

**TECHNOLOGICAL INNOVATION AND COMPETITIVE
ADVANTAGE OF M-KOPA SOLAR (K) LTD**

ERIC A. OLOO

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DECLARATION

This proposal is my original work and has not been presented for a degree in any other University.

Signature: _____

Date: _____ -

ERIC A. OLOO

D61/77230/2015

This Project has been submitted for examination with my approval as University Supervisor

Signature: _____

Date: _____

DR Muya Ndambuki

Department of Business Administration,

School of Business, University of Nairobi

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DEDICATION

To my Dad, you are my daily reminder of all that is good in this world

To my fiancé Judith, for allowing me to take this path of self-actualization

To all my Siblings for being always there for me and for your never-ending support

ABSTRACT

Today's business environment is fast changing, due to increasing globalization and rapid growth of the technologies, a change that makes organization to become more innovative in order to sustain their level of competitiveness. Technological innovation is one such strategy that an organization can adopt to shore up its competitiveness. The objective of the study was to determine the influence of technological innovation as a source of competitive advantage to M-KOPA Solar (K) Ltd. Towards the realization of the research objective; the researcher employed a case study research design in which specific informants that were deemed knowledgeable on the research subject matter were interviewed. The interviewees consisted of one director, chief managers, Project implementers, business development manager, Marketing manager and field manager. In total, the researcher interviewed six informants and the analysis was undertaken using a content analysis technique. The research findings suggest that M-Kopa recognizes customers as an important source of innovation knowledge and that majority of their technological innovations result from both internal and external stakeholders. The major technological innovations that have been adopted by the firm, and which have resulted in the firm increased level of competitiveness include solar energy generated LED lights, SIM card embedded in the M-Kopa control unit and the flexibility of the mobile payment system like the M-Pesa. Generally, the findings reveal that indeed adoption of technological innovation by M-KOPA Solar had resulted in improved performance of the firm which can be attributed to improved competitiveness. The study was limited in terms of the informants and it will be suggested that more interviewees should involved in future studies. The research recommends that training on applicability of innovation strategies should be planned to equip the project staff on the usefulness of technological innovation tools to improve the realization of organization objectives. In addition, the research reinforces to gain stakeholder support in a firms technological process to limit resistances during implementation.

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ABBREVIATIONS AND ACRONYMS

DIO	-	Diffusion of Innovation
ERC	-	Electricity Regulation Authority
IC	-	Innovation Capabilities
IT	-	Information Technology
NSE	-	Nairobi Security Exchange
SHS	-	Solar home systems
SME	-	Small and Medium Enterprises
TAM	-	Technology acceptance model

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Today's business environment is fast changing, due to increasing globalization and rapid growth of the technologies, a revolution that triggers organizations to develop advanced innovative strategies with the aim of sustaining their level of competitiveness. as a result of increasing environmental technological change, firms have engaged themselves in different innovative frameworks that will result in emergence of new ideas and concepts of production bringing technological change that will enhance long term competitiveness in a business line that they are engaged in (Bhide, 2010). However, Koelleger (2013) point that, strategic implementation of new innovation, for example IT, is perceived as a way of simplifying organizational production or functional process given that implementation of the technology in successful and that effective monitoring and evaluation system on the process has been set up, changing the normal way of conducting routine business in the firm facilitating complete manipulation of the system for the benefit of the organization. He further posits that newly technological advancement and its implementation can facilitate creation of new products and services if it is properly implemented to serve the correct purpose in an economical manner that an organization will fully harness its benefits and finally improve the general profitability and customer satisfaction since the products and services produced with high level of technology is perceived to be of higher quality that will meet the desires of consumers. Hence, adoption of technology and innovation process in a firm are related and their effective combination will create a necessary level of competitiveness to a firm.

Based on competitive advantage, the theory of capability-based of proposes that a company can attain justifiable competitive advantage from unique competences possessed by the company (Grant, 1991), in addition, a company must re-invest constantly to expand and uphold prevailing competences with the aim of inhibiting imitability. From the resource-based theory point of view, competitive advantages is determined by the nature of heterogeneous resources that a particular firm possesses independently (Montgomery & Wernerfelt, 1988). Accordingly, organizational capabilities including the ability to innovate new products and services are viewed as a resource that if well harnessed will create the necessary competitiveness to the firm. Koelleger (2013) however, opine that an important element in this association is entrepreneurial strategic decision maker of a company. M-KOPA Solar is presently operating in a market that has received new entrants to make the Kenyan market competitive and the only way for these firms to maintain their market shares and at the same remain relevant in the ever evolving solar market is to introduce new products into the market that meet customer needs.

In such a market, adoption of appropriate technology and innovations are the key determinants of competitiveness and for the firms (Hussin & Suhaimi, 2011). As the managing director of M-KOPA solar observed in the 2015 annual report, technological and innovation processes are essential in the firm because it generates growth, long-term stability, sustainable performance shareholder returns, and continue being at the front line of the organizations' industry. This position is in line with made earlier by Hamel and Prahalad (2004) to the effect that innovations in organization result to a collaboration of incorporation of capabilities and skills when challenging for the prospective market and

that effective management of technology and innovation is the ultimate process in which the owners or management board or directors decide which technologies are needed and how to develop technological capabilities to make new products or services and at the same time to enhance organization competitiveness.

1.1.1 Concept of Technology

Technology adoption in the innovation process denotes the activities that allow an organization to obtain new technology and ideas from the external sources with the aim of creating new and advanced quality products (Gassmann, 2006). He further posits that newly adopted technology acts as a tool that facilitates establishment of innovative products and services from the viewpoint of the company that has implemented if it is effectively utilized in delivery of service or production process in a system that is innovative and that has not been used within the company before.

A firm that implements and gears new online shopping or collaborates with existing business entity operating in a different product line ordinarily alters the normal operating process and the manner in which incoming transactions are executed. Through implementation of new strategies that is adopted by firms valuing and appreciating technological advancement, researchers have termed it as an evolving innovation process in that services are delivered while products are manufactured in a new approach that needs less force but results in high quality products and services. Von Hippel (2011) note that investors in technological sector and successful implementation of the system for instance IT system facilitates establishment of new concepts that will enhance innovation in terms of production enhancement or capacitating an organization to migrate into digital approach of production.

Expenditure or investment on technological system that its impact does not benefit the company in terms of profitability and ease of production process is regarded as sunk costs, a system that will not expand corporate performance. The capacity of an organization to shift technological investments into innovation strategies has a chance of being affected by specific resources of firm for instance previous technological investments, competence, managerial skills, experience, and availability of technical specialists.

1.1.2 Innovation Process

Pavitt (2005) delineates innovation as the adoption of a significantly improved or completely new approach of marketing technique, or a new structural system in business platforms, external relations or workplace environment. Consequently from this characterization, the least prerequisite for effective innovation process is that the method of processing, production, marketing or monitoring and evaluation must be unique to the company. However, various research results and findings have found strategic importance from utilization of technological process and innovative production process that was established by researchers in the field of technology. In addition, the process of innovation begins from different angles such as adopting new ways of production, marketing and gauging new business approaches from lines of production that are effective and register high profitability and integrate the same approach to production lines that has low financial performance (Biemens, 2012).

Innovation made by firms are driven and determined by various factors in the environment including customer-supplier relations; market conditions; network studies, market conditions and external knowledge infrastructures (Nelson, 2013). Apart from the

external factors, internal factors such as cultural factors, structural links, internal competencies and retaining an internal consciousness of the significance of inventiveness to innovation may help improve innovation efforts of a company. Ancona and Caldwell (2012), observed that competitive innovations processes have been found to yield: improved quality of products; establishments of new markets; increase in product variety; reduction of costs associated with labor; enhanced processes of production; reduction in input requirement; minimized environmental impairment; replacement of services/products; low consumption of energy; and conformity to rules and regulations.

This position can be said to be true in the case of Safaricom, a firm which came into the market after other players and has established itself as a market leader. This position has not come from a sheer luck but through the firm being able to develop products that appeal to the customer all the time round. Reduction in cost is additionally a noteworthy effort for advancements, especially as far as upgrades to logistics, production, and the processes of retailing are concerned. At the point when shoppers decrease their spending in times of financial subsidence or over-supply, obviously, organizations can't depend on 'business as usual' procedures to endure.

1.1.3 Technological Innovation

Various research work have characterized technological innovation as a concept that entails establishment of new services, products and process of production; it is associated with rudimentary undertakings and can focus on either the whole process or a particular product. Technological innovation essentially gives the significance of enhanced technological change/ novelty facilitating economic benefits for organizations.

Technological innovation comprises of both effective commercialization of a process and technological discovery (Atalay, Anafarta & Sarvan, 2013). Technological innovation is acknowledged as a motivating factor for realizing a sustainable competitive advantage and giving firms the ability of developing strategic competences to handle the heightened uncertainty and dynamism of the business atmosphere (Burgelman et al., 2009). Technological innovation is deliberated based on the outcome of technological process. Innovation process may consist of amalgamation of prevailing technology and discoveries to create an improved or a new system, process or product (Diaconu, 2011).

Innovative approaches that focus on improvement of existing system of production involves improvement, modification and alteration, of prevailing services and products and/or systems of delivery and production, thus enabling them to be pre-emptive and adaptable to changes from external forces and attain competitive achievement (Burgelman et al., 2009). Even though technological innovation is a significant factor for the competitiveness of an organization in the worldwide competitive atmosphere, it might be a complex idea to advance technological innovation for these companies. Technological innovation originates from a diverse research and development works the processes of technological development and is subject to various aspects influencing external and internal resources of companies.

With the aim of managing high competitiveness among competing firms and the various challenging business dimensions in telecommunication sector, it is significant to establish an enhanced strategic plan that powerfully replicates an expansion in organizational

performance. The sector is also experiencing hasty technological modifications and is presently in the position that requires strategic technological innovation so as to realize competitive advantage (Diaconu, 2011). In order to consider a service as technologically innovative, its features and approach of application should in one or the other way be completely unique or have to be considerably enhanced qualitatively basing on their utility function and the general performance. A technologically innovative product or service might encompass the application of fundamentally new innovative strategies, an amalgamation of new knowledge or pre-existing technologies.

1.1.4 Competitive Advantage

Philip (2010) characterized competitive advantage as a service or product that the customers of a company receives that are of higher quality compared to similar products and services from a different company. Competitive advantage is the capability of a company to inhabit a greater locus in a business environment and outdo its competitors on the principal profitability objective and the general organizational performance. The superior competitive spot of a firm enables it to realize higher productivity than the average rate of productivity of the entire industry (Porter, 1985). Companies endeavor to endure and prosper in market competition by adopting strategies that allows them to carry out organizational activities in a better way than their rivals. Annavarjula and Mohan (2009) described competitive advantage as existence of justifiable measures of production that cannot be imitated easily by competitors. Annavarjula and Mohan (2009) highlight that there are two categories of competitive advantage: sustainable and temporary competitive advantage.

Consequently, the benefits of having competitive advantage results in realization of greater organizational profitability which in turn will attract the attention of competitors into the same line of business and production resulting into stiffer competition reducing the viability of a competitive advantage leading to temporary competitive advantage. Alternatively, the competitive advantages of organizations are viable if players in the same service or production sector are incapable of imitating the basis of advantage or if no one considers generating or delivering improved product or service (Annavarjula & Mohan, 2009). Competitive advantage is the tracking down of a competitive position in a business, the essential sphere that will strategically place a firm to counter competition appropriately. Competitive advantage leads into higher organizational performance that comprise: improved financial performance; greater satisfaction of customers; market share; and customer loyalty (Miles & Covin, 2013).

Researchers have proposed three possible factors that may result in long term organizational competitiveness which is in conjunction with Porter (1985), which are focus, differentiation and cost efficiency. Competitive advantage may come from diverse point of view. With regards to Porter (1985), a company can attain an advanced profit margin (or probable profit) over a competitor in one of two techniques: moreover it provides an indistinguishable service or product at a reduced cost, in any aspect the organization owns a cost advantage; but again it can offer a service or product that is distinguished in the way that the consumer is in a position of paying a price premium that surpasses the extra expense of the diversity benefit. As soon as it is recognized, competitive advantage is susceptible to attrition by business rivals. This ascends since a

firm that has achieved competitive advantage receives advanced profits margin (Shan & Jolly, 2012).

1.1.5 Solar Industry in Kenya

Kenya has a handful resources of solar energy. The daily solar insolation on average is projected to be within 4-6 kilowatt hours per square meter, making it being regarded as one of the finest electric energy production from the solar system in the whole sub-Saharan region of Africa (ERC, 2014). Contingent on the efficiency of conversion system of solar modules, 10-14% of this energy can be transformed to electric power though there is existence of seasonal and regional changes in the country's solar resources.

With regard to the annual report of Kenya Power and Lighting Company (2015), an effective private sector is present, specifically with the small-scale PV market and it is projected that more than 320,000 households in rural areas (4.4% of rural inhabitants in Kenya) possesses a home solar systems as at the end of 2014. Various research findings highlight that more than the sated figure, bearing in mind the establishment of low cost of solar lamps in recent times. From the national statistics, it is indicated however that the sales of solar PV lantern have gone high to approximately 1,000,000 units in 2014. The total solar power capacity installed is projected at 16MWp as of 2012 in that the gigantic geographical area is comprised of solar home systems connected at distinct households. Statistics from the Energy Regularity commission (ERC) of Kenya indicates that the total volume of installed solar system is expected to be more than 20MWp as of January 2016.

Solar home systems (SHS) are normally purchased by individual households and immediately installed to provide electricity for powering radios and TV as well as lighting. In Kenya, SHSs are typically advertised over the counter. The sector is very competitive due to the large number of players. Ranging from M-kopa solar, D-light, Mobisol, Azuri and Bbox. The SHS market in Kenya is assumed to have existed principally due to motivation by the private sector, predominantly from the early the 1990s. Whereas donors from international sources have been lively in diffusion of solar home systems, the role played by the Government has been moderately restricted. Amongst the development organizations and donors, GTZ and the World Bank were significant actors. In the year 2013, SHSs market contributed more than 80% of the aggregate solar PV volume in the market. Eight off-grid kiosk lighting or solar stations and stations for charging mobile-phone were established in recent times.

1.1.6 M-KOPA Solar (K) Limited

M-KOPA SOLAR Kenya Ltd develops and markets solar home systems. It offers solar systems with three lights, phone charging, and a solar powered radio. The company sells its products through dealers and retail shops Kenya. M-KOPA SOLAR Kenya Ltd was founded in 2010 and is headquartered in Nairobi, Kenya. M-KOPA SOLAR Kenya Ltd operates as a subsidiary of M-Kopa, LLC. It is run using a control box, which contains a GSM module, through which customers can buy credit for their power using mobile money transfers. The firm that was established by the initiators of mobile money service provider in Kenya, M-Pesa, is affiliating with the producer of solar product d.light to reduce the price value of solar power and make it reasonably priced for Kenyans living in rural areas and to bring a solution to the last-mile vast problem of availing significant

services and goods to isolated, rural societies. Clients pay US\$35 as a deposit and make a daily payment of 45 cents for a year using a mobile money service, such as M-Pesa. If the customer stops payment, M-Kopa can switch off his or her system remotely. Most of M-Kopa customers live on less than US\$2, but this price, 45 cents a day, is still affordable and cheaper than kerosene in the long run

As of May 2017, M-KOPA has, since its establishment, done solar power connection over 500,000 households to cheap solar energy with 500 newly established households being added on a daily basis. Current customers will make projected savings of US \$ 375 million in four subsequent years. M-Kopa says that the company will connect a million houses to its solar system by the end of 2017 and it looks like they are well on their way to achieving this goal. The customers of M- KOPA will benefit from 62.5 million of kerosene-free system of lighting every month. M-KOPA hires 1,000 full time staff and 1,500 sales representatives in entire East Africa.

The reason behind the rapid expansion of the solar system witnessed in the last half a decade is a result of private sector's competitiveness in marketing strategy even though the government does not give the necessary support. Nevertheless, from 2005, there the Government through the ministries of devolution and energy-rural electrification department, has expressed growing attention for solar energy by facilitating accessibility of electricity in remote areas through PV panels particularly to health facilities and boarding schools located in remote regions. Out of 3000 public and private institutions in rural areas, nearly 450 have been fortified with solar PV schemes, 220 primary and

secondary schools have been connected with separate solar PV having a total capability of 574.22 KWP at a projected cost of 6.16 million Euros.

1.2 Research Problem

A firm's strategic pursuit of progression as a result of creation of new services and products as well as advancement of existing products in an economical advantage in organizations since it facilitates greater financial performance for instance superior profit margins, augmented streams of income and advanced cost of stock. Unluckily, the high level of ambiguity that goes together with innovation, and the extent of menace is frequently experienced in that the top management team discusses innovation dimensions lightly since they will not make an effort of implementing discussed technological dimensions and establish its routine impact on organizational performance hence the available resources both capital and human may be inappropriately distributed or fail to be manipulated completely in order to bring innovation into being (Koelleger, 2013). However, since most firms have engaged in cost-competitive and economical way of production with the aim of enhancing organizational profitability, the factor that should be put into consideration as far as profitability is concerned should be active and strategic innovation process because advancement in technology will give firms the capacity of creating new products and services enhancing sustainable market competitiveness. In the event that the logical innovation strategy is properly implemented, organizational competitive advantage can be geared and realized before competing firms implement the same technology (Pucik, 2008). Therefore, the prominence of new innovations and technologies for growth and competitiveness is a truism among the researchers, policy makers, and management team. Nonetheless, not all new innovations and technologies

result in organizational success. As a result of the increased number of innovations varieties and technological prospects that provides alternatives for companies to select the one that suits appropriately its system, Teece (2009), highlight that it is necessary to distinguish innovative technologies and activities that have the likelihood of spearheading the organization towards progressive growth and long term competitiveness.

The low electricity distribution in Kenya has seen many homesteads rely on kerosene as a mode of lighting. This however changed with the innovation of M-KOPA solar that has seen huge uptake of the solar system by the rural homesteads due to its flexibility in payment. However, in the last decade, there has been increased number of new entrants to the solar energy sector in Kenya. From D-light, M-kopa solar, Azuri, Bbox and Mobisol, the solar home system (SHS) market in Kenya is assumed to have been driven principally by the private entities, precisely from the 1990s. The increased number of solar energy providers in Kenya calls upon established firms, such as M-Kopa solar to introduce more strategies to remain competitive in the changing Kenyan business landscape. One of the policies that can be implemented by the firm to maintain its competitive advantage is technological innovation. Consequently various studies have been conducted both internationally and locally on the influence of technological innovation strategy on firm competitiveness.

Urbancova (2013) investigated the factors that facilitates competitive advantage through knowledge and innovation among the Czech Republic SMEs. Primary data was collected and the findings show that unavailability of suitable workforce having appropriate

experience and knowledge makes it difficult to attain the necessary innovation standard. Similarly, the research found that there is need for establishment of correct organizational culture in the organization to back up constant innovation for effective realization of firm competitiveness. Camisón and Villar-López, (2014) investigated the how organizational innovation acts as a catalyst that facilitates technological advancement and the general organizational performance. The study results reaffirm that organizational innovation enhances the growth of technological innovation and that both technological capabilities and organizational innovation for products and processes can lead to superior firm performance. Dodgson (2018) investigated on the effect of technological partnership in an industry basing on internationalization, policy and strategy in innovation. The study found that information technology and management skills have had the greater influenced on level of innovation collaboration between firms.

Mwangi (2007) researched on the factors that affects financial innovation in Kenyan securities market; a case study of listed companies at the NSE. In his study, he found out that companies that yearn for competitive strategy based on innovation construct and foster unique market-focused knowledge competences that consequently allow such organizations to outclass their rivals by establishing greater value addition and product satisfaction to their customers. Odhiambo (2008) researched on innovation strategies at Standard Chartered (k) ltd and found that for firms to be innovative it should encourage creativity in its learning process and this will lead to an advanced policy of quality and innovation: inventive value innovation and quality improvement. Gathai (2009) undertook a research on the Innovation strategies adopted by Equity bank ltd and found

that in order for a firm to embrace innovation, and then the top management should be involved and direct resources to the team involved in the innovation processes. As can be evidenced from the above studies, there has been no research on the management of innovation and technology as a source of competitiveness. This therefore leads to the following research question; how does technological innovation influence competitive advantage of M-Kopa Solar?

1.3 Research Objectives

To establish the influence of technological innovation on the competitive advantage competitive advantage of M-Kopa Solar (K) Ltd.

1.4 Value of the Study

The management of M-KOPA Solar may benefit from the study since they might be able to gain more insights concerning the competitiveness of their company's innovation processes and also be able to identify the challenges facing innovation in the firm and possible ways of mitigating them. The organization might be able to reinforce those innovation-based capabilities and competitive strategy that could consequently give such firms the capacity to outperform their rivals by generating higher value to their customers.

To other competitors in the energy sector in Kenya, they may learn crucial hints pertaining to the competitive innovations processes at M-KOPA Solar Ltd and how to adopt some of these strategies in their organizations. In the present competitive business environment, market intelligence on what other competitors are doing is a valuable source of information and a strategic tool material.

To the government, this research might form an invaluable source of reference especially the ministry of energy in coming up with policies to guide the energy sector, especially that firms engaged in harnessing renewable energy, in the development of new products. The need to notify competing firms on new products that might change tariffs is one such case that the research may form an invaluable source on how to manage such policies since it will affect the phase of innovation.

To Scholars: The present study is anticipated to intensify the existing body of knowledge and literature that could provide the referencing basis for future scholars intending to study the service industry and position them strategically in order to understand how competitive innovation processes at Safaricom can act as a competitive advantage tool in the service industry.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents relevant literature review gathered in relation to the study. Key areas of literature that will take a center stage in this section comprise of theoretical framework and the various forms of Innovation. The study will further put into context the relationship between management of technology and innovation as a source of competitiveness.

Literature on the innovation process and its various principles will be covered. Specifically earlier studies on innovation process and its effect on a firm competitiveness will be discussed. The theories that are considered relevant to the study, namely; diffusion of innovation theory and technology acceptance model will be discussed as well as their relevance to the study. The chapter will also discuss the various facets that innovation process in a firm can take.

Lastly, the chapter will discuss the various empirical studies undertaken on how innovation process affects firm competitiveness. The effect of how the various innovation process affect firm level of competitiveness is also discussed whereupon various studies on the area has been carried out. Similarly the chapter ends with an exit paragraph.

2.2 Theoretical Foundation

This section scrutinizes the existing theories that are relevant to the present study. The study will be anchored on the Diffusion Innovation Theory and the Technology Acceptance Theory. These are discussed below.

2.2.1 Diffusion Innovation Theory

Diffusion of Innovation (DOI) Theory was advanced by Rogers in 1962 and elaborates how, within a time interval, a concept gains momentum and spreads by means of social platforms. The final outcome of the spread of this idea is that firms, leaving behind the social platform, incorporate a new concept, such as electronic purchasing that is associated with specific benefits. The end result of the adoption process is that a person does something in a unique manner as opposed to the routine way of operation, for example employing a different purchasing procedure. Rogers (2003) further suggest that for diffusion to take place, a person must perceive the new idea, behavior, or product as innovative and is going to improve its current operations.

According to Li and Atuagene-Gima (2011), the diffusion process encompasses four key elements namely; the staunch prevailing company relationship, the time factor, channels that the concept of innovation will be disseminated and innovation concept itself. The theory further postulate that over the entire dissemination or diffusion process, various features of channels of communication, innovation and the social platform may necessarily have varying degree of impact on diffusion process at different time interval. Consequently, as a result of varying process of diffusion, there is need for alignment of

strategies to meet and move according to the rhythm of prevailing market position that matches the phase of diffusion process. Thus, the theory contemplates that the adoption of innovation technique will be based on the ability to offer clear and consistent results that other measures of innovation may not provide (Greenhalgh, 2004).

Adoption, implementation and diffusion of innovation technique will result into utilization of innovations at M-kopa solar (k) ltd which is one of the tenets that is brought up by assimilation of technology (Hager, 2006). Therefore, assimilation of innovation can be understood better because the theory of diffusion of innovation elaborates the critical theoretical foundation of adoption of innovative measures in the field of research on areas such as information systems. The theory of diffusion of innovation highlight that the factors that affect innovation implementation process include compatibility, relative advantage and convenience of the innovative technology which in turn influences significantly the degree of customer satisfaction, the lead time and minimizes the procurement cost. Therefore, M-kopa solar (k) ltd. innovation activities support improvement in firm competitiveness and profitability.

2.2.2 Technology Acceptance Model

Technology Acceptance Model (TAM) is pioneered by Davis (2009) and extends the works of the theory of reasoned action and postulates that external organizational factors such as the development process that a firm is undertaking, training process and system characteristics affects the intension to use a particular technology and this decision is mediated by perceived convenience and utility function of the technology to the system of operation. The intension of a user to incorporate these technology strategies is

dependent on perceived functionality and attitude of the users towards the technology in quest (Agarwal and Prasad, 2009). Further, a customer's attitude to use a digital service application for e-government services will jointly be affected by perceived convenience and utility function of the technology. Davis (2009) characterized the concept of perceived ease as the assumption underlying a given technological system in that its implementation will drastically reduce the amount of believed to be accomplished using tech-oriented approach. According to TAM, perceived ease of use is believed to have a direct impact on usability intention which in return affects perceived usefulness (Horne, 2005).

The technology acceptance theory is relevant to this study because it enables robust prediction of behavioural intention particularly when the consumer is under comprehensive volitional management (Wang & Butler, 2011). In respect to acceptance of governmental information system, for instance, usability of a system will depend on intention of an organization (for example to facilitate easier transaction process between the government and its citizens). Similarly, a customer's volitional control will explain the desires of achieving a certain standard of results as a result of utilizing a particular information system (Conner & Norman, 2015).

In the present study, perceived utility function is characterized as the extent at which technology usage would be useful in improving the M-kopa solar (k) ltd competitiveness. Technology acceptance model opens ways for better use of technology which creates avenues for better performance of M-kopa solar (k) ltd; Conservativeness in

Communication can therefore be broken by the TAM model as one of the factors for technology use is perceived performance.

2.3 Technological Innovation and Competitive Advantage

The current business environment is majorly technology-oriented. However, the ever increasing level of competition has forced businesses and organizations to shift their routine practices and adopt strategic technology that will allow effective organizational performance. In addition, technological innovation has facilitated positive impacts on the overall organizational performance particularly in the market share, value addition and profitability, besides decrease in operational cost, increased rate of suppliers' response to delivery, improved organizational internal and external co-ordination precisely on the value chain, personalized and organizational relationship amongst the trading partners and employees, enhanced public relations stakeholders, increased market share and new opportunities in the industry, accessibility of relevant market information and possessing quality skills and experience, and an instrument of facilitating new methods of management and strategic business planning (Khonget al, 2010).

In a competitive market place, Porter and Millar (1985) highlighted that the capacity of a business organization to adopt new technology that will result in an improved quality of service to its clients describes the level of competitiveness of a bank. One of the technology applications that have gained prominence because of its capacity to enhance customer satisfaction is the advancement in technology. With availability of appropriate technology, a customer has capability to influence the location and time of operation and in the process overcoming many of the inconveniences of moving from one point to

another. An appropriate IT structure can provide improved level of adjustment in the operation procedures along with a lower amount of effort required to start and accomplish the objective of an organization by facilitating constant competitive advantage.

As stated by Porter and Millar (1985), competitive advantage is the capacity of generating extra value from a product that is higher than the direct cost incurred in the production process. Continuous competitive advantage results from capabilities of organizations and availability of resources that have distinct characteristics such as non-substitutable, valuable, rare, and defectively imitable. In order to maintain a high flying competitive advantage, organizations should be able to implement strategic plans based on the organizational internal power, capacity of responding to environmental changes and harnessing of unforeseen opportunities, improve or avoid internal feebleness alongside the capacity of neutralizing emerging market threats. Similarly, IT is has been attributed to be the major driving factor of achieving competitive advantage.

Strategic plans that are innovation-oriented helps an organization to come up with mechanisms that will foster competitive advantage through either focus on product innovation, comparative low rate, proper market positioning or relative differentiation (Porter, 2005). Correspondingly, Lengnick-Hall (2012) assert that technology advances, competitive advantage and innovation have a positive significant relationship. The relationship among innovation strategies and competitive advantage is principally based on four aspects. First, innovations strategies that are complex to reproduce are have high probability of resulting into justifiable competitive advantage (Porter, 2005). Secondly,

innovations that precisely replicate market certainties are more prospective to cause viable competitive advantage. Thirdly, competitive advantage can be gauged from innovation strategies that facilitate a company to fully exploit the effectiveness features of the pertinent industry (Band, 2007). Lastly, long term competitive advantage can be achieved through innovations that depend on technologies and competences that are freely available to the organization (Ansoff, 2008).

Innovation gives an alluring source of competitiveness on the off chance that it makes a positive collaboration for the firm. Similarly, if the advancement procedure or the results of development are hard to duplicate, successful corporate business turns into an undeniably imperative component in continuing competitiveness. Harris and Dickson (2000) recommend that product frame, capacity, value, and appropriation offer potential contexts for decreasing limitability for firms that are innovation oriented. Subramanian and Nilakanta (2009) contended that administrative innovations, for example, the strategic administration of HR or data based innovations, for example, new statistical surveying procedures give more tough courses to focused situating than can be picked up from product quality developments. On the other hand, Tether (2009) suggests that organizations just have some expertise in creating innovations that have vital significance to their business so as to ensure the impersonation of key strategic components. The consistent theme is distinguishing results that are troublesome for different firms to imitate.

Competitiveness and innovation are vital in following up on market substances. Market opportunities and issues are generally determined by client value chains (Porter, 2005). The client's desires can be recognizable, neglected requirements. Innovativeness of this sort regularly depends on applying alterations of existing innovations in new courses for new markets. Market substances present two related, yet particular prerequisites for effective corporate enterprise. The inventiveness should grasp essential and appealing components in the potential purchaser's value chain. Innovations must have an application that is desired, sensibly inescapable, and of some limit, utility to create an effective competitive advantage.

To guarantee that essential and alluring highlights are incorporated into the organizational product and additionally benefit, the trailblazer must be centered on the customer. A complete quality control persuasively addresses the requirement for perceiving and reacting to explicit client inclinations for performance, characteristics, dependability, conformance, solidness, functionality, feel, and perceived quality (Goldman, 2005). Innovative reactions can empower a firm to either position itself inside an alluring specialty or to meet a bigger extent of client inclinations than its rivals. Both the specialty approach and an expansive separation approach are alluring and economical competitive choices (Porter, 2005).

The other factor connecting competitiveness and innovation is timing. Developments that empower a firm to exploit the planning qualities of the important business are bound to prompt economic competitiveness (Betz, 2007). The performance and definition of an

association's market/product procedure regularly reflect timing contemplations. Innovation timing relies upon improvement speed and heading and an association's capacity to benefit from these movements (Duin, 2007). Timing can affect the expense of an endeavor (Porter, 2005). Markets driven by identification by brand may offer imperative first-mover cost favorable circumstances. In these businesses, being first empowers a firm to increase submitted clients before contenders are effectively locked in. Timing may present a significant source of uniqueness or viable cost administration (Teece, 2007). Being first can empower a firm to increase important experience before their rivals. Doorman (2005) argues that focused planning is firmly connected with economic situations. Development exercises viably coordinated to suit industry conditions can be a profitable device in the long term competitive advantage.

Further, exploitation mirrors an extensive variety of skills. Ansoff (2008) proposes that successful innovative procedures are reliant discouraging value affectability in the commercial center. Compelling administration of asset assignments is a basic ability (Kanter, 2013). A large number of these capacities flag an enthusiasm for creating potential collaborations. Making another market requires to imply information of the planned customer so the product will be viewed as valuable and attractive (Miles, 2000). Innovations that make markets require broad special abilities, intra-authoritative systems to fabricate the required foundation, and adequate hierarchical and human duty to defeat deferrals and opposition.

2.4 Empirical Studies and Research Gaps

Technological innovation is regarded as a significant factor that facilitate organizational growth and development which is an important determining factor of competitive advantage in various firms. Hafeez, Zhang and Malak (2012) prove that an organization establish its competitive power so as to obtain sustainable competitive rewards. Firms should be continuously conscious of the dynamic environment at the same time developing and keeping new and prevailing technological competences in order to endure the external factors that may affect organizational progress.

Dodgson (2018) investigated technological collaboration in industry in terms of strategy, policy and internationalization in innovation. The study found that information technology and management skills have had the greater influenced on level of innovation collaboration between firms. The study findings further suggest that collaboration is a way in which vast worldwide firms can by implication get government help for R&D, along these lines further twisting competitive position on the grounds that the huge partnership will, in general, enhance profit through innovation and development. Moreover, shared technological improvement might be contended to deliver an innovation to a standard of the most reduced shared element, as opposed to the impartially best feasible outcomes.

Burgelman, Christensen and Wheelwright (2014) set that technological advancement assigns the capacity of an organization to pick, diffuse and afterward enhance its innovation. In that capacity, it is a dynamic procedure of experience aggregation which includes utilization of innovation, the enhancement and use of existing innovation.

Kamukama et al., (2011) assert that technological advancement enables firms to enhance their competitive edge as far as decreasing expenses, accomplishing a solid reputation among clients and bringing their competitiveness up in universal markets. These focal points may, thusly, positively affect the company's general performance.

Camisón and Villar-López, (2014) researched how hierarchical advancement goes about as an empowering agent of technological development capacities and firm performance. The outcomes reaffirm that organizational advancement upgrades the improvement of technological development capacities and that both technological capabilities and organizational innovation for products and processes can lead to superior firm performance. The findings reveal that organization innovation supports the development of product and process innovation capability, though this was achieved differently depending on the specific type of innovation capability. Further, the result suggest that, though organization innovation directly affects the development of process innovation capabilities, the relationship between OI and product IC is mediated by process IC. Therefore, by a firm simply implementing new advanced management practices (OI) are not sufficient to favour production.

Urbancova (2013) investigated the competitive advantage achievement through innovation and knowledge of Czech Republic SMEs. The aim of the review was to present the findings of a survey that targeted firm innovations and to identify the role of knowledge as an important ingredient in the process of innovations. The study employed primary data collected through the use of questionnaires among 450 SME firms and the findings show that without the right people with knowledge and experience it is

impossible to achieve the required level of innovations. Similarly, the research found that there is need for the correct culture in the organization to support continuous innovation for effective realization of firm competitiveness. The study made the conclusion that companies think that it is vital to advance and bolster a creative culture. Learning also is extremely critical in the innovation procedure since it represents an essential contribution, as well as the output of the change procedure.

Yam, Guan, Pun and Tang (2004) underscores that technological development is the expertise associated with acknowledging and supporting an organization's innovative advancement technique. In their examination, they additionally propose seven measurements for estimating mechanical advancement which include: innovation learning, innovative work, asset assignment, fabricating capacity, showcasing aptitude, authoritative expertise/procedure and scale related capacity, Archibugi and Coco (2005) point out that technological development is the capacity to access and process outside information into some interesting ability or information, then using it powerfully to enhance or build up another product and Launch it effectively.

From the above investigations, one can see that technological advancement is a multi-dimensional idea, which handles the dispersion and utilization of innovation so as to procure business benefits. Basically, mechanical development is the manner by which an association can effectively choose, execute and utilize an innovation with respect to a competitor. Thus the study is undertaken in order to examine the extent to which M-Kopa Solar (K) limited has used innovation technology to achieve competitive advantage over its competitors.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This study sought to determine the relationship technological innovation and competitive advantage of M-Kopa Solar Ltd. In this chapter, the methodology that will be used to undertake the study is described. The chapter discusses in detail the research design, the data collection procedures, research procedures and the method of data analysis.

3.2 Research Design

A research design denotes the methodology that the study uses to accomplish the intended objectives. The study was molded on a case study methodology. Kothari (1990), defines a case study as a powerful form of qualitative analysis and involves careful and complete observation of a social unit be it a person, family, cultural group or an entire community and/or institution. This study focused on how the management of technology and innovation acts as a source of competitive advantage at M-KOPA Solar (k) Ltd. The study employed a case study research design.

The reason for this choice is based on the knowledge that case studies are more appropriate for examining the processes by which events unfold, as well as exploring causal relationships and also it provides a holistic understanding of the phenomena through prodding of the interviewee to give answers to the questions. Standardized questions will make measurement more particular by affecting uniform definitions upon the interviewees as well as making sure that similar data will be collected from separate individuals and then deduced comparatively.

3.3 Data Collection

The study used primary data; this was collected through face to face interview with the researcher. An interview guide was used to collect data on the management of technology and innovation process at M-KOPA Solar. The interviewees will be made of two members in senior management team and four members in the product development division. These respondents are considered to be involved in the formulation and implementation of policies regarding innovation in the firm and also involved in actual development of new products.

3.4 Data Analysis

The data collected was analyzed by use of content analysis. The information was analyzed and evaluated to determine their usefulness, consistency, credibility and adequacy. The content analysis will be used because it assists in making inferences by systematically and objectively identifying specific messages and then relating them with their occurrence trends.

Similar studies in the past like those done by Armule (2003) who researched on the response of the family planning association of Kenya to changes in its operating environment and Kandie (2001) in a study on strategic responses by Telkom Kenya Ltd in a competitive environment used this technique of content analysis.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The research objective was to determine the effect of technological innovation as a source of competitiveness at M-KOPA Solar, Kenya. This chapter presents the analysis and findings with regard to the objective and discussion of the same.

4.2 Response Rate

The respondents comprised the top and middle level managers at the M-Kopa Solar. In total, the researcher interviewed 8 interviewees out of the intended 9. A large size of the interviewees was targeted because under the new organizational structure, the board as well as the management oversees the strategic process in the face of new emerging competition locally. From the interaction with the interviewees, the researcher found that all had at least a first degree from various fields such as land economics, business courses, project planning and finance. Further, respondent's number 4 had a PHD in land economics while the other respondents had various professional courses certificate. With such academic and professional backgrounds, the interviewees were deemed to be capable to analyze and critical identify and respond appropriately to the research questions.

The work experience for the respondents ranged from 2 to twenty two years both within the M-KOPA Solar and other private sector organizations that deal with renewable energy. Having worked in various sectors for such a period, the researcher believed that the informants had firsthand experience on how technological innovation can be used by

a firm to gain competitive advantage. With this solid background, it was felt that the interviewees were knowledgeable enough on the research subject matter and thus of help in the realization of the research objective.

4.3 Technological Innovation at M-KOPA Solar

This section of the interview guide was intended to identify the various technological innovations that have been adopted by M-KOPA Solar in the course of its operations. The themes that were discussed in this section include the identification of products or services that are or not anchored on the internet, whether M-KOPA has been able to deliver products that are technologically based, management changes that have been undertaken to align the organization to quickly respond to the technological changes and also any reorganization on internal processes over the last 12 months to respond appropriately to the market demands.

On the question whether M-KOPA Solar had developed some product (digital goods) or process based technological innovations anchored on the internet, all the interviews answered to the affirmative. Indeed the informants reinforced the point that M-KOPA uses majorly the internet in its operations for its sales across the five countries in Africa, namely; Kenya, Uganda, Tanzania in the Eastern Africa as well as Ghana in West Africa. Informant No.4 thus stated that;

'M-Kopa Solar currently has a 24/7 across 4 markets and currently the largest market user of Microsoft Cloud in Africa. In addition he started that over 10 million mobile payments in a year are made through the mobile money platforms, which is a form of an internet based technology'.

In addition, in order for the company not to lose track of its products sales in the region it operates and also for it not to be tempered with, informant No. 2 started that; *‘the company currently uses geographical mapping of all its products to locate their position and functionality’*. This internet application responds instantaneously upon prompting and this enables M-KOPA Solar to switch off the solar device in-case there is a non-payment by the buyer. In addition, the internet –based application enables the company to read the battery condition of the device on daily basis and currently, it was found that indeed over 1 Million readings are made in a day. This capacity of the organization to monitor the battery condition of its products facilitates effective customer service and therefore resulting in improved customer satisfaction due to the ability of the company customer service team to project the possibility of a battery to malfunction in the near future and thereby arrange for a replacement in advance. At the same time, the interview established that there are still some of the organization processes and products handling that have not been fully automated such as the over 375,000 installations that are carried out in a year over the four countries.

The researcher also sought to determine the extent to which adoption of technology based applications had led to delivery of new products to customers as a result of the adoption of new technologies. The interviewee No. 3 explained that, the capacity of the company to collect payments through the use of various technological platforms, especially the mobile money, had led to the company expanding its product range. In addition, the strategy of using new technology strategies such as cloud computing had led to the introduction of M-KOPA Solar TV as well as the M-KOPA Labs pipeline to schools that will be able to use renewable energy in their schools. The interviewee No 7 referred to

their customer from Athi River Kenya who showed her appreciation of the new company products by stating that;

“I can’t believe I used to spend so much on kerosene. Now I spend less and get clean and brighter light. I can also charge my phone and listen to the news on the radio.”

Similarly, another customer from Kisumu, Kenya show her level of delight with the M-KOPA Solar products by claiming that, *“At the touch of a buqon, we can now see the world right from the comfort and safety of our home.”* These customers were among the first batch to purchase the M-KOPA TV which does not require electricity to power itself. The Technical services director, who was one of the research informants, claimed that their company was the only one in the region that had adopted such TV technology and is serving many of the rural folks as if they were in the urban areas that is served by the conventional grid electricity. The interviewees noted that with their new innovation, M-KOPA IV Solar Home System, it is a perfect off-the-grid solar system for Africa, where land-based infrastructure is poor and the dependability of electricity supply is low. In addition, Interviewee No. 4 explained that through the use of the mobile money system, a customer need to make a deposit of Ksh 3,500 and make a daily payment of Ksh 150/- per day for 365 days. This flexible payment plan technological innovation has enabled the company to averagely sell 500 TV sets per day as compared to less 50 five years ago. Hence technological innovation had resulted in increased sales per annum.

The organizations Business Development Manager (Informant No. 5) specified that the M-Kopa system technological innovation strategy utilizes the combination of three readily available technologies to leverage on its operations by using the solar energy generated LED lights, SIM card embedded in the M-Kopa control unit and the flexibility

of the mobile payment system like the M-Pesa. The company business model involves combining these innovations to meet their market segment demands. The informant stated that,

'..... indeed the organization is not the originator of the technology per se but rather has been able to combine the three existing technologies in unparalleled manner through introduction of affordability proposition to meet a certain market clientele ..' Hence the innovation involves leveraging technological innovations into a business model that appears like a micro finance. The researcher found that as a result of the adoption of the mobile money transfer, M=Kopa currently processes 6.5 million mobile money payment system unlike 8 years ago when the company will process 320,000 salary check off payment before. This implies that the combination of the three technologies has resulted in increased market volume as well as being able to reach areas that appeared unreachable in-grid electricity system.

On the question of whether the company's technological innovation had had an effect on the firms marketing function, informant No. 1 started that the demand of the solar energy generated LED lights has been increasing over the last 5 years. This has been attributed to the adoption of the social media marketing capacity whereby, the organizations marketing team are able to reach many consumers through their mobile phones. Further, the interviewee noted that, last year (2017), M-Kopa solar procured 500,000 photovoltaic solar panels to bridge the surging demand of its products that arose from the adoption of new marketing technique that targeted the a mass market, both in the rural areas as well as the urban centres. The large purchase of the solar panels has been necessitated by the improved marketing capabilities of the firm which currently is targeting the mass market

in which has higher economies of scale. In addition, through the company liaising with oil marketers and in the urban centres, the company has targeted the middle class market in the urban centres who can purchase the solar panels for their rural relatives in areas where electricity has not yet covered. The company's marketing manager stated that;

...over the next five years, the company projects to increase its customer base in Tanzania, for example, by 70 -80% due to the high potential of the market to use the solar powered LED. The company endeavours to use a wide spectrum of marketing avenues that is expected to be received well in the Tanzania market as well as Ghana'

The researcher also sought to gather what management and internal processes changes had M-Kopa Solar introduced as a result of the technological innovations. From the interview, the dominant theme that came out was that as a result of adopting technological innovations in its processes, the organizational structure has had to be changed because of the low cost of operations. Informant No. 5 suggested that as a result of technological innovations in the marketing and business development. It was highlighted that in 2017, the company was able to cut-off its wage bill through retrenchment of its workforce. Through the organization re-organization, the company laid off 18% of its workforce due to their work being unsustainable as a result of automation of the processes. Informant No. 1 claimed that the recently completed restructuring;

"was done to reduce fixed costs and keep the company on the path to profitability. Overall, the company reduced headcount by 18% covering all departments and all levels in Kenya, Tanzania, Uganda and UK. This was due to the company capacity to leverage its technological innovation by outsourcing more of our technology

work, maintaining a smaller in-house team to work directly with outsourcing partners in Kenya and overseas.”

4.4 Technological Innovation as a Source Competitive Advantage at M-KOPA Solar

The objective of the study was to assess the effect of technological innovation as a source of competitive advantage at M-Kopa Solar. The researcher sought to determine the various ways in which the technological innovation adopted by the company had enhanced its competitiveness in a market that is competitive. The themes sought under this section relates to the effect of technological innovation on the firms profitability, turnover, ability to differentiate its products, focus capability and firm specific resources.

The findings from the interview suggest that adoption of technological innovation, had led to improved revenue and reduction of cost in the company. The interviewees noted that indeed over the last three years, the company average sales growth has been around 22 % and this was attributed to the capacity of the company position its products anywhere in the continent that it is located due to the adoption of GPS technologies. Through the use of the SIM card technology, the company can be able to immobilise a Solar TV if the customer fails to service the debt. This can be done from a central location without the need have technicians visit the particular homestead. With regard to the effect of technological innovation on the company turnover, informer No. 3 highlighted that;

‘we expect the in the current year, the company sales of solar powered lighting system to increase by around 500,000 units and the four countries that the company in Africa, the sales is expected to increase by around 1.2 million units. This is expected to increase the firms’ turnover by around USD 8.25 million.’

The ability of the company to differentiate its products was also noted to have been enhanced through technological innovation. The Technical director explained that what has been giving M-Kopa Solar an upper hand in the current product line has been its high quality standards of its products at a low cost. The products are considered to be low cost in comparison with other similar products offered by competing firms though the quality of standards is equally high. This characteristic of the company products is attributed to the development of the solar panels and LED technology that is durable and cost effective.

The company's ability to focus on a small market segment that it has competence in, has resulted in increased knowledge capacity of its employees and better service delivery to its customers. The interviewees explained that the company in its diversification strategy always avoids a situation where the firm moves outside its core mandate which is to provide affordable and quality solar powered gadgets. At the same time, the findings show that M-KOPA always endeavors to develop a product that cannot easily be imitated or if it can be imitated, then it cannot come up with complementary products which will need to be sourced from the same company. Similarly, the organization in its endeavor to continuously be in an innovation mode has dedicated significant resources in training and development programs to its employees. The researcher found that in the financial year 2018, the company was found to have budgeted Ksh 86 Million for the same goal, an increase of 24% from the previous years' budget of Ksh 69 million.

4.5 Discussion of the Findings

The present study was to investigate the influence of technology innovation as a source of competitive advantage at M-Kopa Solar. The study adopted various measurements in trying to gauge the extent at which technological innovation strategy have impacted organizational performance. The study reveals that the M-Kopa recognizes customers as an important source of innovation knowledge, based on the high results that show that the managers agreed to customers being a critical source of innovation knowledge.

In line with the findings by Kamasak and Bulutlar (2010) who explored the effects of knowledge sharing on innovation, the results of the study suggest that the capacity of the firm to engage with both internal and external sources in coming up with an innovation that will be received by the customers. The capacity of a firm to come up with an effective knowledge sharing and storage platform supports the position held by the Knowledge based view theory (Grant, 1996) that suggest that the potential resources that a company acquire may not perform well without establishing its knowledge foundation which is a key element towards achieving a sustainable competitiveness in the market. This is expected to result in improved firm competitive advantage.

The findings of the study reveal that the company has invested particular technologies which have had a positive impact on both its product and process. In line with Hafeez, (2013) finding, investments in and the adoption of particular technologies, such as IT by the firm, can enable innovations, either by improving processes or by enabling the firm to offer new products (M-pesa payment system) or services to its customers. Hence technology innovations that do not result in improved firm competitiveness will turn out to be sunk costs that will not improve corporate performance. As the Resource – Based

View (Barney, 1991) highlight, the ability of firms to transfer technology investments into innovation is likely to be influenced by firm-specific resources such as managerial skills, know-how, experience, the presence of technical experts, and prior technological investments.

As the Resource Based View (Barney, 1991) suggest, firm competitiveness arise from resources that are unique, rare and imitable to the firm, and which, compared with the bundles of other firms, cannot be easily imitated. Thus, the result findings reinforce this position by stating that the firms strive to develop products that are not easily imitated by other competitors in the market. Similarly, the findings suggest that the innovation process undertaken by the M-Kopa is carried out in a way that is aligned to meeting the goals of the firm with regard to its performance.

As established firms in the market, the finds reveal that the M-Kopa adopts gradual innovation and this position supports Guan, Yam, Tang, and Lau (2009) findings that new entrants gain the most with disruptive strategies, while existing incumbents mostly follow incremental or continuous innovation. This is because already they have established their footholds in the local market and hence they need have products that are majorly established.

Unlike the new entrants that have to come up with a new disruptive concept, established firms need gradual and continuous innovations. Generally therefore, the findings reveal that technological innovation influences a firm competitive advantage which in turn

positively affects the firm's financial performances. The literature expound that firms' innovation capacity, advanced technology, efficient control of company resources, brand name, high quality products and services, and human capital are currently identified as the basic factors that facilitates competitiveness for business units (Johnson & Scholes, 2002).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section covers the summary of findings, conclusion, limitations and recommendations arising from the study objective.

5.2 Summary of the Findings

The research objective was to determine the influence of technological innovation as a source of competitive advantage at M-Kopa Solar (K). The study highlighted the importance of innovation strategy for a firm that is operating in a competitive business environment because of its ability to differentiate the firms' products, in terms of cost and quality from the other competitors. The very foundation of an effective technological innovation is for the firms management to have a long-term vision of the firm in relation to the operating conditions that it is operating in. The board was highlighted as playing an important role towards this role and that when the board is constituted with persons with diverse functional and educational capabilities, then it is could steer the company to improved performance through establishment of appropriate strategies. The study established that for technically oriented firm whose products and services life cycle can be short, then the firm should pursue technological innovation to adapt its products continuously to the changing market demands.

The results of the research suggest that M-Kopa system technological innovation strategy utilizes the combination of three readily available technologies to leverage on its

operations by using the solar energy generated LED lights, SIM card embedded in the M-Kopa control unit and the flexibility of the mobile payment system like the M-Pesa. The company business model involves combining these three innovations to meet their market segment demands. These technologies were present before the coming of the M-Kopa Solar and what the firm did was to leverage the three technologies to capture an opportunities that was existing, that is, the provision of an affordable and reliable solar energy to majorly, areas that were not covered by the main electricity grid.

The study reveals that the M-Kopa recognizes customers as an important source of innovation knowledge, by identifying a demand gap that exist and through the same process and develop products that are not easily imitated by other competitors in the market. Similarly, the findings suggest that the innovation process undertaken by the M-Kopa is gradual whereby new features of an existing product are introduced as well as developing complementary items which makes the use of the firm's main product a necessity. The results show that the technological innovation had resulted in the firm competitive advantage, despite the increased level of competition that was manifested by increased sales revenue, increased geographical coverage and availability of the firms' products, reduced cost of operation and improved reliability and quality of the company products.

5.3 Conclusion

In view of the study findings, the following conclusions can be made. Technological innovation could influence a firm organizational competitive advantage and that firms that have incorporated a diverse innovation dimensions have high chances of controlling the market since innovation ensures continuous production of goods and services that are

in line with the current market demands. The study findings reveal that organizations with diverse innovation range are likely to have a better chance of remaining relevant in a competitive business environment. This implies that the strategic innovation is useful for a firm's competitive advantage.

Further, firms' ought to establish a dependable guarantee that they are able to innovate continuously and be ahead of competitors. From the findings, it was noted that technological innovation resulted in improved competitive advantage and therefore, organizations should consider continuous training and capacity building of its employees in order to enhance their chances of innovation. In addition, the study reveals that though different strategies exist in the market, there is no one single strategy that is custom made to all business entities. Rather, a firm should identify its appropriate strategy that will give it appropriate competitiveness based on the market gap that it has identified.

5.4 Limitation of the Study

The major weakness in this study is that it was limited in scope. This means that the findings cannot be over generalized. Further, the study used a case design and there is need to employ various inferential techniques to validate further the results. This study was also limited by other factors in that some interviewees may have been biased or dishonest in their answers considering that they were all commenting on their employer or organization that they have interest. More informants would have been essential to increase the representation of respondents in this study and allowed for better check of consistency of the information given. However, despite the above limitations, the findings presented in this paper have important policy implications.

5.5 Recommendation for Policy and Practice

The study established that those entrusted with spearheading the technological innovation of the organizations should be knowledgeable on different kinds of factors that might influence realization of organizational competitive advantage. It is recommended that training on the applicability of innovation strategies should be carried out to equip the project staff on the usefulness of various tools to improve the realization of organization objectives.

The findings also reinforced the importance of gaining the stakeholders' support for successful organization objectives. It is therefore recommended organizations identify key stakeholders whose support is critical to achievement of its objectives and where necessary continuous consultation be carried throughout the implementation of its objectives.

5.6 Suggestion for Further Study

The study established that majority of the respondents did not understand the different technological innovation tools that can be adopted during the innovation process. A further research need to be undertaken to determine the effect of technological innovation tools on the performance of a firm. Further, the research was a case study and there is need to undertake a cross-sectional study in the energy sector firms.

The study found that technological innovation in general affect the achievement of organizational competitiveness. Future research should seek to determine whether what moderating or mediating factors influence the relationship between technological innovation and performance of the firms.

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APPENDIX I: INTERVIEW GUIDE

The interview guide will seek to determine how the management of technological innovation is a source of Competitiveness at M-Kopa Solar (K) Ltd

SECTION A: Technological Innovations

1. What are some of the product (digital goods) or process based technological innovations that are enabled by internet based innovations?
2. What are some of the product or process based technological innovations that are not enabled by internet based innovations
3. Has M-Kopa Solar been able to deliver new products to customers as a result of the adoption of new technologies? What are some of these products and how different is the system from the earlier delivery system that existed in the organization?
4. What additional services, to the existing ones, have been introduced to the customer service as a result of adopting new technological innovations at M-Kopa Solar
5. Has the company's technological innovation had any effect on the firm's marketing function? Please expound
6. What are some of the management changes that have come about at the company due to technological innovations embraced? Please expound
7. Has your company introduced new company internal processes during the past 12 months? What are some of them?

SECTION B: Technological Innovation as a Source of Competitive Advantage at M-KOPA Solar (K) Ltd

8. Has your company been profitable over the last 12 months? Previous years?(yes / no / don't know, not applicable)
9. Has the turnover of your company increased, decreased or roughly stayed the same when comparing the last financial year with the year before? (Increased / decreased / roughly stayed the same / don't know, not applicable)
10. How has the company differentiated its products and service offerings as a result of technological innovations?

11. How has M-Kopa Solar achieved relative low-cost positioning as a result of technological innovations?
12. How has M-Kopa Solar improved its focus strategy as a result technological innovations?
13. In which way has your firm's technological innovation geared towards customer satisfaction and has the same objective been realised? Please expound.
14. How has the firm's technological innovation reduced the cases of imitability by competitors to your products and business activities?
15. How has your firm's technological innovation is likely to be influenced by firm-specific resources such as managerial skills, know-how, experience, the presence of technical experts, and prior technological investment

THANK YOU SO MUCH FOR YOUR TIME