2019

Analysis of factors that influence adoption of design thinking innovation approach: a case of technology hubs in Nairobi

Catherine W. Chuaga
Strathmore Business School (SBS)
Strathmore University

Analysis of Factors That Influence Adoption of Design Thinking Innovation Approach: A Case of Technology Hubs in Nairobi

CATHERINE WANJIRU CHUAGA

MBA/99663

Submitted in partial fulfillment of the requirements for the

Award of a Master's in Business Administration (MBA) Degree

Strathmore Business School

May 2019

DECLARATION

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

Catherine Wanjiru Chuaga

May 2019

Approval

The dissertation of Catherine Wanjiru Chuaga was reviewed and approved by:

Dr. Humphrey Njogu (Supervisor)
Strathmore University

Dr. George Njenga
Dean, Strathmore Business School

ABSTRACT

Design thinking Innovation is very important for technological hubs to be sustainable in this 21st century. Some of the challenges associated with the traditional innovation approaches include; product centered issues because users' needs are poorly understood and a lot of assumptions are made to develop a product. As a result, products were not well tested and verified against the expected users' needs. Industries are adopting design thinking innovation since it has the user at the centre of product and service innovation. The purpose of the proposed study was to analyze the factors that influence the adoption of design thinking innovation approach in technology hubs in Nairobi. The research design adopted by the study was descriptive. The sample size for the study was 144 respondents who were selected using simple random sampling. Questionnaire and interview guide were used in collecting primary data. Administration of the questionnaires to the respondents was done by the researcher. The researcher also interviewed the respondents where more information was required. End user representative's data was also collected using interview guides. Open-ended questions were analyzed using conceptual content analysis. Descriptive statistics were used in analyzing quantitative data including means, standard deviations, frequencies and percentages. The data was presented in form of tables, pie charts and 2-D and 3-D charts. The study found that design team significantly and positively relate with adoption of design thinking innovation approach. The study also found that design thinking process and adoption of design thinking innovation approach are significantly and positively related. The study also found that creative design environment and adoption of design thinking innovation approach are significantly and positively related. The study recommends that teams should apply collaborative form of work relations when integrating design thinking and should also ensure that their teams comprise of team members from various disciplines; this will ensure that the teams can effectively brainstorm, share and test ideas. Organizations should adopt the five steps of design thinking process which are; Empathize, Define, Ideate, Prototype and Test as an innovation approach. This design thinking process improves the quality of products and solutions developed, reduce the time taken to develop products and most importantly increases customer loyalty and satisfaction. Organizations should also ensure that the design environment is creative because it acts as motivation to the employees and

encourages collaborative and creative work, and it also encourages social interaction with the rest of the team members. This will encourage creation of innovation.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS/ ACRONYMS

AMOS	Analysis of Moment Structures
ANOVA	Analysis of Variance
BM	Business Model
DT	Design Thinking
IBM	International Business Machines
SEM	Structural Equation Modeling
SMEs	Small and Medium Size Enterprises
SPSS	Statistical Package for Social Sciences

ACKNOWLEDGEMENTS

I would like to express my gratitude to the many people who saw me through this thesis in many different ways and with whom this thesis would not have come to completion. Foremost, is to my supervisor Dr. Humphrey Njogu, for the invaluable support, guidance and encouragement; To my family and friends, whose moral support was my greatest strength. Special thanks to James, for always painting the finish line closer, making it seem reachable despite obstacles along the way and waiting right at the finish line.

DEDICATION

To God almighty for his mercies and blessings.

To my dear mom, Jane Njeri Scott, for constantly inspiring me and showering me with love. You instilled all the great values that I live by every day; hardwork, perseverance, dedication, faith and integrity.

To my fiancé, James Karanja, for always reminding me that life is about the choices we make every day and motivating me throughout this journey.

To my daughter, Lira Eden Njeri, for giving me more reasons to work harder every day.

To my dear friends turned family, Grace, Joseph, Priscilla for walking with me every step of the way and encouraging me on this journey with great belief.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The process where changes are made to something by introducing something new that is beneficial to the customer is referred to as innovation (Mckeown, 2012). The process of innovation involves coming up with a new product or new production process with the aim of improving their operations; and the new products could be as a result of the new processes. Afuah (2010) defines innovation as the process of using new systems of technology offering improved and better services. In addition, innovation can be said to be the process where something new and of value is developed to benefit various stakeholders such as individuals, groups, industries, companies and society. Based on this definition, innovation refers to a system which adds value to a company or individuals.

Abernathy and Utterback (2013) classify innovations in regard to its effect on behavior and organizational social structure dynamically continuous, continuous, and discontinuous. Continuous Innovation refers to a new model but the idea is the same and an existing product undergoes change without changing the habits of the customers. A Dynamically Continuous Innovation is where combination is done of two concepts in a way that there exists a learning curve but the customers can comprehend the idea of the product with ease. A Discontinuous innovation requires that there be new experience, comprehension and learning to ensure that they are used appropriately. It is new technology applied in solving needs that exist using a new approach. Creation of new products is as a result of discontinuous innovation has fundamental difference from already existing products and they reshape competition and the markets. Design thinking innovations can be categorised as discontinuous innovation and therefore can be said to be innovation that has intense knowledge (Bronwyn, Hall & Beethika, 2012).

Organizations have been using different types of innovations, these include; red ocean innovation, blue ocean innovation, business model innovation and open source innovation. The red ocean innovation provides a well-defined market space consisting of companies competing with similar products with an aim to get a share in the existing market chunk. This strategy gives rise to extreme competition as all the businesses are fighting to get higher

share from the limited chunk. Blue Ocean innovation is the preceding concept that was developed to give benefit to companies and reduce the extreme competition, breaking down the cluttered industries. Blue Ocean innovation is definitely creating differentiation and providing high value through products but not at the cost of higher value. It is also about developing products meeting needs but at the best price (Demil & Lecocq, 2010).

The key driver of performance of any organization regardless of the sector it's operating in is driven by Business Model (BM). Since the era of internet advent, innovation has continued to be prolific and there are several examples that have been analyzed like Amazon, Google or IBM. According to the information that managers and academicians have provided, in today's business environment, it is not possible for a business to attain competitive advantage through innovation of their products and services and therefore it is important for them to think of their BM (Amit & Zott, 2012). Based on a research study that was carried out in Economist Intelligence Unit (2015) most of the managers are confident in innovation of BM to attain competitive advantage than in development of new products and services.

There are several approaches of design that can be used in exemplifying roadmap to innovation. They are inclusive of designs that are centered on human/user, participatory design, design-driven innovation, and design thinking. The main assumption of the design that is based on the user is that the user has the ability of providing valuable information that will guide the process of designing. The key stakeholders in the process are the users. Brown (2011) indicates that design thinking is an approach to innovation that is centered on users; this is because it applies sensibility of the designer and techniques in matching the needs of the people and what is feasible technologically and what can be converted by a viable business strategy to value for the customer and opportunity in the market.

The use of Design thinking innovation approach is important because it assist organizations to understand their customers. One important step in the framework of this innovation approach is building understanding and changing the vision of the company regarding the meaning and usage of its offerings in creation of growth as well as long term competitive advantage (Wrigley & Bucolo, 2012). The proposition for customer value changes as a result of the innovation approach of design thinking (Bucolo & Matthews, 2011; Verganti, 2008;

Wrigley & Bucolo, 2011). In regard to clients, majority of company's understanding on the needs of their customers is limited. It is important to understand the needs of customers in order to develop products and services but this serves short-term needs. Through the application of innovation approach of design thinking, firms are provided with a chance of developing deeper understanding of clients. Through this new perspective, there are new opportunities for innovation that are created. Through these opportunities the company is provided with opportunities of linking with wider social values which is beyond products.

According to Dell'Era, Marchesi and Verganti (2010) innovation that is driven by design is innovation where there is significance and prevalence in originality of message and design language in comparison to originality of functionality and technology. The basis of this is the idea that each product holds certain meaning to customers and that the style is just possible rhetoric whereby communicating it could mean exploiting it.

Nairobi has been the cradle of technological innovation in Kenya, and the center of the country's thriving tech ecosystem, famously known as Silicon Savannah. Most of the innovation spaces, incubation centers, accelerators, and maker labs were also concentrated in the capital making Nairobi an attractive spot for both technologists and investors. Some innovation spaces, such as the iHub, which was founded in 2010, have launched as many as 170 startups (Dahir, 2017). Other hub technology hubs in Nairobi include, m:Lab East Africa, Growth Africa Hub, NaiLab, Nairobi Garage, iBiz Africa, C4D Labs, iLab Africa, FabLab Nairobi, 88 MPH/ Startup Garage, Spring Accelerator, Safaricom Alpha, I&M Digital Factory and the Hive Cooperative Bank. Some of these hubs work independently, while others operate within the framework of academic institutions. But all of them support entrepreneurs working at the intersection of the technological, creative, and cultural sectors.

1.2 Design Thinking Innovation Approach

The role of a designer is shifted by design-thinking to work across a company, changing the view of the organization on proposed value offered to clients (Kyffin & Gardien, 2013), to co-design (Chesbrough & Schwartz, 2014), and generating competitive advantage that is unique and sustainable (Bucolo & Matthews, 2011b). Through the innovation approach of design thinking, the company is able to radically consider and evaluate new proposition using

various perspectives, typically spanning the needs of the users, demands technologically and requirements of the business (Bucolo, Wrigley & Matthews, 2012). The framework of design thinking gives a conceptual structure assisting the development of innovation by collaborating in the entire company; integrating the functions of operations with strategic vision through the combination of both internal and external sources (Bucolo *et al.*, 2012).

The advantage and potential of design thinking, which is the art of working as a designer, is a very important process to generate new techniques of working and also come up with new solutions. Design thinking applies the use of sensibility of the designer and techniques of matching the needs of the people with technical feasibility and what business strategy can convert to opportunities in the market and value to the customer (Brown, 2011). The innovation mechanism of design thinking is an iterative process which can help in uncovering issues with shareholders, analyze possibilities and synthesize other elements to come up with new solutions. In this process, the movement of practitioners is between concrete and abstract world of understanding (Beckman & Barry, 2013) with the intention of coming up with new propositions of value.

Design as well as innovation is processes of organizations and they work with employees delivering resultant innovation which is not isolated from the systems of the organization (Martin, 2014). The approach of design thinking can be aligned with ideologies of the corporation to fit and leverage the internal abilities, resources, BM with the aim of generating innovative solutions in creating competitive advantage (Thagard & Shelley, 2014). In innovation that is based on design, design thinking is very important through the leverage of a perspective of a creative system integrating the design of the BM. This innovation of design thinking is a philosophy examining every single core facet of business realigning the strategies of the business with the needs of the clients and features that are possible in the market (Wrigley & Bucolo, 2012). This form of innovation is derived from creative interrelationship between the key elements of business to come up with a true value for the client and capture growth profits. This study seeks to analyze factors influencing adoption of design thinking innovation approach in Technology Hubs in Nairobi

1.3 Problem Statement

The traditional methods of innovation break innovation into a series of sequential phases, with gates that must be cleared before you can proceed to the next phase (Kyffin & Gardien, 2013). Challenges with the traditional innovation approach include lack of understanding of the user's needs, working on assumptions of needs that are not tested and verified, and pushing the business innovations to the intended users and thus failing to meet the customer expectations (Peine & Herrmann, 2012).

In order to meet the increasing expectation of clients, businesses should have differentiation in their services, ensure their operations are efficient, ensure delivery results are efficient and ensure flawless experience from end to end. What customers expect today are anticipatory services and experiences that are personalized (Meeker, 2015). Design thinking has become an approach which help companies dealing with technology to come up with new capabilities to respond to the changes taking place in the market for example changes in the needs and preference of customers. When design thinking is applied in businesses dealing with manufacturing, it contributes towards innovation in their BM and its offers in the market (Brown, 2011). Companies that use the approach of design thinking compete through products and services that possess radically new meaning: those conveying a totally new reason for clients to purchase them. Therefore, adoption of design thinking innovation approach is critical for technology firms' sustainability in 21st century.

Due to the challenges experienced in traditional innovation approach, organizations need to adopt better innovation approaches such as the design thinking to deal with the competition in the industry. It is against this background that the study sought to fill the existing research gap by conducting a study to analyse factors that influence adoption of design thinking innovation approach in Technology hubs in Nairobi.

1.3 Objective of the Study

The general objective of the study was to analyze the factors that influence adoption of design thinking innovation approach taking a case of technology hubs in Nairobi.

Specific objectives of the study included:

i. To examine the effect of design team, design thinking process and creative design on adoption of design thinking innovation approach in Technology hubs in Nairobi

ii. To assess the extent of adoption of design thinking innovation approach in Technology hubs in Nairobi

iii. To examine the influence of organizational resources on the adoption of design thinking innovation approach in Technology hubs in Nairobi

1.4 Research Questions

The study sought to answer the following research question:

i. What is the effect of design team, design thinking process and creative design on adoption of design thinking innovation approach in Technology hubs in Nairobi?

ii. What is the extent of adoption of design thinking innovation approach in Technology hubs in Nairobi?

iii. What is the influence of organizational resources on the adoption of design thinking innovation approach in Technology hubs in Nairobi?

1.5 Significance of the Study

The findings of the study might be of great importance to other technology hubs that seek to adopt the design thinking innovation approach. The implementation of design thinking approach may help the organizations to be in pace with the changing business environment and gain competitive advantage.

The findings of the study may also be important to the management of the technology hubs. They would be to understand the influence of organizational resources that management have control on and how to support the design team perform their tasks better to achieve the organizational goals.

The findings of the study might also be important to employees. It provided an understanding on the adoption of design led innovation. This would ensure employee willingness to implement the new technology. This may also encourage employees to be innovative. This would improve the organization productivity as well as competitiveness.

The findings may also be important to the government and policy makers. It will provide an understanding on the importance of adoption of design led innovation. Policies that encourage organizations adopt innovations would be formulated. This is important for organizations to gain competitive advantage.

In addition, it might help academicians to understand the extent of adoption of design thinking in technology hubs in Nairobi. The study would add to the literature on design thinking. The study may be used as a reference for future studies. The study findings may also encourage academicians to come up with new models of design thinking innovation.

1.6 Scope of the study

The objective of the study was to analyze the factors that influence adoption of design thinking innovation approach: A Case of Technology Hubs in Nairobi. The study focuses on the adoption of design thinking approach in the technology hubs to meet the needs of the end users satisfactorily. The extent of adoption refers to the products developed using the approach, years of experience by firms and employees. The study focused on the design team involved in using design thinking and captured the perceptions of the end users only involved in the design thinking process as part of the design team. The study was conducted in Technology hubs and/or labs in Nairobi.

1.7 Conclusion

The chapter reviewed the background information for the study, the problem statement, the objectives of the study, research questions, and significance of the study and the scope of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter discusses the theories used in explaining the factors influencing adoption of design thinking innovation approach, the empirical literature, study research gaps and the conceptual framework. When companies are working on DT, there are three key elements that should be considered; the team responsible for design should constitute of individuals from different disciplines, working environment should be creative and the process should be iterative (Plattner, Meinel & Weinberg, 2009).

2.2 Theoretical Review

This study reviewed the design thinking model. Design thinking is a methodology that provides a solution-based approach to solving problems. It's extremely useful in tackling complex problems that are ill-defined or unknown, by understanding the human needs involved, by re-framing the problem in human-centric ways, by creating many ideas in brainstorming sessions, and by adopting a hands-on approach in prototyping and testing (Compton & Barrett, 2015). Over recent decades, it has become crucial to develop and refine skills which allow us to understand and act on rapid changes in the business environment and behavior. The world has become increasingly interconnected and complex, and design thinking offers a means to grapple with all this change in a more human-centric manner (Menial & Leifer, 2011).

Design teams use design thinking to tackle ill-defined or unknown problems (otherwise known as wicked problems) because the process reframes these problems in human-centric ways, and allows designers to focus on what's most important for users. Design thinking offers us a means to think outside the box and also dig that bit deeper into problem solving. It helps designers carry out the right kind of research, create prototypes and test out products and services to uncover new ways to meet users' needs (Cumulus, 2015). The design thinking process has become increasingly popular over the last few decades because it was key to the success of many high-profiles, global organizations—companies such as Google, Apple and Airbnb have wielded it to notable effect, for example. This outside the box thinking is encouraged at every level of business (Menial & Leifer, 2011). Design thinking

improves the world around us every day because of its ability to generate ground-breaking solutions in a disruptive and innovative way. Design thinking is more than just a process, it opens up an entirely new way to think, and offers a collection of hands-on methods to help you apply this new mindset (Cumulus, 2015).

2.2.1 Design Thinking Model

Design thinking was launched by design school (d.school) of Stanford and the IDEO Design Consulting Company, and it is one of the theories that are emerging on creativity to solve social as well as commercial related issues. Its emphasis is to consider humans as center in thinking and design. In the scenario of learning the method understands the users and defines the needs of the users in stages so that the creativity of the student is triggered and inspires and motivates them to present creative ideas quickly with a prototype. Then, improvement of ideas is done through testing. Through design thinking the goal of establishing the needs of users can be realized through procedural manner and ideas for new designs can catch design community attention (Lee & Wang, 2014). The entire set of design thinking comprises of five steps: empathize, define, ideate, prototype and test.

In the first stage of design thinking process, gaining the understanding of the issue that you want to solve takes place. At the stage of Define, information that was created and collected at the stage of Empathize is put together. In the third stage which is the process of design thinking, designers are now prepared to start the process of generation of ideas. The fourth stage, the team responsible for designing produce several inexpensive versions of the products or specific features found within the product, this is to allow investigation of the problem solution that was generated during the third stage. During the final stage, the designers get to test the completed products rigorously with the use of best solutions that are identified during the stage of prototyping (Hasso-Plattner Institute of Design at Stanford, 2007). The process of design thinking is as represented in the figure 2.1;

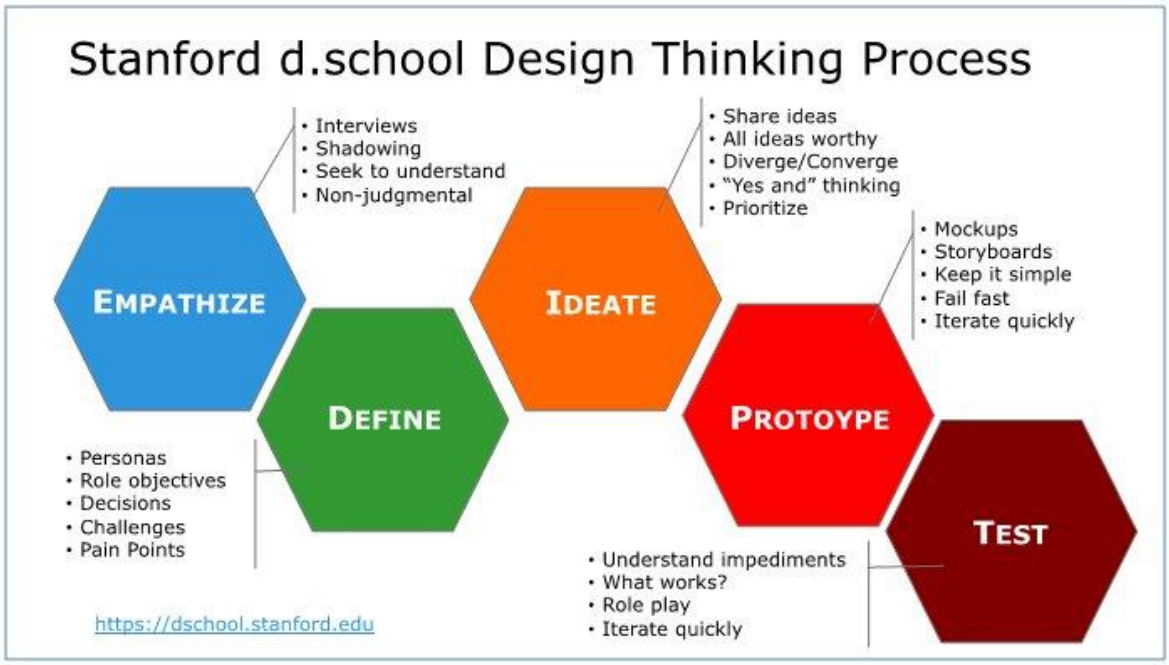

Figure 2.1: Design Thinking Process

Source: (Hasso-Plattner Institute of Design at Stanford (d.school), 2007).

2.2.2 D.School's Design Thinking Framework

2.2.2.1 Multi-disciplinary Teams (Design Teams)

In any project that is based on design thinking, teamwork is considered to be the center (Plattner, Meinel & Weinberg, 2009). Despite the fact that teams always exist, the ones best suited for DT should have variety as well as diverse in regard to their professional background (Thoring, Luippold & Müller, 2014). With the aim of dealing with the complex nature of the challenges of design, usually, teams are usually used with the aim of providing various skills as well as viewpoints, since varied teams allow the members of the team to brainstorm on ideas and varied thought (Kelley, 2001). The style of work that is collaborative emphasizes on integrating DT and team work comprising of various disciplines is considered to be crucial (Brown, 2008).

Coaches usually provide support to the teams at the d.school. The coach has the responsibility of introducing useful methods to the teams and facilitating discussions to

ensure that the team does not deviate from its original task (Häger *et al.*, 2015). Brainstorming is one of the methods that encourages working collaboratively and is also form of exchanging knowledge which is a crucial element in working as a team (Brown, 2009).

2.2.2.2 The Design Thinking Process

The framework also consists of the process of DT characterized by chaos, iterative, and a times exploratory (Braha & Reich, 2003). The process of DT comprises of 5 flexible steps which are: Empathize, Define, Ideate, Prototype and Test.

i. Empathize

a. Understand

At this initial stage, the key focus is to understand the challenge (Kelley, 2001). The focus in this stage is becoming expert; this implies that team members gather as much information as they possibly can on the topic that is being considered which includes contexts as well as their dependencies (Thoring & Müller, 2011). A challenge that is agreed on assists the individuals to grow together and ensure that the skills and knowledge of every person in the team is used (Paulus, 2000). Tools for example the 360° research or the map of stakeholders facilitates fast acquisition of knowledge and grasping of ones involved (Häger *et al.*, 2015). Nonetheless, the insight that is acquired in this stage is hypothetical and could be questionable in proceeding processes.

b. Observe

At this stage, the team acquires views from the outside and empathize shareholders and its users (Thoring & Müller, 2011). The use of ethnographic methods of research like observation of users in their natural setup, user interview or journey map in achieving deeper emphatic understanding of users is recommended by Hassi and Laakso (2011). At this stage, Noweski *et al.* (2012) recommends that a team needs to consider various contexts; this is because most of the time, interesting solutions are already in existence in different context and it is possible to transfer it and create a challenge to the design.

ii. Define:

a. Point of View

Collected information from the previous stages is combined into a 'Point of View', whereby the challenge is reframed. Thoring and Müller (2011) did a detailed research on the process of Design Thinking and indicated that this stage is the complicated one; this is because integration of the information collected and developing of shared understanding within the members of the group is not easy. The method that can help at this stage, in discovering insights and the findings made, are clustering methods or personas (Häger *et al.,* 2015). 'How might we' and Design questions can also help, aiming at creating several possibilities of responses and allowing teams to transform their thinking process (Martelaro *et al.,* 2015).

iii. Ideation

At this stage, the team comes up with various solutions that are possible depending on the points that were generated previously. There is individual generation of solutions and also in the team through the application of multiple forms acting, sketching and brainstorming (Noweski *et al.,* 2012). Rules help in preserving the dynamics of the team and in encouraging building of ideas generated by others. After that, the focus of the team is channeled to those ideas to be developed further (HPI-D-School, 2015).

iv. Prototyping

At this stage of 'Prototyping', development and building of concrete solutions is done. According to Hassi and Laakso, (2011), continuous prototyping is an important element because it benefits the entire process of design thinking. The attitude of 'Show, don't tell' motivates creation of visuals that compel as well as *design artifacts* enabling individuals to get an experience of the entire context. Projects of DT, prototype isn't just but a mere presentation but rather it is a tool to stimulate thinking and explore ideas through creation of concepts that are concrete (Boland & Collopy, 2004). Therefore, main aim is; create rapid fashion prototypes, since the focus is not on creation of artifacts that are beautiful but instead it is to transfer main ideas (Häger *et al.,* 2015).

v. Testing

During the last stage, every single prototype that has been created is tested with the target users. Testing of the prototype can be through questionnaires, observation or interviews. The collected information should be synthesized once more. Based on results obtained from synthesizing, consecutive iteration will be started by the team which will determine whether they will move on with the idea or they will have to refine it or start the process all over again from understanding of the problem (Häger *et al.*, 2015).

A method toolbox supplements the basic structure as mentioned above with various concrete practices of work like personas and brainstorming which can be applied by teams in various stages of the process (Lindberg, 2013). There are various functions that are fulfilled by method toolbox: It compensates competency deficit of team members and also facilitates coordination and structure. Another advantage is that it has unique terms for the process of design that is detained with the aim of ensuring communication within the team (Lindberg, 2013).

There exists some room for improvements to be done, especially in regard to point of feedback (Thoring & Müller, 2011). They indicated that the only time for iteration to take place is after provision of feedback is done, and at the moment, feedback present is from process of DT in the testing stage. It is an indication that there is need for establishment of more test steps in other stages. Additionally, the details of prototype execution also results to varied feedbacks. A rough prototype results to feedback questioning the concept while a prototype that is more finished results to feedback on prototype execution (Thoring & Müller, 2011).

2.2.2.3 Creative Design Environment

Cultural as well as physical creative environment is another factor that is related with design thinking (Lindberg, 2013). With the aim of generating solutions that are innovative, it is important for the team responsible for design to have an environment creating trust, process of making decision that is democratic, mutual openness, intrinsic motivation and optimism (Brown, 2009). Creation of spaces is done based on particular purpose and trigger activities and also behaviors (Thoring, Luippold & Müller, 2012). D.school designers explained design

as a continuous process of creation of prototype, modifications and iteration (Doorley & Witthof, 2012). Thus, these ideals are embodied in the spaces of design thinking through the supply of items needed by the designers and being open to transformations and modifications from designers (Doorley & Witthoft, 2012).

Thoring, Müller and Luippold (2012) did identify various roles performed by spaces DT, and should be put into consideration when the spaces are being created. For collaborative and creative work, spaces are very important factors. Interacting socially with the rest of the team members is very crucial when innovation is being created. Spaces should be designed in a way that allow for group discussions by layout of tables and chairs.

Spaces can also be used for stimulation. Workspace of DT most of the time is related with random artifacts, whiteboards and pencils. The materials facilitate fast creation of ideas and also concepts that can be modified and rejected without feeling any loss (Martelaro *et. al.*, 2015). Also design space plays an important role in acting as 'knowledge repository', since information storing can be done in various spaces (Luippold, Thoring & Müller, 2012). Additionally, spaces are indicators of particular culture that provides an appropriate atmosphere for creativity. Spaces can inspire, for instance offer various objects that can be used by teams in various situations. When they are designed appropriately, spaces could act as manifestation of process, for example by having flexible furniture instead of fixed chairs allowing group work.

Creation of a dedicated workplace in every step, by looking at the surroundings, one will get to determine the state of the project (Luippold, Thoring & Müller, 2012). Aside from space's physical elements that were described previously, there is also another important aspect of a design environment that is creative and this is the mindset. It is combination of traits that are most important, style of thinking, and mentality that is required by individuals in order for them to be successful in DT (Brown, 2008; Hassi & Laakso, 2011).

i. Empathy

Design thinkers should have the approach of 'people first' and have empathy in order for them to triumph in inspiring innovation (Brown, 2008). The role played by empathy in design thinking is very important. In addition, it fills the gap between team of design thinking and the customers and assists in creation of insight in the team (Köppen & Meinel, 2015). During two initial stages of DT process, the focus is directed to development of empathy towards users and customers. Most of the time the team make observations while taking notes and then base the design approach on what they have observed and not just asking users their wants. It is important for designers to show empathy to their customers whom they are designing for. Failure of showing empathy will lead to lack of understanding of intended users and what type of products and services they need. Empathy also facilitates collaboration between members of a team. Design thinking brings together various innovators having different background and is expected of them to be collaborative, conduct research on users and synthesize to collect information needed for creation of new insight (Gumienny *et al.,* 2015). It is thus important for players of a team to make adjustments in their perspectives favoring the perspective of others (Köppen & Meinel, 2015). It is claimed that 'warm-ups' positively affects team work by reducing stress level and nervousness (Jobst et al., 2012). Additional tools and guides for design thinking meant to boost empathy within are for instance 'defer judgment' in order for members of a team to be perceived and asked without judgment or assumption of a 'beginners mindset' intercepting the experience of an individual and expert knowledge (Köppen & Meinel, 2015).

ii. Integrative Thinking

Design thinking is also characterized by constraints that are competing being brought harmony (Hassi & Laakso, 2011). Leaders being faced contradicting models decide to develop a better model which is superior to the existing ones, instead of selecting one over the other (Martin, 2007). Brown (2009) insisted that design thinkers need not to depend on analytical processes in solving design issues that are wicked, but need to have the ability of seeing all the salient aspects of the issue and which most of the time contradictory in order to come up with new and unique solutions. DT refers to integrating thinking process based on

the ability of examining and exploiting ideas opposing each other and their constraints in order to come up with new and unique solutions.

iii. Optimism

Also, mentality of design thinkers should optimistic (Hassi & Laakso, 2011). The assumption they should have is despite the level of challenge they face with constraints of an issue there is always a solution better than existing ones (Brown, 2008). Gloppen (2009) indicated that DT most of the time relate with finding joy in solving problems and finding opportunities in areas where others have surrendered. Thinkers of design enthusiastically view constraints of competition as an excitement since they make the process more challenging (Dunne & Martin, 2006).

iv. Experimentalism

It is also important for design thinkers to be explorative and their mentality should be experimental which includes a license exploring possibilities and will to take risks (Hassi & Laakso, 2011). Thinkers of design ask questions and creatively make exploration of constraints proceeding in a totally different and new direction (Brown, 2008). Faults that result from explorations are regarded as natural and are an integral part in the process and the strategy that is preferred in enabling this exploration are prototypes (Brown, 2008).

v. Ambiguity Tolerance

Design thinkers tolerating level for ambiguity should be high (Hassi & Laakso, 2011). Experimentation is needed for innovation at the knowledge level of a person and there are a times when this could frustrate (Meinel & Leifer, 2015). Boosting acceptance and comfort with the process of resolving problem is the main feature while at the same time remaining open (Boland & Collopy, 2004).

vi. Future Oriented

Character that relates to DT is ability of anticipating and visualizing new scenarios. This is because, it is considered that design improves a situation that already exists into one that is preferred, the commencement point for work, and most of the time it is strong vision regarding the future (Hassi & Laakso, 2011).

Brown (2008) indicated that state of thinkers of design cannot be established through educational background. Instead it is about comprehension of the key values in the approach of design thinking. Generally, the 'mindset' mentioned above combines some of the important characteristics to be possessed by design thinkers which will aid in having a design environment that is creative.

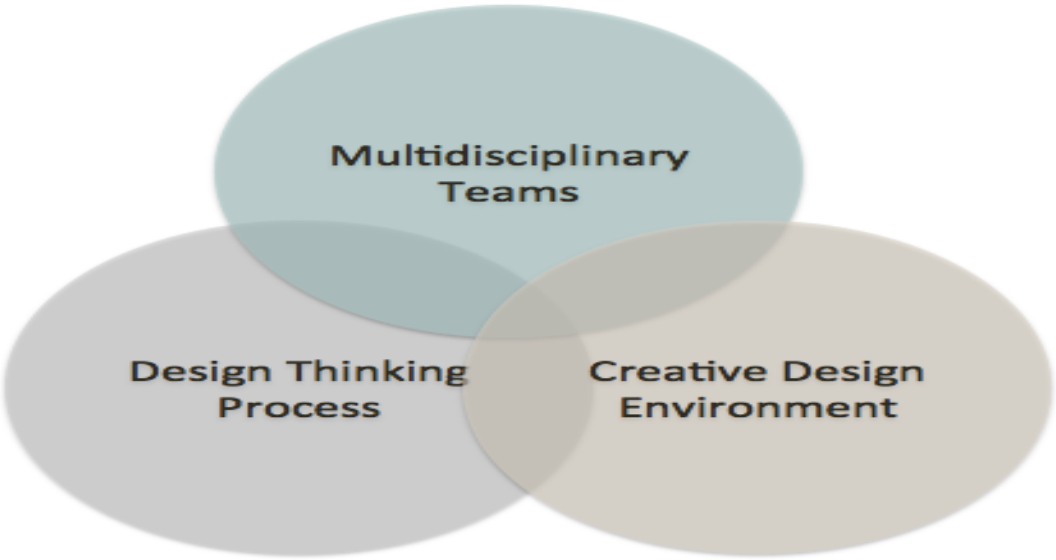

Figure 2.2: D.School's Design Thinking Framework

Source: (Lindberg, 2013).

2.3 Empirical Review

Technology hub is a collaborative space contributing to development processes that are centered on the users and in a manner that has no direct link with employment or products based in the market. The result is that it advances views that are centered on development and whose focus is on wellbeing and agency valued by individuals (Manyika, 2013). The McKinsey Global Institute (2013) explained that technological hubs are incubators while World Bank and the African Development Bank (2012) refer technological hubs as local development clusters (2012). According to AfriLabs technological hubs are spaces serving as physical nexus points for investors, entrepreneurs and developers (AfriLabs, 2015) and therefore they can act as concentration or pool of actors whereby some of the same dynamics as the ones seen in clusters could assert themselves.

Akinyemi (2015) indicated that tech hubs can be of various forms, but majority operate as combined workspace, accelerator, coffee shop, Internet café, training center, event venue, incubator, and/or makerspace. Despite there being great diversity from one hub to the other in terms of structure, membership, amenities and other factors, the general consent is that hub acts as a meeting point in a community (Friederici, 2014). For example, hubs try to support sharing of knowledge and encourage creativity through connection of people having like minds with outsiders who are skilled by offering mentoring and networking opportunities. Generally, existence of hubs is mainly to enable and also support entrepreneurship and innovation more than creating and implementing them (Hersman, 2012).

For instance, iHub emerged in 2010; it was a space of technology community in Nairobi to get together and connect with each other and work together on various ideas. The cofounder of iHub, Erik Hersman, indicated that by the year 202 a conducive environment for Hub could be available in a total of six cities in Africa which were; Nairobi, Lagos, Accra, Cape Town, Cairo, and possibly Dakar. For these ventures to succeed it depends on properly combining talent, policies, location, funding, infrastructure and entrepreneurial culture (Hersman, 2016)

Telstra, which is a leading company in Australia dealing with telecommunication and information Services applied the use of design thinking as a function of learning and development in creating a "90-Day" onboarding experience to address turnover and issues of engagement of newly employed. The process of design thinking was used by the company:

- Empathize with users: carried out focus group and interviews with managers, employees and HR with the aim of exploring their challenges and what they needed.
- Define Challenge: the challenges were synthesized with important HR data to establish objectives for the program which led to dramatic improvements and therefore delight employees.
- Idea generation & build prototypes: they then developed various tools and solutions which were refined several times which allowed for "fast failure" and then the lesson that was learnt was integrated.

- Test: The program was then piloted through the use of persona-based blueprints in describing the onboarding journey as well as outcome.

Because of this process of design thinking, the level of productivity increased, commitment and engagement level of employees was on the increase and newly employees got integrated fast into the company (Bersin, Solow & Wakefield, 2016).

2.3.1 Multi-disciplinary Teams (Design Teams)

Engberts and Borgman (2018) did a study on the application of DT for innovation of service: current practices, expectations and adoption barriers. The aim of the study was developing an understanding on the way DT is applied and the reason for its application, and the advantages and challenges in its adoption. In line with literature already in existence, there were five propositions that were developed and guided collection of data and analysis in a total of 8 case studies on projects on innovation of service where there was the application of DT. From the findings, it is evident that DT is a way of thinking being supported by tools, techniques and processes. The benefits expected push its application, where the value of the customer is increased in delivering innovation of service and also improvement of ability of dealing with complications. DT adoption is affected by the understanding of an individual and avoidance of uncertainties.

Liedtka (2017) did an evaluation on the effects of DT in action. The research was a case study and the aim was to identify elements that are actually practiced under "design thinking" rubric and assess its value to enhance the performance of innovation of the organization. The sample used in the study was a total of 22 organizations spanning the sector; the companies were inclusive of NGOs, government agencies and large companies. First, key elements used by these companies in their designs that are centered on the users were identified then exploration was done on the set of findings concerned with mechanism to enable creation relating to the process of innovation in the companies that were being investigated. What followed next was exploring how the enabling processes facilitated improvement in performance of innovation in the organization; this was in relation to quality of available choices, reduction in risk of investment, enhanced likelihood of success in implementation, increase in adaptability of the organization and creation of capabilities locally. The findings

of the study showed that, when considered as an end to end system for solving problem, DT provides an integral process as well as a toolkit that incorporates creative and analytic approach in solving problems, and it has the ability of improving significantly the outcomes of innovation.

2.3.2 Design Thinking Process

Reine (2017) evaluated the culture of DT for innovation. The aim of the study was improving the understanding on what DT for innovation implies and therefore facilitates successful implementation. The study discussed DT for innovation in a wider perspective of the culture of the organization. A framework that consists of 9 dilemmas in innovation was applied as organizing device, analyzing literature on DT for innovation and accounts where the use of DT was applied practically. The study did argue that the power of DT is in tension between what seemed to be opposite ways of thinking like; thinking analytically verses intuitively, and linearly thinking versus thinking iteratively. In order for DT to flourish, it is important for it to be embedded in the culture of the organization with the capability of maintaining a dynamic balance on various fundamental tensions in the process of innovation.

Bucolo and Matthews (2010) studied on the use of innovation approach of disruptive DT in developing new services: the practice of innovation in times of discontinuity. An approach that was led by design was explored to assist companies that dealt with medical devices to come up with new services and also experiences that would shape the future of the nation in regard to development and deployment of services of health care. Design tools as well as methodologies that were used in the study were based on authentic understandings of experiences by shareholders, to help companies in creating vision scenarios of the future healthcare. By applying these processes, companies get the chance of exploring complications that might be encountered in delivering of healthcare services in markets that are emerging and therefore allow them to develop products and service solutions aimed at ensuring their availability and affordability to all.

2.3.3 Creative Design Environment

Townson, Matthews and Wrigley (2016) studied the results of application of design innovation in manufacturing companies in Australia. Data was collected from a

manufacturing company in Australia where the researcher worked for four days in a week for a period of 11 months and used action research is applying innovation that is led by design. Deep shareholders insights were translated with the employees of the company into novel propositions for the organization. From the research it was established that there was a large untapped potential of designer with experience to act as a catalyst in innovation and assist the company in developing innovation that is inspired by the customers since they apply the use of innovation that is led by design to deal with the barriers and establish the opportunities in the market environment that is continuously changing. New knowledge was provided in regards to the benefit of innovation that is led by design in an environment that is dynamic.

Gulari and Fremantle (2015) evaluated if the approach of design innovation can apply to SMEs. The study used a sample of 8 SMEs and 9 designers to establish the characteristics of SMEs and design innovation. The study also analyzed audio-visual materials and literature of design innovation with the aim of reflecting on discourse of design innovation. The study established that most approaches of innovation are exemplified by means of multi-nationals and large enterprises. From the findings it was evident that most of the concepts of design innovation encouraged enterprises to understand their users with the ability of providing valuable information regarding the process of design.

Moalosi (2016) assessed innovation that is led by design within small creative companies in Botswana. The study assessed whether innovation that is led by design assists creative companies in Botswana in creating added value to the products and services they offer. The results showed that creative companies and institutions of research and development showed a weak association and the result is that it affected promotion as well as development local capabilities technologically like creating sustainable products of high quality and efficient services.

The factor which has been highly studied is the design thinking process while factors which have not been studied include the design team and creative design.

2.3.4 Organizational Resources

Johnson, Sholes and Whittington (2013) contend that resources are assets, knowledge, capabilities, and organizational processes that enable the firm to conceive and implement

strategic decisions. Resources are inputs into the production process and can be tangible or intangible. Tangible resources include the financial and physical assets that are identified and valued in a firm's financial statements, such as capital, factories, machines, raw materials and land. Intangible resources are generally more difficult to measure, evaluate, and transfer and include employee's knowledge, experiences and skills, firm's reputation, brand name and organizational procedures.

Leonard-Barton (2015) contends that the presence of different organizational resources and capabilities positively affects the outcome of the innovation process and, thus, can be used to extend the findings on the firm's capacity to innovate. Collis, (2014) posited that if resources provide the inputs, then organizational capabilities represent the firm's capacity to coordinate, put it in productive use, and shape inputs into innovative outputs. Lynn (2015) studying high technology US firms found a positive relationship between learning and innovation.

2.4 Research Gap

Liema and Brangierb (2012) evaluated on innovation and design approaches within prospective ergonomics. Moalosi (2016) assessed innovation led by design within small creative companies in Botswana. Price, Wrigley and Matthews (2017) evaluated on design innovation and sense making: opportunities to connect. Townson, Matthews and Wrigley (2016) examined on results from application of innovation led by design in manufacturing company in an Australia. Gulari and Fremantle (2015) evaluated on whether design innovation approaches were applicable to SMEs. Bucolo and Matthews (2010) studied on the use of innovation approach of disruptive DT in developing new services: the practice of innovation in times of discontinuity. Townson (2014) studied emerging imperatives from innovation engagement that is led by design in the mining industry.

Price, Wrigley, Matthews and Dreiling (2014) assessed the design research for the real world: innovation model that is led by design. Acklin, Cruickshank and Evans (2010) evaluated challenges in the introduction of new design and knowledge on design management into activities of innovation for SMEs having little or no experience with design. Kembaren, Simatupang, Larso and Wiyancoko (2014) did an examination on

innovation practice that was led by design in Design-preneur led Creative Industry. Niedderer *et al.* (2016) did a study on design for change in behaviour as a driver for sustainable innovation: opportunities and challenges in implementing it in both private and public industries.

Evidence from the empirical literature indicates that there is minimal research done on factors influencing adoption of design thinking innovation approach. Most of the empirical studies were not conducted in Nairobi. The study aimed to fill the research gap in terms of context by analyzing factors influencing adoption of design thinking innovation approach with a focus on Technology hubs in Nairobi.

2.5 Conceptual Framework

Conceptual framework refers to a tool of research whose aim is to help the researcher in developing awareness and also understand a situation that is being scrutinized. When it is articulated clearly, conceptual framework can be very useful in assisting the researcher to create meaning from the findings. It's part of agenda for scrutiny, testing, reviewing and reforming of negotiations and also in explaining possible relationship between the variables (Smith, 2004). The conceptual framework has outlined the factors that influence the adoption of design thinking innovation approach.

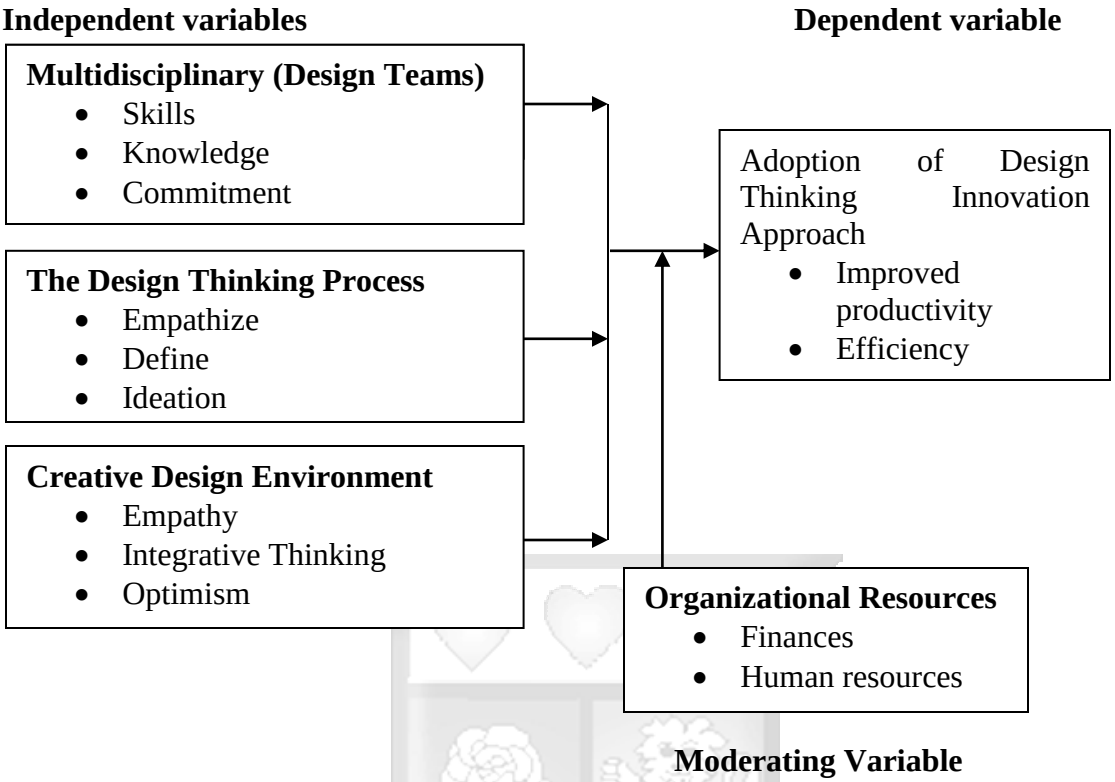

Figure 2.3: Conceptual Framework

Teamwork is essential in a design thinking project since when individuals make their contribution in an activity, it will be mostly successful. In this research we will try to find out the team compositions of the design teams, the years of experience.

DT is a suitable methodology that can be applied in solving problems in this 21st century, because it combines technological feasibility and the perspective of both users and businesses. DT can be said to be a paradigm for solving problems and making decisions where the innovation capabilities of an organization can be improved or made a reality. Design teams should be in an environment that creates trust, processes of making decisions are democratic, there is mutual openness, intrinsic motivation and optimism; this will ensure that the solutions they generate are innovative.

This section is a table representation on operationalization of variables. Operationalization refers to how variables are defined and measured as used in the study.

2.6 Operationalization of Variables

Table 2.1: Operationalization

Independent variables	**Operational ability**
Design Team	• The design team composition • Years of experience using design thinking • Years of working with the current organization • Perception of the team composition and the skills • Opinion on having a team facilitator • Opinion on working with large and small design team • Opinion of the end user rep role in the process • Perception from end user on appreciation and understanding of needs • End user rep likelihood to recommend and use solutions from the process involved
Design Thinking Process	• Opinion on ability to empathize with users • Opinion on ability to define challenges • Opinion on ability to generate innovative ideas • Opinion on ability to build and test prototypes • Opinion on DT process to increase collaborative work style • Opinion on DT process to increase customer loyalty and satisfaction • Opinion on DT process to increase quality of product • Opinion on DT process to reduce time to develop solutions • Opinion of DT Process usability: simplicity, ease of use, ease of understanding
Creative Design Environment	• Perception of creative environment • Opinion on decision making process • Opinion on openness and trust within teams • Opinion on organizations encouraging experimental ideas • Opinion on the space layout on team creativity
Moderating Variable	
Organizational Resources	• Opinion on organizations support on materials: design rooms, stationary, and training • Opinion on top management embracing design thinking as an organizational strategy • Opinion on organization support on financial: incentives

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter discusses the research design, study target population, sampling techniques, data collection instruments, data collection methods, pilot study, data analysis and presentation and ethical considerations.

3.2 Research Design

According to Cooper and Schindler (2011), a research design is the plan and structure used to analyze the subject matter under study and whose purpose is to answer the research questions. The study used a descriptive survey design. A descriptive research study endeavors to depict and describe a theme mainly by crafting a profile of collection of issues under focus. The design was preferred because it helped in obtaining information concerning the status of phenomena. The design also helped the researcher to observe and describe the behavior of the subject under study without influencing it.

3.3 Target Population

A population is any complete group with at least one characteristic in common (Mugenda & Mugenda, 2003). The study targeted design team employees in Technology hubs in Nairobi County. Nairobi County was chosen because of high concentration of Technology hubs. According to the GSMA (2017) report, there are 11 Technology hubs in Kenya as listed in Appendix IV. The study targeted the design team employees in the Technology hubs. The design teams comprised of Product Designer, Product Manager, UX Designer, UX Researcher, Interaction Designer, Visual Designer, Design Projects Manager, Data Analysts, Prototype Developers/ Programmers, Business Designer as well as end user representative for different products. According to human resource report (provide reference) of the targeted technology hubs, the population of design team members from all the hubs is 225. The target population was 225 design team members in the Technology hubs in Nairobi.

3.4 Sampling Technique

The sample size was drawn from a list of employees who form the target population. The study used simple random sampling to select the sample for the study. Yamane's (1967) formula was adopted to obtain the sample size as shown below

n = N / 1 + N (e) 2

Where:

n = the desired sample size, N = the population size, e = level of precision (0.05)

Therefore; $n = 225 / 1 + 225(0.05^2) = 144$

The sample size of the study was 144 respondents out of which 120 were issued with questionnaires and 24 were selected for interviewing

3.5 Data Collection Instruments

The study collected primary data by use of questionnaires. The questionnaire was designed in line with the study objectives and it had both open ended and close ended questions. The questionnaire had two sections, one section was about the demographic information of the respondents and the second section had questions about the study objectives. Questionnaires were considered appropriate because they are free from bias. Respondents were given adequate time to provide well thought out answers. Questionnaires gave respondents freedom to express their views or opinion and also to make suggestions (Kothari, 2004).

End user representative's data was also collected using interview guides. This helped in eliciting more information for the study. Interviews helped to collect in-depth information on respondent's opinions, thoughts, experiences, and feelings

3.6 Data Collection Procedure/process

The questionnaires were administered to the respondents by the researcher both the online and offline. A span of seven days was allowed for the respondents to fill in the questionnaire. Any issues that arose during data collection, the researcher clarified them. Once the respondents filled in the questionnaires, collection was done by the researcher. The study maintained a register of the issued questionnaires to ensure that questionnaires distributed are

returned; this boosted the response rate. The researcher also interviewed the end user representatives to understand their perceptions on their involvement in the design thinking process.

3.7 Research Quality

A pilot test was conducted to 6 employees from various technology hubs. After the pilot test, the questionnaires were edited, some questions omitted and others revised to ensure clarity, relevance and simplicity for ease of understanding. This step was the test for the validity of the tool.

Additionally, in order to establish reliability of the questionnaire through pretesting, the study conducted reliability analysis. Cronbach's Alpha was used applied in determining the reliability of the questionnaire. Gliem and Gliem (2003) indicated that 0.7 is the acceptable threshold value for Alpha and therefore, it was this study's benchmark. Table 3.1 shows the findings from the reliability analysis where Design Team, as an alpha of 0.814, Design Thinking Process as an alpha of 0.821, Creative Design Environment as an alpha of 0.833, and Organizational Resources an alpha of 0.847. From the findings all the variables had alpha values greater than 0.7 which implies that all the variables were reliable.

Table 3.1: Reliability analysis

Scale	Cronbach's Alpha	Number of Items
Design Team	0.814	6
Design Thinking Process	0.821	18
Creative Design Environment	0.833	6
Organizational Resources	0.847	5

3.8 Data Analysis and Presentation

Before processing of collected data, the questionnaires were checked for completeness. Data was then edited, coded and tabulated. Collected data was coded using Statistical Package for Social Sciences (SPSS). The output from SPSS was in form of figures. The analysis sought to answer the research questions of this study. Descriptive analysis was conducted. It helped researcher to summarize the data and find patterns. Descriptive statistics included means,

standard deviations, frequencies and percentages. The data was presented in form of tables, pie charts and graph. Open-ended questions were analyzed using conceptual content analysis. Analysis involved the production and interpretation of frequencies counts and tables that described and summarized the data.

Inferential statistics that is correlational and regression analysis was conducted to establish the relationship between the study variables. The multiple regression models were;

$Y = \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$

Y = Adoption of design thinking innovation

X_1 = Design team

X_2 = Design thinking process

X_3 = Creative design environment

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are regression coefficients corresponding to X_1, X_2, X_3, X_4 respectively

ε= Error term

β = the beta coefficients of independent variables

3.9 Ethical Considerations

Ethics aims at ensuring that no one is harmed or suffer any adverse effects as a result of the research activity. Considering the common sensitive association between the respondents and the researcher, the study did build sensible safeguards in regard to requirements and ethical considerations. All the information that was collected was therefore treated confidentially and was used solely for academic reasons. Anonymity was observed by not mentioning the names of the respondents in the study.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

In this chapter, analysis of data, its interpretation, presentation and discussion of findings from data collected from the field is discussed. Specifically, the chapter covers the general information of the respondents and analysis of findings of each study's objectives. Discussions of the findings are based on both inferential and descriptive statistics.

4.2 Response Rate

The sample selected for this study was 144 respondents out of which 120 questionnaires were administered to the internal design team while 24 end user representatives were selected for interviews. Only 100 respondents issued with questionnaires dully filled and returned their questionnaires and 16 respondents were interviewed; this translated to a response rate of 116 respondents out of 144, which translates to response rate of 80.6%. According to Mugenda and Mugenda (2008), a rate of response of 50% is considered to be adequate; a rate of 60% is considered good and a rate of response of 70% and above is considered excellent for reporting and analysis. Therefore, our rate of response was considered excellent. As shown in Table 4.1

Table 4.1: Response rate

Response	Frequency	Percent
Response	116	80.6
Non-response	28	19.4
Total	**144**	**100.0**

4.3 Analysis of Respondents

4.3.1 Respondents Role

Respondents were requested to indicate their designation.

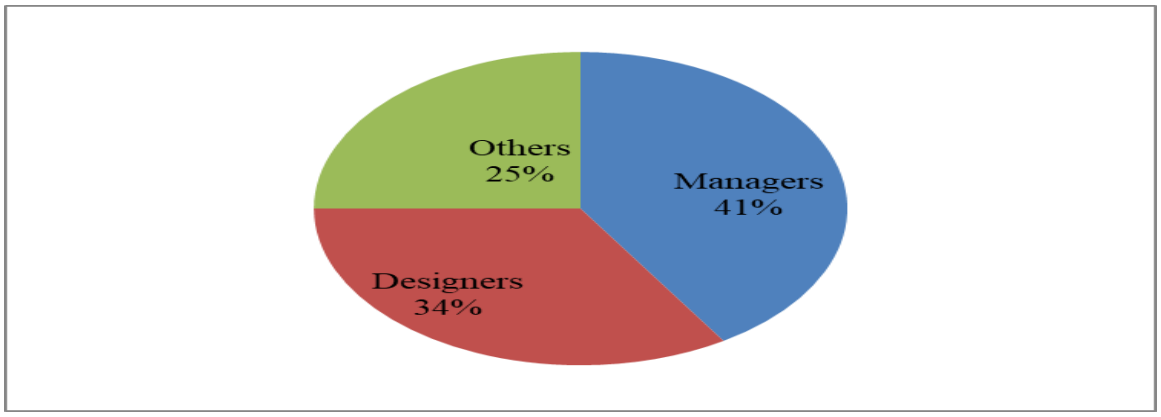

Figure 4.1: Designation of Respondents

The results were as follows: There are various roles that are performed by the respondents under the design team. Some of the roles they indicated were managers (41%); and there were various types of managers including product managers and Design Projects Manager. Others played the role of designers (34%) including Product Designer, UX Designer, Interaction Designer, Visual Designer, Service Designer and Business Designer. Other respondents (25%) indicated that their role in the organization was UX Researcher, Data Analysts, Prototype Developers/ Programmers, Information Architect and Test Engineers. From the findings it is evident that the study used respondents performing various roles in the organization.

4.3.2 Respondents Length of Service in the Organization

Respondents were requested to indicate the length of time they have worked in the organization. The results were as presented in Figure 4.1.

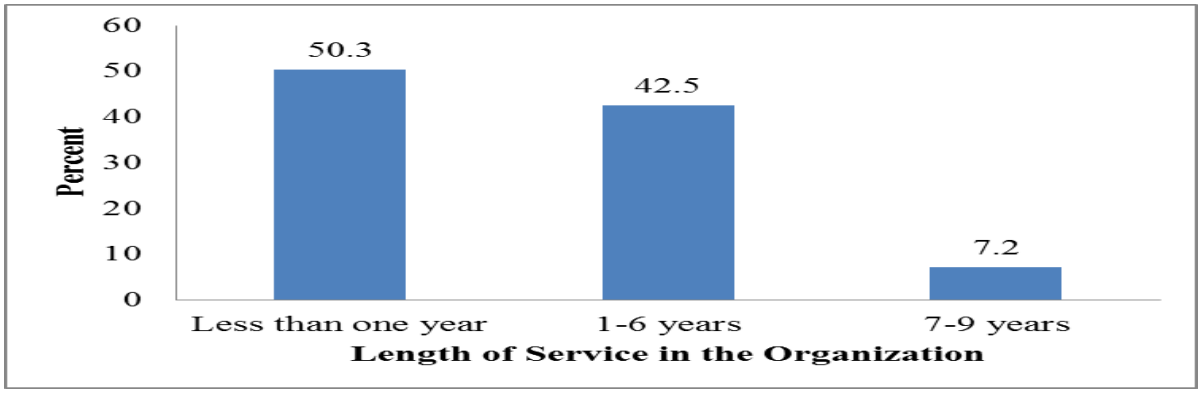

Figure 4.2: Length of Service in the Organization

The findings presented in figure 4.1 shows that 50.3% of the respondents had worked in the organization for a period of less than one year, 42.5% for 1 to 6 years, and 7.2% for 7 to 9 years. This is an indication that the respondents have worked in the organization varying amount of time with majority (50.3%) having worked in the organization for less than one year.

4.3.3 Adoption of Design Thinking Innovation Approach by Organizations

Respondents were requested to indicate whether their organization had adopted design thinking innovation approach (Empathize, Define, Ideate, Prototype, and Test). The results were as presented in Figure 4.2.

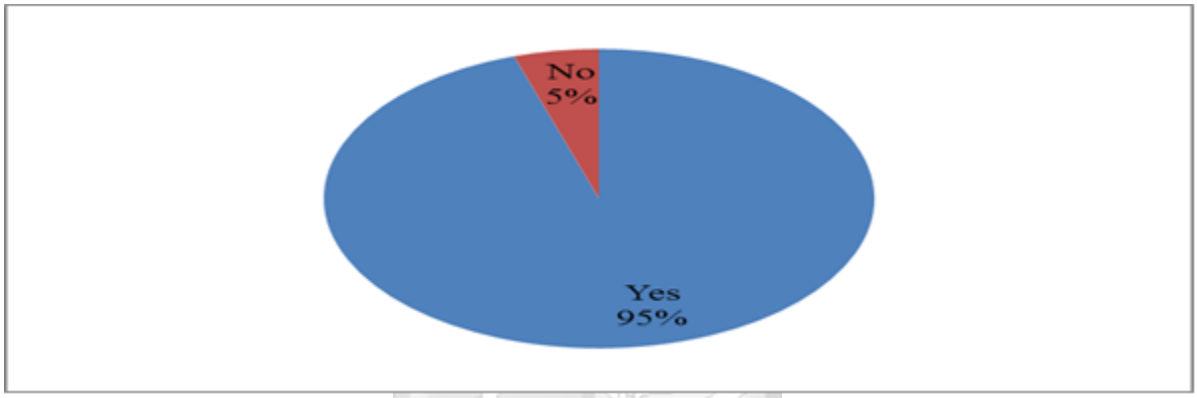

Figure 4.3: Adoption of Design Thinking Innovation Approach

The findings presented in figure 4.2 show that 95% of the respondents agreed that their organization has adopted Design Thinking Innovation Approach while 5% indicated that their organization had not adopted it yet. This shows that majority of the organizations have adopted Design Thinking Innovation Approach as indicated by majority (95%) of the organizations.

4.3.4 Organizations Length of Time Using Design Thinking Innovation Approach

For those respondents who indicated that their organization has adopted Design Thinking Innovation Approach, they were requested to indicate the length of time in which they have used the design approach in their organization. The results were as presented in Figure 4.3.

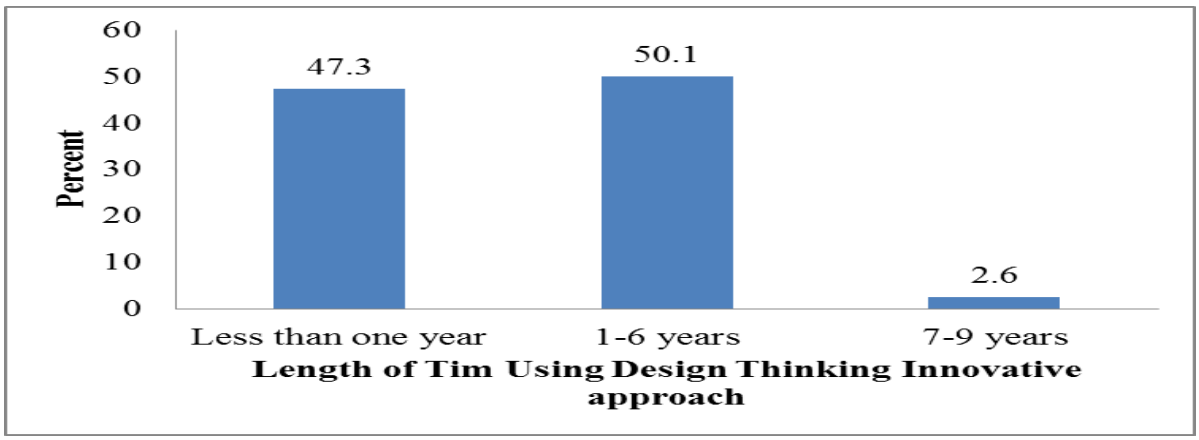

Figure 4.4: Organizations Length of Time Using DT Innovation Approach

Based on the findings presented in figure 4.3, 50.1% of the respondents indicated that their organization has been using Design Thinking Innovation Approach for a period of 1 to 6 years, 47.3% for less than 1 year, and 2.6% for 7 to 9 years. This was an indication that the organizations have used Design Thinking Innovation Approach long enough to provide the information needed for this study.

4.3.5 Respondents Length of Time Using Design Thinking Approach

Respondents were requested to indicate the length of time they have used or practiced the design thinking approach. The results were as presented in Figure 4.4.

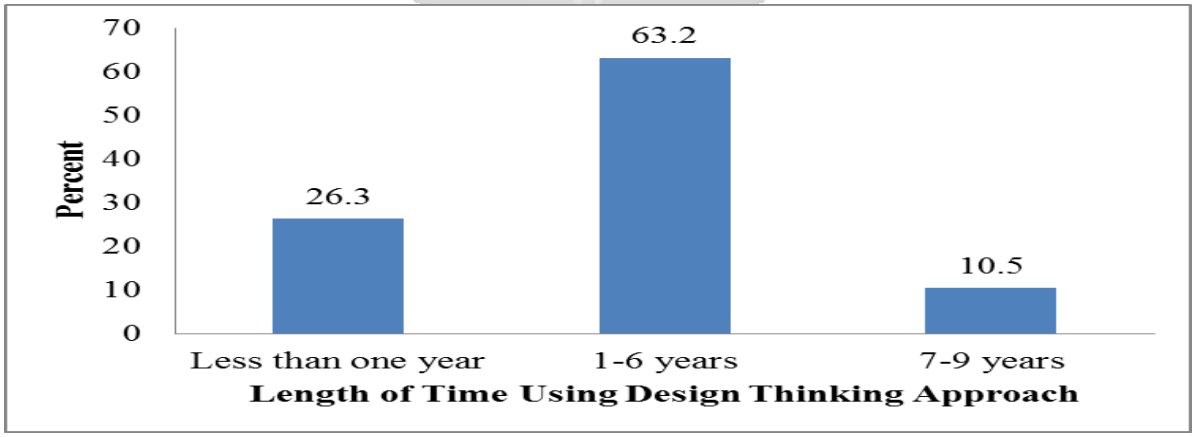

Figure 4.5: Length of Time Using Design Thinking Approach

The findings presented in figure 4.4 shows that 63.2% of the respondents have used or practiced the design thinking approach for a period of 1 to 6 years, 26.3% for less than one year, and 10.5% for 7 to 9 years. The findings show that the respondents have used or

practiced design thinking approach for long periods of time and therefore have the information needed for this study.

4.4 Effect of design team, design thinking process and creative design on adoption of design thinking innovation approach in Technology hubs in Nairobi

4.4.1 Design Team

4.4.1.1 Internal Design Team

In this section, respondents were requested to indicate their level of agreement on various statements using a scale of 1-5. Scale 1 being – strongly disagree, 2- disagree, 3- moderate, 4- agree, 5- strongly agree. The means were interpreted as follows; a mean of 0-1 implied that the respondents strongly disagreed, a mean of 1.1-2 implied they disagreed, 2.1-3 suggest that they were neutral, a mean of 3.1-4 suggest they agreed, and a mean of 4.1-5 implies the respondents strongly agreed. The findings on various objectives of the study are presented in subsections below.

Respondents were requested to indicate their level of agreement on various statements on design team as a factor that influence the adoption of design thinking innovation approach. The results were as presented in Table 4.2.

Table 4.2: Design Team on Adoption of Design thinking Innovation Approach

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev.
We have a strong team made up individuals from multi-disciplinaries and or various departments.	0	11	16	26	47	4.090	0.940
Each team member brings diverse skills to the design team	0	5	5	37	53	4.380	1.163
We have a lead facilitator to facilitate the design discussions.	0	11	21	21	47	4.040	0.923
The facilitator also ensures the team is focused on the tasks.	0	11	21	42	26	3.830	0.711
I prefer working with a small design team while	5	0	11	32	53	4.310	1.124

solving a design challenge/ problem							
I prefer working with a large design team while solving a design challenge/ problem	26	37	32	0	5	2.210	0.394

From the findings presented in table 4.2, the respondents strongly agreed that each team member brings diverse skills to the design team as shown by a mean of 4.380, they prefer working with a small design team while solving a design challenge/ problem as shown by a man of 4.310, they have a strong team made up individuals from multi-disciplinaries and or various departments as shown by a man of 4.090 and that they have a lead facilitator to facilitate the design discussions as shown by a mean of 4.040. The study also found that the respondents agreed that the facilitator ensures the team is focused on the tasks as shown by a mean of 3.830. Furthermore, the respondents strongly agreed on their preference in working with smaller teams while at the same time had neutral opinion on their preference in working with a large design team while solving a design challenge/ problem as shown by a mean of 2.210. These findings agree with statement by Kelley (2001) who indicated that with the aim of dealing with the complex nature of the challenges of design, usually, teams are usually used with the aim of providing various skills as well as viewpoints, since varied teams allow the members of the team to brainstorm on ideas and varied thought.

4.4.1.2 End User Representative

Perception of end user role in the design thinking process

From the interview guide the respondents were requested to state their opinion regarding their role and their importance of their role in the team. Most of the respondents indicated that they consider their role to be very important because it contributed towards helping the team understanding users' needs, building and testing of the product/service. They further mentioned that the role that is assigned to every member of the team is important because all roles work collaboratively. From the findings it is evident that the end user felt their role played an important role.

Perception of end user on internal team appreciation and understanding of their needs

The interviewer asked the interviewees whether they felt that the team appreciated their role and understood their needs. Most of the respondents indicated that they felt that the team

considered their needs when they were developing innovative products and that they felt appreciated. Other respondents indicated that there are a times when they feel that their contribution in the team is not appreciated but that did not happen often.

During the interview, the interviewees were asked whether their needs were met in the developed product or service. 70% of the respondents stated that because they were involved in almost all phases of the process, they felt that the design process considered their needs and therefore they felt contented and appreciated. From the findings it is evident there is a high perception of the end users' needs being understood and feeling appreciated in the process,

End user perception on the likelihood to use and recommend products/solutions

During the interview, the respondents were asked whether they would or are already using the products that they were involved in the innovation process. 100% of the respondents stated that they would use the products they were involved in the development because they understand what they need and create value in them. They were also asked whether they would recommend the product or service to other users. They also indicated they would recommend the product or service to other users who would find value in them.

4.4.2 Design thinking process

Respondents were requested to indicate their level of agreement on various statements on Design Thinking Process as a factor that influence the adoption of design thinking innovation approach. The results were as presented in Table 4.3.

Table 4.3: Design Thinking Process on Adoption of Design thinking Innovation

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev.
Design thinking methodology helps me to empathize with users	0	0	5	32	63	4.580	1.359
Design thinking tools help the team clearly define a challenge or problem statement	0	0	5	26	69	4.620	1.450

Design thinking process helps the design team generate innovative ideas that solve users' needs.	0	0	5	37	59	4.530	1.277
The design thinking process helps the team with tools to build and test prototypes.	0	0	5	37	59	4.530	1.277
Design thinking process encourages collaborative work style in my organization	0	0	11	32	59	4.470	1.231
Design thinking process helps the team design and develop meaningful products and solutions	0	1	1	36	61	4.421	1.235
Solutions / Products developed through design thinking approach have increased customer value satisfaction and loyalty	0	0	5	58	37	4.320	1.129
Solutions / Products developed through design thinking approach have increased quality of product developed / solutions designed	0	0	3	43	53	4.000	1.133
Solutions / Products developed through design thinking approach have reduced the time to develop products/ designed solutions	0	2	4	38	56	3.947	0.788

According to the findings presented in table 4.3, the respondents were in strong agreement that design thinking tools help the team to clearly define a challenge or problem statement as shown by a mean of 4.620, design thinking methodology helps them to empathize with users as shown by a mean of 4.580, design thinking process helps the design team generate innovative ideas that solve users' needs as shown by a mean of 4.530, the design thinking process helps the team with tools to build and test prototypes as shown by a mean of 4.530, design thinking process encourages collaborative work style in their organization as shown by a mean of 4.470, design thinking process helps the team design and develop meaningful products and solutions as shown by a mean of 4.421 and that solutions / products developed through design thinking approach have increased customer value satisfaction and loyalty as shown by a mean of 4.320. The study also established that the respondents agreed that solutions / products developed through design thinking approach have increased quality of product developed / solutions designed as shown by a mean of 4.000 and that solutions / products developed through design thinking approach have reduced the time to develop products/ designed solutions as shown by a mean of 3.947. The findings concur with the statements by Liedtka (2017) who indicated that, when considered as an end to end system for solving problem, DT provides an integral process as well as a toolkit that incorporates

creative and analytic approach in solving problems, and it has the ability of improving significantly the outcomes of innovation. Bucolo and Matthews (2010) indicated that DT allows healthcare organizations to develop products and service solutions aimed at ensuring their availability and affordability to all.

4.4.2.1 Design Thinking Process Usability

Table 4.4: Design Thinking Process Usability Influence on Adoption of Design thinking Innovation

Design Thinking Process Usability							
I find the design thinking process simple	0	6	4	35	55	3.368	0.431
I would still use design thinking to address similar and/ or different problems	0	5	11	37	47	4.260	1.025
I imagine that most people would need training support to use design thinking methodology.	5	5	5	27	58	4.240	1.218
I find the various stages in the process are well integrated	0	5	26	22	47	4.070	0.940
I think there are too much inconsistency in design thinking process	32	42	21	0	5	2.040	0.330
I imagine that most people would learn to use the design thinking process very quickly.	5	32	11	37	15	3.300	0.542
I find the design thinking process very awkward to use	37	53	0	10	0	1.870	0.434
I feel very confident using the design thinking process.	0	0	16	42	42	4.260	0.979
I needed to learn a lot of things before I could get going with this methodology.	11	26	5	53	5	3.150	0.848

The respondents were in strong agreement that they would still use design thinking to address similar and/ or different problems as shown by a mean of 4.260, they feel very confident using the design thinking process as shown by a mean of 4.260, they imagine that most people would need training support to use design thinking methodology as shown by a mean of 4.240 and that they find the various stages in the process to be well integrated as shown by a mean of 4.070. The study also found that the respondents agreed that they find the design thinking process simple as shown by a mean of 3.368, they imagine that most people would learn to use the design thinking process very quickly as shown by a mean of 3.300 and that they needed to learn a lot of things before they could get going with this methodology as shown by a mean of 3.150. The study also established that the respondents disagreed that

they think there are too much inconsistency in design thinking process as shown by a mean of 2.040 and that they also disagree to find the design thinking process very awkward to use as shown by a mean of 1.870. These findings agree with Bersin, Solow and Wakefield (2016) that the process of design thinking has positive effects since the level of productivity increased, commitment and engagement level of employees was on the increase and newly employees got integrated fast into the company. Engberts and Borgman (2018) noted that DT adoption is affected by the understanding of an individual and avoidance of uncertainties

4.4.3 Creative environment

Respondents were requested to indicate their level of agreement on statements on Creative Design Environment as a factor that influence the adoption of design thinking innovation approach. The results were as presented in Table 4.5.

Table 4.5: Creative Design Environment on Adoption of Design thinking Innovation

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev.
My organization provides a conducive creative environment to practice design thinking	0	6	11	56	28	4.090	0.969
There is a democratic decision process when it comes to decision making on ideas and project	0	5	37	32	26	3.790	0.651
I feel that there is mutual openness and trust among my design team members.	0	5	16	47	32	4.060	0.872
My organization encourages experimental ideas to solve challenges regardless of the risks involved.	0	16	21	42	21	3.680	0.655
The design space in the organization motivates and encourages creativity with multi colors and floor designs	11	5	32	32	21	3.500	0.556

The findings reveal that the respondents were in strong agreement that their organization provides a conducive creative environment to practice design thinking as shown by a mean of 4.090, and that they feel that there is mutual openness and trust among their design team members as shown by a mean of 4.060. The respondents agreed that there is a democratic decision process when it comes to decision making on ideas and project as shown by a mean of 3.790, their organization encourages experimental ideas to solve challenges regardless of the risks involved as shown by a mean of 3.680 and that the design space in the organization motivates and encourages creativity with multi colors and floor designs as shown by a mean of 3.500. The findings are in agreement with statement by Brown (2009) that when an organization aim at generating solutions that is innovative, it is important for the team responsible for design to have an environment creating trust, process of making decision that is democratic, mutual openness, intrinsic motivation and optimism.

4.5 Extent of adoption of design thinking innovation approach in Technology hubs in Nairobi

Respondents were requested to indicate how often they held design thinking workshops / design sprints in their organization. The findings were as presented in Table 4.7.

Table 4.6: Design Thinking workshops/Design Sprints in Organizations

	Frequency	Percent
Always (Weekly)	24	23.7
Usually (Monthly)	42	41.8
Sometimes (Quarterly)	27	26.9
Rarely (Bi-Annually)	2	1.7
Never	6	5.9
Total	**100**	**100**

The findings presented in table 4.7 show that 41.8% of the respondents indicated that their organization held design thinking workshops / design sprints monthly, 26.9% indicated that they held it quarterly, 23.7% indicated it was held in their organization weekly, 5.9% indicated they never held a design workshop/ sprint and 1.7% indicated that they've held it twice a year. From the findings, it was evident that majority (94.1%) of the organizations

have held a design thinking workshops / design sprints and with only 5.9% indicating that it was never held in their organizations. In addition, most (40.4%) of the organizations holding design thinking workshops/design sprints held them monthly.

Respondents were requested to indicate the number of products/solutions they have developed using the design thinking innovation approach; i.e. the Products / solutions that have been launched in the market. The results were as shown in Figure 4.5.

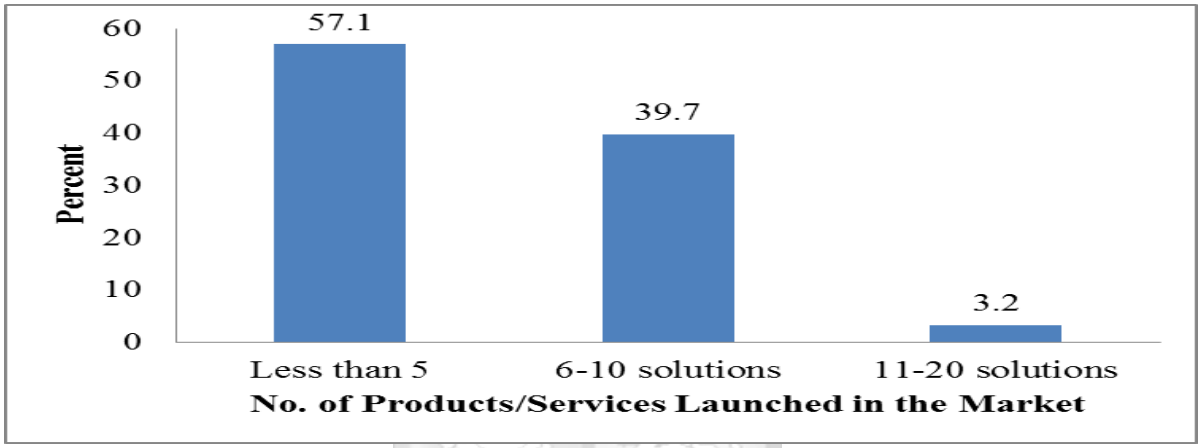

Figure 4.6: No. of Products/Services Launched in the Market by Organizations

The findings show that 57.1% of the respondents indicated that their organization has launched less than 5 products/services in the market, 39.7% indicated theirs has launched 6 to 10 solutions, and 3.2% indicated 11 to 20 solutions. This showed that majority of the organizations have launched products and services in the market but the numbers are still low as indicated by majority (57.1%) of the respondents despite the fact that majority of the organizations have been practicing design thinking for 1-6 years.

The respondents were further requested to indicate the number of products and services that they have been innovated and launched in the market and those were meant to improve current existing organizational problems and those that were new solutions to new challenges. The results were as shown in Table 4.8.

Table 4.7: The Focus of the Innovated Solution

Intention of the Solution	Frequency	Percent
Improving current existing organizational problems	51	50.8
New solutions to new challenges	49	49.2
Total	**100**	**100.0**

The findings presented in table 4.8 shows that 50.8% of the teams focus was to use design thinking to improve current existing organizational problems while 49.2% were new solutions to new challenges.

Respondents were also requested to indicate if there are other factors that have influenced the adoption of design thinking in their organization. The respondents indicated that some of the challenges that they face were external influence like trends in the market, the realization that experimentation has better learning from the insights generated; attending design thinking events, other respondents indicated that since they are a Service Design company they are all about Design Thinking and that the management believes in design thinking inherently. Other factors indicated were involvement of stakeholders to get buy-in and agile methodology and digital team. Others indicated that they faced the challenge of unclear goals provided by the organization; limited ideas from the team members, other team players are too serious and boring. Lack of facilitators with experience, closed mindedness of some of the team members, unfriendly space were other factors indicate by the respondents.

4.6 Influence of organizational resources (Finance, Raw materials and Human Resource) on the adoption of design thinking innovation approach in Technology hubs in Nairobi

Respondents were requested to indicate their level of agreement on mediating effect of Organizational Resources on the adoption of design thinking innovation approach. The results were as presented in Table 4.6.

Table 4.8: Organizational Resources

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev.
My organization invests in my design thinking knowledge by providing learning materials, books, training and /or certifications.	21	16	26	37	0	2.790	0.589
My organizations top management embraces design thinking innovation approach as an organizational strategy	6	6	28	28	33	3.790	0.676
My organization provides materials required in design thinking sessions such as design rooms, stationaries.	5	5	11	32	47	4.110	0.988
My organizations top management provides financial or monetary support for design thinking.	5	5	21	53	16	3.700	0.838
My organization provides incentives for innovations or solutions address business problems or create new business for the organization.	0	20	32	37	11	3.410	0.562

The findings show that the respondents were in strong agreement that their organization provides materials required in design thinking sessions such as design rooms, stationaries as shown by a mean of 4.110. The respondents also agreed that their organizations top management embraces design thinking innovation approach as an organizational strategy as shown by a mean of 3.790, their organizations top management provides financial or monetary support for design thinking as shown by a mean of 3.700 and that their organization provides incentives for innovations or solutions address business problems or create new business for the organization as shown by a mean of 3.410. The findings also

show at the respondents did not agree or disagree that their organization invests in their design thinking knowledge by providing learning materials, books, training and /or certifications as shown by a mean of 2.790. Thagard and Shelley (2014) indicated that the approach of design thinking can be aligned with ideologies of the corporation to fit and leverage the internal abilities, and resources with the aim of generating innovative solutions in creating competitive advantage.

4.7 Inferential Statistics

The study conducted both correlation and multiple regression analysis to test the influence among predictor variables. The researcher applied the use of SPSS to code, enter and compute the measurements of the multiple regressions.

4.7.1 Correlation Analysis

The correlation analysis is applied in analyzing the relationship between the response and the predictor variable. The results were as shown in Table 4.9.

Table 4.9: Correlations Coefficient

		Adoption of DT Innovation Approach	Design Team	Design Thinking Process	Creative Design Environment
Adoption of DT Innovation Approach	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	100			
Design Team	Pearson Correlation	.816**	1		
	Sig. (2-tailed)	.000			
	N	100	100		
Design Thinking Process	Pearson Correlation	.783**	.408	1	
	Sig. (2-tailed)	.002	.051		
	N	100	100	100	
Creative Design Environment	Pearson Correlation	.772**	.513	.541	1
	Sig. (2-tailed)	.002	.049	.065	
	N	100	100	100	100

The findings established that Design Team was strongly and positively correlated with adoption of design thinking innovation approach as shown by r = 0.816, statistically

significant p = 0.000<0.01; Design Thinking Process and adoption of design thinking innovation approach were positively correlated as shown by r = 0.783, statistically significant P = 0.002; Creative Design Environment and adoption of design thinking innovation approach had positive correlation as shown by r = 0.772, statistically significant P = 0.002. This implies that design team, design thinking process, and creative design environment with adoption of design thinking innovation approach are associated.

4.7.2 Model Summary

Model summary is applied in analyzing the variation of response variable as a result of change in the predictor variables.

Table 4.10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.894[a]	0.799	0.790	0.01135

The findings revealed that the value of adjusted R^2 was 0.790 which implies that there existed 79.0% change in adoption of design thinking innovation approach, because of changes of design team, design thinking process, and creative design environment. The remaining 21% suggest that there are factors that influence adoption of design thinking innovation approach which weren't discussed in the study. Correlation coefficient denoted by R showed the association between the variables that were being studied. The findings established that the study variables were strongly and positively related as shown by correlation coefficient value of 0.894.

4.7.3 Analysis of Variance

In order to establish whether the data applied in the study was significant, the study conducted analysis of variance.

Table 4.11: Analysis of variance

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	143.868	3	47.956	29.929	.012b
	Residual	59.913	96	1.602		
	Total	**203.781**	**99**			

The findings from ANOVA showed that the significance level of the population parameters was 0.012 which implies that the data is suitable to make conclusion on population parameters because the value was less that the selected significance level of 0.05. The F critical was found to be smaller than F calculated (29.929 > 2.699) suggesting that design team, design thinking process, and creative design environment have significant influence on adoption of design thinking innovation approach.

4.7.4 Beta Coefficients of the study Variables

The regression equation was

$Y = 1.487 + 0.406 X_1 + 0.422 X_2 + 0.365 X_3 + e$

From the equation, holding design team, design thinking process, and creative design environment constant, the variables will have significant influence on adoption of design thinking innovation approach as shown by constant = 1.487 as shown in Table 4.12.

Table 4.12: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.487	0.312		4.766	0.003
	Design team	0.406	0.069	0.387	5.884	0.002
	Design thinking process	0.422	0.089	0.409	4.742	0.003
	Creative design environment	0.365	0.092	0.355	3.967	0.006

Design team is statistically significant to adoption of design thinking innovation approach as shown by ($\beta = 0.406$, $P = 0.002$). It implies that design team significantly and positively relate with adoption of design thinking innovation approach. This implies that increasing design team by a single unit will lead to an increase in adoption of design thinking innovation approach.

Design thinking process is statistically significant to adoption of design thinking innovation approach as shown by ($\beta = 0.422$, $P = 0.003$). This suggests that Design thinking process and adoption of design thinking innovation approach are significantly and positively related.

Therefore, increasing Design thinking process by a single unit will lead to an increase in adoption of design thinking innovation approach.

Creative design environment is statistically significant to adoption of design thinking innovation approach as shown by ($\beta = 0.365$, $P = 0.006$). This implies that creative design environment and adoption of design thinking innovation approach are significantly and positively related. Therefore, increasing Creative design environment by a single unit will lead to an increase in adoption of design thinking innovation approach by 0.365 units.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, key findings, conclusions drawn, and recommendations made there-to are presented. Both conclusions and recommendations addressed the study's objectives. The general objective of the study was to analyze the factors that influence adoption of design thinking innovation approach taking a case of Technology Hubs in Nairobi

5.2 Summary of Findings

5.2.1 Effect of design team, design thinking process and creative design on adoption of design thinking innovation approach in Technology hubs in Nairobi

The study identified and analyzed data on the influence of design team, design thinking process and creative design environment on adoption of design thinking innovation approach in Technology hubs in Nairobi

5.2.1.1 Design Team

- **Internal Design Team**

In addition, the study found that each team member brings diverse skills to the design team, team employees prefer working with a small design team while solving a design challenge/ problem, have a strong team made up of individuals from multi-disciplinaries and or various departments and they have a lead facilitator to facilitate the design discussions. The study also found that the respondents agreed that the facilitator ensures the team is focused on the tasks. Furthermore, team members had neutral opinion on their preference in working with a large design team while solving a design challenge/ problem. Kelley (2001) indicated that with the aim of dealing with the complex nature of the challenges of design, teams are usually used with the aim of providing various skills as well as viewpoints, since varied teams allow the members of the team to brainstorm on ideas and varied thought.

- **End User Representative**

The study found that the design team considers their role to be very important because it contributed towards helping the team understanding users' needs, building and testing of the

product/service. Further, the role that is assigned to every member of the team is important because all roles work collaboratively. The study also revealed that the design team needs were met when they were developing innovative products and that they felt appreciated. The design team were involved in almost all phases of the process, so they felt that the design process considered their needs and therefore they felt contented and appreciated. The study also established that design team members use the products they were involved in the development because they understand what they need and create value in them.

5.2.1.2 Design Thinking Process

The study found that design thinking tools help the team to clearly define a challenge or problem statement, design thinking methodology helps team employees to empathize with users, design thinking process helps the design team generate innovative ideas that solve users' needs, the design thinking process helps the team with tools to build and test prototypes, design thinking process encourages collaborative work style in their organization, design thinking process helps the team design and develop meaningful products and solutions and that solutions / products developed through design thinking approach have increased customer value satisfaction and loyalty. The study also established that solutions / products developed through design thinking approach have increased quality of product developed / solutions designed and that solution / products developed through design thinking approach have reduced the time to develop products/ designed solutions.

- **Design Thinking Process Usability**

The study also established that team employees would still use design thinking to address similar and/ or different problems, and they feel very confident using the design thinking process, team employees imagine that most people would need training support to use design thinking methodology and that they find the various stages in the process to be well integrated. The study also found that team employees find the design thinking process simple; they imagine that most people would learn to use the design thinking process very quickly and they needed to learn a lot of things before they could get going with this methodology. The study further established that team employees disagreed that there is too much inconsistency in design thinking process and that the design thinking process is very

awkward to use. Bersin, Solow and Wakefield (2016) indicated that the process of design thinking has positive effects since the level of productivity increased, commitment and engagement level of employees was on the increase and newly employees got integrated fast into the company.

5.2.1.3 Creative Design Environment

The study revealed that team employees' organization provides a conducive creative environment to practice design thinking, and they feel that there is mutual openness and trust among their design team members. The study also established that there is a democratic decision process when it comes to decision making on ideas and project, organization encourages experimental ideas to solve challenges regardless of the risks involved and the design space in the organization motivates and encourages creativity with multi colors and floor designs. The study further established that team employees did not agree or disagree that their organization invests in their design thinking knowledge by providing learning materials, books, training and /or certifications. Brown (2009) indicated that when an organization aim at generating solutions that is innovative, it is important for the team responsible for design to have an environment creating trust, process of making decision that is democratic, mutual openness, intrinsic motivation and optimism. The findings are also supported by design thinking model which outlines the design thinking process hence enhances the understanding of design thinking.

5.2.1.4 Organizational Resources (Finance, Raw materials, Human resource)

The study found that organization provides materials required in design thinking sessions such as design rooms, stationaries. Also organizations top management embraces design thinking innovation approach as an organizational strategy, organizations top management provides financial or monetary support for design thinking and organization provides incentives for innovations or solutions address business problems or create new business for the organization. The study also found that team employees did not agree or disagree that organization invests in their design thinking knowledge by providing learning materials, books, training and /or certifications. Thagard and Shelley (2014) indicated that the approach of design thinking can be aligned with ideologies of the corporation to fit and leverage the

internal abilities, and resources with the aim of generating innovative solutions in creating competitive advantage.

5.2.2 The extent of the adoption of Design thinking Innovation Approach

The study found that most organizations hold design thinking workshops / design sprints on a monthly basis. Although the average organization has practiced design thinking for about 1-6 years, the numbers of launched products are very low, that is between 1-5 products. The study also revealed that the products and services that have been launched in the market were meant for improvement of problems that currently exist in the organizations and also for new solutions to challenges. Reine (2017) noted that, in order for DT to flourish, it is important for it to be embedded in the culture of the organization with the capability of maintaining a dynamic balance on various fundamental tensions in the process of innovation. Tech companies are using quality tools to organize their innovation cycles, likewise automotive, manufacturing, or even consulting industries more focused on standardization should start using quality together with design thinking so as to get a disciplined empathetic approach to customer requirements. Samsung Electronics manufactures inexpensive, imitative electronics for other companies. Its engineers built products to meet prescribed price and performance requirements. The findings are also supported by D.School's Design Thinking Model which notes that the adoption of innovation is dependent on design team commitment and creative designs.

5.2.3 Influence of organizational resources (Finance, Raw materials and Human Resource) on the adoption of design thinking innovation approach in Technology hubs in Nairobi

The study revealed that the organization provides materials required in design thinking sessions such as design rooms, stationaries. Organizations top management embraces design thinking innovation approach as an organizational strategy, organizations top management provides financial or monetary support for design thinking and that the organization provides incentives for innovations or solutions address business problems or create new business for the organization. Thagard and Shelley (2014) indicated that the approach of design thinking

can be aligned with ideologies of the corporation to fit and leverage the internal abilities, and resources with the aim of generating innovative solutions in creating competitive advantage.

5.3 Conclusions

The main objective of the study was to analyze the factors that influence adoption of design thinking innovation approach taking a case of Technology Hubs in Nairobi. Due to the challenges of traditional innovation methods and increase in competition between organizations, businesses should have differentiation in their services, ensure their operations are efficient, ensure delivery results are efficient and ensure flawless experience from end to end. What customers expect today are anticipatory services and experiences that are personalized and organizations are always adopting to new methods of innovation; including design thinking.

The study found that design team is statistically significant to adoption of design thinking innovation approach. The study also found that design team significantly and positively relate with adoption of design thinking innovation approach. The study therefore found that increasing design team (multi-disciplinary team, diverse skills and lead facilitators) by a single unit will lead to an increase in adoption of design thinking innovation approach.

The study established that design thinking process is statistically significant to adoption of design thinking innovation approach. The study also found that design thinking process and adoption of design thinking innovation approach are significantly and positively related. The study therefore conclude that, increasing Design thinking process (methodology, tools) by a single unit will lead to an increase in adoption of design thinking innovation approach.

The study established that creative design environment is statistically significant to adoption of design thinking innovation approach. The study also found that creative design environment and adoption of design thinking innovation approach are significantly and positively related. The study therefore concludes that increasing Creative design environment (conducive creative environment, democratic decision making, mutual openness and trust) by a single unit will lead to an increase in adoption of design thinking innovation approach.

5.4 Recommendations

The study recommends that teams should apply collaborative form of work relations when integrating design thinking and should also ensure that their teams comprise of team members from various disciplines; this will ensure that the teams can effectively brainstorm, share and test ideas.

Organizations should adopt the five steps of design thinking process which are; Understand, Observe, Ideate, Prototype and Test as an innovation approach because it improves the quality of products and solutions developed. The approach reduces the time taken to develop products and most importantly increase customer loyalty and satisfaction. This is because the intended user or the product or solution is involved from the beginning to the very end of the process. It's a simple approach but the management should invest in training the team in skills needed to excel.

The organization should also ensure that the design environment is creative, this is important because it acts as motivation to the employees and encourages collaborative and creative work, and it also encourages social interaction with the rest of the team members. This will encourage creation of innovation.

The organization should ensure maximum utilization of organization resources. This can be done by ensuring that the resources are used for the right purposes. The correct acquisition of material required. This will ensure successful implementation of the innovation.

5.5 Suggestions for further studies

The general objective of the study was to analyze the factors that influence adoption of design thinking innovation approach taking a case of Technology Hubs in Nairobi. The study generalized all Technological Hubs in Nairobi and therefore the study recommends further research to be conducted on factors that influence adoption of design thinking innovation approach in individual technology Hub to facilitate comparison of findings. Future study on the impact of the design thinking approach on performance of technology firms as well as across other industries will be necessary.

REFERENCES

Abernathy, W.J. & Utterback, J.M. (2013). *Innovation and the Evolution of Technology in the Firm*, Harvard University Press, Cambridge, MA,

Acklin, C., Cruickshank, L. & Evans, M. (2010). Challenges of introducing new design and design management knowledge into the innovation activities of SMEs with little or no prior design experience. E*uropean Academy of Design Conference - Crafting the Future*, 10.

Afuah, A. (2010). *Innovation Management*, New York, Open University Press.

Akinyemi, T. (2015). *All Hands on Deck: Why Hub Sustainability is a Complex Challenge that Requires a Systemic Solution, Medium*, retrieved from http://bit.ly/2iuBeKs.

Amit, R. & Zott, C. (2012). Creating value through business model innovation", *MIT Sloan Management Review*, 53(3), 41-49.

Amit, R., Zott, C., Massa, L. (2010). *The business model: Theoretical roots, recent developments, and future research.* Barcelona, Sage.

Beckman, S., & Barry, M., (2014). Innovation as a Learning Process: Embedding Design Thinking. *California Management Review*, 50(1): 25–56.

Behrendorff, C., Bucolo, S., & Miller, E. (2011). Designing Disruption – Linking Participatory Design and Design Thinking in Technology Orientated Industries. In *Proceedings of the 2011 Conference on Designing Pleasurable Products and Interfaces*, 53:1–53:8.

Berlyne, D. E. (1962). Uncertainty and Epistemic Curiosity. *British Journal of Psychology*, 53: 27-34.

Bersin, J., Solow M., & Wakefield, N. (2016). *Design Thinking: Crafting the Employee Experience.* Retrieved from: https://dupress.deloitte.com

Boland, R. J., & Collopy, F. (Eds.). (2004). *Design matters for management, in Managing as Designing*, Stanford University Press, Stanford, CA, 3-18

Boudreau, K. (2010). Open Platform Strategies and Innovation: Granting Access vs. Devolving Control, *Management Science*, 56(10), 1849-1872.

Braha, D., & Reich, Y. (2003). Topological structures for modeling engineering design processes. *Research in Engineering Design*, 14, 185–199.

Bronwyn, H., Hall, P. & Beethika, K. (2012) *New Economy Handbook,* University of California at Berkeley.

Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6): 84-92.

Brown, T. (2009). *Change by design*. New York: Harper Collins.

Brown, T. (2014). Design Thinking. *Harvard Business Review*, 86(6): 85–92.

Bucolo, S. & Matthews, J. (2010). *Using a Design Led Disruptive Innovation Approach to Develop New Services: Practicing Innovation in Times of Discontinuity*. Queensland University of Technology Brisbane, Australia.

Bucolo, S., & Matthews, J. (2011b). *Design Led Innovation – Exploring the Synthesis of Needs, Technologies and Business Models*. In *Proceedings of the Participatory Interaction Conference*, Sønderborg, Denmark.

Bucolo, S., Wrigley, C., & Matthews, J. (2012). Gaps in Organizational Leadership: Linking Strategic and Operational Activities through Design-Led Propositions. *Design Management Journal*, 7(1): 18–28.

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Business Models. Long Range Planning*, 43 (2-3).

Chesbrough, H. W. (2003). *The Open Innovation: The New Imperative for Creating and Profiting from Technology*, Harvard Business School Press: Boston, MA.

Chesbrough, H., & Schwartz, K. (2014). Innovating Business Models with Co-Development Partnerships. *Research-Technology Management*, 50(1): 55–59.

Cooper, D. & Schindler, P. (2011). *Business Research Methods*. 11th Edition, McGraw Hill, Boston.

Cross, N. (2012). Designerly Ways of Knowing. *Design Studies*, 3(4): 221–227. Kyffin, S., & Gardien, P. (2013). Navigating the Innovation Matrix: An Approach to Design-led Innovation. *International Journal of Design*, 3(1), 57–69.

Davies, J., Foxall, G. R., & Pallister, J. (2002). Beyond the intention-behavior mythology: An integrated model of recycling. *Marketing Theory*, 2 (1), 29-113.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13 (3), 319–340.

Davis, J., Foxall, G., & Pallister, J. (2002). Beyond the intention behavior mythology: An integrated model of recycling. *Marketing Theory, 2*, 29-113.

Dell'Era, C., A. Marchesi and Verganti, R. (2010). Mastering Technologies in Design-Driven Innovation. *Research Technology Management*, 2(2).

Dell'Era, C., A. Marchesi and Verganti, R. (2010). *Mastering Technologies in Design-Driven Innovation.* Research Technology Management March 2010.

Demil, B. & Lecocq, X. (2010). Business Model evolution: In search of dynamic consistency", *Long Range Planning*, vol. 43, n° 2/3, pp. 227-246.

Doğan, E. (2016). Effect of Innovation on Competitiveness. *Ekonometri ve İstatistik Sayı*, 24, 60-81.

Doorley, S. & Witthoft S. (2012). *Make Space. How to Set the Stage for Creative Collaboration.* Wiley, Hoboken, NJ.

Dunne, D., & Martin, R. (2006). Design thinking and how it will change management education, *Academy of Management Learning and Education*, 5(4), 514-523.

Economist Intelligence Unit (2015). Business 2010 – Embracing the challenge of change", *The Economist*, 34 pages.

Engberts, F. & Borgman, H.P. (2018). *Application of Design Thinking for Service Innovation: Current Practices, Expectations and Adoption Barriers*. Proceedings of the 51st Hawaii International Conference on System Sciences.

Fishbein, M & Ajzen, I. (2010). *Predicting and changing behavior. An introduction to theory and research.* Reading, MA: Wesley.

Gathenya, J., Bwisa, H., & Kihoro, J. (2012). *Entrepreneurial Strategic Planning Practices and Firm Performance among Women-led Small and Medium Enterprises in Kenya*. Unpublished Ph. D thesis, Jomo Kenyatta University.

Gliem J.A. & Gliem R.R. (2003) *Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales*. 2003 Midwest Research to Practice Conference in Adult, Continuing, and Community Education, Columbus, 82-88.

Gloppen, J (2009). Perspectives on design leadership and design thinking and how they relate to European services industries, *The Design Management Institute*, 4(1), 33-47

GSMA Report (2017). Africa: a look at the 442 active tech hubs of the continent. Retrieved from https://www.gsma.com/mobilefordevelopment/programme/ecosystem-accelerator/africa-a-look-at-the-442-active-tech-hubs-of-the-continent

Gulari, M.N. & Fremantle, C. (2015). Are design-led innovation approaches applicable to SMEs? *International Conference on Engineering and Product Design Education*, 3(4).

Gumienny, R., Jobst, B., Meinel, C., & Lindberg, T. (2015). *Is There a Need for a Design Thinking Process?* Proceedings of the 8th Design Thinking Research Symposium, (243-249), University of Technology, Sydney, New South Wales

Hager B., Yang A. C., Brady R., Meda S., Clementz B., & Pearlson G. D., (2016). Neural complexity as a potential translational biomarker for psychosis. *J. Affect. Disord*, 20, 1–11.

Hassi, L., & Laakso, M. (2011). *Design thinking in the management discourse; Defining the elements of the concept.* Paper presented at the 18th International Product Development Management Conference, Delft University, Delft, the Netherlands.

Hersman, E. (2012). *Afrilabs Provide a Model for African Innovation, Collaboration*. http://memeburn.com/2011/02/afrilabs-provide-a-model-for-african-innovation-collaboration/

Hesbrough H. W. (2006). *Open Business Models: How to thrive in the new innovation land-scape*, Harvard Business School Press: Boston, MA.

Kelley, T. (2001). *The art of innovation*. New York: Doubleday.

Kembaren, P., Simatupang, T.M., Larso, D. & Wiyancoko, D. (2014). Design Driven Innovation Practices in Design-preneur led Creative Industry. *Journal Technology Management Innovation,* 9(3), 91.

Köppen, E. & Meinel, C. (2015), "Empathy via Design Thinking: Creation of Sense and Knowledge", In:Plattner, H., Meinel, C. and Leifer, L. (Eds.), *Design thinking research: Building innovators, Understanding Innovation*, Springer International Publishing, Cham, pp. 15–28.

Kothari, C.R. (2009). *Research Methodology: Methods and Techniques*. New Age International, 401.

Lee, M. H. & Wang, C. H. (2014). Develop Students' Future Imagination and Ability to Create—Introduction to IDEO Design Thinking Model. *Taiwan Educ. Rev*, 6, 28–30.

Liedtka, J. (2017). Evaluating the Impact of Design Thinking in Action. *Academy of Management Proceeding, 1*(1).

Liema, A. & Brangierb, E. (2012). Innovation and design approaches within prospective ergonomics. *Management Journal*, 41, 5243-5250.

Lindberg, T. (2012). *On the Perception, Adoption and Implementation of Design Thinking in the IT Industry.* In H. Plattner, C. Meinel and L. Leifer (Eds.), Design Thinking Research. Studying Co-Creation in Practice (229-240). Berlin: Springer

Manyika, J., (2013). *Manufacturing the future: The next era of global growth and innovation.* New York, NY: McKinsey Global Institute. Retrieved from http://www.mckinsey.com/business-functions/operations/our-insights/the-future-of-manufacturing

Martelaro, N., Nneji, V. C., Ju, W., & Hinds, P. (2015). *Tell me more: Designing hri to encourage more trust, disclosure, and companionship*. Paper presented at the Eleventh ACM/IEEE International Conference on Human Robot Interaction.

Martin, R. (2007a). Design and business: Why can't we be friends? *Journal of Business Strategy*, 28(4), 6-12.

Martin, R. (2014). Design and Business: Why Can't We Be Friends? *Journal of Business Strategy*, 28(4): 6–12.

Martin, R.L., (2010). *The design of business: why design thinking is the next competitive advantage.* Harvard Business Press.

Mckeown, M (2012). The Truth about Innovation. Pearson / Financial Times. ISBN 0273719122.

McKinsey Global Institute, Big data (2013). The next frontier for innovation, competition, and productivity.

Meeker, M. (2015). *Internet Trends 2015*. Available at http://www.kpcb.com/internet-trends.

Meinel, C., & Leifer, L. (2015). *Introduction.* In H. Plattner, C. Meinel, &L. Leifer (Eds.),Design thinking research Building innovation eco-systems(pp. 310). Cham: Springer.

Moalosi, R. (2016). Assessment of Design-driven Innovation within Botswana's Small Creative Industries. *International Journal of Cultural and Creative Industries*, 3(2), 54-67.

Mugenda, O.M. & Mugenda, A.G. (2003) Research Methods, Quantitative and Qualitative Approaches. ACT, Nairobi.

Nafula, K. M. (2017). *Effect Of Innovation On Firm Competitiveness: A Study Of Small And Medium Enterprises In The Manufacturing Sector In Nairobi City County, Nairobi*. Unpublished Thesis, University of Nairobi.

Newsom, J.T. (2012). A multilevel structural equation model for dyadic data. *Struct. Equ. Model*, 9, 431–447

Niedderer, K., Ludden, G., Clune, S. J., Lockton, D., Mackrill, J., Morris, A., Cain, R., Gardiner, E., Evans, M., Gutteridge, R., & Hekkert, P. P. (2016). Design for behaviour change as a driver for sustainable innovation: Challenges and opportunities for implementation in the private and public sectors. *International Journal of Design*, 10(2), 67-85.

Noweski, C., Scheer, A., Bùttner,N., hienen,J., Erdmann,J. and Meinel,C.(2012). *Towards a Paradigm Shift in Education Practice: Developing Twenty-First Century Skills with Design Thinking*, H. Plattneretal(eds.), Design Thinking Research, Understanding Innovation, 71:94.

Paulus, P.B. (2000). Groups, Teams and Creativity: The Creative Potential of Idea-Generating Groups. *Applied Psychology*, 49(2), 237-263.

Peine, K., Wentzel, D. & Herrmann, A. (2012). Getting better or getting worse? Consumer Responses to decreasing, constant, and ascending multi-dimensional Price Profiles, *Review of Managerial Science*, 6(1), 81--101.

Plattner, H.; Meinel, Ch. & Weinberg, U. (2009). *Design Thinking Innovation*. lernen, Ideenwelten öffnen. München.

Price R. Wrigley C. & Matthews J. (2017). *Design-led innovation and sense making: opportunities to connect.* Design management academy conference.

Price, R., Wrigley, C., Matthews, J. & Dreiling, A. (2014). *Design Research for the real world: A Design-led Innovation Model for Action Research*. Thesis, Queensland University of Technology.

Reine, P.P. (2017). The culture of design thinking for innovation. *Journal of Innovation Management*, 5(2), 56-80

Rogers, E. M. (1995). *The Diffusion of innovation* (4th. ed.). New York, NY: Free Press

Smith, J. A. (2004). Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative research in psychology. *Qualitative Research in Psychology, 1*, 39-54.

Teece, D. (2010): Business Models, Business Strategy and Innovation. *Long Range Planning* 43 (2-3), 172–194.

Thagard, P. & Shelley, C., (2014). Abductive reasoning: Logic, visual thinking, and coherence. In M. L. Dalla Chiara, ed. *Logic and scientific methods*. Dordrecht: Kluwer, 413–427.

Thoring, K., & Müller, R. M. (2011a). *Understanding Design Thinking: A Process Model based on Method Engineering.* International Conference on Engineering and Product Design Education, City University. London, UK.

Thoring, K., Luippold, C., & Mueller, R. M. (2012b). *Where do we learn to Design? A Case Study about Creative Spaces.* Proceedings of the International Conference on Design Creativity (ICDC2012), Glasgow, UK.

Townson, P. (2014). *The emergent imperatives from a design-led innovation engagement within the mining industry.* Unpublished Thesis, Queensland University of Technology.

Townson, P., Matthews, J. and Wrigley, C. (2016) Outcomes from Applying Design-Led Innovation in an Australian Manufacturing Firm. *Technology Innovation Management Review*, 6 (6).

Van Akkeren J. and Harker, D., (2003). The mobile Internet and small business: An exploratory study of needs, use and adoption with full-adopters of technology. *Journal of Research and Practice in Information Technology*, 35(3), 205-220.

Verganti, R. (2008) Design meanings and radical innovation: A meta model and a research agenda. *Journal of Innovation Management* 25: 436-456.

Verganti, R. (2009). *Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean.* Boston, MA: Harvard Business Press.

Verganti, R. (2011) Radical Design and Technology Epiphanies: A New Focus for Research on Design Management. *Journal of Product Innovation Management* 28 (3), S. 384–388.

Wrigley, C., & Bucolo, S. 2012. New Organisational Leadership Capabilities: Transitional Engineer the New Designer? In *Leading Innovation through Design: Proceedings of the DMI 2012 International Research Conference:* 913–922. Boston, MA: DMI.

APPENDICES

STRATHMORE BUSINESS SCHOOL

Dear respondent,

The aim of this questionnaire is to gather information on **"Factors influencing the adoption of design thinking innovation approach in Technology hubs in Nairobi"**. Your responses will be beneficial to the researcher as they will help in accomplishment of her academic requirements. I kindly request you to provide honest responses. Confidentiality of the information provided will be observes and will only be used for academic reasons. Do not indicate your name in the questionnaire. Provide the most appropriate response to each item.

Appendix 1: Questionnaire

Kindly tick appropriately

Section A: Demographic Information

1. What is your role in the organization?

   ……..

2. How long have you been working in the organization?

   [ ] Less than 1 year

   [ ] 1- 6 years

   [ ] 7 -9 years

   [ ] Above 10 years

3. Has your organization adopted design thinking innovation approach? (Empathize, Define, Ideate, Prototype, Test)

   [ ] Yes

   [ ] No

4. If Yes, how long have you used the design thinking approach in your organization?

   [ ] Less than 1 year

[ ] 1- 6 years

[ ] 7 -9 years

[ ] Above 10 years

5. As an individual, how long have you used or practiced the design thinking approach?

   [ ] Less than 1 year

   [ ] 1- 6 years

   [ ] 7 -9 years

   [ ] Above 10 years

Section B: Factors influencing the adoption of Design thinking Innovation Approach

6. On a scale of 1-5, with scale 1 being – strongly disagree, 2- disagree, 3- moderate, 4- agree, 5- strongly agree, please indicate the degree to which you agree to the following statements on the factors that have influenced the adoption of design thinking innovation approach in your organization.

   I. **Design Team**

Statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
We have a strong team made up individuals from multi-disciplinaries and or various departments.					
Each team member brings diverse skills to the design team					
We have a lead facilitator to facilitate the design discussions.					
The facilitator also ensures the team is focused on the tasks.					
I prefer working with a small design team while solving a design challenge/ problem					

I prefer working with a large design team while solving a design challenge/ problem					

II. **Design Thinking Process**

Statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Design thinking methodology helps me to empathize with users					
Design thinking tools help the team clearly define a challenge or problem statement					
Design thinking process helps the design team generate innovative ideas that solve users' needs.					
The design thinking process helps the team with tools to build and test prototypes.					
Design thinking process encourages collaborative work style in my organization					
Design thinking process helps the team design and develop meaningful products and solutions					
Solutions / Products developed through design thinking approach have increased customer value satisfaction and loyalty					
Solutions / Products developed through design thinking approach have increased quality of product developed / solutions designed					
Solutions / Products developed through design thinking approach have reduced the time to develop products/ designed solutions					
Design Thinking Process Usability					
I find the design thinking process simple					

I would still use design thinking to address similar and/ or different problems					
I imagine that most people would need training support to use design thinking methodology.					
I find the various stages in the process are well integrated					
I think there are too much inconsistency in design thinking process					
I imagine that most people would learn to use the design thinking process very quickly.					
I find the design thinking process very awkward to use					
I feel very confident using the design thinking process.					
I needed to learn a lot of things before I could get going with this methodology.					

III. **Creative Design Environment**

Statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
My organization provides a conducive creative environment to practice design thinking					
There is a democratic decision process when it comes to decision making on ideas and project					
I feel that there is mutual openness and trust among my design team members.					
My organization encourages experimental ideas to solve challenges regardless of the risks involved.					
The design space in the organization motivates and encourages creativity with multi colors and floor designs					
My organization invests in my design thinking knowledge by providing learning materials,					

books, training and /or certifications.					

IV. **Organizational Resources (Human, Capital, Monetary and Raw Materials)**

Statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
My organization invests in my design thinking knowledge by providing learning materials, books, training and /or certifications.					
My organizations top management embraces design thinking innovation approach as an organizational strategy					
My organization provides materials required in design thinking sessions such as design rooms, stationaries.					
My organizations top management provides financial or monetary support for design thinking.					
My organization provides incentives for innovations or solutions address business problems or create new business for the organization.					

Section C: The extent of the adoption of Design thinking Innovation Approach

7. How often do you hold design thinking workshops / design sprints in your organization?

   [ ] Always

   [ ] Usually

   [ ] Sometimes

   [ ] Rarely

[ ] Never

8. How many solutions/ products have you developed using the design thinking innovation approach? (*Products / solutions that have been launched in the market*)
   [ ] Less than 5
   [ ] 6- 10 solutions
   [ ] 11 -20 solutions
   [ ] Above 20 solutions

9. Of the above mentioned, how many were solutions toward:
   Improving current existing organizational problems …….
   New solutions to new challenges ……

10. Are there other factors that have influenced the adoption of design thinking in your organization. Please state them:

……

……

THANK YOU FOR YOUR PARTICIPATION

Appendix II: Interview Guide

The interview guide is used to collect data from the end user representatives who are key team players to the design thinking process. The main purpose for the interview is to understand their role in the process and perceived usefulness of the product/ service and the process.

1. Tell me about your self
2. What was your role in the design process?
3. Do you think your role was key to the product and service?
4. Do you think the team appreciated your role and understood your needs?
5. Were your needs met in the developed product or service?
6. Would you use or Do you use the product?
7. Would you recommend the product or service to other users?

Appendix III: List of Technology hubs

Source: (GSMA report, 2017)

1. iHub Innovation
2. m:Lab East Africa
3. Growth Africa Hub
4. NaiLab
5. Nairobi Garage
6. iBiz Africa
7. C4D Labs
8. iLab Africa
9. FabLab Nairobi
10. 88 MPH/ Startup Garage
11. Spring Accelerator

Other Technology Hubs in Nairobi

1. Safaricom Alpha
2. I&M Digital Factory
3. The Hive Cooperative Bank