.874</td>
<td>0.906</td>
<td>1.286</td>
<td>1.177</td>
<td>-0.203</td>
<td>0.691</td>
<td>1.086</td>
<td>2.213</td>
<td>0.957</td>
</tr>
</tbody>
</table>

Following the extraction of SE1 and SE2 due to high SD, the developed model was as indicated on the next page.
4.7.2 Improved Model

Figure 4.8: Improved Structural Model for the Relationship of the Study Variables

4.7.3 Model Fits for Structural Model

Table 4.15 presents the model fit measurement statistics for the overall structural model for study variables. The fit statistics indices were within the satisfactory range therefore the structural model fit the data adequately hence the improved model was fit for the study.
Table 4.15: Model fits for Structural Model

<table>
<thead>
<tr>
<th>Measure</th>
<th>CMIN</th>
<th>DF</th>
<th>CMIN/DF</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>PCLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>96.348</td>
<td>69</td>
<td>1.395</td>
<td>0.932</td>
<td>0.977</td>
<td>0.046</td>
<td>0.603</td>
</tr>
<tr>
<td>Threshold</td>
<td>--</td>
<td>--</td>
<td>Between</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
<td>&lt;0.08</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 and 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td>--</td>
<td>--</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

4.8 Regression Weights

4.8.1 Effect of Computer Self-Efficacy on Adoption of E-learning Technology

The path coefficient for the relationship between SE and adoption of e-learning was weak and not significant hence dropped from the model. As indicated on figure 4.7, SE was weak due to high SD and was dropped from the model.

4.8.2 Effect of Objective Usability on Adoption of E-Learning Technology

The path coefficient for the relationship between OU and adoption of e-learning was significant in three levels as shown on table 4.16 regression weight and figure 4.8.

4.8.2.1 Without Latent/Intervening Variable

The path coefficient for the relationship between OU and PEOU was positive and significant at the 0.05 level (βeta=0.938, T-value =3.658, p<0.05) as indicated on table 4.16 and figure 4.8. The positive relationship indicates that one unit increase in OU will result in 0.938 increase in PEOU. Similarly, relationship between OU and PU was positive and significant at the 0.05 level (βeta=0.26, T-value =3.562, p<0.05) as indicated on table 4.16 and figure 4.8. The positive relationship indicates that one unit increase in OU will result in 0.26 increase in PU. Hence OU affects adoption of e-learning technology.

4.8.2.2 With BI as Latent/Intervening Variable.

The path from OU to PEOU or to PU though BI as intervening variable was not statistically significant (p > .05) hence concludes BI as latent/intervening variable does not influence OU to adoption of e-learning technology.
4.8.2.3 With ATT as Latent/Intervening Variable.

The path from OU to PEOU or to PU though ATT as intervening variable was statistically significant. OU to PU through ATT as latent variable was significant; at the 0.05 level (β=0.435, T-value =3.629, p<0.05) as indicated on table 4.16 and figure 4.8. However, OU to PEOU with ATT as latent variable was not significant (p>.05).

4.8.3 Effect of System Accessibility on Adoption of E-learning Technology

The path coefficient for the relationship between SA and adoption of e-learning was weak and not significant hence dropped from the model.

**Table 4.16: Regression Weights**

<table>
<thead>
<tr>
<th>Path</th>
<th>Unstandardized Estimates</th>
<th>standardized Estimate</th>
<th>SE</th>
<th>T</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without latent</td>
<td>PEU &lt;--- OU</td>
<td>0.938</td>
<td>0.881</td>
<td>0.256</td>
<td>3.658</td>
</tr>
<tr>
<td></td>
<td>PU &lt;--- OU</td>
<td>0.26</td>
<td>0.236</td>
<td>0.167</td>
<td>3.562</td>
</tr>
<tr>
<td>With BI as latent</td>
<td>BI &lt;--- OU</td>
<td>0.953</td>
<td>0.672</td>
<td>0.18</td>
<td>5.296</td>
</tr>
<tr>
<td></td>
<td>PEU &lt;--- BI</td>
<td>0.042</td>
<td>0.056</td>
<td>0.088</td>
<td>0.477</td>
</tr>
<tr>
<td></td>
<td>PU &lt;--- BI</td>
<td>0.143</td>
<td>0.184</td>
<td>0.086</td>
<td>1.658</td>
</tr>
<tr>
<td>With ATT as latent</td>
<td>ATT &lt;--- OU</td>
<td>0.899</td>
<td>0.755</td>
<td>0.153</td>
<td>5.869</td>
</tr>
<tr>
<td></td>
<td>PU &lt;--- ATT</td>
<td>0.435</td>
<td>0.47</td>
<td>0.12</td>
<td>3.629</td>
</tr>
<tr>
<td></td>
<td>PEU &lt;--- ATT</td>
<td>-0.075</td>
<td>-0.084</td>
<td>0.125</td>
<td>-0.601</td>
</tr>
</tbody>
</table>

4.9 Predictive Relevance of the Model

The quality of the structural model can be assessed by $R^2$ which shows the variance in the endogenous variable that is explained by the exogenous variables. Based on the results reported in figure 4.8, the $R^2$ was found to be 0.74 and .62: indicating that OU can account for 74% of adoption for e-learning though PEOU and 62% adoption of e-learning though PU. The other factors are determined by other variables.

4.10 Chapter Summary

The study results presented and discussed in this chapter reveals the descriptive of SE, SA, OU as the independent variable, BI, ATT as latent or intervening variables, and lastly PU and PEOU as dependent variable. The inferential analysis revealed SE and SA had
little to no effect on PU and PEOU. Only OU influenced PU and PEOU. Similarly, BI and ATT as intervening variable only affect OU interaction with PU and PEOU.
CHAPTER FIVE

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS.

5.1 Introduction

This chapter presents the summary of the study, discussion of findings, conclusion and recommendation. The summary, conclusion was based on chapter four findings while discussion was based on literature review. The last area on the recommendation covers the recommendation on the area of study and recommendation on further studies.

5.2 Summary of the Study

The purpose of the study was to investigate the factors affecting the adoption of e-learning technology in Kenya. This was guided by the following research objectives; To establish the effect of self-efficacy on adoption of e-learning technology in Kenya, to find out how objective usability affects adoption of e-learning technology in Kenya and lastly to investigate the effect of system accessibility on adoption of e-learning technology in Kenya.

This study used explanatory/hypothesis research design to investigate the factors which affect adoption of e-learning technology in Kenya. An explanatory research design was fit to the study because it will helped to ascertain not only the relationship between the different variables, but measure the effect and strength of each independent variable on the dependent variable which was the technology adoption. The target population was social media (Facebook) users in Kenya. According to Internet World Statistics there are over 6.2 million Facebook subscribers in Kenya as of June 2017. This study focused on 196 social media users in Nairobi who were interested in e-learning or have ever learned online. They were sampled by geographic cluster, simple random sampling technique with a focus on Nairobi. Online questionnaire was used by Google form and 95% responded.

For objective one, on SE, ‘I feel confident finding information on e-learning (online learning) systems’ was highly rated as strongly agreed at 47.1% and agreed at 39.3%. The second question ‘I have the necessary skills for using an e-learning (online learning) system’ was highly rated as strongly agreed at 44.3% and agreed at 40.7%. The correlation result revealed positive correlation between PEOU with SE (r=0.441, p<0.05) and PU with SE (r=0.337, p<0.05). On the CFA, there was a strong model equation but
on the SEM it was not. The path coefficient for the relationship between SE and adoption of e-learning was weak and not significant hence dropped from the model. As discussed in chapter four (figure 4.7), SE was weak due to high SD and was dropped from the model. Hence SE does not affect adoption of e-learning in Kenya.

For objective two, response on OU was also similar as follows ‘Once I use an e-learning system, I can easily remember how to navigate it’ was highly rated as strongly agreed at 36.4% and agreed at 46.4% and ‘E-learning (online learning) systems save me time’ was highly rated as strongly agreed at 34.3% and agreed at 47.1%. However, the question on ‘Most e-learning (online learning) systems are easy to use’ was rated differently with agreed at 45.0% and neutral at 26.4%. The correlation result revealed positive correlation between PEOU with OU (r=0.598, p<0.05) and PU with SE (r=0.456, p<0.05). Based on SEM, the path coefficient for the relationship between OU and adoption of e-learning was significant in three levels. Without latent/intervening variable, OU and PEOU was positive and significant at the 0.05 level (β=0.938, T-value =3.658, p<0.05). The positive relationship indicates that one unit increase in OU will result in 0.938 increase in PEOU. Similarly, relationship between OU and PU was positive and significant at the 0.05 level (β=0.26, T-value =3.562, p<0.05). The positive relationship indicates that one unit increase in OU will result in 0.26 increase in PU. Further, with BI as latent/intervening variable, the path from OU to PEOU or to PU though BI as intervening variable was not statistically significant (p> .05) hence concludes BI as latent/intervening variable does not influence OU to adoption of e-learning technology. Lastly, with ATT as latent/intervening variable, the path from OU to PEOU or to PU though ATT as intervening variable was statistically significant. OU to PU through ATT as latent variable was significant; at the 0.05 level (β=0.435, T-value =3.629, p<0.05). Hence OU affects adoption of e-learning technology.

On last objective on SA, the response were; ‘I can access e-learning (online learning) systems on my mobile phone’ was highly rated as strongly agreed at 29.8% and agreed at 38.3%. While the question on ‘I have no difficulty accessing and using an e-learning (online learning) systems in Kenya’ was ranked differently with agreed at 39.4% and neutral at 26.6%. The correlation result revealed positive correlation between PEOU with SA (r=0.441, p<0.503) and PU with SA (r=0.514, p<0.05). The path coefficient for the relationship between SA and adoption of e-learning was weak and not significant hence dropped from the model.
5.3. Discussion of the Results

This section interprets the results and findings of the study. It explores some of the pertinent issues in the discussion of adoption of e-learning technology in Kenya, highlighting problems and gaps in existing research and recommending areas for further research theoretical development and field development.

5.3.1. Effect of Self Efficacy on Adoption of E-learning Technology.

The questions for SE were highly ranked as agreed or strongly agreed: ‘I feel confident finding information on e-learning (online learning) systems’ was highly rated as strongly agreed at 47.1% and agreed at 39.3%. The second question ‘I have the necessary skills for using an e-learning (online learning) system’ was highly rated as strongly agreed at 44.3% and agreed at 40.7%. The correlation result revealed positive correlation between PEOU with SE (r=0.441, p<0.05) and PU with SE (r=0.337, p<0.05). On the CFA, there was a strong model equation but on the SEM it was not. The path coefficient for the relationship between SE and adoption of e-learning was weak and not significant hence dropped from the model. As discussed in chapter four (figure 4.7), SE was weak due to high SD and was dropped from the model, it has little to no effect on the adoption of e-learning in Kenya.

This Self efficacy as a factor in my study matched Venkatesh and Davies (1997) analysis which narrowed down the Technology Adoption Model by focusing on one of the main determinants of adoption; Perceived ease of use. In this literature they conducted three experiments to determine if Computer self-efficacy, their study supported the hypothesis that an individual’s ease of use is anchored to her or his general computer self-efficacy at all times (Venkatesh & David, 1997). Whereas the factor alone was outweighed by other stronger factors in my study, the effect on perceived ease of use and Perceived usefulness was incredibly strong and cannot be dismissed.

Similarly, my research was also in tandem with Hsia, Chang and Tseng (2012) research on high-tech firms which have implemented e-learning systems and discovered that computer self-efficacy is an antecedent of perceived ease of use (Hsia, Chang, & Tseng, 2012). In their work they also highlighted behavioral intention as a factor, whereas my research was not focusing on BI, it still turned out to have some strength in the model.
In agreement with Boateng et al. (2016) who investigated the determinants of E-learning adoption in developing countries, they theorized that findings from developed countries on ELA (E-Learning Adoption). Their study revealed that self-efficacy had a direct effect on PEOU, which reflects accurately in my study as well; self-efficacy has a strong relationship with PEOU if not an incredibly strong relationship with adoption if taken in isolation.

Whereas Saade and Kira (2009) concluded that computer self-efficacy does play an important role in mediating the anxiety-perceived ease of use relationship for learning management system (e-learning) usage or adoption. This study reflected that whereas there is a relationship between self-efficacy and perceived ease of use, which was stronger than the relationship between PU and SE it is not that strongest variable when it comes to adoption of technology and in this case e-learning technology.

The results of my study were similar to Zainab, Bhatti and Alshagawi (2017), in their research they concluded that Computer self-efficacy was statistically insignificant through PEOU, this differed from the conclusions of earlier research by Zainab et.al (2015). In addition, PEOU had an indirect effect through PU. Therefore, only PU of the TAM constructs indicated strong predictive strength in e-training adoption.

The results from my study reflected similarly or rather in tandem with Lee (2006) who showed that mandatory usage of electronic learning system is necessary in technology adoption- in order to build computer self-efficacy. The target for the research were people who have interacted with e-learning systems in one way or another, ergo to them where as self-efficacy is a factor to consider, it is not the most important one. Because of their interaction self-efficacy levels were high enough for them to be comfortable with e-learning systems.

My research varied in that even though self- efficacy is a factor to consider, its strength as a factor on its own was not enough to affect adoption of e-learning technology. One could argue that the latest generation have a confidence in technology which lacked in prior decades ergo it is not a factor that is as prevalent.

5.3.2. Effect of Objective Usability on Adoption of E-Learning Technology

The correlation result revealed positive correlation between PEOU with OU (r=0.598, p<0.05) and PU with SE (r=0.456, p<0.05). Based on SEM, the path coefficient for the relationship between OU and adoption of e-learning was significant in three levels.
Without latent/intervening variable, OU and PEOU was positive and significant at the 0.05 level (βeta=0.938, T-value =3.658, p<0.05). The positive relationship indicates that one unit increase in OU will result in 0.938 increase in PEOU. Similarly, relationship between OU and PU was positive and significant at the 0.05 level (βeta=0.26, T-value =3.562, p<0.05). The positive relationship indicates that one unit increase in OU will result in 0.26 increase in PU. Further, with BI as latent/intervening variable, the path from OU to PEOU or to PU though BI as intervening variable was not statistically significant (p> .05) hence concludes BI as latent/intervening variable does not influence OU to adoption of e-learning technology. Lastly, with ATT as latent/intervening variable, the path from OU to PEU or to PU though ATT as intervening variable was statistically significant. OU to PU through ATT as latent variable was significant; at the 0.05 level (βeta=0.435, T-value =3.629, p<0.05). Hence OU affects adoption of e-learning technology.

As discussed in the literature review, objective usability concerns aspects of the interaction not dependent on users’ (Hornbaek, 2006) basically, objective usability is independent of user experience and this can be measured to give a broader and clearer picture.

This study reflected similarly to the studies of Venkatesh and Davies (1997) and their contemporaries who highlighted objective usability as a key factor in the adoption of technology. As per the research above there is a clear relationship between objective usability, Perceived Usefulness and Perceived Ease of Use.

My study reflected results similar to Zaharias and Poulymenakou (2006), research which studied the essential relationship and interplay between usability and instructional design. In this literature they highlight the factor of usability with a focus not only on the system, but the characteristics. This mirrors my results with over 80% of respondents either strongly agreeing of agreeing to the objective usability queries. The Objective usability was not only measuring their usability, but ease of system usability.

It was interesting to see the results of the analysis and the strength of objective usability. This reflected similarity to the conclusion of Shackel (2009) that as computers become cheaper and more powerful, it seems certain that usability factors will become more and more dominant in the acceptability decisions made by users and purchasers. In this
research Shackel highlighted the importance not only of the objective computer usability but of the design and user interface and my research added strength to this conclusion.

It was interesting to discover the strong relationship between the latent variable of attitude and objective usability to PEOU and PU. This was similar to the work by Shackel (2009), he highlighted the usability variables as; effectiveness, learnability, flexibility and attitude.

In tandem with Park and Wentling (2007) whose focus was particularly computer attitudes and computer usability, my research unveiled a strong relationship between objective usability and adoption and objective usability through PEOU to attitude.

My decision to research on objective usability varied from the work of Hennessy et al. (2010) who theorized that research on adoption of technology is East Africa needs to focus on issues like internet access and technology gaps. My work filled this gap by proving that objective usability is a viable and important factor to consider when it comes to adoption of E-learning technology.

Objective usability came out very strongly as a factor which affects the adoption of e-learning technology in Kenya; this filled the gap in African literature, not only focusing on infrastructural issues but the actual system interaction. This study reflected on the state of e-learning technology adoption in Kenya as well as the user trend and the importance of objective usability.

5.3.3. Effect of System Accessibility on Adoption of E-learning Technology

On the last objective of SA, the descriptive response had variance response; ‘I can access e-learning (online learning) systems on my mobile phone’ was highly rated as strongly agreed at 29.8% and agreed at 38.3%. While the question on ‘I have no difficulty accessing and using an e-learning (online learning) systems in Kenya’ was ranked differently with agreed at 39.4% and neutral at 26.6%. The correlation result revealed positive correlation between PEOU with SA (r=0.441, p<0.503) and PU with SA (r=0.514, p<0.05). The path coefficient for the relationship between SA and adoption of e-learning was weak and not significant hence dropped from the model.

System accessibility refers to a situation where anyone, regardless of their personal characteristics and type of environment, is able to access the information provided through the Learning Objects.(Batanero, Karhu, Holvikivi, Oton, & Amado-Salvatierra,
My study resulted in a confirmation in the relationship between SA and PEOU as well as PU but the correlation was very weak, which means that system accessibility has a positive relationship with these factors but not strong enough to affect the adoption of e-learning technology in Kenya.

In this study the System accessibility factor focused on two areas, ease of access as well as access through mobile technology, this was similar to Park, Nam and Cha (2011) who focused on the behavioral intention to use m-learning technology by university students in institutions of higher learning. They also reflected positive correlation between SA and PEOU and SA and PU.

Similarly my work reflected the work of Male and Pattinson (2011) whose research touched not only on computer usability but mobile technology usability; m-learning. In the research it was determined that it is essential that e-learning systems are designed to assist learners or users achieve their societal aspirations not just emphasizing on successful utilization of the technology, because in these cases success is measured by the usability. Mobile e-learning was an important question in my research because it not only reflects on usability but access as well. Over 68% of respondents agreed and strongly disagrees that they can access e-learning on their mobile phones.

My research differed from Calisir et al. (2014) who focused on e-learning adoption for blue collar employees in an automotive industry. SA for E-learning in my study was broadly covered and not specific to an industry. Regardless there were still similar formative conclusions that access is an important factor to consider. System accessibility was not strong enough to hold to the SEM structure but there was still a relationship between SA and PEOU and SA and PU.

This research differed from those in the literature review especially in regards to the strength of the factor of system accessibility. There was a relationship between the PEOU and PU but it was not strong enough to hold to the model, which means the significance of SA in adoption of e-learning technology in Kenya is little to none.

5.4. Conclusions

5.4.1. Effect of Self-Efficacy of Adaption of E-Learning Technology
The path coefficient for the relationship between SE and adoption of e-learning was weak and not significant hence dropped from the model. As discussed in chapter four, SE was
weak due to high standard deviation and was dropped from the model. Ergo as per the research it is not an important factor adoption of e-learning in Kenya with or without BI and ATT as intervening variables. This does not nullify the contribution of this factor, but in comparison to other factors its strength is lessened.

5.4.2. Effect of Objective Usability of Adaption of E-Learning Technology

Based on SEM, the path coefficient for the relationship between Objective Usability and adoption of e-learning, it is clear that objective usability affects adoption of e-learning technology in Kenya significantly.

5.4.3. Effect of System Accessibility of Adaption of E-Learning Technology

SEM on SA could not be performed because the path coefficient for the relationship between SA and adoption of e-learning was weak and not significant hence dropped from the model. This concludes SA is not an important factor on adoption of e-learning technology without BI and ATT as intervening variables. System accessibility factors are lined through the two comparison variables of objective usability and self–efficacy but alone is rather weak. It is not a significant.

5.5 Recommendations

5.5.1. Suggestions for Improvement

From the results of this study there are several proposed improvements that can be undertaken to boost the adoption of e-learning practices in Kenya.

5.5.1.1 Effect of Self–Efficacy of Adaption of E-learning Technology

Self- efficacy in regards to technology has increased at an incredible rate and this is mainly due to cheaper devices and internet penetration. The government needs to continue supporting the initiatives which encourage the continuous use of ICT to improve the already growing levels of self-efficacy, and enforce policy to support the growing industry as well as subsidies to encourage more adoption. Potential instructors need to take advantage of the populations’ steady self-efficacy growth to create content which can be consumed on e-learning platforms. As people continue to interact with technology so is the way in which they will want to learn. E-learning platforms need to take advantage of the fact that it is not confidence-Self –efficacy which affects its adoption and leverage the environment to not only facilitate content creation but publishing on their sites.
5.5.1.2 Effect of Objective Usability of Adaption of E-learning Technology

Objective usability is integral to the adoption of E-learning technology. The Kenyan government needs to set up standards and regulations which can set ISO standards for e-learning technology in order to ensure user experience is up to quality to ensure objective usability is positive and thus people utilize the technology efficiently. Objective usability does not stop at the technology but the content as well. Potential instructors need to keep this in mind and make their content interactive and interesting to maintain interest and user adoptability. E-learning platforms need to streamline their user experience journey to ensure that people come back to use their platforms and interact with their system. Objective usability allows for a blank slate initial interaction, after which the experience determines whether people will return to the platforms.

5.5.1.3 Effect of System Accessibility on Adaption of E-learning Technology

In this study system accessibility has little to no effect on the adoption of e-learning adoption in Kenya, but we must take into consideration the study focused on Nairobi, which has a high penetration of internet and access to exposure and knowledge of technology. In this case accessibility is not an important factor, but in rural areas the government needs to kick start initiatives to bring them up to the level of the metropolitan areas. E-learning platforms need to work hand in hand with government to create projects which can loop in the rural areas and customize their platforms to suit offline access.

5.5.2. Suggestions for Further Research

Based the responses received and the SEM analysis further research should focus on the two variables of system accessibility and self-efficacy involving a larger number of variables to examine as well as larger numbers of respondents to support the factor analysis. Research should also focus on attitude and behavioral intention and their interaction with perceived easiness of use and perceived usefulness. The research needs to now shift from the metropolitan areas to the rural areas in order to get a holistic view of the e-learning environment in Kenya.
REFERENCES


APPENDICES

Appendix I: Questionnaire

SECTION I: GENERAL INFORMATION

Kindly answer all the questions by ticking in the relevant box or answer.

1. Gender? Male □ Female □

2. Age? Less than 18 □ 18-25 □ 26-32 □ 33-40 □ Above 40 □


4. Educational Background.
   
   Below high school □ High school □ Undergraduate □ Postgraduate □

5. Have you ever learned anything online? Yes □ No □

6. Which platform did you use?
   Facebook □ YouTube □ Google □ Udemy □ Zydii □ Coursera □
   Other e-learning platform

7. What skill/s did you want to learn?
   Career □ Relationship □ Business □ Educational □
   Other

## SECTION 2: TECHNOLOGY ADOPTION

Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where; 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree).

<table>
<thead>
<tr>
<th>E-learning Self –Efficacy</th>
</tr>
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<tbody>
<tr>
<td><strong>SE1</strong></td>
</tr>
<tr>
<td><strong>SE2</strong></td>
</tr>
</tbody>
</table>

Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where; 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree).

<table>
<thead>
<tr>
<th>Objective Usability</th>
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<tbody>
<tr>
<td><strong>OU1</strong></td>
</tr>
<tr>
<td><strong>OU2</strong></td>
</tr>
<tr>
<td><strong>OU3</strong></td>
</tr>
</tbody>
</table>
Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where; 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree).

**System Accessibility**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Description</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA1</td>
<td>I have no difficulty accessing and using an e-learning (online learning) system in Kenya.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>SA2</td>
<td>I can access e-learning (online learning) systems on my mobile phone</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where; 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree)

**Perceived Ease of Use**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Description</th>
<th>Rating</th>
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<tbody>
<tr>
<td>PEU1</td>
<td>I find e-learning (online learning) systems easy to use.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>PEU2</td>
<td>Learning how to use an e-learning system is easy for me.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>PEU3</td>
<td>It is easy to become an expert at using an e-learning (online learning) system.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where; 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree)

### Perceived Usefulness

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<tr>
<td>PU1</td>
<td>E-learning (online learning) would improve my learning experience.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>PU2</td>
<td>I can use e-learning (online learning) to increase my personal and professional skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>PU3</td>
<td>E-learning could make it easier to study course content (instead of physical classes).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where; 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree)

### Attitude

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<tbody>
<tr>
<td>ATT1</td>
<td>Studying through e-learning is a good idea.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>ATT2</td>
<td>Studying through e-learning is a sensible idea</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>ATT3</td>
<td>I have positive thoughts toward e-learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Please indicate the extent to which you agree or disagree with the following statements by circling the relevant number where: 1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree).

<table>
<thead>
<tr>
<th>Behavioral Intention</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>BI1 I intend to check announcements from e-learning (online learning) systems frequently.</td>
<td></td>
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<tr>
<td>BI2 I intend use e-learning (online learning) systems quite a bit</td>
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THANK YOU