2020

Effect of sustainable relationships on the growth of technology hubs in Kenya.

Ogonda, Ted
Strathmore Business School
Strathmore University

EFFECT OF SUSTAINABLE RELATIONSHIPS ON THE GROWTH OF TECHNOLOGY HUBS IN KENYA

TED OGONDA

MBA/108377/2018

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF BUSINESS ADMINISTRATION OF STRATHMORE UNIVERSITY

JULY 2020

DECLARATION

I, the undersigned, declare that this project is my original work and has not been submitted for examination in any other institution.

TED OGONDA

MBA/108377/2018

Sign: ..... **Date:** 10/07/2020

Approval

This research project has been submitted for examination with my approval as the university supervisor

DR. JAMES WANJAGI

LECTURER

STRATHMORE UNIVERSITY

Sign: ..... James Wanjagi .... **Date: ...July 8, 2020.....**

ABSTRACT

The number of technology hubs coming up in Africa has been on the rise in the recent past, as depicted by several studies herein. However, despite the upsurge in the number of hubs, there is limited expansion and advancements in most of them, hence prompting the need to examine factors affecting their growth. Past studies have established that sustainable relationships influence growth in organizations. The studies have also singled out collaboration, coopetition, and differentiation aspects in sustainable relationships. The current study sought to establish the effect of collaboration, coopetition, and differentiation on the growth of technology hubs in Kenya. The study was grounded on the resource-based view theory and the firm growth theory. The study design was a descriptive research with the unit of analysis being 40 Technology Hubs in Kenya, with two managers each, being considered. The study sampled the 80 respondents drawn from the 40 Tech Hubs. The study relied on quantitative data using a structured research questionnaire. The study adopted a drop and pick and online google forms in the data collection process. The collected research data were analyzed using both descriptive and inferential techniques. The analyzed data was presented graphically. The study was able to obtain a response rate of 91% of the sample participants. The study indicates that 49% of the Tech Hubs were involved in coopetition, 43% in collaboration, and 8% had undertaken differentiation. The study concludes that collaboration, coopetition, differentiation, and business environment are positively related to the growth of Tech Hubs in Kenya. The research recommends that management of Tech Hubs embrace collaborative and coopetitive efforts as these will be critical to their growth. The study further recommends that they develop alliances with other regional Tech Hubs for service focused development. The study also recommends that the government should create awareness within the public on the benefits that can be achieved by embracing digitalization within the various economic sectors.

Keywords: *Growth of Technology Hubs, Sustainable Relationship, Collaboration, Coopetition and Differentiation*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATION AND ACRONYMS

ANOVA	Analysis of Variance
GSMA	Global System for Mobile Communications Association
ICT	Information and Communication Technology
NACOSTI	National Commission for Science Technology and Innovation
SME	Small and Medium Enterprises
WDR	World Development Report

OPERATIONAL DEFINITION OF TERMS

Collaboration	This refers to the action of working together through the creation of alliances and partnerships between businesses (Palakshappa & Gordon, 2007).
Coopetition	This refers to the active collaboration between two business competitors towards mutually satisfying benefits (Bengtsson & Johansson, 2014)
Differentiation	This is the action of one firm distinguishing its service and product offering from other competing firms (Vermeulen, 2013)
Sustainable relationships	This refers to the cross-connections between businesses that are dependent on each other towards having mutually beneficial understanding (interdependency) (Friederici, 2014).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

A Technology Hub (Tech Hub) is a space where early-stage technology innovators, enthusiasts, and entrepreneurs gather to support and build tech communities, (Tech hubs in Africa: ITC, 2019). The Tech Hubs Africa report further states that hubs and the projects they support are more likely to thrive in a well-functioning ecosystem. Technology hubs comprise of startup firms that are new, young and emergent ventures (Song, Podoynitsyna, Van Der Bij, & Halman, 2008); with typically fewer operational resources (Katila, Rosenberger, & Eisenhardt, 2008) that are not dominant in their field or industry; and need to form strategic relationships within the business environment (Street & Cameron, 2007). In well-developed markets, tech start-ups are commonly organized around research campuses that provide knowledge support, subsequently becoming innovative hubs that interest formal and informal investors (Memba, Gakure, & Karanja, 2012).

Frontier markets support tech start-ups primarily through independent incubators, pooling resources, and organizing training and mentoring sessions for their developers as well as laying the foundation for collaborative relationships and alliances in the tech industry (Moraa, Murage, & Omenya, 2012). Business relationships enable organizations to gain valuable contacts in the business network of their partner (Ashnai, Henneberg, Naudé, & Francescucci, 2015). From these assertions, it's evident that Tech Hubs thrive in an ecosystem with various interrelationships. As has been seen in all complex developments, the evolution of technology hubs has been bumpy and discontinuous. Tech Hubs typically have taken the form of one or multiple areas of focus, namely, innovation, incubation, and acceleration (O'Connor, Corbett, & Pierantozzi, 2009).

While Innovation mostly is about the conceptualization of ideas, Incubation is a competency-based on experimentation to uncover latent or hidden needs and next-generation concepts. They further assert that these require the ability to experiment with multiple technologies and business concepts or models simultaneously (Arteaga & Hyland, 2013). The management of these start-ups has been shadowed under the functioning of incubation centers, which have been responsible for providing developers with the necessary tools to convert their ideas into

successful ventures (Moraa, 2012). Nonetheless, tech start-ups are still susceptible to various factors that influence their managerial activities and affect the overall success of their ventures (Street & Cameron, 2007).

The number of Tech Hubs in developing countries is burgeoning, helping technology developers and entrepreneurs to network, innovate, and start businesses. This, however, has given rise to different types of hubs championing a myriad of courses (Friederici, 2014). Hyland and Arteaga (2013), in their attempt to classify Tech Hubs, described innovation as the conceptualization of business opportunities and incubation as a competency-based on experimentation, identification of unknown needs, and development of new concepts.
Kenya has seen a positive trend with Tech Hubs sprouting in many cities and towns, including Nairobi (iHub, Nailab, Nairobi Garage), Mombasa (SwahiliBox), Kisumu (LakeHub), Eldoret (Dlab Hub), Voi (Sote Hub), Machakos (Ubunifu), and Nyeri (Mt. Kenya Hub and DeHub) (Dahir 2017). The nebulous definitions of Tech Hubs have led to varying numbers published by different studies. This could also be attributed to the disparity between those that are registered versus those that are active. The scope of the current study was guided by the categorization of Tech Hubs as defined by GSMA Ecosystem Accelerator and Forbes (2019) which puts the number of Tech Hubs in Africa at 618, Nigeria 85, South Africa 70 and Kenya at 50, forming the unit of analysis of the current research.

1.1.1 Sustainable Relationships

Reynolds, Fischer, and Hartmann (2010) indicate that sustainable relationships refer to leadership and business practices focused on fostering communication, business bonds, and improving business connections with other industry players. EtradeFall (2020) indicates that for the sustained impact of the Tech Hubs operating in Africa, there is a need to create a better ecosystem through networking, collaborations, and building a sustainable system. This can be achieved more so through the adaptability of the firms and developing interconnected networks with all policymakers.

The recent surge of technology hubs in developing countries and, in particular, across Africa has brought about an urgent need to understand mechanisms for collaboration, competition, and differentiation (Friederici, 2014). Flanders (2015) has stated that new sustainable communities have been created to assist entrepreneurs and young companies in developing

their thoughts into successful businesses that could compete and thrive in the market. Kuivalainen, Saarenketo, and Puumalainen (2012) indicated that after the latest recession, entrepreneurs have stepped up their commercial enterprise plans and evolved new communities to assist with their innovation.

Bengtsson and Johansson (2014) assert that technological and market convergence, together with the numerous temporal relationships, not only increase the likelihood of competition among SMEs but also encourage collaboration. Bengtsson and Kock (2014), dispels the notion of commoditization by asserting that all goods and services are differentiable. According to Adner (2016), interdependence across organizations and related activities along with value creation and value capture, including - business models, platforms, coopetition, multi-sided markets, networks, technology systems, supply chains, value network results in a symbiotic ecosystem.

Jiménez and Zheng (2018), in an examination of the development of technology hubs, note that adopting collaborative workspaces and having human-centered development processes contribute to an improved value within the technology hubs. Hautamäki and Oksanen (2015) note that collaboration and co-creation are vital to enhancing growth within technology firms. Jankowska (2013) found out that creativity, cooperation, and competition are crucial to fostering innovativeness and cluster growth. Cheruiyot (2018) notes that differentiation in innovation hubs is key to growth in the firms. From the above studies, there is a reoccurring theme that coopetition, collaboration, and differentiation have been critical in innovativeness and growth. The current study thus adopted the above components of sustainable relationships to establish their effect on the growth of technology hubs in Kenya.

1.1.1.1 Collaboration

Collaborative business relationships, including strategic alliances, joint ventures, ecosystem clusters, and consortia, are standard methods for dealing with resource constraints, accelerating technological advancement, and heightened levels of competition in the global marketplace (Palakshappa & Gordon, 2007). Kiron (2017) states that digitally-focused firms collaborate more as they pursue their corporate objectives that are dependent on the effective use of technology. However, he also asserts that increased collaboration can be undesirable due to strong egos, mistrust, and historical animosity but can be overcome by changing work

practices, behaviors, norms, and adapting essential elements of a company's culture. Daidj (2016) describes collaborative approaches like co-conception, co-design, co-creation, and co-production that have been adopted by many companies from various sectors in varying degrees and rely more on a "market pull" outlook as opposed to a "technology push" philosophy.

1.1.1.2 Coopetition

The Oxford dictionary defines coopetition as cooperative competition. Bengtsson and Johansson (2014) argued that the "liability of smallness and newness" in startups which is characterized by their difficulty to obtain capital and other resources needed to bring new technologies to market, coupled with their high risk of failure in the early stages, can be compensated by coopetition. In an attempt to create value or capture value, companies have applied "Game Theory " with a non-zero-sum intent in which the "Value Net" represents the interdependencies among all the players whose strategies can evolve with changing situations, switching from complementary to a competitor and thus turn the context into one of coopetition (Daidj, 2016). Numerous researchers have referred to ecosystems in which rival firms simultaneously cooperate and compete. Coopetition has also been analyzed from the perspective of platforms. Technology hubs have generally resorted to platform strategies that allow them to benefit from contributions made by other ecosystem players (Daidj, 2016). He continues to argue that these platforms are usually required to be open to allow for efficient sharing of value like has been depicted in the coopetition between Android (Google) versus iPhone (Apple).

1.1.1.3 Differentiation

Allen (2012), says that if an organization isn't differentiated from its peers, it's as good as not having a strategy. Vermeulen (2013) describes differentiation as the ability to go beyond the substantive contents of scarcely differentiable products to still present oneself as unique through things that transcend the generic offerings. Nissing (2012) asserts that competition without differentiation often leads to significant price wars that eventually result in the commoditization of the product or technology. At the same time, we see many industries in which firms do more or less the same thing with significantly high levels of success for all, like in the case of McKinsey, BCG, or Bain. Their offerings are mostly similar (Vermeulen, 2013). This somehow downplays the significance of differentiation.

1.1.1.4 Business Environment

Kelly and Firestone (2016) suggested that with the rapid expansion of digital technologies and the great benefits they bring to the economy, there is a need for better infrastructural development, strengthening of regulation, and supporting digital investments. This will help to drive digital technology space growth in Africa. Ndemo and Weiss (2017) found that for the digital transformation and innovation to be sustained in Kenya, there is a need for accelerator programs, infrastructural development, and policy changes to be instituted to transform Kenya into a Digital hub. This study sought to examine how the various business environment components have influenced the growth of Tech Hubs in Nairobi City County.

1.1.2 Firm Growth

In today's competitive business environments, firms delineate their arrangements on how to maintain their business operations, competitiveness, and improve their productivity utilizing the concept of growth. Growth strategy often plays a vital role in a business's management as it assists a company to set a path or direction and figure a way to achieve its goals (Gibus & Kemp, 2003). The growth and performance of an organization can be assessed using both financial and non-financial measures (Richard, 2009).

As indicated by Richard (2009), firm performance envelops three viewpoints: financial performance, that is, benefits, return on resources and quantifiable profit, market and product performance, and shareholder return. Gredel, Kramer, and Bend (2012) note that success in business can be interpreted in many different ways. The most commonly adopted definition of success is financial growth with a high level of profits. However, other definitions of success are equally applicable, and many businesses set themselves alternative goals. Some gain satisfaction and attain success by developing new products.

Liao, Welsch, and Stoica (2003) note that the leading indicators of business success cannot be found in financial data alone. They can be examined by other metrics such as service quality, customer satisfaction, and innovation. Market share metrics like these often reflect a business's economic condition and growth prospects better than it's reported earnings. (Giuri & Luzzi, 2003) examines patterns of growth in technology firms and indicates that the number of technological developments, innovation capacity, and market share are critical definitions of

growth measures. The research measured the growth of technology hubs in Kenya based on qualitative metrics of innovation, several innovations, and market expansion.

Knight (2014) acknowledges that collaboration within the technology firms is essential to improving the competitiveness within the ecosystem. Bouncken, Laudien, Fredrich, and Görmar (2018) notes that resource sharing, knowledge sharing, and coopetition within the Tech Hub firms are essential to improved performance. Muchiri and Karume (2016) indicate that improvement in infrastructure growth within the country have been instrumental to the growth in the innovation capacity.

1.2 Statement of the Problem

The number of Tech Hubs coming up in Africa has been on the upward trend in the recent past. Research carried out for the World Development Report (WDR) 2016, tracks some 618 separate Tech Hubs, many of which have been started in the last few years (Kelly & Firestone 2016). However, they also demonstrate a high failure rate and varying degrees of success. WDR (2016) states that, of the 102 hubs initially documented in the World Bank's 2013 stocktaking of African Tech Hubs, 27 have closed for varying reasons. As of 2016, the GSMA Ecosystem Accelerator suggested there are 314 active Tech Hubs in Africa. A phenomenon that exhibits such variance deserves analysis in its own right hence the need for the current study to examine the growth within Tech Hubs in Kenya. The current study sought to bridge the knowledge gap by examining the link between sustainable relationships and growth in Tech Hubs.

Muchiri and Karume (2016) note that Kenya has witnessed a growth in broadband infrastructure, which has contributed to the setting up of several Tech Hubs. The researchers further indicated that despite there increasing presence in the country, the hubs have not been able to foster technological learning and exploitation. Further, Mutua (2016) notes that the technology innovation ecosystem in Kenya is rife with inefficiencies, poor management, and political meddling, which leads to low demand-driven innovation output. Mbeva, Atela, and Tigabu (2016) indicate that the innovation systems and climate in Kenya, in particular, have been limited by the lack of collaboration and interventions, which has led to the weak linkage between the technological sector players. From the above, it is evident that the technological innovation ecosystem is rife with a myriad of challenges which have hampered their growth.

Several studies have been done on dynamics surrounding the development of Tech Hubs (Kelly & Firestone, 2016) or even factors affecting their success at a global level (Harper-Anderson & Lewis, 2018). Knight (2014) indicates that collaboration contributes to competitiveness and sustainability in hubs. Mulas, Minges, and Applebaum (2016), in their study on boosting technology innovation, notes that innovation ecosystems lead to better growth in tech startups and increases economic productivity. The study further indicates that technology ecosystems are critical for the growth and sustainability of startup firms. Cheruiyot (2018) found out that co-creation and differentiation were vital to enhancing brand innovation within the innovation labs in Kenya. However, there's limited literature on the collaboration, coopetition, and differentiation levels in Kenyan Tech Hubs and how these could bring about increased growth amongst them. The current study sought to fill this empirical gap and enhance the available knowledge. The research sought to establish the effect of sustainable relationships on the growth of Technology Hubs in Kenya.

1.3 Objectives of the Study

The primary purpose of this study was to examine the effect of sustainable relationships on the growth of Technology Hubs in Kenya.

1.3.1 Specific Objectives:

i. To establish the influence of collaboration on the growth of Technology Hubs in Kenya.
ii. To examine the effect of coopetition on the growth of Technology Hubs in Kenya.
iii. To establish the effect of differentiation on the growth of Technology Hubs in Kenya.
iv. To determine the moderating effect of the business environment on the association between sustainable relationships and growth of Technology Hubs in Kenya.

1.4 Research Questions

i. What is the influence of collaboration on the growth of Technology Hubs in Kenya?
ii. What is the effect of coopetition on the growth of Technology Hubs in Kenya?
iii. What is the effect of differentiation on the growth of Technology Hubs in Kenya?
iv. What is the moderating effect of the business environment on the association between sustainable relationships and the growth of Technology Hubs in Kenya?

1.5 Scope of the Study

The research scope was geographically limited to the review of Tech Hubs operating in Kenya predominantly within Nairobi City County. The contextual scope of the study focused on how collaboration, coopetition, and differentiation practices affect the growth of Technology Hubs in Kenya. The growth of the Tech Hubs in Kenya was measured by the innovative capacity, several innovators, hackathons, market expansion, and service quality. The theoretical scope of the study was limited to the firm-growth theory and the resource-based view theory. The study methodological scope focused on a quantitative approach in solving the research problem.

1.6 Significance of the Study:

The study is expected to be of importance to various stakeholders within the ICT sector in Kenya. To the government, the findings of this research can be critical in expanding the development of the country as a regional technology hub through policy formulation and implementation of measures geared towards improving the industry. To the various Tech Hubs, the results are expected to expand their managerial capacity and entrench a culture of sustainable relationships through collaboration, coopetition, and differentiation practices. To the body of knowledge, the study will contribute to empirical evidence on sustainable relationships within Tech Hubs and act as reference material for future research work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The second chapter of the research reviews related literature to the study constructs. The chapter presented the theoretical underpinnings as well as the related empirical literature. It further presented a summary of the research gaps. Finally, it outlined the conceptualized link between the research variables as well as the operationalization of the study variables.

2.2 Theoretical Review

The theoretical framework is an explanation provided by existing theories relevant to the research problem. This explanation provides a broader societal perspective of the problem. The theoretical framework is not a mere description of the different theories but explains how these assist in the interpretation of the problem (Kombo & Tromp, 2006).

2.2.1 Resource-Based View Theory

The theory was developed by Wernerfeldt and Rumert (1984); According to Klung (2006), the resource-based view (RBV) theory states that firms' performance is influenced by resources available (Madhani, 2010). The argument is that firms with more resources are more likely to achieve better results and sustainability as compared with those with few resources. Resources are also referred to as factors of production and include land, labor, capital, and entrepreneurship. Critics have argued that while the availability of these resources is necessary, it is not sufficient for improvement of firms' performance as these must be used effectively. Efficiency and effectiveness, therefore, are not determined by the number of resources used in the production process but on the parameters such as quality control system and organizational policies (Priem & Butler, 2001).

The RBV shifts the focus from the external environment (industrial concentration of firms) and market positioning as a basis for competitive advantage (Porter, 1998). It further differs from the Porter five forces model as this tends to amplify the role of external factors in the performance of a firm. Newbert (2007) has added a new dimension to this debate through an argument that it is not the static resources that form the basis of competitive advantage. Instead, it is the organization's capabilities, valuable, non-imitable, and non-substitutable resources that make the difference.

According to Barney (1991), for these resources to promote sustainable competitive advantage, they need to satisfy the value, rarity, imitability, and non-substitutability (VRIN) criteria. This will ensure protection and insulation from competitors (Brown, 2007). Wade and Hulland (2004) define resources as assets and capabilities that enable a firm to capture the market. Further, they have distinguished the factors in the resource-based view theory that allow a firm to achieve a competitive advantage in the short and long term. They state that value, rarity, and appropriateness of resources have short term gains that cannot be sustained in the long run. It is the low imitability, substitutability, and immobility that allow the firm to sustain competitive advantage in the long term (Newbert, 2007).

The resource-based view theory was fundamental to this study in examining how the adoption of collaboration, differentiation, and coopetition aspects can be integral to strengthening the sustainable relationship among Tech Hubs. The theory helped to explain how these different facets can be leveraged by Tech Hubs as a predictor of increased growth and competitive edge in the firm.

2.2.2 The Firm Growth Theory

Penrose (2009) introduced the firm growth theory and highlights a company's growth or decrease as a consequence of management choices. Businesses grow for several reasons, including taking advantage of a market gap, gaining a competitive advantage over others, and winning higher market shares. The theory is of the opinion that two kinds of company development exist; inner and external growth. In-house growth is typically a slower method, according to the theory. This can be accomplished by requesting owners to add more assets or plugging earnings back into the company. External growth, on the other hand, can be accomplished through external financing, incubation, or through mergers and acquisitions (Rangongo & Ngwakwe, 2018).

The theory of the firm sets out to explain the nature and limitations (or boundaries) of the firm as an economic institution (Aghion & Howitt, 1992). It is founded in an economic organization study that attempts to explain the observed diversity of institutional arrangements in the economy and states that firms (corporations) exist and make decisions to maximize profits. Businesses interact with the market ecosystem to determine demand and pricing, then allocate resources according to models that look to maximize profits (Beck & Demirguc-Kunt, 2006).

Geroski (2002) has done the foundational work on the theory of enterprise growth. Based on his theoretical review of growing enterprises, he concluded that enterprises move through five distinct stages of growth. Each phase contains a relatively calm period of growth that ends with a management crisis (Masurel & Van Montfort, 2006). These five phases and crises of growth are creativity, direction, delegation, coordination, and collaboration. He suggests that an enterprise goes through evolution and revolution crises. These crises can be solved by introducing new structures and programs that will help employees to revitalize them. Greiner's phenomena of evolution and revolution became the basis of many studies on the enterprise growth cycle. This theory was relevant to this study since it explains drivers to firm growth within the technology industry.

2.3 Empirical Review

2.3.1 Growth of Technology Hubs

Forbes (2019) indicates that despite the exponetial expansion of technology hubs in Africa only 25% of the provide coworking spaces thus limiting there growth opportunities. The report indicates that 41% of the hubs are offering incubator services, 24% are innovation hubs, 14% are accelarators while only 39% are by virtue coworking hubs. Financial Times (2019) notes that the growth of the digital space in Africa has resulted in improved innovation within various sectors, improved soft skills, team work among software developers and expansion in the business productivity regionally. Bouncken, Laudien, Fredrich, and Görmar (2018) indicate that collaboration and co-creation are crucial to growth in innovations.

Bayen and Giuliani (2018) demonstrated that in the last decade the rise in capital financing and venture supporters there has been a growth in the Tech environment across Asia and Africa as noted by the improved growth in ICT skills, tech hubs, innovation levels and digital entreprenurship. Hersman (2012) found out that technology hubs have promoted business innovation, inclusive business environment and have created a level playing ground for firms in the African contined. Aregbesola (2014) notes that innovation hubs and multitude of cowroking spaces are key to growing of techpreneurs and improving the innovation in the continent. The study notes that tech hubs are a catalyst for open innovation, growing of creatives in tech and improving technological nexus across countries.

2.3.2 Structure of Technology Hubs

Friederici (2014), describes incubation and acceleration hubs as entities offering physical workspaces, mentoring and coaching, application testing kits, and startup competitions. He further asserts that these incubation and acceleration centers would only be practical after the local innovation ecosystem has reached a certain level of maturity. The focus of this study was on innovation, incubation and acceleration hubs, collectively referred to here as Tech Hubs. Innovative ideas have been with us since the beginning of time. Cavemen struck flint stones against the rock to create fire in their caves (Schaufeld, 2015).

In modern times, we have seen start-up factories, incubation hubs, test laboratories, and hotspots for innovation spring up in cities around the world (Straub, 2016). Innovation is often viewed to happen by chance or only through necessity. But in reality, companies can improve their innovation capabilities by being less reliant on circumstantial needs and focusing more on a deliberate search process and conceptualization of business opportunities (MIT Sloan Management Review, 2018). Technology Hubs have had varied classifications based on their purpose or core activities. Hannon and Chaplin (2003), categorized them based on their real-estate positioning versus business development focus as follows:

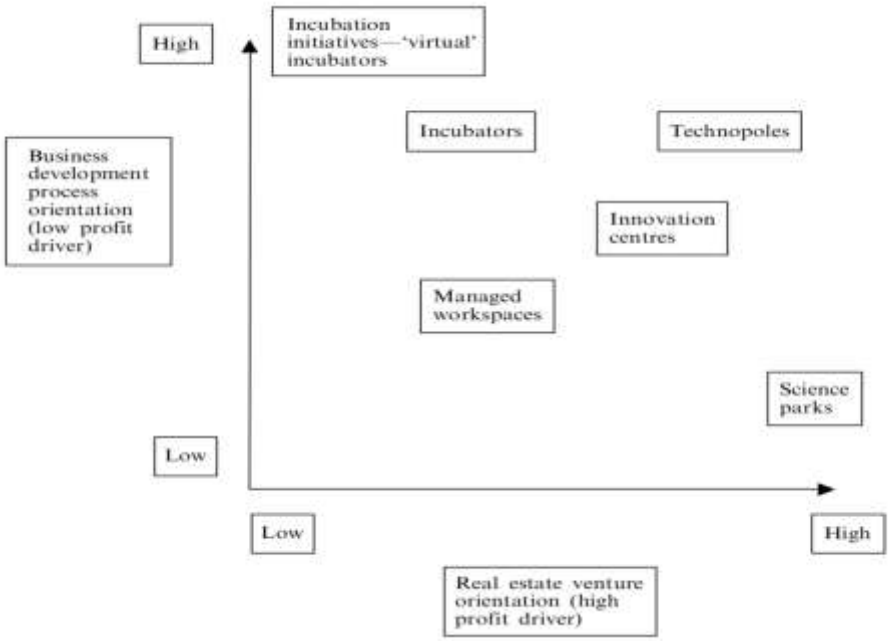

Figure 2.1 Indicative Conceptual Classification

There's been a thin line in their positioning, resulting in some Tech Hubs continuously morphing and taking an amalgamated form over time. According to Kelly and Firestone

(2016), there have been debates on whether an innovation hub or incubator is most appropriate for the African scene, more generally. Harper-Anderson and Lewis (2018), described incubators as places that provide a supportive environment for start-ups and fledgling companies. Innovation hubs, on the other hand, typically focus on building tech communities by convening a variety of informal stakeholder gatherings, peer-learning sessions, conferences, and ideation and prototyping competitions.

2.3.3 Collaboration and Growth of Tech Hubs

Even though there are a few dissenting views on the benefits of collaboration, for instance, Palakshappa and Gordon (2007) found little evidence on learning intent in the collaborative relationships, most literature corroborate that when businesses truly collaborate to drive innovation and do this with deliberate intent rather than by accident, they can and often create higher value outcomes for all parties in a replicable and sustainable basis (Morgan 2017). Longo and Giaccone (2017), stated that innovation was used as a tool by firms to foster the development of new ideas and innovative products through collaboration amongst different actors that participate in the process. As it is human nature to collaborate, evidenced by how people cohabited in small communities to share various responsibilities during the agricultural era more than 10,000 years ago as opposed to doing everything individually (Thea, 2017).

The industry (incubation hubs) and academia (innovation hubs) stand to benefit from long term co-operation where firms will gain greater access to cutting-edge research and scientific talent while learning institutions will gain access to financial support and partnerships in research (Lutchen 2018). Knight (2014), researched international education hubs. The study focused on collaboration for competitiveness and sustainability. The research adopted an explanatory research design with data being collected using structured questionnaires. The results of the study indicate that both local and international business collaborations contributed to global competitiveness and sustainability. The study focused on education hubs, whereas the current research explored how collaboration affects growth in Tech Hubs.

Hautamäki and Oksanen (2015) examined sustainable innovation with a focus on the competitive advantage for knowledge hubs. The study adopted a descriptive research approach. The study relied on qualitative analysis techniques. The findings of the research indicate that sustainability is an essential source of innovation and growth. The results show that when different actors collaborate and co-create, there is better innovation and growth through a

unique ecosystem. The study, however, utilizes a qualitative approach while the current research adopted a quantitative approach.

Hamari, Sjöklint, and Ukkonen (2016) conducted a study examining the sharing economy and how businesses participate in collaborative consumption. The study employed a survey research design that sampled 168 respondents. The collected data was analyzed using a mix of descriptive and inferential analysis. The findings show that participation in collaborative consumption is motivated by many factors such as its sustainability, enjoyment of the activity as well as economic gains resulting from the collaboration. However, the research results show that there is no direct link between collaborative consumption and sustainability. The study, however, was not focused on the technology hubs, which are the unit of analysis in the current research.

Cunningham, Cunningham, and Ekenberg (2015) conducted an assessment of potential ICT-related collaboration and innovation capacity in East Africa. The study utilized non-probability and purposive sampling across the three countries in East Africa. The research relied on face to face semi-structured interviews. The results indicate that there is a positive link between collaboration and innovation capacity within the regional firms. The results indicate that open collaboration has contributed to the sustainability and building of entrepreneurial culture within ICT firms. The study scope focused on East African countries, whereas current research examined growth in Kenyan Tech Hubs.

Gumboh (2017) conducted a study on collaboration on the strength of business-to-business relationships amongst Information and Communication Technology of Small and Medium Enterprises in Kenya. The study adopted a mixed research approach, with 134 firms being considered in the study. The study found that innovation, planning, cost, and risk management collaborations were individually significant predictors of business-to-business relationship with risk management collaboration being the most significant predictor. The study indicates that collaborations can be leveraged in expanding business growth among ICT firms. The current research focused on Tech Hubs in Kenya.

2.3.4 Coopetition and Growth of Tech Hubs

Bengtsson and Johansson (2014) have argued that SMEs cooperate for various reasons, namely, to increase their ability to innovate, strengthen their voice in the marketplace, increase economies of scale, reduce risk and uncertainties, goal congruence amongst others. From InfoDev's extensive study of technology hubs in Sub-Saharan Africa, Friederici (2014) assert that most of them focus on startup creation and support through incubation and acceleration, skills development through training, and workshops, and community building through events and online platforms.

Chim-Miki and Batista-Canino (2017) conducted a study on partnering based on coopetition in the inter-organizational networks. The research utilized an exploratory, descriptive research design with data being collected from 545 tourism firms and 49 local businesses. The findings indicated that increased competition among industry participants was a key predictor of coopetition behavior than the external competition. The study indicates that trust, shared value, and complementarity culminating from partnering between firms enhances their alliance forming. The study, however, focused on the tourism sector while the current research is limited to Tech Hubs in Kenya.

Bouncken, Laudien, Fredrich, and Görmar (2018) studied coopetition in coworking-spaces with specific reference to the value creation and appropriation tensions in an entrepreneurial space. The study reviewed interview data and secondary sources as the primary data collection instruments. The findings indicated that coopetition in co-working places through sharing knowledge, resources, and appropriation of creative ideas led to value creation within firms. The study also indicates that open corporate coworking space and independent coworking space are the keys to enhancing coopetition within the workplace. The study was limited to entrepreneurial workspaces, while the current study examines the growth of Tech Hubs in Kenya.

Sindakis and Theodorou (2017) examined global opportunities for entrepreneurial growth. The study focused on coopetition and knowledge dynamics within and across firms. Findings indicate that firms are building alliances with their competitors to ensure entrepreneurial survival and growth. The study indicates that cooperative interactions among firms lead to knowledge dynamics, which are essential for promoting innovation and new technological

investments. The study focuses on entrepreneurial growth, while the current study examines the growth within Tech Hubs in Kenya.

Zakrzewska-Bielawska (2013) researched coopetition as a factor in the development of innovative and technologically advanced firms with a focus on the high-tech sector. The study adopted a quantitative approach and selected 61 high-tech firms within Poland who took part in the research interviews. The findings of the study show that coopetition at a microeconomic level is a stimulator of development for high-tech firms, while coopetition between competitors positively contributes to a firm's innovativeness. The study focuses on high tech sector firms in Poland, whereas current research examined Tech Hubs in Kenya.

Hare (2018) conducted a qualitative study on the reasons for weak coopetitive relationships among South African Spaza Shop Owners. The study adopted an exploratory qualitative research approach with semi-structured questionnaires being utilized in conducting interviews. The study adopted a content analysis of the research data. The results of the study indicate that lack of trust among business owners, lack of awareness of the potential benefits of coopetition contributed to the poor coopetitive relationships. Findings further show that the volatility in the business environment led to a weak commitment to coopetitive relationships within firms. The research, however, did not focus on Tech Hubs, which are the primary unit of analysis for the current study.

2.3.5 Differentiation and Growth of Tech Hubs

Vanderstraeten and Matthyssens (2012) conducted an examination of service-based differentiation strategies for business incubators by exploring external and internal alignment. The study adopted a qualitative analysis focusing on two economic development incubators. The results of the content analysis indicate that service-based differentiation for incubators enhances the firm capacity to align internal and external strategies. The study further indicates that the adoption of service differentiation positively influences customer value. The study was, however, not focused on Tech Hubs; hence the results may not be replicated in the current research scope.

Jiménez and Zheng (2017) conducted a study on the spatial perspective of innovation and development within innovation hubs in Zambia and the UK. The research was grounded on the

theory of space making, which focuses on the analysis of how firms produce distinct forms of collaboration and innovation for development. Through a case study analysis, the research indicates that differentiation with innovation hubs was integral in innovation development within both countries. The study further indicates that dynamism within innovation hubs enhances innovation development. The research, however, fails to indicate how differentiation within the hubs enhances growth within Tech Hubs in Kenya.

Du, Yalcinkaya, and Bstieler (2016) researched sustainability, social media-driven open innovation, and new product development performance. The study adopted a quantitative methodology in the examination of product development across large tech firms. The collected research data was analyzed using descriptive and inferential analysis. The results show that differentiation and sustainability orientation contribute positively to changes in customer focus and new product development. The study further indicates that social media-driven open innovation activities enhance definition in the technical expertise of tech firms. The study was limited to technology firms, while the current study examines growth among Tech Hubs in Kenya.

Johnson (2018) investigated the factors facilitating innovation in technology startups in Ghana. The study applied a multiple case study of the technology entrepreneurship ecosystem in Ghana. The study focused on qualitative research using semi-structured interviews with 20 technology entrepreneurs in Ghana. The paper indicates that the biggest challenge for technology entrepreneurs were institutional factors (regulation and bureaucratic) and limited opportunities for differentiation within the tech ecosystem. The study was domiciled in Ghana; hence the results may not be representative of the Kenyan Tech Hubs scope.

Cheruiyot (2018) examined the brand positioning of innovation labs in Kenya and how they can create an effective branding strategy. The study adopted a case study research design at the Living lab with the desktop review being adopted in the research. The research further conducted expert interviews with experts in innovation management. The findings of the study show that effective branding among innovation labs contributes to the creation of differentiation, which offers visible benefits to the clientele and stakeholders within the innovation labs. The study was based on a case study while the current research focussed on the Tech Hubs operating in Kenya.

2.3.6 Business Environment and Growth of Tech Hubs

Kelly and Firestone (2016) examined the growth of Tech Hubs in Africa and indicates that the development of fiber optic network, increasing demand for a more technologically-driven economy and improved government support has been critical in improving the growth of the digital divide in the continent. You, Dal Bianco, Lin, and Amankwah-Amoah (2019) reviewed the technology divide in 21 African countries and indicated that a digitalized business environment, improved government incentives, and setting up of digital cities improved the technological progress.

Sambuli and Whitt (2017) examined technology innovation hubs and policy engagement. The study notes that lack of adequate incentives, lack of public sector partners, and restrictive financial support limited the growth of the innovation ecosystem. Akanle, Ademuson, and Omotayo (2019) studied the link between incubation hubs and development in Southwestern Nigeria. The study employed an explanatory research design and relied on a quantitative approach. The results indicate that an increase in collaboration between Tech hubs and the public and private sector will increase the synergy and productivity within the Tech ecosystem. The study further notes that increased budgetary allocation and tax incentives are crucial to improving growth within the sector.

Muchiri and Karume (2016) examine the role of broadband in spurring innovations in Kenya and utilized a descriptive quantitative study. The data was collected using interview schedules, and the findings indicate that the government should put up supportive policies and mechanisms that will support innovations. Cheruiyot (2018) indicates that improved infrastructure development, increased fiber connectivity, and government policies have been vital in improving the innovation space within the country. Gumboh (2017) found out that a conducive business environment and effective business to business communication have been positively associated with enhanced performance of technological SMEs in the country.

2.4 Summary of Literature and Research Gaps

Table 2.1 Research Gaps

Author	Title	Findings	Research Gap
Bouncken, Laudien, Fredrich, and Görmar (2018)	Coopetition in coworking-spaces with specific reference to the value creation and appropriation tensions in an entrepreneurial space	The findings indicated that coopetition in co-working places through sharing knowledge, resources, and appropriation of creative ideas led to value creation within firms	The study was limited to entrepreneurial workspaces, while the current study examines Tech Hubs in Kenya.
Cheruiyot (2018)	Brand positioning of innovation labs in Kenya and how they can create an effective branding strategy	Effective branding among innovation labs contributes to the creation of differentiation and visible benefits to the stakeholders	The study was based on a case study while the current research focussed on the Tech Hubs operating in Kenya.
Hamari, Sjöklint, and Ukkonen (2016)	The sharing economy and how businesses participate in collaborative consumption	The research results show that there is no direct link between collaborative consumption and sustainability	The study, however, was not focused on Tech Hubs, which are the unit of analysis in the current research.
Hare (2018)	A qualitative study on the reasons for weak coopetitive relationships among South African Spaza Shop Owners	Findings further show that the volatility in the business environment led to a poor commitment to coopetitive relationships within firms	The research, however, did not focus on Tech Hubs, which are the primary unit of analysis for the current study.

Hautamäki and Oksanen (2015)	Sustainable innovation with a focus on the competitive advantage for knowledge hubs	The results show that when different actors collaborate and co-create there are better innovation and growth through the special ecosystem	The study, however, utilizes a qualitative approach while the current research adopted a quantitative approach
Johnson (2018)	Investigation of the factors facilitating innovation in technology startups in Ghana	The paper indicates that the biggest challenge for technology entrepreneurs was limited opportunities for differentiation within the tech ecosystem	The study was domiciled in Ghana hence the results may not be representative of the Kenyan Tech Hubs scope

Source: Researcher (2020)

2.5 Conceptual Framework

A conceptual framework is a structure of concepts that are pulled together as a map for the study (Gartner, 2005). The framework hypothesizes the interaction between the independent variables and the sustainable relations among Tech Hubs in Kenya.

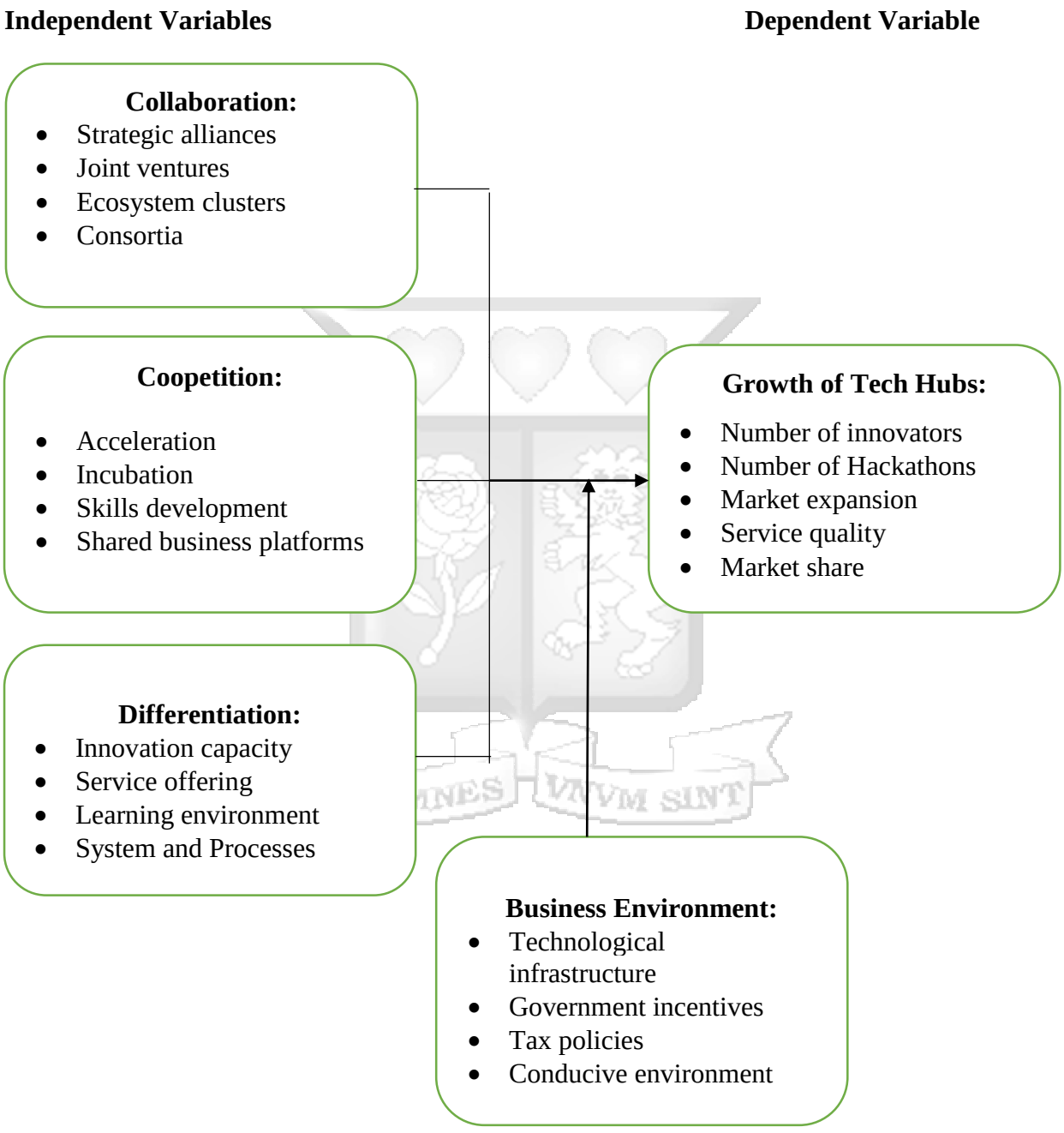

Figure 2.2 Conceptual Framework
Source: Researcher (2020)

From the literature reviewed, the following conceptual framework was used to provide a basis for the research design and data analysis. The independent variables were Collaboration, Coopetition, and Differentiation. The dependent variable was the growth of Tech Hubs.

Table 2.2 Operationalization of Research Variables

Variable	Type of variable	Indicators	Data collection tool	Data analysis
Collaboration	Independent	• Strategic alliances • Joint ventures • Ecosystem clusters • Consortia	Structured questionnaire; 5-point Likert scale	Descriptive analysis and inferential analysis
Coopetition	Independent	• Acceleration • Incubation • Skills development • Shared business platforms	Structured questionnaire; 5-point Likert scale	Descriptive analysis and inferential analysis
Differentiation	Independent	• Innovation capacity • Service offering • Learning environment • System and Processes	Structured questionnaire; 5-point Likert scale	Descriptive analysis and inferential analysis
Business environment	Moderator	• Technological infrastructure • Government incentives • Tax policies • Conducive environment	Structured questionnaire; 5-point Likert scale	Descriptive analysis and inferential analysis
Growth of Technology Hubs	Dependent	• Innovation capacity	Structured questionnaire;	Descriptive analysis and

• Number of innovators • Number of Hackathons • Market expansion • Service quality	5-point Likert scale	inferential analysis

Source: Researcher (2020)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research methodology that was used to carry out the study. It comprises of research design, population, sampling and sample size, data collection methods, research quality as well as data analysis procedures. Riemer et al. (2011) describe research methodology as the techniques that researchers adopt to ensure that their work can be critiqued, is repeatable, and adaptable.

3.2 Research Design

This is the structure that holds the elements of the research together. It structures the research, showing how all of the significant parts of the research, work together to answer the central questions (Babbie & Mouton, 2002). This research adopted a cross-sectional descriptive study where data was collected at one point in time. The cross-sectional design is selected because it is simple, affordable, and ensures completion of the study within the given period. The study adopted a quantitative research approach using structured questionnaires in the data collection process.

3.3 Population and Sampling

3.3.1 Target Population

The population comprises of all individuals or objects of desire for research due to their observability (Mugenda & Mugenda, 2003). The population for the study was drawn from the personnel working within the 40 Tech Hubs operating in Kenya. The unit of observation was two executive managers within the Tech Hubs; thus, the population of the research was 80 personnel members.

3.3.2 Sampling Technique and Sample Size

Bryman (2012) refers to the sampling frame as the source list with emphasis that it must be appropriate, reliable, comprehensive, and correct. The sampling frame for the research included all the 80 respondents drawn from the Tech Hubs. The study adopted a census survey of all the respondents within the Tech Hubs. This ensured there is an equal representation of

all the respondents in the course of the research. The sample size for the study was 80 respondents drawn from the Tech Hubs operating in Kenya.

3.4 Data Collection

3.4.1 Data Collection Instruments

The study adopted the use of the questionnaire for data collection. This is widely used, especially in economic and business research (Fraenkel & Wallen, 2006). In this study, a structured questionnaire was developed. This has a list of questions that were ordered in a way that each respondent is presented with the questions in the same manner. Responses were, therefore, standardized. The process of developing the questionnaires ensures that the basic principles were observed, as stated by Kothari (2011). The questionnaire only had closed-ended questions. The study objective and hypotheses informed the instrument, and the constructs of the conceptual framework aided in the designing of the research instrument. The study adopted a 5-point Likert scale in the collection of participants' responses.

3.4.2 Data Collection Procedures

Data was obtained using a self-administered questionnaire. Initially, the questionnaires were mailed to the respective Tech Hubs. The study sought the clearance of the ethics review committee as well as the National Commission for Science Technology and Innovation before embarking on the data collection. The study sought correspondence with the managers of the Tech Hubs before collecting research data. The study employed a drop and picked method in the data collection with Google forms being utilized where the alternate method was not possible. The research was conducted between February 2020 and March 2020.

3.5 Research Quality

The questionnaire developed for the study was pretested before adoption in the main research. This was done with a group similar to the study population (10% of sample size) while using procedures similar to those that were used in the study as recommended (Mugenda & Mugenda, 2003). This was conducted in institutional innovation centers within Nairobi City County.

3.5.1 Reliability of Research Instrument

Reliability is the degree to which a research instrument can give similar results in numerous experiments (Cooper & Schindler, 2014). The reliability of the research focuses on ascertaining the internal consistency of the research instruments. The research adopted the Cronbach Alpha, which was utilized in assessing the reliability scores of the research variables. The study adopted all the constructs with reliability scores of 0.7 and above.

Table 3.1 Reliability Statistics

Construct	Cronbach's Alpha	N of Items
Growth of Tech Hubs	.744	5
Collaboration	.799	5
Coopetition	.881	6
Differentiation	.794	5
Business environment	.682	4

The findings above present the results of the Cronbach alpha test. Golafshani (2003) provides the following rule of thumb: ">.9 Excellent, >.8Good,>.7 Acceptable,>.6 Questionable,>.5 Unacceptable". Based on the above, all the dependent and independent variables had an acceptable Cronbach alpha of above 0.7. The moderator variable had an alpha of .682, which was questionable; hence the questions were realigned before the primary research was undertaken.

3..5.2 Validity of Research Instrument

The research employed both construct and content validity. For content validity, the questionnaire was reviewed by a peer expert within the field of Tech Hubs. The supervisor was contacted to ascertain the research's content validity. Upholding of construct validity was possible by ensuring that all research variables are covered in the questionnaire.

3.6 Data Analysis and Presentation

The data obtained was edited and coded into SPSS 23 for analysis. The study employed both descriptive and inferential statistics and further undertook diagnostics tests to ensure the accuracy and fitness of the data by testing the hypothesis developed (Sekaran, 2016). Descriptive and inferential analysis was employed throughout the project. The descriptive analysis comprises an estimation of means, frequencies, and standard deviations—the

inferential analysis comprised of correlation analysis, Variance (ANOVA), and regression analysis. The results of the study were presented using charts, tables, and bar graphs. Collinearity tests and normality tests were employed in conducting the diagnostics tests.

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon}$$

Where:

Y = Dependent Variable (Growth of Tech Hubs)

Independent variables being;

X_1 is collaboration

X_2 is coopetition

X_3 is differentiation

α = the constant

$\beta 1- 3$ = the regression coefficient or change included in Y by each X

Tests for Moderation Effect

The study further undertook the moderator variable analysis using the below regression model;

$$\mathbf{Y = \alpha + bX + cZ + dX*Z + \varepsilon}$$

Where;

Y= growth of Technology Hubs

X= Aggregate effect of sustainable relationships on the growth of Technology Hubs

Z= Hypothesized moderation effect of business environment on the growth of Technology Hubs

dX*Z = The composite effect of sustainable relationships, business environment, and growth of Technology Hubs

ε = Error term

b,c,d = Coefficients of the predictor variables

3.7 Ethical Considerations

This study upheld ethical standards by ensuring that the consent of the respondents is obtained before conducting the research and maintaining confidentiality for all the information gathered. All the approvals from the relevant authorities were sort and obtained before carrying out the study. All the findings of the study were analyzed and disclosed factually without compromising the quality of the study.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This study was undertaken to establish the effect of sustainable relationships on the growth of Tech Hubs in Kenya. This chapter focuses on the presentation of the findings of the analysis. This chapter will be divided into the background information, the descriptive analysis, and the inferential analysis.

4.2 Background Information

The study sought to determine the number of critical factors among the participants. This section presents the response rate of the study and the demographic profile of the participants.

4.2.1 Response Rate

Cooper is Schindler (2014) suggest that a response rate of above 50% is suitable for analysis, while a response rate of above 80% is excellent for statistical analysis. The study was able to obtain a response rate of 91% (N=73), with only 9% of the sampled participants not being considered in the research.

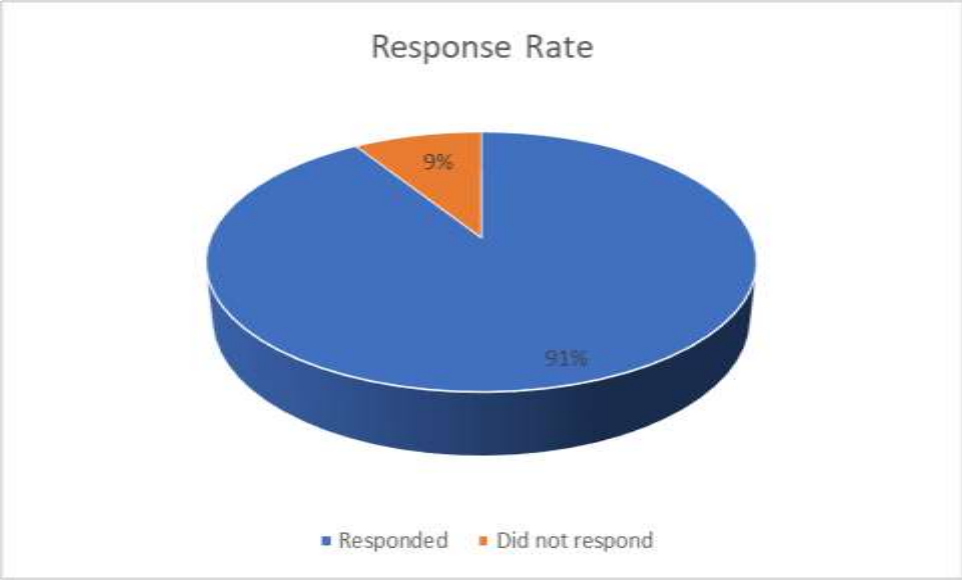

Figure 4.1 Response Rate

4.2.2 Age of the Respondents

The research examined the age of the respondents, and the results are as indicated below in Table 4.1.

Table 4.1 Age of Respondent

	Frequency	Percent
Below 25 years	21	28.8
25-35 years	37	50.7
36 and above	15	20.5
Total	73	100.0

The results show that the majority of participants, 50% were between the age of 25-35 years, 29% were below 25 years, while only 21% were above 36 years of age. This shows that the youth population in the country has been integral in driving innovation, which is in line with the government development plans and inclusion initiatives.

4.2.3 Gender of Respondents

The study examined the distribution of the participants by their gender. The research shows that the majority of the respondents, 63% were female participants. In comparison, 37% of the participants were male managers within Tech Hubs, as shown below.

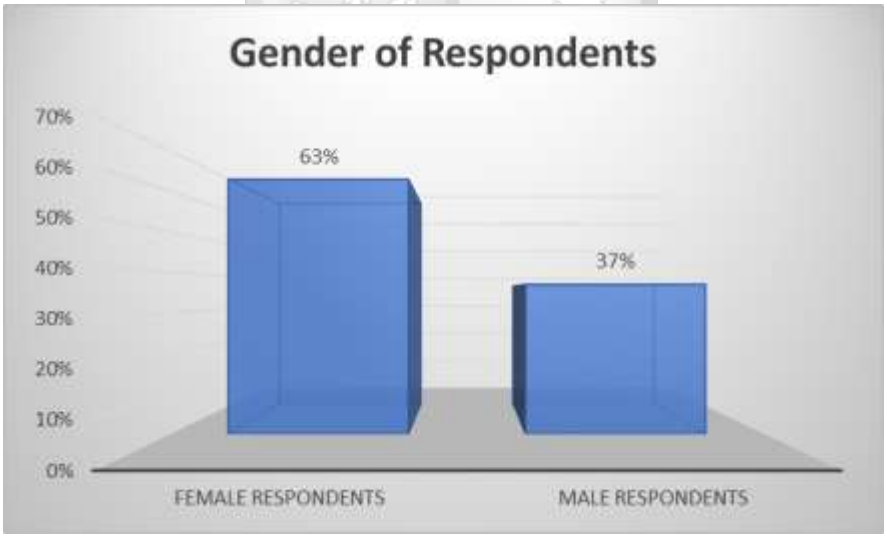

Figure 4.2 Gender of Respondents

4.2.4 Education Level of Respondents

The study further asked the respondents to indicate their highest educational qualification. The results are in Table 4.2 below.

Table 4.2 Respondents Education Level

	Frequency	Percent
Diploma	2	2.7
Graduate	32	43.8
Postgraduate	39	53.4
Total	73	100.0

The findings above show that 53% of the respondents had attained a postgraduate qualification; 44 % of the respondents had a graduate-level education, while only 3% of the participants had attained a diploma level education.

4.2.5 Position in the Organization

The study further surveyed the distribution of the respondents per position within the tech hubs. The results are shown below.

Table 4.3 Respondents Position in the Organization

	Frequency	Percent
Managing director	4	5.5
Head of operations	18	24.7
Programs director	51	69.9
Total	73	100.0

The results show that 70% of the respondents were in program directors within the Tech Hubs, 25% was the head of operations, while only 5% of the respondents were managing directors. The findings show that the participants were in a position to offer information necessary to solve the research problem.

4.2.6 Length of Period in Tech Hubs

The study examined how many years the firm has been within the Tech Ecosystem in Kenya. The findings show that the majority of the firms, 75% have been involved for more than five years, while 25% of the firms have been within the Tech Hub ecosystem for 2-4 years. This shows that the firms have amassed adequate experience within the ecosystem, which is key to obtaining relevant research information.

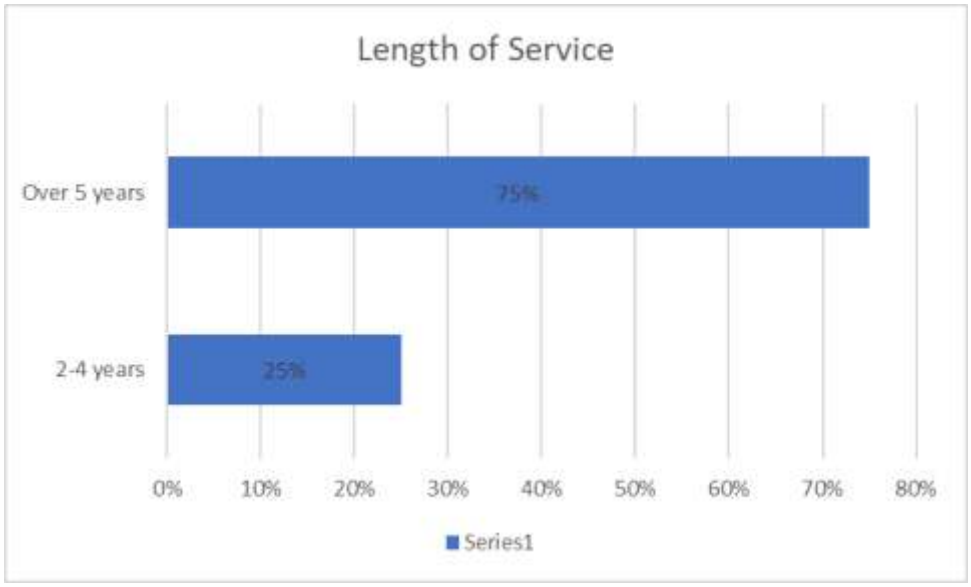

Figure 4.3 Length of Service

4.2.7 Type of Sustainable Relationships

In an examination of the types of sustainable relationships within Tech Hubs, the findings obtained in the study are shown below.

Table 4.4 Type of Sustainable Relationships

	Frequency	Percent
Formal relationship	27	37.0
Informal relationship	42	57.5
No relationship	4	5.5
Total	73	100.0

The results of the research indicate that 57% of the firms had adopted informal relationships, 37% of the respondents indicated that their firms had formal relationships in place while only 6% of the firms were in no active relationships within the Tech Hub Ecosystem.

4.2.8 Common Type of Relationships

The study further sought to establish the common types of relationships that Tech Hub firms have in place. The findings are shown below.

Table 4.5 Common Type of Relationships

	Frequency	Percent
Collaborations	31	42.5
Coopetition	36	49.3
Differentiation	6	8.2
Total	73	100.0

The study findings show that 49% of the firms have deployed coopetition, 43% have implemented collaborations. In comparison, 8% of the firms have instituted differentiation as the results in Table 4.5 above indicate.

4.3 Descriptive Analysis

The study was premised on establishing the association between collaboration, coopetition, differentiation, business environment, and growth of Tech Hubs. The variables were examined separately, and the results are presented using means and standard deviations as the main parameters of the descriptive analysis.

4.3.1 Collaboration

The first variable of the study is the level of collaboration between the Tech Hubs in Kenya, and the results of the descriptive examination are shown below.

Table 4.6 Descriptive Results for Collaboration

	Sum	Mean	Std. Deviation
The organization undertakes strategic alliances with other Tech Hubs within the industry	289.00	3.9589	1.00607
The organization has implemented joint venture undertakings with other Tech Hubs within the industry	282.00	3.8630	1.19391
There is better ecosystem clustering within Tech Hub firms	286.00	3.9178	.95384
There is better consortia development	257.00	3.5205	1.41529
The organization develops new business through networks of our customers	299.00	4.0959	.85252

The findings indicate agreement among respondents that the organization undertakes strategic alliances with other Tech Hubs in the industry, as indicated by a mean value of 3.9589. The results also show agreement that the organization has implemented joint venture undertakings with other Tech Hubs within the industry, as shown by an agreement of 3.863. Concerning better ecosystem clustering within Tech Hub firms, there was agreement among respondents, as shown by mean of 3.9178. The respondents also agreed that there was better consortia development as indicated by mean of 3.5205 and a deviation of 1.41529, showing high variations in the responses. The results also show agreement that the organization develops new business through networks of customers, as shown by a mean of 4.0959 and a deviation of .85252 denoting moderate variations. These findings are consistent with literature from Hautamäki and Oksanen (2015), who show that co-creation and collaboration are critical to the growth within the technology ecosystem.

4.3.2 Coopetition

The second variable of the study is the level of coopetition between the Tech Hubs in Kenya, and the results of the descriptive examination are shown below.

Table 4.7 Descriptive Results for Coopetition

	Sum	Mean	Std. Deviation
The organization actively participates in acceleration programs with other Tech Hubs	298.00	4.0822	.84580
The organization has sustained a better competitive edge	293.00	4.0137	.90513
The organization has adopted a shared business platforms model	270.00	3.6986	1.16291
The organization has attained better skills development through partnerships	271.00	3.7639	1.15665
The organization is part of a program for co-creation of value	294.00	4.0274	.99962
The organization is aware of the advantages of partnering	290.00	3.9726	1.01342

Concerning the organization's active participation in acceleration programs with other Tech Hubs, there was agreement among participants as indicated by mean of 4.0822. The results indicated agreement that the organization has sustained a better competitive edge, as shown by

the mean of 4.0137 and a deviation of .90513. The study also indicates agreement among respondents that the organization has adopted a shared business platform model, as shown by a mean of 3.6986. Findings further show that participants agreed that the organization had attained better skills development through partnerships, as indicated by mean of 3.7639. Concerning the organization being part of a program for co-creation of value, there was agreement as indicated by a mean of 4.0274. The results indicate agreement that the organization is aware of the advantages of partnering, as shown by mean of 3.9726 and deviation of 1.01342, indicating high dispersion in the responses. Similar findings have been identified by Chim-Miki and Batista-Canino (2017). They suggest that complementarity and partnerships, value-sharing, and alliance forming are critical in inter-organization networks and development.

4.3.3 Differentiation

The third variable of the study is the level of differentiation between the Tech Hubs in Kenya, and the results of the descriptive examination are shown below.

Table 4.8 Descriptive Results for Differentiation

	Sum	Mean	Std. Deviation
The organization has a robust research and development program to foster service development	294.00	4.0274	.94241
The organization has insights on new ways to approach program development	296.00	4.0548	1.01229
The firm has developed and sustained an integral learning environment	283.00	3.8767	1.01304
The organization has in place core system and processes to foster service differentiation	285.00	3.9041	1.01604
The organization can leverage on opportunity recognition and exploitation to foster performance	290.00	3.9726	1.01342

The responses obtained show that respondents agreed that the organization has a robust research and development program to foster service development as denoted by a mean of 4.0274 and dispersion of .94241. The results show agreement that the organization has insights on new ways to approach program development, as noted by the mean of 4.0548. Findings indicate agreement that the firm has developed and sustained an integral learning environment as indicated by mean of 3.8767 and a standard deviation of 1.01304, showing high variations

in responses. The results show an agreement among participants that the organization has in place core system and processes to foster service differentiation, as shown by mean of 3.9041. The study findings indicate agreement that the organization can leverage on opportunity recognition and exploitation to foster performance, as shown by the mean value of 3.9726 above. The findings of this study are in line with empirical evidence by Vanderstraeten and Matthyssens (2012). They note that differentiation within incubators can be crucial to driving customer value and service development within tech incubators.

4.3.4 Business Environment

The fourth variable of the study is the examination of the prevailing business environment within the Tech Hubs ecosystem in Kenya, and the results of the descriptive examination are shown below.

Table 4.9 Descriptive Results for Business Environment

	Sum	Mean	Std. Deviation
There is an improvement in the availability of technology infrastructure within the country	301.00	4.1233	.92714
There is an improvement in incentives offered by the government for new Tech Hub startup within the country	253.00	3.4658	1.16764
There is a conducive digital space for the growth of better innovative space in the country	275.00	3.7671	1.09950
The tax policies in place are supportive of the growth of the digital space	259.00	3.5479	1.16716

Concerning whether there is an improvement in the availability of technology infrastructure within the country, there was agreement among respondents, as shown by the mean value of 4.1233. The results also indicate agreement among respondents that there is an improvement in incentives offered by the government for new Tech Hub startup within the country as noted by mean of 3.4658 and dispersion of 1.16764, noting high dispersion in the responses. The findings of the study indicate there is an agreement that there is a conducive digital space for the growth of better innovative space in the country, as shown by a mean of 3.7671. The research also indicates agreement among respondents that the tax policies in place are supportive for the growth of the digital space as indicated by mean of 3.5479 and a deviation of 1.16716, as shown above. The study results are supported by previous literature Kelly and

Firestone (2016). They indicate that increased infrastructure development, enhancing government support, and driving technological-development are critical to growth in the digital divide.

4.3.5 Growth of Tech Hubs

The dependent variable of the study is the examination of the growth of the Tech Hubs ecosystem in Kenya, and the results of the descriptive examination are shown below.

Table 4.10 Descriptive Results for Growth of Tech Hubs

	Sum	Mean	Std. Deviation
The Tech Hub has been able to expand its service offering to other regions in the country	308.00	4.2192	.76823
There has been a growth in the number of hackathons held by the Tech Hub	306.00	4.1918	.82761
The Tech Hub has witnessed growth in the number of innovators being mentored in the firm	307.00	4.2055	.70630
The Tech Hub has been able to foster the level of service quality offered to innovators	311.00	4.2603	.72701
The Tech Hub has witnessed an acceleration in the number of innovative developments among in-house innovators	299.00	4.0959	.98833

Concerning the growth of the Tech Hubs, the respondents agreed that they have been able to expand its service offering to other regions in the country, as shown by a mean of 4.2192. Concerning whether there has been a growth in the number of hackathons held by the Tech Hub, there was agreement as noted by mean of 4.1918. The study results showed agreement that the Tech Hubs have witnessed growth in the number of innovators being mentored in the firm as indicated by mean of 4.2055. The study notes there was agreement among respondents that the Tech Hub has been able to foster the level of service quality offered to innovators as indicated by mean of 4.2603 and a moderate dispersion in responses of .72701. The findings show that the Tech Hub has witnessed an acceleration in the number of innovative developments among in-house innovators as depicted by the mean of 4.0959 and variation of .98833.

4.4 Inferential Analysis

The research further sought to examine the association between the research variables. The research adopted both correlation and regression analysis in determining association and relationship, respectively.

4.4.1 Correlation Analysis

The research utilized the Pearson Correlation to determine the association between the study variables. The findings are shown below,

Table 4.11 Correlation Results

		Growth of Tech Hubs
Collaboration	Pearson Correlation	.428**
	Sig. (2-tailed)	.000
	N	73
Coopetition	Pearson Correlation	.189
	Sig. (2-tailed)	.008
	N	73
Differentiation	Pearson Correlation	.296*
	Sig. (2-tailed)	.011
	N	73
Business Environment	Pearson Correlation	.075
	Sig. (2-tailed)	.028
	N	73

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The first objective of the study sought to establish the effect of collaboration on the growth of Tech Hubs. The results show there is a positive and significant association, as shown by *P-value = .428, Sig = .000<.05*. Knight (2014) notes that collaboration is critical to competitiveness and sustainability. Hamari, Sjöklint, and Ukkonen (2016) suggest that collaboration is positively related to sustainability and increased economic gains.

Findings further show correlation results of *P-value = .189, Sig = .008< .05* between coopetition and growth of Tech Hubs. This indicates that there is a positive and significant association between coopetition and the growth of Tech Hubs in Kenya. These results are in

line with Bouncken, Laudien, Fredrich, and Görmar (2018). They indicate that coopetition has enhanced value creation and development of entrepreneurial space.

The results also show correlation results of *P-value = .296, Sig = .011<.05* between differentiation and growth of Tech Hubs. This indicates that there is a positive and significant association between differentiation and the growth of Tech Hubs in Kenya. Jiménez and Zheng (2017) similarly found out that differentiation within innovation hubs is critical to the development of innovations and enhancing dynamism. Du, Yalcinkaya, and Bstieler (2016) also show that differentiation positively contributes to customer-focus and product development. The fourth objective of the study sought to establish the effect of the business environment (moderator) on the growth of Tech Hubs. The results show there is a positive and significant association, as shown by *P-value = .075, Sig = .028<.05*. Sambuli and Whitt (2017) note that increased public sector support and creating a conducive environment is key to the growth of the innovation ecosystem.

4.4.2 Diagnostic Analysis

The study applied both collinearity tests and normality tests to examine the tests for linear regression assumptions. The findings are shown below.

Table 4.12 Collinearity Tests

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Collaboration	.893	1.119
	Coopetition	.811	1.233
	Differentiation	.791	1.264
	Business Environment	.800	1.250

a. Dependent Variable: Growth

The study relied on the variance inflation factor to determine the multicollinearity error between the independent variables. The findings indicate collaboration (VIF= 1.119), coopetition (VIF= 1.233), differentiation (VIF= 1.264), and business environment (VIF= 1.250) were all below the value of 10 showing there were no collinearity problems in the research data.

Table 4.13 Normality Tests

	Kolmogorov-Smirnov[a]	Shapiro-Wilk

	Statistic	df	Sig.	Statistic	df	Sig.
Growth	.126	73	.200	.944	73	.113
Collaboration	.138	73	.200	.955	73	.110
Coopetition	.118	73	.200	.965	73	.140
Differentiation	.165	73	.200	.957	73	.114
Business Environment	.157	73	.200	.961	73	.125

a. Lilliefors Significance Correction

The study relied on the Shapiro-Wilk tests since the number of observations was less than in 2000. The findings indicate that all the study variables had a significant value that was above .05, which indicates that the data was typically distributed, as shown in Table 4.13.

4.4.3 Regression Analysis

The research sought to determine the relationship between sustainable relationships and the growth of Tech Hubs. The study adopted the ordinary least square regression, and the results are shown below.

Table 4.14 Regression Results

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.464[a]	.215	.181	2.17993

a. Predictors: (Constant), Differentiation, Collaboration, Coopetition

b. Dependent Variable: Growth

Regression analysis above indicates that holding other factors constant, sustainable relationships as measured by differentiation, collaboration, and competition contribute to 21.5% variations in the growth of Tech Hubs in Kenya. The findings of the study are in line with various researchers who have shown that; Cunningham, Cunningham, and Ekenberg (2015) found that collaboration improves innovation capacity; Hare (2018) coopetition is critical to the performance of firms and Johnson (2018) who notes that differentiation supports better growth in technology firms.

4.4.4 ANOVA Analysis

The research relied on a regression model to determine the relationship between the study variables. The significance of the model was tested using ANOVA tests.

Table 4.15 ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	90.052	3	30.017	6.317	.001[b]
	Residual	327.893	69	4.752		
	Total	417.945	72			

a. Dependent Variable: Growth

b. Predictors: (Constant), Differentiation, Collaboration, Coopetition

The findings of the ANOVA analysis indicate that the regression model adopted in the study was statistically significant, as indicated by Sig = .001<.05 with an F-value = 6.317.

4.4.5 Regression Coefficients

The resultants coefficients of the regression analysis are shown in the table below.

Table 4.16 Regression Coefficients Results

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	12.744	2.143		5.948	.000
	Collaboration	.265	.081	.370	3.279	.002
	Coopetition	.014	.075	.023	1.192	.049
	Differentiation	.139	.094	.178	1.489	.001

a. Dependent Variable: Growth

The resultant regression model is shown below;

$$\mathbf{Y = 12.744 + .265}X_1 \mathbf{+ .014}X_2 \mathbf{+ .139}X_3 \mathbf{+ 2.143}$$

The findings of the coefficients results show a ***significance value of .002<.05*** between the collaboration and growth of Tech Hubs, which indicates that a unit change in collaboration will result in a .265 change in the growth of Tech Hubs in Kenya. Gumboh (2017) also found out that collaboration fostered business-to-business relationships and expanding firm growth.

The findings of the coefficients results show a ***significance value of .049<.05*** between coopetition and growth of Tech Hubs, which indicates that a unit change in coopetition will result in a .014 change in the growth of Tech Hubs in Kenya. Zakrzewska-Bielawska (2013 shows that coopetition between competitors is critical to innovativeness and performance.

The findings of the coefficients results show a ***significance value of .001<.05*** between differentiation and growth of Tech Hubs, which indicates that a unit change in differentiation will result in a .139 change in the growth of Tech Hubs in Kenya. Cheruiyot (2018) supports the findings of this study by also indicating that differentiation is critical to brand creation and innovativeness in the country.

4.5 Moderator Variable Analysis

The study further incorporated the business environment as a moderator variable. The results of the moderation are represented in the regression summary shown below.

Table 4.17 Moderation Regression Results

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.464[a]	.215	.181	2.17993
2	.475[b]	.226	.180	2.18128

a. Predictors: (Constant), Differentiation, Collaboration, Coopetition

b. Predictors: (Constant), Differentiation, Collaboration, Coopetition, Business Environment

The findings of the research show that there was a positive moderating effect of the business environment on the relationship between sustainable relationships and growth of Tech Hubs in Kenya, as shown in the change in the R-square. The results indicate that holding other factors constant 22.6% (R^2= *.226*) changes in the growth of Tech Hubs can be determined by differentiation, collaboration, coopetition, and business environment. You, Dal Bianco, Lin, and Amankwah-Amoah (2019) notes that a digitalized business environment is critical to improvement in the technological environment. Akanle, Ademuson, and Omotayo (2019) further note that tax incentives, budgetary support, and private-public alliances are crucial to growth in incubation hubs.

Table 4.18 Moderation ANOVA Results

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	90.052	3	30.017	6.317	.001[b]
	Residual	327.893	69	4.752		
	Total	417.945	72			
2	Regression	94.403	4	23.601	4.960	.001[c]

Residual	323.543	68	4.758
Total	417.945	72	

a. Dependent Variable: Growth

b. Predictors: (Constant), Differentiation, Collaboration, Coopetition

c. Predictors: (Constant), Differentiation, Collaboration, Coopetition, Business Environment

The findings of the ANOVA analysis indicate that the regression model adopted in the study was statistically significant, as indicated by Sig = .001<.05 with an F-value = 4.960. This shows that the business environment has a statistically significant moderating effect on the relationship between sustainable relationships and the growth of Tech Hubs in Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter is critical in the research in presenting the summary of the study. The chapter further presents a discussion of the results, the conclusions, and the recommendations that are drawn from the study. The chapter further presents a suggestion for further research work.

5.2 Summary

This study aimed at examining the link between sustainable relationships and the Growth of Tech Hubs in Kenya. The study further examined if the business environment moderated the relationship between the independent variables and the dependent variable. The research was grounded on the resource-based view theory and the firm growth theory. The study utilized a positivist research philosophy with a cross-sectional research design. The population of the study was the 40 operating Tech Hubs Kenya, with two managers being considered.

The research was able to obtain a response rate of 91% of the sample respondents. The findings of the study showed that the majority of the Tech Hubs had adopted some form of relationships within the ecosystem. The study results also show that most of the firms have either adopted collaboration or coopetition in the relationships within the ecosystem. The results indicate that there is a positive relationship between sustainable relationships and the growth of Tech Hubs in Kenya. The findings further show that there is a significant moderating effect of the business environment on the relationship between sustainable relationships and the growth of Tech Hubs.

5.3 Discussion

5.3.1 Collaboration

The study sought to analyze the level of collaboration within Tech Hubs in Kenya. The study notes that at least 43% of the firms have initiated the collaboration with other Tech Hubs in the ecosystem. The findings indicate that a unit change in collaboration will result in a .265 change in the growth of Tech Hubs in Kenya. The findings indicate that most of the firms have undertaken strategic alliances, joint ventures, and development consortia. Cunningham, Cunningham, and Ekenberg (2015) similarly found out that collaboration was critical to the development of entrepreneurial capacity within innovation centers. The results also show that

firms have developed clusters within the ecosystem and developed the new business through networking. Hautamäki and Oksanen (2015) are of a similar view that collaboration can help in the growth of ecosystems through better co-creation and shared value. Gumboh (2017) also notes that collaboration can be critical to business growth within the ICT ecosystem.

5.3.2 Coopetition

The research examined the level of coopetition within the Tech Hubs, and results show that 49% of the firms have adopted some form of coopetition within the ecosystem. The findings indicate that a unit change in coopetition will result in a .014 change in the growth of Tech Hubs. Findings show that respondents' firms have engaged in acceleration programs geared towards promoting firm growth. Chim-Miki and Batista-Canino (2017) show that shared value and complementarity have fostered firm growth through alliances development. Bouncken, Laudien, Fredrich, and Görmar (2018) posits that coopetition has stimulated value creation. The study further notes that the firms have adopted shared business models and formulated partnerships and co-creation initiatives within the ecosystem. The findings also indicate that firms are striving to develop better skills that are key to gaining a competitive advantage in the ecosystem.

5.3.3 Differentiation

The research also examined the level of differentiation within the Tech Hubs, and results show that 8% of the firms have adopted some form of differentiation within the ecosystem. The findings indicate that a unit change in differentiation will result in a .139 change in the growth of Tech Hubs in Kenya. The findings of the study show that firms are developing independent research and development as well as new program development, which enhances their service value. Vanderstraeten and Matthyssens (2012) findings also indicate that service-based differentiation for incubators has been key to improving the firm capacity. Jiménez and Zheng (2017) note that dynamism within innovation hubs is key to innovation development. The study also notes that firms are deploying their core-systems as well as environmental learning practices to foster their performance. Du, Yalcinkaya, and Bstieler (2016), in their research, notes that differentiation has positively contributed to customer focus and product development.

5.3.4 Business Environment

The study findings show that respondents are in agreement that the government has advanced technological infrastructure and the creation of a conducive digital space within the country. Cheruiyot (2018), in their study, found out that having the requisite infrastructure in place, fiber connectivity, and government policies are vital to the growth in the innovation space. The study results also show that tax policies have been advanced to support the local digital ecosystem; however, the incentives offered have not been sufficient, as indicated by some of the respondents. Muchiri and Karume (2016) posit that putting in place supportive government policies and mechanisms has fostered innovations. Gumboh (2017), in the same vein, notes that the conducive business environment is key to technological performance within the country.

5.4 Conclusions

Based on the results obtained, the research concludes that differentiation, coopetition, and collaboration are positively associated with the growth in the Tech Hubs in Kenya. The results of the study also show that the business environment positively moderates the relationship between sustainable relationships and the growth of Tech Hubs. The results show there is a positive and significant association between the collaboration and growth of Tech Hubs in Kenya, as shown by *P-value = .428, Sig = .000<.05*. The study indicates that the development of clusters, co-creation, and shared value between the Tech Hubs can be vital to stimulating the growth of the tech ecosystem.

The study further concludes that there is a positive and significant association between coopetition and the growth of Tech Hubs in Kenya *P-value = .189, Sig = .008< .05.* The research reveals that formulation of strategic alliances, value creation, adopting a shared business model, and creating partnerships can help the firms develop better skills and obtain a competitive edge within Tech Hubs. The results also show a positive and significant association between differentiation and the growth of Tech Hubs in Kenya *P-value = .296, Sig = .011<.5.* The study shows that having independent research and development, service differentiation, and deploying core systems is critical to business development within Tech Hub firms.

The study concludes that there is a positive and significant association, as shown by *P-value = .075, Sig = .028<.05* between the business environment and the growth of Tech Hubs. The study concludes that the development of the required infrastructure, offering business

incentives, tax incentives, and deploying better fiber connection is associated with growth in the Tech Hubs.

5.5 Recommendations

5.5.1 Policy Implications

The results are expected to be essential to stakeholders within government agencies. The study recommends that the Ministry of ICT should develop clear policies on the incentives that can be directed to the Tech industry to stimulate their growth. This can be in the form of offering new business development incentives, tax breaks, and less stringent business startup policies. Further, the government should create awareness across the country on the benefits that can accrue from the digitalization of the various economic sectors. Currently, the adoption of technology has been skewed towards the financial and transport industry; hence there is a need for the government to guide technologically-oriented development across the underserved sectors in the country.

5.5.2 Managerial Implications

The research recommends that the management of Tech Hub firms should foster involvement in shared workspaces, as this will help reduce the costs of running Tech Hubs. Further, the study recommends that Tech Hubs offering the same services should strive to collaborate as this will provide the firms a better competitive edge. The research also suggests that Tech Hubs should seek to create cross-border relations with other regional Tech Hubs as this will help in value sharing between countries, which can be integral to the development of the tech ecosystem and offering more customer-centered solutions.

5.6 Areas for Further Research

The study suggests that future research should be undertaken to assess the preparedness of the public towards a technology-driven economy as this will be vital to fostering the innovative capacity in the country.

REFERENCES

Adner, R. (2016). Navigating the leadership challenges of innovation ecosystems. . *MIT Sloan Management Review,* , 58(1).

Aghion, P., & Howitt, P. (1992). A Model of Growth through Creative Destruction. . *Econometrica* , 60 (3) 323 – 351.

Akanle, O., Ademuson, A. O., & Omotayo, A. (2019). Incubation Hubs and Development in Southwestern Nigeria. . *Ilorin Journal of Sociology*, 11(2), 248-260.

Allen, J. (2012). Living Differentiation. . *Harvard Business Review Press.*

Aregbesola, R. (2014). Africa tech hubs–A tale of hope or hype?. Africa at LSE. *2014 LSE Africa Summit*.

Arteaga, R., & Hyland, J. (2013). *Pivot: How top entrepreneurs adapt and change course to find ultimate success.* John Wiley & Sons.

Ashnai, B., Henneberg, S. C., Naudé, P., & Francescucci, A. (2015). Inter-personal and inter-organizational trust in business relationships: An attitude–behavior–outcome model. . *Industrial Marketing Management.*

Babbie, E., & Mouton, J. (2002). *Social research.* . Belmont, CA: : Wadsworth Group.

Barney, J. (1991). Firm resources and sustained competitive advantage. . *Journal of Management.* , 17(1) , 99-120.

Bayen, M., & Giuliani, D. (2018). *Africa: a look at the 442 active tech hubs of the continent.* Mobile for Development.

Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. . *Journal of Banking & Finance,* , 30(11), 2931-2943.

Bengtsson, M., & Johansson, M. (2014). Managing coopetition to create opportunities for small firms. *International small business journal,* , 32(4), 401-427.

Bengtsson, M., & Kock, S. (2014). Coopetition—Quo vadis? Past accomplishments and future challenges. . *Industrial marketing management,*, 43(2), 180-188.

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. . *Review of Managerial Science,* , 12(2), 385-410.

Brown, E. (2007). Competitive advantage and the resource based view of the firm.

Bryman, A. (2012). *Social Research Methods.* . New York, USA:: Oxford University Press.

CBI Insights. (2018). *Global Tech Hubs*. Retrieved from CBI Insights: https://www.cbinsights.com/research/report/global-tech-hubs/

Cheruiyot, N. (2018). Brand positioning of innovation labs in Kenya: Creating an effective branding strategy . *Doctoral dissertation. University of Nairobi*.

Chim-Miki, A. F., & Batista-Canino, R. M. (2017). Partnering based on coopetition in the interorganizational networks of tourism: a comparison between Curitiba and Foz do Iguaçu, Brazil. . *Revista Brasileira de Gestão de Negócios-RBGN*, , 19(64), 219-235.

Cooper, R. D., & Schindler, S. (2014). *Business Research Methods.* . Boston:: Irwin McGraw Hill.

Cunningham, P., Cunningham, M., & Ekenberg, L. (2015). Assessment of potential ICT-related collaboration and innovation capacity in east Africa. *IEEE Global Humanitarian Technology Conference (GHTC)* , (pp. 100-107). IEEE.

Daidj, N. (2016). *Strategy, structure and corporate governance: Expressing inter-firm networks and group-affiliated companies.* . Routledge.

Doran , J., & McCarthy , N. (2017, October). *The role of entrepreneurship in stimulating economic growth in developed and developing countries*. Retrieved July 2018, from Taylor & Francis Online: https://www.tandfonline.com/doi/full/10.1080/23322039.2018.1442093?scroll=top&needAccess=true

Du, S., Yalcinkaya, G., & Bstieler, L. (2016). Sustainability, social media driven open innovation, and new product development performance. . *Journal of Product Innovation Management*, , 33, 55-71.

EtradeForAll. (2020). *ITC – Sustaining the impact of Africa's tech hubs*. Retrieved from EtradeForAll: https://etradeforall.org/itc-sustaining-the-impact-of-africas-tech-hubs/

FifiFinance. (2017). *Silicon Savannah: How Tech Hubs are Promoting Economic Growth*. Retrieved from FifiFinance: https://fififinance.com/africa/silicon-savannah

Financial Times. (2019). *Growth of tech hubs masks Africa's IT skills dilemma*. Retrieved from Financial Times: https://www.ft.com/content/c60e2d46-0611-11ea-a958-5e9b7282cbd1

Flanders, S. (2015). *US Tech Startup Overview: In The United States Of America.* . New York, NY: : Flanderstrade.

Forbes. (2019, 11 26). *Africa's Booming Tech Hubs Are "Backbone of Tech Ecosystem"*. Retrieved from Forbes: https://www.forbes.com/sites/tobyshapshak/2019/07/11/africas-booming-tech-hubs-are-backbone-of-tech-ecosystem-having-grown-40-this-year/#10ea814c24c2

Fraenkel, J. R., & Wallen, N. E. (2006). *How to design and evaluate research in education.* New York, USA:: McGraw Hill.

Friederici, N. (2014). More Art than Science? Exploring the Roles of Technology Innovation Hubs for Urban Regions in Developing Countries. *In Exploring the Roles of Technology Innovation Hubs for Urban Regions in Developing Countries (March 24, 2014). EU-SPRI Forum,*. Early Career Researcher Conference.

Geroski, P. (2002). The growth of firms in theory and in practice. . *Competence, Governance and Entrepreneurship, ,* 10(1), 168-186.

Gibus, P., & Kemp, R. G. (2003). Strategy and small firm performance: Scientific Analysis of Entrepreneurship and SMEs. *Journal of Small Business Strategy, ,* 12 (2): 1-11.

Giuri, P., & Luzzi, A. (2003). Patterns of growth of technology based SMEs in Europe. *Strategic Management Journal; ,* 24, pp.889–902.

Gredel, D., Kramer, M., & Bend, B. (2012). Patent-based investment funds as innovation intermediaries for SMEs: In-depth analysis of reciprocal interactions, motives and fallacies. . *Technovation, ,* 32(9), 536-549.

Gumboh, J. (2017). Effect of Supply Chain Collaboration on the Strength of Business-to-Business Relationship amongst Information and Communication Technology of Small and Medium Enterprises in Kenya . *Doctoral dissertation, COHRED, JKUAT*.

Hamari, J., Sjöklint, M., & Ukkonen, A. (2016). The sharing economy: Why people participate in collaborative consumption. *Journal of the association for information science and technology,*, 67(9), 2047-2059.

Hannon, P. D., & Chaplin, P. (2003). Are incubators good for business? Understanding incubation practice—the challenges for policy. Environment and Planning C: . *Government and Policy, ,* 21(6), 861-881.

Hare, C. (2018). *A Qualitative Study on the Reasons for Weak Coopetitive Relationships Among South African Spaza Shop Owners* . Doctoral dissertation, University of Pretoria.

Harper-Anderson, E., & Lewis, D. A. (2018). What Makes Business Incubation Work? Measuring the Influence of Incubator Quality and Regional Capacity on Incubator Outcomes. *Economic Development Quarterly, ,* 32(1), 60-77.

Hautamäki, A., & Oksanen, K. (2015). Sustainable innovation: Competitive advantage for knowledge hubs. *Orchestrating Regional Innovation, Espoo Innovation Garden, Aalto Univeristy, ,* 87-10.

Hersman, E. (2012). Mobilizing tech entrepreneurs in africa (innovations case narrative: iHub). *Innovations: Technology, Governance, Globalization*, 7(4), 59-67.

Jankowska, B. (2013). Coopetition as an attribute of clusters fostering innovativeness of enterprises–the case of one creative cluster. . *International Journal of Business and Management Studies,* , 5(1), 69-80.

Jiménez, A., & Zheng, Y. (2017). A spatial perspective of innovation and development: Innovation hubs in Zambia and the UK. *In International Conference on Social Implications of Computers in Developing Countries* (pp. pp. 171-181). Springer, Cham.

Jiménez, A., & Zheng, Y. (2018). Tech hubs, innovation and development. . *Information Technology for Development,* , 24(1), 95-118.

Johnson, N. B. (2018). Facilitating Innovation in Technology Startups in Ghana: A Multiple Case Study of the Technology Entrepreneurship Ecosystem in Ghana. *Södertörn University, School of Social Sciences*.

Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. (2008). Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly,* , 53(2), 295-332.

Kelly, T. (2015). Tech Hubs across Africa: Which Will be the Legacy-makers?'. *World Bank IC4D Blog*.

Kelly, T., & Firestone, R. (2016). *How tech hubs are helping to drive economic growth in Africa.* World Bank.

Knight, J. (2014). International education hubs: Collaboration for competitiveness and sustainability. . *New Directions for Higher Education,*, 2014(168), 83-96.

Kuivalainen, O., Saarenketo, S., & Puumalainen, K. (2012). Start-up patterns of internationalization: A framework and its application in the context of knowledge-intensive SMEs. *European Management Journal,* , Vol 30, issue 4, pp.372-385.

Liao, J., Welsch, H., & Stoica, M. (2003). Organizational absorptive capacity and responsiveness: an empirical investigation of growth oriented SMEs. . *Entrepreneurship Theory and practice,* , 28(1), 63-85.

Longo, M. C., & Giaccone, S. C. (2017). Struggling with agency problems in open innovation ecosystem: corporate policies in innovation hub. . *The TQM Journal,*, 29(6), 881-898.

Madhani, P. (2010). *Resource based view: Concepts and practices.* . Hyderabad, India:: Icafai University Press.

Masurel, E., & Van Montfort, K. (2006). Life Cycle Characteristics of Small Professional Service Firms. *Journal of Small Business Management,*, 44(3), 461-473.

Memba, S. F., Gakure, W. R., & Karanja, K. (2012). Venture Capital (VC): Its Impact on Growth of Small and Medium E nterprises in Kenya. *International Journal of Business and Social Science,* , 3(6), 32-38.

MIT Sloan Management Review. (2018). Fostering a Culture of Innovation. *MIT Sloan Management Review*.

Moraa, H. (2012). *Understanding the Key Factors of the iHub Model.* . Nairobi: iHub Research.

Moraa, H., Murage, K., & Omenya, R. (2012). *Intellectual Property in Technological Innovations.* . iHub Research.

Muchiri, P. R., & Karume, S. (2016). The Role of Broadband in Spurring Innovations in Kenya. *Texila International Journal of Clinical Research*, Volume 4, Issue 1, Dec 2016.

Mugenda, O., & Mugenda, A. (2003). *Research Methods: Quantitative and Qualitative Approaches.* Nairobi: Acts Press.

Mulas, V., Minges, M., & Applebaum, H. (2016). Boosting tech innovation: Ecosystems in cities: A framework for growth and sustainability of urban tech innovation ecosystems. Innovations: . *Technology, Governance, Globalization,* , 11(1-2), 98-125.

Ndemo, B., & Weiss, T. (2017). *Digital Kenya: An entrepreneurial revolution in the making (p. 509).* Springer Nature.

Newbert, S. (2007). Empirical research on the resource based view of the firm: An assesment and suggestions for future research. *Strategic Management Journal,* , 28; 121-146.

O'Connor, G. C., Corbett, A., & Pierantozzi, R. (2009). Create three distinct career paths for innovators. *Harvard business review,* , 14, 78.

Palakshappa, N., & Gordon, E. M. (2007). Collaborative business relationships: Helping firms to acquire skills and economies to prosper. *Journal of Small Business and Enterprise Development,* , 14(2), 264-279.

Penrose, E. T. (2009). *The Theory of the Growth of the Firm.* . Oxford university press.

Porter, M. E. (1998). *The competitive advantage of nations.* New York, USA:: Free Press.

Priem, R. L., & Butler, J. E. (2001). Is the resource-based" view" a useful perspective for strategic management research. . *Academy of Management Review,* 26(1), 22-40.

Rangongo, M. F., & Ngwakwe, C. C. (2018). Human Capital Investment and Economic Growth: A Test of Endogenous Growth Theory in Two Developing Countries. . *Acta Universitatis Danubius. OEconomica,* , 15(1).

Reynolds, N., Fischer, C., & Hartmann, M. (2010). Determinants of sustainable business relationships in selected German agri- food chains. *British Food Journal*, Vol. 111 No. 8, pp. 776-793.

Richard, B. (2009). Measuring Organizational Performance: Towards Methodological Best Practice. . *Journal of Management*, pp. 523-537.

Sambuli, N., & Whitt, J. P. (2017). *Technology innovation hubs and policy engagement.* The Institute of Development Studies .

Schaufeld, J. (2015). *Commercializing Innovation. Turning Technology Breakthroughs into Products.* New York: Apress.

Sekaran. (2016). *Research Methods for Business. A skill building approach, . .* Sussex: John Wiley & Sons Ltd,.

Sindakis, S., & Theodorou, P. (2017). *Global Opportunities for Entrepreneurial Growth: Coopetition and Knowledge Dynamics within and across Firms.* Emerald Publishing Limited.

Song, M., Podoynitsyna, K., Van Der Bij, H., & Halman, J. I. (2008). Success Factors in New Ventures: A Metaanalysis*. *Journal of product innovation management, ,* 25(1), 7-27.

Straub, R. (2016). The Promise of a Truly Entrepreneurial Society. Harvard Business Review Press. *Harvard Business Review Press*.

Street, C. T., & Cameron, A. F. (2007). External relationships and the small business: A review of small business alliance and network research. *Journal of Small Business Management, ,* 45(2), 239-266 .

Tiwana, A. (2008). Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity. *Strategic Management Journal,,* 29(3), 251-272.

Vanderstraeten, J., & Matthyssens, P. (2012). Service-based differentiation strategies for business incubators: Exploring external and internal alignment. . *Technovation, ,* 32(12), 656-670.

Vermeulen, F. (2013). You Can Win Without Differentiation. . *Harvard Business Review Press*.

Wade, M., & Hulland, J. (2004). The resource based view and information systems research: Review, extension and suggestions for future research. . *MIS Quarterly,,* 107-142.

Wired. (2018). *The Techies Turning Kenya Into a Silicon Savannah*. Retrieved from Wired: https://www.wired.com/story/kenya-silicon-savannah-photo-gallery/

You, K., Dal Bianco, S., Lin, Z., & Amankwah-Amoah, J. (2019). Bridging technology divide to improve business environment: Insights from African nations. . *Journal of Business Research*, 97, 268-280.

Zakrzewska-Bielawska, A. (2013). Coopetition as a factor in the development of innovative and technologically advanced firms: an example of the high-tech sector. *roceedings of*

the international symposium on business and management, knowledge association of Taiwan Publisher,.

APPENDICES

Appendix I: Ethical Review Letter

Strathmore UNIVERSITY

11th March 2020

Mr Ogonda, Ted
ted.ogonda@strathmore.edu

Dear Mr Ogonda,

RE: Effect of Sustainable Relationships on the Growth of Technology Hubs in Kenya

This is to inform you that the SU-IERC has reviewed and **approved** your above research proposal. Your application approval number is **SU-IERC0640/20.** The approval period is **11th March, 2020 to 12th March, 2021.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

for. Dr Virginia Gichuru,
Secretary; SU-IERC

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC)
11 MAR 2020
TEL: +254 (0)703 034 000
P. O. Box 59857 - 00200
NAIROBI - KENYA

Cc: Prof Fred Were,
Chairperson; SU-IERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email info@strathmore.edu www.strathmore.edu

Appendix II: NACOSTI License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **473131**

Date of Issue: **23/March/2020**

RESEARCH LICENSE

This is to Certify that Mr.. Ted Ogonda of Strathmore University, has been licensed to conduct research in Nairobi on the topic: EFFECT OF SUSTAINABLE RELATIONSHIPS ON THE GROWTH OF TECHNOLOGY HUBS IN KENYA for the period ending : 23/March/2021.

License No: **NACOSTI/P/20/4274**

473131

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix III: Questionnaire
PART A: GENERAL INFORMATION

1) Age Bracket

   Below 25 years [ ]

   25 – 35 years [ ]

   36 and above [ ]

2) Gender

   Male [ ]

   Female [ ]

3) Education Level

   Diploma [ ]

   Graduate [ ]

   Postgraduate [ ]

   Others (Specify)……

4) Your position in the organization

   Managing Director [ ]

   Head of Operations [ ]

   Other [ ]

5) How long has the Tech Hubs been in place within the ecosystem?

   Less than 2 years [ ] 2-4 years [ ] Over 5 years [ ]

Part B: Establish the effect of Sustainable Relationships on the Growth Tech Hubs in Kenya

6) What kind of sustainable relationships does the Tech Hub maintain with other Tech hubs in the ecosystem?

   Formal relationship [ ]

   Informal relationship [ ]

   No relationships [ ]

7) Which is the most common type of sustainable relationships maintained by the Tech with other Tech hubs in the ecosystem?

   Collaborations [ ]

   Coopetition [ ]

Differentiation [ ]

Kindly answer the following questions based on your agreement with growth of Tech Hubs. The scale level ranges from 1 – 5

5= strongly agree 4= Agree 3= Disagree 2= Strongly Disagree 1= Neither Agree nor Disagree

No	Growth of Tech Hubs	5	4	3	2	1
8)	The Tech Hub has been able to expand its service offering to other regions in the country					
9)	There has been a growth in the number of hackathons held by the Tech Hub					
10)	The Tech Hub has witnessed growth in the number of innovators being mentored in the firm					
11)	The Tech Hub has been able to foster the level of service quality offered to innovators					
12)	The Tech Hub has witnessed an acceleration in the number of innovative developments among in-house innovators					

Kindly answer the following questions based on your agreement with collaboration amongst Tech Hubs. The scale level ranges from 1 – 5

5= strongly agree 4= Agree 3= Disagree 2= Strongly Disagree 1= Neither Agree nor Disagree

No	Collaboration amongst Tech Hubs	5	4	3	2	1
13)	The organization undertakes strategic alliances with other Tech Hubs in the industry					
14)	The organization runs joint venture undertakings with other Tech Hubs in the industry					
15)	There is better ecosystem clustering within Tech Hub firms					
16)	There is greater consortia development within Tech Hub firms					

17)	The organization develops new business through networks of our customers and business partners.					

Kindly answer the following questions based on your agreement with coopetition amongst Tech Hubs. The scale level ranges from 1 – 5

5= strongly agree 4= Agree 3= Disagree 2= Strongly Disagree 1= Neither Agree nor Disagree

No	**Coopetition amongst Tech Hubs**	**5**	**4**	**3**	**2**	**1**
18)	The organization actively participates in acceleration programs within the Tech Hub community					
19)	The organization has sustained a better competitive edge through the incubation programs					
20)	The organization has adopted a shared business platforms model with other Tech Hubs in the industry					
21)	The organization has attained better skills development through partnership with other Tech Hubs in the industry					
22)	The organization is part of programs for co-creation of value within the industry					
23)	The organization is aware of the advantages of partnering with other firms within the industry					

Kindly answer the following questions based on your agreement with differentiation amongst Tech Hubs. The scale level ranges from 1 – 5

5= strongly agree 4= Agree 3= Disagree 2= Strongly Disagree 1= Neither Agree nor Disagree

No	**Differentiation amongst Tech Hubs**	**5**	**4**	**3**	**2**	**1**
24)	The organization has a robust research and development program to foster service development					

25)	The organization has insights on new ways to approach product development					
26)	The firm has developed and sustained an integral learning environment					
27)	The organization has in place core system and processes to foster service differentiation					
28)	The organization is able to leverage on opportunity recognition and exploitation to foster performance					

Kindly answer the following questions based on your agreement with differentiation amongst Tech Hubs. The scale level ranges from 1 – 5

5= strongly agree 4= Agree 3= Disagree 2= Strongly Disagree 1= Neither Agree nor Disagree

No	**Business Environment**	**5**	**4**	**3**	**2**	**1**
29)	There as an improvement in the availability of technology infrastructure within the country					
30)	There is an improvement in the incentives offered by the government for new tech hub startup					
31)	There is a conducive digital space for the growth of a better innovative space in the country					
32)	The tax policies in place are supportive for the growth of the digital space in the country					

Thank You

Appendix IV: List of Tech Hubs

1. Digital Green
2. Growth Hub
3. Ujuzi Kilimo
4. Tulaa
5. KARO
6. T-HUB
7. Wilk Technology
8. Next Technology
9. Satworks Africa
10. Software Dynamics
11. E-limu
12. Brick Technologies
13. Xoko POS
14. Biometrics Technology Ltd
15. Pillar Technologies Ltd
16. C4dLab
17. ILab
18. Innova Technologies
19. Akirachix
20. Fuzu
21. iBiz Africa
22. Zova Group
23. Nairobi Garage
24. Biometrics Technology Limited
25. CISCO Edge
26. Hydro IQ
27. MEST incubator
28. Kuza Biashara
29. Mara Launchpad
30. Software Tech
31. Decoded Africa
32. Interactive Tech
33. Gearbox

34. Mania Tech
35. KeKoBi
36. Chandaria Innovation Center
37. Arifu
38. FabLab
39. SophieBot
40. Village Capital