ORGANIZATIONAL AGILITY, PRODUCT DEVELOPMENT PROCESSES, OPERATIONAL PROCESSES AND PERFORMANCE OF CHARTERED UNIVERSITIES IN KENYA

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A THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN BUSINESS ADMINISTRATION, FACULTY OF BUSINESS AND MANAGEMENT SCIENCES, UNIVERSITY OF NAIROBI

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DECLARATION

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

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DEDICATION

I dedicate this thesis to my dear daughter Gloria Mukiri and my sister Jennifer Aithiabi for giving my life a meaning and a purpose.

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ABBREVIATIONS AND ACRONYMS

BSC	Balanced Score Card
CHE	Commission for Higher Education
CUE	Commission for University Education
IC	Iacocca Conference
ICT	Information and Communication Technology
KCSE	Kenya Certificate of Secondary Education
NPD	New Product Development
SMEs	Small and Medium Enterprises
OECD	Organization for Economic Development
UK	United Kingdom
USA	United States of America

ABSTRACT

The double admissions of students in 1987/88 and 1990/91 academic years to public universities, elevation of middle level colleges to university status, introduction of module (II) programmes, growth of private universities, regulation of universities, reduction in government funding, among other happenings created serious challenges for all universities in Kenya. These rapid changes embedded in the concept of agility, motivated the study whose broad objective was to establish the relationship between organizational agility, product development processes, operational processes and performance of chartered universities in Kenya. Product development processes was hypothesised as a mediator and operational processes as a moderator to the relationship. The study was anchored on general systems theory, socio-technical systems theory, theory of constrains and collegial theory. The research paradigm was positivism while research designs included descriptive, cross sectional and census survey. Four objectives and corresponding hypotheses were formulated and subjected to descriptive, factor and regression analysis to describe the variables and predict the relationship between the independent and dependent variable. The unit of analysis was 48 chartered universities whereas the unit of observation was all Faculties/ Schools. Each sector was analysed separately because preliminary results were different. Regarding objective one, there was a significant positive relationship between organizational agility and performance of public universities but the same was negative and insignificant for private universities possibly because government drivers of agility affected public universities more but market drivers affected both. Private universities also had superior capabilities and reacted better to the drivers. On objective two, there was partial mediation on the relationship for public universities as hypothesised. Same test was not performed for private universities because the initial model was not significant. Objective four that focused on the joint effect of independent variables on performance was confirmed and operational processes were found to have the greatest contribution to performance of each sector. The findings were consistent with previous studies and supported the theoretical view that organizations are continuously exposed to changes in the business environment and their survival is dependent upon the ability to adapt through flexibility and adaptations that trigger creations and innovations. The study, therefore, extended the knowledge borders in operations management through the finding that organizational agility influences performance directly and through partial mediation of product development processes and moderation of operational processes. The findings provided various contributions to theory, policy and practice and were consistent with the theories except collegial theory which may be partially applicable when rapid change occurs. There is need to rethink collegium orientation of universities but maintaining their missions. Policy makers can utilize the findings to formulate policies aimed at better performance with respect to agility, product development and operational processes. Policies and practices supported by the findings will create awareness of how universities can take advantage of opportunities created by agility. Future studies may need to focus on effect of individual dimensions of organizational agility and measures of performance on public and private universities separately. A modified replication of the study across industries is recommended on a continuous basis. There was evidence to suggest that organizational agility interacts with product development processes and operational process to influence performance through other paths apart from what was studied.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The emergence of strategic thinking and the discovery of better means of doing business compelled firms to adopt strategic business orientations for competitiveness (Chase, Shankar, Jacobs, & Aquilano, 2013). However, in a 21st century organization, there has been obvious discrepancy between strategic thinking and performance emanating from daunting, complex and unrelenting challenges of the operating environment (Wirtenberg, Lipsky, Abrams, Conway, & Slepian 2007: Nafei, 2016). Such turbulence in business environment made manufacturing firms in United States of America (USA) to lose market dominance for manufactured products in the 70s and 80s attesting to the need for firms to continuously rethinking their operations strategy (Nagel, 1992, Wendler, 2016).

When mass production era was at its peak, USA thrived in mass produced goods whose market declined as a result of serious challenge from more personalized products manufactured by small firms (Sabel & Zeitlin, 1985). Mass targeted market is a characteristic of factory production anchored on push perspective where the producer assumes that whatever is manufactured has a ready market. Manufacturing firms in USA and other western countries were founded on this premise and all the goods produced found a ready market. However, development in transportation, technology, production of electricity, development of small scale production and ability to substitute factory products at household level led to decline in demand of mass produced goods (Mokyr, 2000). Some European and Asian countries were involved in

the World War I and II that created an opportunity for the American firms to develop their manufacturing capability because of the huge market (Zeitlin, 1995).

When war ended, these countries embarked on improving their economies through industrialization leading to competition for various markets that were previously dominated by the American firms. As part of rivalry for bigger market share, companies' business systems evolved from mass production to mass customization and product personalization where fulfilling customer needs was paramount to realizing significant sales in a competitive environment (Hu, 2013). Consequently high competition in each industry and sector compelled firms to devise strategies and actions that enabled them to adapt to continuous change, that originate from new computing capabilities, innovations, demographic patterns, social changes, new markets and use of information technology to reach distant markets (Zitkiene & Deksnys, 2018).

Observations by Dove (1992), Gunasekaran (1998) and subsequent literature on evolution of business philosophies proposed that focus on agility was one of the ways that could have helped firms to bridge the gap between unpredictable challenges and performance(Wendler, 2016). Agility is a concept that originated at Lehigh University conference in the USA, where practioners and scholars had gathered to find solutions to the poor performance of their manufacturing firms in the 70s, 80s through to the 90s (Goldman & Preiss, 1991*)*. Since the inception of the term (Iacocca Institute, 1991), conceptualization and empirical studies on the phenomenon concentrated on its effects

and implication on manufacturing firms without much attention to other industries (Seethamraju, 2006). However, the phenomenon which refers to turbulence and adaptation to unpredictable operating environment affected firms across industries whose survival depended on their ability to be agile (Mckinsey & Company, 2018).

Although existing firms tried to adjust to dynamic business environment with some level of success, literature indicates that technology based industries reacted more successfully to competitive agile instigated threats through swift product development processes and systems alignment (Cooper, 2016). Other firms achieved better performance through rapid innovation of market driven products by launching and offering them through a process that is perceived by customers to be superior (Gunasekaran, 1999; Nafei, 2016). The observations created the motivation for the study which proposed that a combination of organizational agility, rapid product development processes and appropriate operational processes can result to a more desirable firm performance.

The focus of the study became universities because it had been observed that they remained stable in their operations and retained a distinctive culture over a long period of time when agility was ravaging other industries (Dove & Willis, 1996). Over that period, the phenomenon caused organizations to change their original missions as a result of turbulence in their operating and business environment. However, beyond the 90s universities came under pressure to change their offering, processes and approaches when dealing with students, other consumers of knowledge and at the same time retain the distinctive identity on which they were founded (Matheou & Saiti, 2005). Universities

world over experienced instability because of government regulation, increased demand of pedagogical learning, global competition, changing nature of work, evolving information technology and blurred boundary between industries (Mukherjee, 2014).

Some industries invaded the traditional domain of universities by introducing learning institutions either as an additional line of business or trained manpower that support specific knowledge, skills and competencies required by the industry in which they operate in. Such includes hospitals, insurance companies, and hospitality industries among others in Kenya. Big private hospitals introduced nursing schools, insurance companies training colleges, hospitality industry catering colleges while banks started monetary college and the situation was duplicated industrial wise. Examples of industry specific training institutions in Kenya include Cicely Macdonald School of Nursing: Nairobi hospital, The Aga Khan University Hospital: Nairobi, College of Insurance: Nairobi, Boma International Hospitality College: Nairobi, Kenya School of Monetary Studies: Nairobi, College of Insurance: Nairobi and many more as was observed in institutional websites.

Based on extensive literature review, the following theories were found to underlay the explanation of the relationship of the variables that the study focused on. These were -; general systems theory, socio-technical systems theory, theory of constraints and collegial theory. The relationship between internal and external environments (firm and its markets) which were affected by agility was supported by general systems theory (Kast & Rosenzweig, 1972). This theory proposes that a closed system generating energy

must have an opening for it to survive and all types of organizations continue to exist because of continuous input-output processes that interconnect internal environment to the external one. Although capabilities are contingent to a firm, agile organizations have to be flexible and competent in product development processes as well as in transformational processes as they respond to personalized customer requirements (Sharifi & Pawar, 2001). Production of an item or any other value added product is achieved by pooling resources in a supply chain and transforming them in well-coordinated input-output internal processes (Pong, 2013). When the final product is released to the consumers, there is endless flow of activities in input-output demand and the consumption cycle is sustained by the worth of the product in the value chain (Janvier-James, 2012).

Socio-technical systems theory (Zwaan Der Van, 2001) and theory of constraints (Aryanezhad & Komijan, 2004) provided a basis for interaction of technology, people and systems in input-output transformational activities during product development and in operational processes. Since the study was focused on universities, collegial theory (Baldrige, 1971) was included to explain the unique academic culture that characterizes universities as autonomous institution. Guba and Lincoln (1994) explains that research should be supported by a theory which perform the role of a fulcrum to ideas showing how knowledge develops over time; giving credence to a study as having followed a scientific inquiry process and progress.

1.1.1 Organizational Agility

Ideas concerning agility found their way into literature in 1950s (Wendler, 2013) but the

concept gained more prominence after the Iacocca conference of 1991 (Goldman & Preiss, 1991). The term agility was coined and defined as the ability of a manufacturing system to meet the rapidly changing needs of the market place (Dove, 1992). The forum observed that such an organization needed to have systems with capability of shifting quickly among product models and product lines in order to take advantage of the opportunities as well as minimize the impact of threat from competitors and emerging technologies (Wendler, 2016)

Literature review indicated lack of consensus on the dimensions of agility that led to emergence of various explanatory models. Among them was that of Sharifi and Zhang (1999) who divided the concept into three constructs namely drivers, enablers/capabilities and providers/responses. The models that followed through to 2020s acknowledged drivers of agility as a major source of disruption to firm performance and they were identified as market dynamics, competitor activities, customer requirements, technology and social factors. Enablers were defined as abilities that organizations required to respond to the changes in the external environment while providers were means by which organizations integrated their capabilities such as organizational structure, technology, people, innovations, relationships and information systems to post performance. Dove (1992); Gunasekaran (1998); Chang, Hu and Hong (2013); Lenerius, Brundin, Reinman and Dedering, (2014) among others supported this model without obvious classification of agility into constructs.

Another significant model was that of Yusuf, Sarhadi and Gunasekaran (1999) that classified agile attributes along 10 decision domains which had 32 sub domains. Gligor, Holcomb and Stank (2013) made further contribution by adding alertness, accessibility, decisiveness, swiftness and flexibility to the taxonomy. Equally, Sambamurthy, Baradwaj and Grover (2003) identified customer agility, partnership agility and operational agility as other aspects that influenced supply chain performance. Worley and Lawler III (2010) explained that in addition to systems agility, mind-set agility, adaptable organizational design and leadership were a necessity for an agile organization. Charbonier-Voirin (2011) summarized the views of various models and concluded that all earlier frameworks referred to organizational propensity to read the markets, utilize resources, improvise and innovate transformational processes, mobilize and align human resources to the strategic prospects. Since then, focus has shifted to organizational agility as key determinant of continuity of an organization after disruption because it integrates employees, structure, technology and performance. (Wendler, 2016; Nafei, 2016) Therefore, organizational agility was found to play a critical role in achieving competiveness as opposed to the entire concept of agility. The study adopted this view and focused on the organizational agility and performance of chartered universities in Kenya.

Effect of agility on universities tended to conform to the propositions of Sharifi & Zhang (1999) model because Twindle and Nichols (2013) identified the following as drivers of agility in many of western universities. Global competition in research, expectations of higher standards by governments, increased comparative evaluation through national and

global university rankings, changes in sources of funding (typical decline in government funding), limits to the possible growth of fees charged to students and the potential disruptions by emerging technologies. Less well educated students from various institutions of higher learning was also cited as another driver of agility which made students to prefer certain universities that were thought to produce more qualified professionals. Similar observations were made in context of Australia (Mukherjee, 2014) and in general reference, technological drivers were noted to have arisen from growth of capacity of computer hardware, software and associated networking capabilities (Glaser, 2014).

According to Bogt and Scapens (2009), universities in the UK and Netherlands experienced a myriad of pressures that necessitated agile reactions. These ranged from requirement to promote economic growth, conformance to internationalization of the university education, need to control costs, adaptation to the professional management standards, decentralization of teaching units, greater control of the outputs, increase in the number of students, decrease of student sponsorship by government, introduction of loans to the students and increase of numbers of students funding their studies. Drape and Rudd (2016) observed that university education in Sub Sahara countries needed to adopt approaches to education that were necessary to meet the wide range of aptitudes that were driven by the market needs. Equally related observations were made by Chakrbarti (2002) with reference to universities in USA which led to conclusion that drivers of agility can be broadly classified as increase in demand for pedagogical studies and relevant academic value expected from well learned individuals by the industry and the society at large (McCowan, 2018). Universities needed reciprocate by being more

accountable and perform better unlike before when there was liberal funding by government and religious institutions.

1.1.2 Product Development

The existence of an organization is defined by the product or services that are offered to the customer. A product is therefore created, innovated or adopted from another firm in its original form or modified for differentiation and for agility purpose, business firms try to gain competitive advantage through unique products or the process of offering them to the customers. Consequently, a set of practices, metrics and pathways that are intended to introduce a new product or process are necessary for competitive advantage (Chang, Hu & Hong, 2013).

There are several methods of product development processes which are distinguished by the period it takes to go through idea initiation, development and launch into the market. Some methods are characterized by bureaucratic processes which make it difficult for a firm to introduce a product to the market faster than the competitors. Other methods are agile in nature and they are used for the purpose of reacting to a rapid change that requires a new or innovated product to solve an emerging problem (Cooper, 2016).

Traditionally, companies used one version or the other of stage –gate process to develop their products (Ettlie & Elsenbach, 2007). The method consists of stages and gates which represent actions and decision points that approve continuation or discontinuation of the product development. It was also popular with most manufacturing firms because it had ability to reduce technical and business uncertainties that preceded product launch

(Cooper, 1990). The method provides precautionary measures that are necessary because of the enormous resources that go it the whole process of product development and the implication of failure in the event that a product does not succeed (Craig, Wangbenmad, Mohamad & Ahmed, 2013). Stage –gate process is associated with Cooper (1990a) who introduced and developed it progressively in subsequent publications. However, in a fast changing business environment, stage – gate method, was found to be inadequate in achieving shorter product development processes cycle that is required to introduce new products to the market either as a competitive advantage or as a way of meeting the changing demands of the consumers.

Stage-gate approach aims at achieving a perfect product by eliminating iterations that improve the performance at each stage. However, Zhang (2012) explained that complete elimination of product imperfections by iterations was not achievable even in the last stage of product development process and recommended that application of stage- gate method needed modification in order to yield the desired swift introduction of a product to the market. Leon, Farris and Letens (2013) argued that the approach to product development by planned and frequent iterations was not necessary but needed to be introduced at the most productive point of product development. Therefore, agile product development requires an agile method that can get the product right the first time and launch rapidly to take advantage of market opportunities.

Rao, Naidu and Chakka (2011) identified nine methods of agile product development that were widely used to develop software products. These were scrum, crystal agile

modelling, Dynamic System Development (DSD), pragmatic programming, internet speed development, extreme programming and Adaptive Software Development (ASD). Each of these had their own set of tools and advantages which implied that their applicability was to support a particular element of project management in development of a software product (Sommer, Hedegaard, Popovska & Jensen, 2015). While scrum and extreme programming methods were widely used in software product development, it is only scrum that was applicable to product development beyond technology product based industries. The method was also found to be appropriate in all other aspects of a product that needed to be developed (Abrahamsson, Warsta & Ronkainen, 2003).

Scrum method took into account user's requests, time pressure, competition, quality, vision and resources that were available in the firm and were necessary to deliver a product that responded to drivers of agility (Takeuchi & Nonaka, 1995). Unfortunately, scrum was also found to be limited in that, it was used for improving or modifying an existing product but not for creating a totally new one (Lonel, 2008). A third model, stage-gate/scrum hybrid, was recommended because it puts into account iterations and speed that are required in developing and introducing a product to the market which guarantee some level of competitive advantage (Cooper, 2016).

The development of universities in medieval times was associated with products such as training of manpower for church and state (Geuna, 1996) while growth of research universities in Germany and technical ones in the USA can also be attributed to product development that catered for emerging needs of the state, societies and industries

(Goldin & Hatz, 1999; Forest & Altabach, 2007). Likewise, realization of Kenya's economic and social goals requires a responsive higher education that carters for emerging needs and challenges (Kinyanjui, 2007; Kavita, 2017). This can be achieved by developing products beyond traditional curricula such as targeted research, training, specialized consultancy, translation of ideas and innovations to actual products that capture agile drivers from industry, state and market.

1.1.3 Operational Processes

Definitions of a business (operational) process are varied but can be summarized as a sequence of logically related activities that must be performed along a value chain to deliver a product to a consumer and accomplish strategic goals of a firm (Barbra, Del Valle, Weber & Jimenez, 2013). Diverse views converge on the idea that a business/operational process involves the manipulation of either physical or informational inputs to create value through a series of interacting activities that exchange or transform input into valuable output. An entire business/operational process consists of human component, physical structure and a connecting information technology system (Anttila & Jussila, 2013). In the context of the study, product development process was conceptualized as a process by which a university can create a product fast enough to meet the needs of the consumers while complying with stakeholder requirements.

Traditional organizations work as departments or silos that are dedicated to one specific aspect of an activity in a process; a narrow focus in specialization that makes an organizational structure inefficient when flexibility and adaptation are required (Harmon,

2003; Chang, 2006). This is a characteristic of university structure that has distinct academic and managerial divisions that operate differently and yet they are required to converge at the point where the set goals are achieved (Ayodo, 2016).

The main role of faculty is to develop and implement curricula related programmes, teach, assess, evaluate and conduct research (Odhiambo, 2018). Such functions depend on competences, skills and inner commitment by instructional providers who are guided by collegial consensus rather than by administrative controls (Baldrige, 1971: (Drape & Rudd, 2016). Management on the other hand is in charge of supporting processes such as planning, organizing, coordinating and controlling university functions. Both arms are supposed to converge at a point where learners are prepared in a given field to fit in a profession upon graduating (McCowan, 2018). However, conflict arises from incongruence of collegium approach by faculty members and the management perspectives (Mattheou & Saiti, 2005). This creates a challenge of the two divisions that jointly determine the university strategy and alignment of processes towards achieving the objectives and common goals.

Collegium ideology is based on thought patterns and distinguished scholarly accomplishments (Lazega, 2005), that may not necessarily be acknowledged and appreciated by those in university administration who consider different measures of performance (Kaplan and Norton, 1992). This inability to conceptualize the difference can create inflexibility that inhibits fast response to negative effects of agility. Similar gap was observed by Dove and Willis (1996) who opined that an agile university needs to

unify faculty and administrative processes in order to achieve the intended mission when agility occurs. This is crucial because funding and external stakeholders' interest demand that universities take an entrepreneurial, efficient and accountable approach to strategy and operations in order to post a desirable performance (Yego, 2016).

1.1.4 Organizational Performance

Performance can be viewed as the extent to which an organization accomplishes objectives in order to achieve the overall goal (Kaur & Kumar, 2014). It is widely used as dependent variable in business studies to measure the relative position of a firm in the industry. Traditional firms used accounting measures of performance as indicators of how well the goals were being achieved but managers realized that financial component alone was not reliable as a single measure (Singh, Darwish & Potocnik, 2016). More indicators were required to provide clear view of the performance and financial measures did not also indicate the critical areas of a business that required a closer focus. In view of this, Kaplan and Norton (1992) introduced the Balanced Score Card (BSC) model that provided a wider view of organizational performance in terms of financial, customer, learning and growth as well as internal processes. The BSC was further expanded to include corporate social responsibility and environmental concerns as illustrated in sustainable balanced score card model (Hubbard, 2009). Consequently, various organizations amplify their focus on either financial or non-financial measures depending on their key objectives.

Performance of universities can be reflected better by both financial and non-financial measures of performance because they have multiple, contradictory and complex missions that include teaching, research, service to communities and revenue generation. Twidale & Nichols (2013) explained that a variety of measures have been used successfully in assessment of performance of universities in line with their objectives. Bogt & Scapens (2009) identified some of them as education mission which had indicators such as number of programmes, student enrolment, student- lecturer ratio, class size, number of graduates and academic pathways. Others included research excellence measured by rankings, awards, honours, publications, funding and innovations (patents, spin-offs/products and license agreements); university faculty, staff, alumni and friends of the university measures were captured by expression of satisfaction and support they give to their respective universities. The final category was infrastructure found in a university and was indicated by number of faculties/schools, teaching space, laboratories, library and facilities such as accommodation, catering, recreation and information technology (University of Toronto, 2014).

The study adopted measures of non-financial performance namely-; customer perspective, growth and development and internal processes because universities have missions that are not necessarily profit oriented. Supporting this view, Oanda et al. (2008) observed that in the Kenyan context, even private universities have to meet the public good before any other consideration. Therefore, the approach chosen to measure performance was suitable because the main role of any university is to impart knowledge through teaching, research and provision of service to the community (Charkarbati,

2002). The indicators of performance selected for the study were-; degree programmes offered, number of graduates, recruitment of staff, and support for staff progression, research funding, ranking, information technology facilities, research output, faculties and department establishment.

1.1.5 University as a Collegium Organization

The term university refers to an independent institution that develops knowledge for the sake of it, transmits, disseminates and uses it in social and technical innovation for the furtherance of societies (Lazega, 2005). Geuna (1996) traced the origin of universities to the 12^{th} century in Europe, but the term university emerged in the 19^{th} century as a derivative of the terms universitas literarum which means in totality or whole. The term university therefore describes autonomous institutions that developed as a result of conflict among papacy, emperor and local jurisdictions of the Roman Empire.

Universities therefore, become independent and alternative for people who did not owe allegiance to church, state or their local regimes. Church and state governance systems had strong opposing opinions that did not accommodate people who had contrary ideas; consequently they allowed universities to thrive as way of containing individuals who had high intellectual capacity (Pedro-Carañana, 2012). These were believed to possess abilities to wreck the church and state organizations if allowed to thrive freely within the society. This made it easy for universities to progress as autonomous institutions with distinct rigid collegium character of scholarship and academic freedom that generated and disseminated knowledge for the sake of it.

Traditionally universities were viewed as bastions of knowledge for development of the religious institutions and governance of states (Geuna, 1996). Overtime, universities have been identified as establishments that transmit and generate knowledge through teaching, research and service to the community. In the context of USA, Charkarbati (2002) explained that the prominence of knowledge based industries added even a bigger role to universities in regional and economic development. This unique character of service to progression of civilization attracted funding that had no accountability attached and it facilitated breakthrough discoveries in creations and innovations that have revolutionized scientific, economic and social components of the society; a clear indication of the critical role played by universities in the society.

The aim of establishing medieval universities was to train elites for ecclesiastical purpose because the church served dual roles of spirituality and governance (Geuna, 1996) which changed gradually with the separation of the spiritualism that remained with the church while governance took military and political dimensions. Consequently universities began to train manpower for government service as an added responsibility. Later research universities emerged in Germany followed by technical ones in USA and subsequent spread to the rest of the world as a result of colonization (Forest & Altabach, 2007).

The current state of universities took shape after World War II whose primary role was to serve the state and economy as a consequence of pressure from population and industrial

growth (Goldin & Haltz, 1999). It is therefore evident that evolution of universities resulted from product development in response to an external necessity. A study by Mattheou & Saiti (2005) added a dimension, that universities needed to change from collegial traditions to a more strategic and entrepreneurial approaches depending on the needs of the consumers.

Similar to evolution of other sectors of economy, agility phenomenon affected higher education world over. Research findings by Twindle & Nichols (2013), identified drivers of agility in many western countries universities as-; greater global competition in research, expectations of higher standards from governments, increased comparative evaluation through national and global university rankings, change in funding sources (typical decline in government funding), limit to the possible growth of fees charged on students, and the potential of technological disruptions from growth of computer application (advanced hardware, applications, connectivity and high speed internet) and less well-educated students among others. A study by Bogt and Scapens (2009) of universities in the UK and Netherlands showed that a myriad of pressures that necessitated agile reactions occurred. These ranged from requirement to promote economic growth, conformance to internationalization, need to control costs, adaptation of the professional management standards, decentralization of the units, greater control of the outputs, increase in the number of students, decrease of student sponsored by government and introduction of educational commercial loans as well as increase of students financing their education.

1.1.6 Chartered Universities in Kenya

A chartered university in Kenya is an establishment of higher education that has been granted permission by the president to confer academic awards to qualified persons in accordance to provisions of universities Act 2012, (CUE, 2014). The first university to be established in Kenya was University of Nairobi in 1970. However, its existence dates back to when it was Royal College till 1961 when the name was changed to University College (Nyangau, 2014; Okioga, Onsongo & Nyaboga, 2012). According to Chacha (2004), Mackay report led to the establishment of Moi University in 1984. In 1985 Kenyatta University College was elevated to university status having been a constituent college of University of Nairobi since 1972. In late 1988 an act of Parliament made Jomo Kenyatta College of Agriculture and Technology a constituent college of Kenyatta University which became a full-fledged university in 1994. Egerton University was previously an agricultural diploma college which was upgraded to university in 1987. Maseno University attained university status in 2000 having been previously a constituent college of Moi University. Masinde Muliro University of Science and Technology, also a former constituent college of Moi University became a university in 2007.

According to Chacha (2004) Commission for Higher Education (CHE) was established in 1995 to ensure standards in university education but it mainly accredited and regulated private universities. As a result, private universities that were established earlier attained legal chartered status before some of the oldest full-fledged public universities whose charter was assumed by virtue of their prestige. The CUE was established by Universities

Act No. 42 of 2012 to replace CHE with wider mandate of regulating university education (CUE, 2014). As a result, 13 public universities were awarded chartered status in 2013, out of which six of the oldest universities were awarded chartered status as a formality and in compliance with the new law that placed them under the regulation of CUE.

Apart from the six public universities that were established before 2007, the ones that were chartered in 2013 were constituent colleges of the older universities. There were 30 chartered public and 18 private universities making a total of 48 in 2016 (CUE, 2016). Some of the oldest chartered private universities include United States International University-Africa (USIU-Africa) which was established in Kenya in 1969, Daystar University 1974 and University of East Africa Baraton 1978 while the rest were relatively young. Other non- chartered universities were operating on interim letter. The older universities experienced the effect of agility compared to the new ones which were established when the more severe rapid changes were happening (Mukhwana et al., 2016)

Public and some of the faith based universities were mainly funded from public resources because of their unique role in increasing citizens' knowledge base, their ability to influence state policy and practices which in turn contribute to the welfare of the nation. This practice is universal where a majority of the universities are owned by state and religious groups (Mattheou & Saiti, 2005). The role that universities play in societies, make it difficult to draw up clear indicators that are a true reflection of their actual performance.

Agility related challenges started in Kenyan public universities in the 80s and triggered spiral like problems that required practical solutions if they were to remain relevant to social and economic development of the country (Odhiambo, 2018). In that period, there was a high number of students who had qualified for university education but only a limited number got enrolled in the few universities that existed (Wandiga, 1997:). Internal difficult circumstances and external political interference led to frequent strikes by both students and lecturers (Oanda, Chege & Wesonga, 2008). Consequently, rampant university closure that prolonged the period of completing degree programmes and wider gaps of transition between secondary and university education occurred**.** Cumulatively, there was a backlog of qualified students whose needs for higher education required a solution (Nganga, 2010).

Change in government policies led to double intakes of 1987/1988 and 1990/91 that over stretched the demand for the resources available in the universities (Nyangau, 2014). The limited capacity that existed, decreased government funding, un-responsive and poorly aligned curricula to market needs provided opportunity for expansion of university education (Gudo, Olel & Oanda, 2011: Odhiambo, 2018). Subsequently, public universities started module II programmes that admitted self –sponsored students (Chacha, 2004). The aim of the programme was to broaden revenue stream and support government policy of providing higher education to all qualified citizens. Middle level colleges were upgraded to expand university services to rural areas. Satellite campuses were established in urban centres and liberalization of university education saw setting up

of new private universities and expansion of those that were already in existence (Oanda & Jowi, 2012 : Mukhwana et al., 2016)

Unprecedented drastic measures of curbing examination cheating at Kenya Certificate of Secondary Examination (KCSE) by government in 2016 led to decrease in number of students that joined universities in 2016-2017 academic years (Leftie, 2016). A few years to 2016, an unusual exam pass rate at KCSE level of examination was witnessed occasioning increased capacity in universities and the government had to intervene to restore normalcy (Wanzala, 2015). When this agile measure occurred, idle capacity and related consequences especially reduction of revenue earning was experienced by almost all the universities.

The challenge of less revenue earning capacity was compounded when government started funding all students who qualified for university education and allowed placement of the surplus in public universities to join private ones under its sponsorship. This reduced the number of self-sponsored students who had initially spurred massive capacity. There was also further proposal to decrease government funding to public universities as result of unit-based costing where some courses such as medicine attracted more monetary support compared to others (Wanzala, 2018). The degrees that attracted higher funding had fewer students and they were confined to a few universities while those that had low funding contributed the bulk especially in private universities (Mukhwana et al., 2016). Private universities earned less from government sponsored students compared to self-sponsored ones.

Before the events of 2016-2017 academic years, lower quality of education offered by some of the universities had initiated the process of closure and freezing of establishment of new and satellite campuses by the regulatory authority (Commission for University Education (CUE), 2014). These un-expected additional changes left idle capacity and escalated reduction of income for almost all the universities (Mungathia, 2018). Turbulence in university education is a critical issue of concern because of the enormous contribution to the social economic development of a country and the long term ripple effect to other sectors of economy (Kinyanjui, 2007: Odhiambo, 2018). The possible effects of the rapid changes on performance of universities in Kenya provided contextual evidence of the need to investigate the agility phenomenon.

1.2 Research Problem

University education in Kenya experienced rapid changes in 80s and 90s which magnified in the 20s to create challenges in meeting the expectations. Some of the changes were double intakes of 1984-1985, 1987-1988, 1990-1991 (Oanda at al., 2008) and later 2010-2011 academic years. University intake of 1987-1988 alone, increased student population by 75.2% (Wandiga, 1997) but later reduced in 2016-2017 (Leftie, 2016). These changes caused expansion and contraction of universities' student population that led to permanent closure of Inoorero University and temporary for Presbyterian University of East Africa as result of insolvency.

In the same period, some universities that were not meeting the set standards were warned by CUE for non-compliance (Wanzala, 2018) and a myriad of other complex

agility related factors, created challenges and opportunities for higher education (Mukhwana et al., 2016 : Kitavi, 2017 : McCowan,2018). Despite the difficult times experienced across the universities, USIU-Africa and Strathmore registered positive performance between 2009 -2015 when many others had challenges compared to the previous years (Strathmore, 2015; USIU-Africa, 2016). This implied that either rapid change was affecting universities differently or there were certain contingent competitive advantage factors that were contributing to the difference in performance.

Similar rapid changes were observed in the manufacturing firms and the phenomenon identified as agility was conceptualized for over two decades prior to the study (Iacocca Institute, 1991; Goldman et al., 1995; Gunasekaran, 1998). The themes that ensued in models of agility that emerged later provided an indication that the concept was dynamic and comprised of various dimensions contextual to time and environment. Each of its aspects did not necessarily happen simultaneously neither did it have similar effects on performance of various organizations (Sharifi & Zhang,1999; Yusuf et al.,1999; Sambamurthy et al., 2003; Gligor et al., 2013).

Empirical study by Huang and Li (2008) concluded that agility was defined in the context of manufacturing industries in 1980s and 1990s while research in service industries was lacking. Wendler (2013) investigated on agility from different perspectives with aim of selecting a suitable agility framework that represented the structure and components of an organization for further research, found that there were 30 constructs that referred to organizational agility, two, work force agility and one, intelligence and

collaboration agility. Sajdak (2013) and Mckinsey & Company (2018) arrived at similar conclusion that agility was multifaceted and its impact was diverse across industries. Earlier, Charbonier-Voirin (2011) analysed various models of agility and concluded that the type of agility that was critical to organizational performance was organizational agility. This view was supported by Wendler (2016) who explained that despite the advances in research on agility, extant definition was lacking but organizational agility was emerging as an obvious aspect whose effect on specific industries was necessary.

A review on various models of agility by (Zitkiene & Deksnys, 2018) concurred with existing literature that studies on agility were not conclusive. Implicitly, a wide range of conceptual gaps existed in determining the precise aspect of agility that affects performance of organization in a specific sector or industry. Studies revealed were also clear that agility phenomenon cannot be predicted with certainty and there is need to research further on its characteristics. In the context of Kenyan universities, Gudo et al. (2014) studied on university expansion, issues of quality education, challenges and opportunities with the objective of determining whether universities had sufficient physical facilities to offer quality education. Expost facto and survey designs were used: a case study of two public and two private universities. The findings revealed that limited room capacity, lecturers and high number of students affected exam invigilation, while opportunities included collaboration with government and private sector in order to counter the challenges. Studies by Yego (2016) on challenges facing higher education in management of privately sponsored student programmes (PSSP) in Kenya and Mungathia (2018) on the challenges encountered by selected private universities in Kenya in

implementing strategies that would lead to a financially sustainable university shown that rapid changes continued to occur in universities in Kenya.

Tarus, Gichoya and Muumbo (2015) conducted a longitudinal study from 2010 to 2012, using purposeful sample of three universities. Proportionate sample size of 125 lecturers, 14I ICT staff, six members of management and three directors of schools was used. Data was collected using open ended -semi structured interview guide on directors while a questionnaire was applied on other participants. The findings were; infrastructure was costly and inadequate, internet was limited, technical skills on e-learning and e-content creation was limited and there was low interest and commitment to use of e-learning by faculty members. These studies were univariate, used case study approaches and revealed challenges relating to infrastructure as well as inadequate funding but did not show their significance to performance of universities or the extent to which findings could be generalized.

Product development processes and operational processes were conceptualized in the process of literature review where some form of association with concept of agility was acknowledged (Wieder, Marie –Anne Le Dain & Trebucq, 2007)). Introduction of a product to the market can be a competitive advantage for a firm, if the methods or processes used to develop it are fast enough to take advantage of opportunity created by agility. Cooper (1990a) and Cooper et al. (2002) showed that manufacturing firms in USA that relied on stage-gate method of product development delayed in product launch

which implied that universities known for lengthy processes could have delayed more if they used same process.

Sommer et al. (2015) researched on improved product development process performance through agile/stage-gate hybrid in order to establish whether stage-gate and stage-gate/scrum hybrid method influenced performance: a case study of manufacturing organization in Denmark. In-depth interview, observation and a questionnaire were used in data collection and findings indicated that two companies that used stage- gate method had to add more gates and there was no significant increase to performance compared with the previous. The company that used stage-gate/scrum hybrid posited a better performance. A study on university and animation industry collaboration: new product development process conducted by Suwannatat et al. (2012) found that product development used stage gate method and there were no collaborations in product development with the industry. The objective was to determine product development processes used, and identify the nature of industry- university collaboration in universities in Thailand. Qualitative case study of five universities was selected and data collected by use of in-depth interview and focus groups. Cooper (2016) conclusively indicated that an agile method of product development was necessary in the period of agility in the manufacturing firms and provided a gap as to whether service providing firms required the same. The current study therefore intended to fill the gaps by finding out if universities used processes to create products fast enough when changes occurred.

Firms exist because operational processes form the link between planning and operational functions by facilitating the input- output transformation (Chase et al., 2013). Studies by Pong (2013) and Harmon (2010) provided evidence that business/ operational processes as a strategic capability is not fully recognized by firms. The study found that business processes evolve on their own as organization systems mature and they only feature prominently when companies are automating their systems. Research by Kazemi, Hassan & Ferredoon (2013) and Glaser (2014) found that human intelligence is required in mapping out a process before automation. The mapped out process should have clear inputs and outputs in order to contribute to positive performance. Accordingly, standardized business processes and automation of simple tasks provide data on systems monitoring which enable management to predict process performance in real time.

Barbra et al. (2013) researching on automatic generation of optimized business process models from constraint specifications, found that an optimized business process model had a number of processes that are executed within a given time frame. These studies showed that firms delegate identification of their processes to external persons for automation and in such cases, a possibility occurs, where wrong business processes are automated if the owners do not understand tasks and activities that constitute their processes. Since operational processes form the linkages in any firm, this study aimed at finding out if processes were aligned in a way that ensured efficiency in universities if variation in demand occurred.

A varied number of studies on organizational agility, product development processes and business process showed a single variable approach and such examples included; a study on influence of enterprise systems on business process in manufacturing firms in Australia conducted by Seethamraju (2006). A similar study was done by Seethamraju & Seethamraju (2009) on relationship between enterprise systems and business process agility in chemical manufacturing industries in Australia. Sommers et al. (2015) also used a single variable on a research on improved product development processes performance through agile/stage hybrids in manufacturing firms in Denmark while Durkin, Howcroft & Fairless (2016) examined product development processes in higher education marketing in UK universities. These studies were conducted in western industrialized countries and they addressed different themes that focused on a linear relationship between an independent and a dependent variable yet incentive to produce a product, method of producing it and operational processes/input-output transformation, must interact in some way to influence performance.

A majority of the most relevant reviewed empirical studies summarized in (Table 2.1) used explorative and case study research designs with data mining and in-depth interview as the main methods of data collection. Examples of such were Bessant et al. (2001) who used explanatory longitudinal case study, Tarus et al. (2015) longitudinal study of a purposeful sample of three universities, Gudo et al. (2014) expost facto and survey designs of a case study of two public and two private universities, Malenje (2014) case study of Masinde Muliro University in Kenya, Sommer et al. (2015) case study design with In-depth interview and observation as methods of data collection, Seethamraju

(2006) exploratory and case study designs and Durkin et al. (2016) case study of six universities among others. Findings from such studies cannot be generalized for an entire industry and therefore, a quantitative study across specific industries was necessary to supplement the qualitative exploratory studies that were already in existence.

In summary, the concept of agility was found to be multifaceted; evolving without definite description of its nature and the known effects on the manufacturing firms could not be generalized across industries. Contextual studies of effects of agility on Kenyan universities were univariate with a focus on infrastructure and limited funding in regard to student population. From operations point of view empirical studies on operational processes were few and limited to automation of e-learning (Tarus et al. 2015) while relationship between product development and agility was lacking. However (McCowan; Odhiambo, 2018) observed that Kenya needs curricula that meet needs of the market in addition to the relevant ones. Evidence from the empirical studies provided a motivation to address the gaps identified and the study sought to answer the following question; what is the relationship between organization agility, product development processes, operational processes and performance of chartered universities in Kenya?

1.3 Objectives of the Study

The broad objective of the study was to establish the relationship between organization agility, product development processes, operational processes and performance of chartered universities in Kenya. The specific objectives were to determine the influence of:

(i) Organizational agility on performance of chartered universities in Kenya.

(ii) Product development processes on the relationship between organizational agility and the performance of chartered universities in Kenya.

(iii) Operational processes on the relationship between organizational agility and performance of chartered universities in Kenya.

(iv) Organizational agility, product development processes and operational processes on the performance of chartered universities in Kenya.

1.4 Value of the Study

The findings will provide guidance to policymakers in formulating policies that will help universities to anticipate change and take advantage of opportunities created by agility. Rapid change requires that universities react fast to take advantage of opportunities while they exist and minimize negative effects on their performance. The regulator of university education should also play the role of a facilitator in accelerating the introduction of new degree programmes that market changes may demand.

The study will also benefit managers of universities in that; findings inform on the implication of organizational agility, product development processes and operational processes on performance. Since government drivers of agility have a significant effect on public universities, managers should assess the timings creating new products and ensure efficient processes. In this regard, managers of public university should benchmark with some of the private universities to find the specific enablers and capabilities that help them cope better with negative effects of agility.

The study will equally be significant to future academicians and researchers through the findings that; organizational agility had significant positive influence on performance of public universities but not private. Government drivers of agility affected public universities more than private universities possibly because they were quick to adapt to compliance requirements. Market drivers of agility affected both sectors and private universities had better enablers and capabilities.

Product development processes had partial mediation to the relationship between organizational agility and performance of public universities and therefore there were other mediating factors not considered in the study. The model used to investigate organizational agility and performance was not fit to investigate the mediation effect of product development processes for private universities. Operational processes were found to be the differentiating factor between the performance of public and private universities.

Contribution to the evolving knowledge in agility, product development processes and operational processes by extending the concepts to the service industry and in particular educational services where the knowledge is under researched in the context in which they have been covered in the study. The findings will also offer a useful empirical basis to pursue the studies further in the under researched constructs of variables. More investigation is required on sectors separately because they are different. The study also considered all perspectives of balanced score card (Kaplan & Norton, 1992) and there is need for future studies to narrow to few indicators of performance in the universities.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Organizational agility as a business orientation attracted a lot of interest since the coinage of the term agility at Iacocca conference. The phenomenon was identified when scholars and practioners reacted to threats that faced manufacturing firms in US in the 80s (IC, 1991). Theoretical and empirical literature did not capture fully the extant nature of relationship between organizational agility and performance of organizations. The following chapter consists of theories upon which the study was anchored, broad review of empirical literature that supported the variables, summary of the most relevant studies and the proposed conceptual framework of the relationships of the variables.

2.2 Theoretical Underpinnings

Organizational agility encompasses the ability of a firm to logically synchronize the value adding processes that aim at achieving goals and competitive advantage in turbulent times. General systems theory, theory of constraints, socio-technical systems theory and collegial theory underpinned the knowledge of variables studied. They anchor the continuous flow of processes and the activities internal and external of the organizations.

2.2.1 General Systems Theory

The theory is associated with Kast and Rosenzweig (1972) who traced the models of mechanistic and organismic systems to way before 1850 but linked the systems thinking as applied to business firms with Scotts (1961). The theory proposes that organization consists of closed and open systems which help it to function as one continuous entity.

Systems that are closed cannot survive because increase in entropy (exponential increase in activities in firms) creates greater levels of disorganization that eventually lead to self-destruction. An open system on the other hand moves to higher levels of differentiation and development because it is embedded in a system of interrelated organizations that are interconnected by communication channels, information flow, input supplies and output in form of tangible products and services (Mele, Pels & Polese, 2010)

The assertion of the theory implies that, a functional organization must have both closed and open systems where a closed system refers to the internal functions and the relationships that must be coordinated in order to transform inputs to outputs. Owen (2019) concurs by explaining that a system is holistic with high degree of integration because the components of a system, often systems in their own right, require connectedness for value addition. General systems theory anchored the study hypothesis that; organizational agility had a relationship with performance of universities. It also supported the inclusion of product development processes and operational processes because an organization provides value in form of a physical or a service product to the market. Mele et al. (2010) observed that although a system is whole, it is highly integrated with several modifiers to relationships which in the context; included intervening and moderating influencers to the processes of value creation.

The theory was also suitable in explaining the relationship between faculty and management processes in a university. Chikere, and Nwoka (2015) opined that one of the

strengths of general systems theory is that it provides visibility of how diverse components of management processes link to form a system that functions as an entity.

Although the theory explains that organizations survive because of having an open system, it falls short of explaining the influence of employees who practice departmental systems thinking that limit the ability to synchronize the internal and external processes into one continuous entity.

Most organizations including universities have traditional line structures that are based on areas of specialization and they hinder smooth transition of functions from the organization's internal environment to the external. Twidale and Nichols (2013) recognized the multiple roles that universities have in creating knowledge and serving the community. However, universities are inclined into being more of a closed system because of the collegial heritage that may require some form of modification when a rapid change occurs. This was supported by Chakrabarti (2002), Mukherjee (2014) and Durkin et al. (2016) who acknowledged the existence of rigid complex systems in various faculties of universities. The system originates from a culture of cherishing academic freedom, intellectualism and social elitism which is complicated and self-contradictory (Lazega, 2005). The culture may inhibit optimal performance in the advent of turbulence in education sector that arise from change in technological, industrial and social-economic developments. In such times, universities like any other organization require a multidisciplinary approach when responding to rapid changes (drivers of agility) (World Bank Report, 2019)

2.2.2 Theory of Constraints

The theory was postulated by Goldrat in 1984 with a focus on the systems improvement for optimal performance (Aryanezhad & Komijan, 2004). It is anchored on five essentials which if followed can lead to better firm performance. These include identification of the constraints, deciding on how to exploit the opportunities resulting from constraints, subordinating the other activities to the constraints, elevating the constraints and if a change occurs as a result of eliminating the constraint, the system is analysed further to identify new constraints (Trojanowska & Dostatni, 2017).The five basics form step by step cyclic procedure of optimizing a production system for continuous improvement. The underlying assumption is that any organization must have at least one constraint related to physical, policy or managerial processes (Chako et al., 2017).

Yiego (2016) and McCowan (2018) findings on case studies of some universities in Kenya showed existence of systems constraints as a result of agility which needed to be elevated through enablers and responses for optimization. A limitation of the theory in the context of the study is that constraints arising from agility can be rapid while its basic assumption is that they can be ascertained with ease. Since the theory originally addressed physical systems, it is possible to miss out constraints contained in the managerial processes. Despite the limitations, the theory anchored operational processes variable because improvement of performance of a university is determined by continuous identification and rectification of challenges in the systems.

2.2.3 Socio-Technical Systems Theory

Zwaan Der Van (2001) associated the theory with Trist (1960), Brown; Emery (1967) and Rosenzweing (1972) studies on dynamic systems. It postulates that an organization consists of technical and the social subsystems that must be configured to suit the operational processes that are specific to its functions. Technical system consists of assets, technology and information while social system is made up of human resource capabilities such as skills and competences (Fischer & Hermann 2011). The social system designs the technical system through goal setting and processes that aid in achieving firm objectives (Savaget et al., 2018). These systems however are broadly presented in the theory and there is need to delimit the aspects that are applicable to specific organization.

In the context of the study, it supports product development variable because technical and social systems interact to create a new or innovated product. When drivers of agility cause a disruption, social and technical systems realign to restore equilibrium in firm's operations (Nafei, 2016). It also explains operational processes which link the social and technical subsystem.

2.2.4 Collegial Theory

The theory can be traced back to the ideas of Weber who explained that organizations, whose members have specialized knowledge, cannot be managed fully by a bureaucratic system but rather by consensus (Baldrige, 1971). Collegial theory advocates an administrative system where consensus is derived from members who are theoretically equal (Lazega, 2005). Observation in educational policy analysis by Organization for

Economic Development (OECD), 2003, indicates that status in a faculty is not only based on money and seniority but also on a characteristic dimension of prestigious symbolic recognition of academic contribution and a continuous critical judgement about the quality of its members.

However, this uniqueness of scholarly community has been challenged over time by state funding that is attached to efficiency and accountability (Mattheou & Saiti, 2005). Besides the state, there are external stakeholders with equal demands resulting to the need of fusion of the academic traditions and executive powers for better management of a university. The faculty resists or is slow to adopt innovations that are not consistent with their teaching methodologies, yet this should be the norm in order to keep up with market and society changes (Chang, 2018). The theory, though not supporting any study variable was included to illuminate the origins of challenges emanating from faculty staff whose culture may not agree with some of managerial policies that challenge academic foundations. The theory anchors the fact that over emphasis on financial measures of performance in a university may erode their vision and mission which in turn may be detrimental to knowledge creation.

2.3 Empirical Review

This section discusses the empirical studies that indicate the possible relationships among the variables or lack of it in order to identify direction of linkages, gaps and clarity of the objectives. The subsections address organizational agility and performance, organizational agility, product development processes and performance, organizational

agility, operational processes and performance and lastly the joint relationship of them all.

2.3.1 Organizational Agility and Performance

The extant relationship between organizational agility and performance across firms was unclear because of non- consensus on the concise dimensions of the concept of agility. Development of literature since the inception of the concept of agility (IC, 1991; Zitkiene & Deksnys, 2018), provide diverse views on the ideas which show a multifaceted characteristics and dimensions. Empirical studies done over that period indicate an extensive use of exploratory and case study approaches which revealed varied gaps for further investigation.

Huang & Li (2008) and Wendler (2013) showed that the dimensions of agility were varied, evolved over time, and were contingent to the industry or a firm. Equally, Bessant, Knowles, Francis, and Meredith (2001) developed agility framework with themes that addressed physical processes, strategy and the linkages as part of agile enterprise and recommended further studies on the relationship between agility and firm performance as well.

Wendler (2016) studied dimensions of organizational agility in the software and IT service industry: insights from an empirical investigation, "Communications of the Association for Information Systems". The factors extracted were work force, technology, management change, collaborations/corporations and agile values through

Confirmatory factor analysis and cluster analysis. Though the study narrowed to a specific industry, it was also exploratory; involving a large worldwide population of the industry and recommended that further conclusive inquiries were necessary. Alhadid (2016) examined the effect of organizational agility on performance of information technology companies in Jordan with the objective of identifying effect of human resources, information technology and innovation on organizational performance.

Jalal (2017) replicated the same variables on telecommunication sector in Pakistan but Jordanian study had more methodology rigour hence more reliable. A study on Egyptian pharmaceutical companies showed that sensing agility, dimensions agility and acting agility were factors of organizational agility that were key to improving organizational performance (Nafei, 2018). A Key finding of the study was the human factors in agility played a key role in performance.

Three studies focused on information technology industries, possibly due to its fluidity and the recommendation from all; was that the findings could not be generalized for other industries. The very nature of agility provided opportunity for further search on how the specific features of the phenomenon was affecting various industries. Notably, the studies concentrated on drivers of agility from non-operations viewpoint. The current study aimed at widening the scope of drivers studied to include enablers and responses as suggested by Sharifi & Zhang (1999) model because universities are perceived to be slow in evolution (Dove & Willies, 1996; Mattheou & Saiti, 2005).

Research by Sambamurthy, Baradwaj and Grover (2003), Seemathraju (2006) and Richardson, Kettinger, Banks and Quintana (2014) indicated that even within manufacturing industry, different factors of organizational agility were contingent to firms within a sector. The studies also majored on general concept of agility while literature was clear that only certain aspects of agility were specific to a particular industry, sector or firm. Charbonier-Voirin (2011), Wendler (2016) and Zitkiene & Deksnys (2018) argued that organizational agility had a greater influence on performance of a firm compared to other forms of agility and this study proposed that the same might have been the case with universities.

2.3.2 Organizational Agility, Product Development Processes and Performance

The period taken to develop and introduce a product to the market is critical for competition (Durkin et al., 2016), suggesting that product development processes through scrum or stage-gate/scrum hybrid may help a firm to achieve competitive advantage (Cooper, 2016). Sharifi & Pawar (2001) established that team dynamics, tooling, investment and co-allocation affected effectiveness of scrum method in developing manufactured products. Equally a research by Sommer et al. (2015) on manufacturing firms in Denmark indicated that development of a complex product by stage-gate method was a failure while a hybrid of stage gate and scrum had a positive relationship with agility. The studies confirmed that success of scrum method could not be guaranteed without putting into account broad human factors, material and capital inputs. Similar to other studies relating to agility and product development, the two featured manufacturing firms.

Sharma (2019) conducting a comprehensive literature review on product development process, found that product development aims at problem solving because it involves knowledge accumulation. Perhaps this explains limitation of empirical studies on the appropriateness of the method followed in developing a service product. Where the studies had been conducted, the objective focused on other aspects besides the process followed in ensuring that a product is launched while the opportunity existed. Such an example was a study by Suwannatat, Anuntroranich and Chandracha (2012) in Thailand, which investigated on whether university – industry collaboration was necessary in animation industry. Durkin et al. (2016) studied product development processes in higher education marketing in UK universities to determine whether the fuzzy front end of product development processes was supported by innovation and market orientation.

Events that triggered agility deliberations on challenges that affected manufacturing sector of USA in 1991 (IC, 1991) provided a clear indication that a company may have a product but fail to sell if a demand does not exist. Sharma (2019) advocates that product development process should factor customer voice before embarking on product design and the processes. Implicitly, product development processes appears somewhere between organizational agility and performance. The reasoning was that a consumer will only have a relationship with an organization if there is a product on offer that fulfils their needs, wants or desires. The importance of a clear understanding of the relationship between a product and market drivers in higher education is necessary because of the incongruence of views of university mission by faculty and management staff.

This was equally observed by Yieke (2011) who pointed out that while the mission of faculty is to discover, organize and transmit knowledge for the sake of it, the goals of management are to meet the expectations of the stakeholders. These conflicting goals inhibit development of products in form of programmes, innovations, trainings, research among others even when a market exists. This is because either party may fail to perceive the opportunity created or reach a consensus on the procedures to be followed in product development (OECD, 2003). Therefore, the study proposed that product development processes intervened on the relationship between organizational agility and performance of universities.

2.3.3 Organizational Agility, Operational Process and Performance.

Automation and application of technology to operational processes has been a prevalent strategy that enhances speed and efficiency when performing tasks and activities on well mapped business processes only (Anttila & Jussila, 2013). As alluded to in the literature, organizations do not deliberately synchronize their activities to form processes but rather allow them to evolve on their own except when automating the systems. The danger in this is that, inefficiencies develop or negative performance may happen as result of performing unnecessary or inappropriate activities within a process. Therefore organizations that deliberately design their processes have higher levels of efficiency and subsequent performance (Chang, 2006)

Investigating on identification of business processes in an enterprise management in 138 companies of various sizes, Lema ńska-Majdzik and Okręglicka (2015) found that

employees were partially aware of the business process but they did not know how it influenced performance. The weakness of the study was that hypothesis were overloaded with several factors and the findings may not reflected the correct position because positive responses to the others parts of the hypothesis may have contributed to the partial significance about the business processes.

Baiyere, Tapanainen and Salmela, (2018) conducted a study on agility of business processes – lessons from a digital transformation context, a case study of SWFT – European company which consisted of 1200 companies. The findings were that business process influenced non-financial performance and by inference financial performance but the response rate of 10.58 percent was rather small. The two studies were exploratory and the recommendations were that further research specific to industries was necessary in order to ascertain the precise relationship between business process and performance because it supports the input- output processes unique to a company.

In manufacturing firms, business processes have been a challenge because different departments focus on a narrow function and yet realization of strategy requires a common approach (Barbra et al., 2013). This was confirmed by Seethamraju (2006) who investigated on the influence of enterprise systems on business agility in manufacturing industries in Australia. Quality and cost were found to be the most important measures of process performance that also impacted on profitability while speed and flexibility were found to be important for a 21st century manufacturing firm. Seethamraju and Seethamraju (2009) explored enterprise systems and business process agility in a

chemical manufacturing company in Australia. The findings were that the standardized repetitive processes made the system efficient and contributed to appropriate response to drivers of agility. However, incorporation of inefficient non-standardized processes led to inflexibility and rigidity. The latter system become very inefficient and made the firm respond to agility inappropriately. Other significant conclusions included; the flow of information in horizontal integrated system simplified the process but reduced flexibility. Vertical integration improved decision making and communication in non-technical processes but inhibited the same in technical processes. Studies by Petkovics, Tumbas, Markova and Zoltan (2014) and Cao, Thompson and Triche (2013) equally showed that firms concentrated on automating systems without prior design of the processes. The study acknowledged that clear identification and mapping of a business process were critical before automation of operations.

The major weakness of these studies was that business process involved mechanical automation unlike service processes where it is difficult to standardize processes that involve human contact. They however showed that business processes are varied and there is none that can be prescribed universally even for optimization of input-output physical processes in different industries. The studies have also applied bivariate relationship yet performance is an output of numerous factors with complex interactions. The study therefore, proposed that operational processes moderated the relationship between organizational agility and performance of universities.

2.3.4 Organizational Agility, Product Development, Operational Processes and Performance

Dove (1992) and Gunasekaran (1998) observed that a modern organization must be agile in order to survive indicating that the starting point for a business to achieve some form of performance was possession of a product, a process and ability to deal with organizational agility. Review of literature provided some evidence of empirical studies on the relationship between combinations of two but not three factors identified as necessary for performance. Example of such is a study by Wieder et al. (2007) on evaluation of new product development process agility in an intensive innovation context; a case study of typical problems encountered during the modification of the product dominant design in a manufacturing company in France.

Alzoubi, Firas, and Abdel (2011) also conducted a study on factors affecting organizational agility on product development processes in Jordanian's companies. Sena, Coget and Shani (2009) investigated on product development process, firm's organization structure and organization of software development teams as a mechanism for realizing agility; a case study of a company that was involved in software development for cooperative decision making in the context of military and business enterprise clients in US. Malenje (2014) studied challenges facing business process automation in the public universities in Kenya with the objective of finding out whether Information and Communication Technology (ICT) resources acquired by the university were deployed appropriately, whether ICT resources had been employed in university core business and whether university primary business processes enjoyed automation. These studies

indicated that only specific factors of agility, new product development processes and operational processes had been investigated at a time which suggested that there were numerous interactive aspects of the of variables that remained unexplored.

Concerning the dependent variable, it was noted that ranking of universities put into account the entire performance perspectives as identified by Kaplan & Norton (1992). The main bodies that credibly ranked universities in the world used closely related operational criteria such as-; ability to attract qualified students and faculty staff, research publications and citations, international outlook and knowledge transfer that attracted industrial-stakeholder collaborations and funding through endowments, innovations, patents, licensing and consultancy (Pavel, 2015). These rankings indicated that certain agile universities from America and UK remained at the top consistently for a period of time (Ahmed, 2015) indicating that organizational agility had a relationship with performance. The study therefore, proposed that a combination of organizational agility, product development processes and operational processes influenced organizational performance.

2.4 Summary of Empirical Review

In this chapter, both theoretical and empirical studies concerning organizational agility, product development processes, operational processes and performance were reviewed. Theories anchoring the study proposed that performance of an organization is determined by interactive-interdependent transformational processes within and between internal and external environments. However, the studies were inconclusive as to the precise

components of organizational agility and there was evidence to suggest that dimensions of agility are numerous, varied and impacts differently on firm performance. Tsourveloudis, Valavanas, Gracanin and Matijasevic (2002) and Vinoh and Aravindraji, (2011) used fuzzy topsis analysis models in attempt to measure the 'unknown' of organizational agility. Empirically then, effect of agility on performance of organizations was not fully understood and further investigations were recommended in literature all through to 2018 (Wendler, 2016; Zitkiene & Deksnys, 2018).

Methods of product development processes are in the domain of manufacturing firms where products are developed with the aim of increasing performance by exploiting opportunities without deliberate consideration of triggering factors (Sharma, 2019). However, it is clear that agile factors are responsible creations or innovation of products and synthesis of the discussed findings led to the proposal that product development processes intervenes on the relationship between organizational agility and performance because factors of agility were thought to trigger product development.

Operational processes applied in transformational processes contribute to competitiveness, but firms do not deliberately design and map them in a clear documented format that is easy to follow. Accordingly, Seethamraju (2006) among other scholars of business processes explained that the order and efficiency of execution of activities in a manufacturing set up lead to varying levels of performance. Therefore, it was postulated that operational processes moderates the relationship of organizational agility on performance. A summary of key studies is provided in Table 2.1 below which

show author(s), objectives, methodology, key findings, knowledge gap(s) and how the study was to fill the identified gaps.

Table 2. 1: Summary of Empirical Review and Research Gap(s)

Author(s)	Topic	Objective(s)	Methodology	Findings	Gap(s)	How gaps were addresses
Bessant et al. (2001)	Developing agile enterprise	Determine what constitutes an agile organization.	Explanatory, Longitudinal and case study research designs were used. Ten small and medium enterprises were studied. Interventions were introduced and a network of workers (focus group) met monthly to share experiences through a learning network.	Key agile factors emerged as follows: agile strategy, agile processes, agile people and agile linkages. Performance indicators suggested were speed of response, volume, variety, frequency of innovation and time taken to introduce new products to market.	A single variable was studied yet a combination of variables interacts to impact on a business. A qualitative research approach was applied and case study research design was used. The findings therefore could not be generalized for other enterprises.	Multiple variables were used. A quantitative research was adopted to enable generalization
Sharifi and Pawar (2001)	Product development strategies for agility: Case study of three manufacturing companies in UK	Explore issues related to formation, development and operationalization of multi-disciplinary New Product Development (NPD) teams. (collocation and virtual teams)	Observation of product development processes at-; team level, concurrent engineering and teams located in different countries.	Independent team developed product in five months. Problems were shared and solved. Costs reduced. Concurrent engineering led to development of product in 11 months. Virtual team failed in developing a product on time.	Product development involved a physical product and not a service product. Findings could not be generalised because it was a case study.	The study aimed at processes for developing a service product.
Seethamraju	Influence of	Determine whether it	Exploratory and	Quality and cost	Direct relation	The study

(2006)	enterprise systems on business agility in manufacturing industry in Australia.	was possible to achieve both process efficiency and process agility in an Enterprise Resource Planning (ERP) environment.	case study designs were used. Data collection was done by data mining and interviewing four to five managers per organization that had ERP system.	efficiency influenced performance. Speed and flexibility were required for agility. Agile business process was necessary for a company's innovation, competitive action and exploitation of opportunities.	between independent variable and dependent variable were assumed. Cross sectional research design was used to study changes of variables instead of longitudinal design.	included a mediator and a moderator.
Wieder et al. (2007)	How to evaluate the New Product Development (NPD) process agility in an intensive innovation context.	To position the problems encountered during a period of instability when developing innovative and complex system.	Data was collected by accompanying the manufacturer in the development of a complex product in a company that was in existence.	Agility was found to be the key ability needed to cope with the alternate stable and unstable periods of product development processes.	Methodology was complex and may not be replicated easily. Variables were not identified. Case study research design was used and findings could not be generalized. Study was explorative	The study goes beyond explorative design to a generalizable study.
Huang and Li (2008)	Tracking the evolution of research issues on agility.	Determine research issues in agility, what was found and what remains to be answered.	Critical incident technique and content analysis.	Agility was defined in the context of manufacturing industries in 1980s and 1990s. research on agile in service Industries was lacking,	A single variable was described by use of secondary data.	Study used primary data and it was furthering research on agility in the 2020s.
Seethamranju	Enterprise	Analyse the	Exploratory case	Efficient process	Agility affected	The study

& Seethamuraju (2009)	systems and business process	influence of enterprise systems implementation on business process agility. Determine the moderating effect of integration, standardization, best practice and process orientation to building agility in the process	study of a chemical manufacturing company in Australia. In depth -semi structured interview was used to collect data.	before automation contributed to agility on automation but integration and standardization made the process rigid and inflexible. Horizontal integration increased speed but reduced flexibility. Vertical integration increased decision making process, Best practice embedded into the system had no influence on agility. Orientation did not influence agility.	both Independent and dependent variables and yet direct relationship was assumed. Best practices were not operationalized.	focused on a service process
Sena et al. (2009)	Designing for agility as an organizational capability: Learning from a software development.	Develop basic understanding about changing work and products management practices. Identify the work practices and design factors that enable agility. Learn about sub -	Longitudinal case study of a software development firm in Australia over a period of 5yrs at interval 1and 11. In-depth interviews and observation methods of data	Product development was based on basic modular. Customer views were incorporated and teams were involved. In regard to agility, organizational	Many variables were studied without directional relationship. Case study was used and findings cannot be generalized.	Study narrowed to four variables In order to study the details.

		teams and their intra-dynamics.	collection were used.	structure was informal and flexible. Learning was organized around social systems of the firm.		
Alzoubi et al. (2011)	Factors affecting organizational agility on product development processes.	Determine relationship between employee empowerment, customer oriented culture, information technology, learning organization and organizational agility on product development processes.	Descriptive and survey research designs were used to study manufacturing firms in Jordan. A stratified sample was used. A semi-structured and close ended questionnaire was used to collect data.	Employee empowerment had a significant relationship with organizational agility. Customer oriented culture and learning organization agility had effect on agility of product development processes. Information technology agility had no effect on product development processes.	Many independent variables were studied without controlling for each in order to determine the effect of individual variable on the dependent variable. There was notable difficult in translating the study to English hence the findings could not be relied on.	Effect of mediator and moderator can be tracked
Tarus et al. (2012)	Challenges of implementing electronic learning in Kenya. A case of Kenyan public universities.	Determine the challenges of implementing electronic learning in Kenyan public universities.	Longitudinal study was carried out between 2010-2012 Purposeful sampling of 3 universities was done. Proportionate	Challenges identified were inadequate infrastructure, costly and limited internet, shortage of technical skills on e-learning and e-content, low	Single variable was studied. Purposeful sample of universities could have been biased. In appropriate method of data analysis was used.	Study applied objective methodologies.

			sample size of 125 lecturers, 14I ICT staff, six members of management and three directors of schools was used. A guide of open ended -semi structured interview was used on directors while questionnaire was used on other participants.	interest and commitment to use of e-learning by faculty members.		
Cao et al. (2013)	Investigating the role of business process and knowledge management systems on performance: Multcase approach.	Determine how business process knowledge management fit was affected by business process and knowledge management characteristics, how business process and knowledge management system fit could predict utilization, how business process and knowledge management fit and utilization affects individual and	Explanatory research design was used to study multiple case studies of companies in deferent sectors. Interview was used as a method of data collection.	Non –routineness, interdependence and job title affected business process and knowledge management systems fit. Business process systems fit affected individual and organizational performance.	Study methodology was complicated. Case studies of companies in distribution and communication technology industry were used. Findings cannot be generalized for other business sectors. Study was explorative.	The study was generalizable

		organizational performance.				
Suwannatat et al. (2012	University and animation industry collaboration: New product development processes process.	Determine product development processes used. Identify the nature of industry- university collaboration.	Qualitative case study of 5 universities in Thailand. Depth interview and focus groups were used to collect data.	Product development used stage gate. No collaborations in product development processes.	An explorative study with no clarification of variables was carried out	Variables were determined with clarity
Wendler (2013)	Agility from different perspectives	Select a suitable agility framework that represents the structure and components of an organization for further research.	Open source Gephi tool using lay out algorithm force atlas was used to map out similar concepts from different frameworks.	30 concepts referred to organizational agility, two work force agility and one intelligence and collaboration agility.	Single variable (agility) was studied. Frameworks assumed to apply to all industries. Study was not deterministic	The study was deterministic by focusing on education sector.
Petkovics et al. (2014)	Cloud to support university processes in external collaboration	Identify business processes of Serbian universities and redesign according to partner models. Find out how supporting capability of cloud computing improve external collaborations.	Analysis of leading journals. A total of 1,005 journals were examined by searching the word 'cloud' or 'cloud computing'	Cloud computing was used to support the various processes. Also Improved input-output data quality in collaborative processes and enabled efficiency in external collaborations.	Direct relationship between independent and dependent variable was assumed.	Multiple relationships were determined.
Gudo et al. (2014)	University expansion and issues of quality education, challenges and	Determine whether universities had sufficient physical facilities to offer quality education.	Expost facto and survey designs were used. Case study of two public and two private	Limited room capacity, lecturers and high number of students affected exam invigilation.	There was weakness in methodology and the findings could not be relied on.	The methodologies were clear.

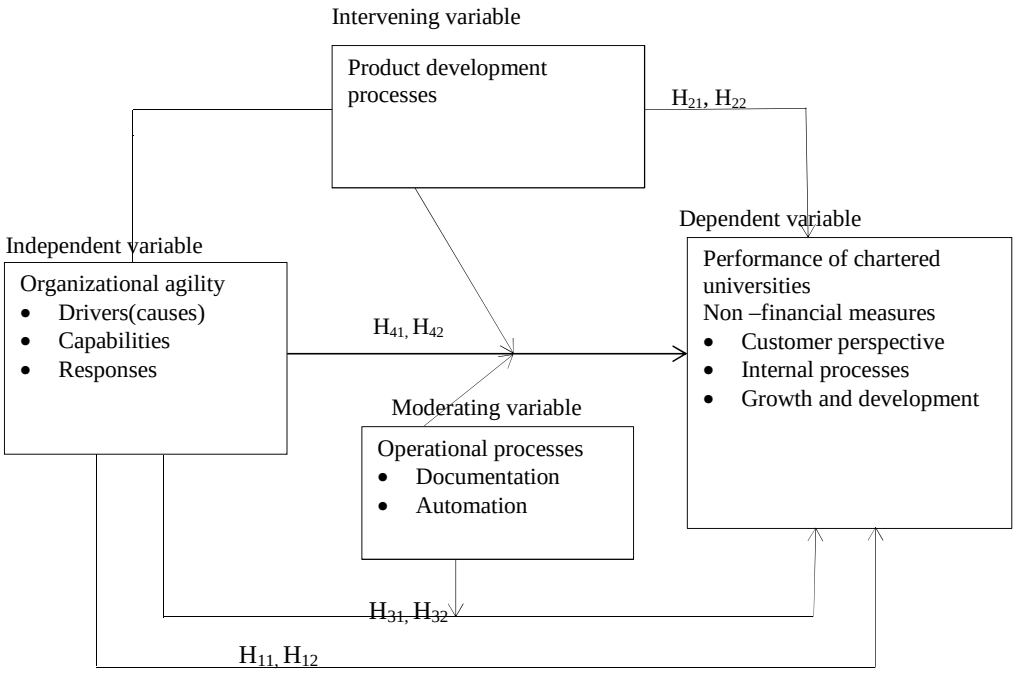
	opportunities.		universities was done. A sample was used. Questionnaire was used to collect data. Documents were used to interpret the questionnaire.	Various opportunities included collaboration with government and private sector.		
Salamzadeh et al. (2014)	Agility path through work values in knowledge based organization: A study of virtual universities in Iran.	Identify the path to achieve agility through work values. Determine methods that enable investment to achieve agility through work values.	Two phase study was done. In-depth interviews were first done followed by collection of data using questionnaire were applied to lecturers and managers. Multiple regression using fuzzy topsis mathematical models were used to for data analysis.	Self-development and work life balance had a relationship with agility.	Manufacturing context was used to interpret findings in virtual universities. Study focused on human resource issues.	The study adopted operations perspective.
Malenje (2014)	Challenges facing business process automation in the public universities in Kenya.	Determine if ICT resources acquired by the university were deployed appropriately.	Case study of Masinde Muliro University in Kenya.	No deliberate or rational approach to allocation of ICT resources. Allocation to individuals and departmental depended on	Operationalization of the variables was not explained. Use of descriptive statistics was not adequate in determining the relationship of	Predictive analysis was used to determine the relationship between independent variables and

				respective needs. Core business processes were not given first priority.	variables.	dependent variable
Sajdak (2015)	Theoretical and practical aspects of developing agile enterprise. A case study of a family owned food company in Poland.	To determine the theoretical and practical aspects of developing agile enterprise.	A case study of family business. In-depth interview with employees, the president and the owner.	Acuity, flexibility, entrepreneurial resourceful and strategic leadership have a relationship with developing agile enterprise	Research methodology was not clear. Exploratory design was used and variables were not clear.	Generalizable methodologies were used
Sommer et al. (2015)	Improved product development processes performance through agile/stage-gate hybrid.	Determine the influence of stage-gate and stage-gate/scrum hybrid process of product development processes on performance.	Case study of manufacturing organization in Denmark. In-depth interview, observation and a questionnaire were used	Two companies that used stage gate had to add more gates. No significant performance than before. Stage-gate/scrum hybrid led to better performance	Direct relationship between independent variable and dependent variable was assumed.	Study focused on service industry
Durkin et al. (2016)	Product development in higher marketing in UK Universities	Determine whether the fuzzy front end of a product development processes was supported by innovation and whether it was market oriented.	Case study of six universities in UK.	Innovation originated from staff. Programme directors assumed responsibility. Faculty approved the programmes in principle. Development followed a formal process.	No clarification of the variables under study. Sample could have been biased.	Variables were clearly identified.

2.5 Conceptual Framework

The conceptual framework shown on Figure 2.1 below was constructed from the gaps identified in the literature and supported by theories anchoring the study. Organizational agility and performance were thought to have a direct relationship ($H_{11,}$ H_{12}), while product development processes intervened (H_{21}, H_{22}), and operational processes moderated ($H_{31,}$ H_{32}) the relationship. The three independent variables were proposed as having a joint ($H_{41,}$ H_{42}) influence on the dependent variable.

Figure 2 1: Conceptual Framework



Source: Author 2018

The conceptual framework above shows the proposed relationship of organizational agility, product development processes, operational processes and how they can jointly influence performance of chartered universities in Kenya. Organizational agility was

derived from Shariffi & Zang (1999) model whose ideas were supported in subsequent literature with constructs identified as drivers, enablers/capabilities and responses. Product development processes are methods followed when developing a product and the commonly applicable ones are stage-gate, scrum, and stage-gate –scrum hybrid (Cooper, 1990, 2016; Takauchi &Nonaka, 1995; Lonel, 2008). No subdivision of operational processes was found in the literature and none were formulated. Performance however considered customer, internal processes, growth and development perspectives (Kaplan & Norton, 1992). H_{11}. H_{12}, H_{21}, H_{22}, H_{31}, H_{32}, H_{41} and H_{42} appearing on the diagram represent the hypotheses expounded further in section 2.6 below.

2.6 Study Hypothesis

The null hypotheses were formulated as follows:

H_{11}: Organizational agility does not influence performance of chartered public universities in Kenya.

H_{12}: Organizational agility does not influence performance of chartered private universities in Kenya.

H_{21}: Product development processes do not intervene on the relationship between organizational agility and performance of chartered public universities in Kenya.

H_{22}: Product development processes do not intervene on the relationship between organizational agility and the performance of chartered private universities in Kenya.

H_{31}: Operational processes do not moderate the relationship between organizational agility and the performance of chartered public universities in Kenya.

H_{32}: Operational processes do not moderate the relationship between organizational agility and the performance of chartered private universities Kenya.

H_{41}: Organizational agility, product development processes and operational processes do not jointly influence performance of chartered public universities in Kenya.

H_{42}: Organizational agility, product development processes and operational processes do not jointed affect the performance of chartered private universities in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter presents methodology adopted which include; research philosophy, design, and population, method of data collection, analysis and discussion of details of each.

3.2 Research Philosophy

Research philosophy is the foundation on which development of knowledge is anchored (Saunders, Lewis & Thornhill, 2009) and it consists of assumptions rooted in the concepts of epistemology, ontology and axiology. Epistemology explains the nature of knowledge, its forms, how it is acquired and communicated. Ontology refers to assumptions made in order to determine the reality of a phenomenon while axiology is the value and ethical orientation that influence the research process (Kivunja & Kuyini, 2017). Ontology rests on explaining the nature of the world as to whether it is fixed or dynamic while epistemology underlies how a researcher discovers knowledge either as part or independent of it (Guba & Lincoln, 1994). If knowledge discovered is independent of the researcher, the paradigm becomes positivism and if otherwise intepretivism.

The assumptions made in each philosophical approach form the basis of how the researcher views the world, relates with it, chooses approaches and techniques from a range of potential alternatives when examining relationships of research variables. Krauss (2005) explained that while positivism approach can be used to discover certain knowledge, some realities evolve in context of social, political, cultural, economic, values and ethics. In such a case, researcher becomes part of the process in order to discover the

fundamentals of searching for knowledge. Creswell (2003) argued that positivism and intepretivism should be combined to form mixed research approach for purpose of achieving the wholeness of certain circumstances of research interest.

This study adopted positivism view because of its predictive power in testing theories and determining the relationships among variables for purpose of generalization. The role of the researcher was to establish how organizational agility influenced performance of chartered universities in Kenya through the interaction of product development processes and operation processes. Four theories; general systems theory, theory of constraints, socio-technical systems theory and collegial theory supported various propositions made. The paradigm therefore, validated the methodology and procedures that were followed in arriving at the conclusion of how the predictor variables influenced the dependent variable.

3.3 Research Design

A research design is a plan that is adopted in formulating objectives and methods for purpose of achieving the overall aim of the study. Cooper and Emory (1995) suggested that various research designs are supposed to put into account philosophical view, context of research elements, possible relationships among the variables and the period within which the study is conducted. As such, the study adopted a combination of descriptive, cross-sectional and census survey designs that support a broad view of understanding how the independent variables interact to influence the dependent variable.

Descriptive research design described the nature of the possible relationships among the variables, cross sectional design accounted for the short duration that data was collected while census comprised of all chartered universities in Kenya, targeting the Faculties /Schools. Inclusion of various research designs in a study is supported by Zikmund (2003) who emphasized the importance of describing the nature and dynamics affecting a business within a given period of time.

3.4 Population of Study

Population is the number of elements or individuals that share certain characteristics that define a phenomenon associated with it (Nachmias & Nachmias, 2004). The total number of chartered universities in Kenya was 48 out of which 30 were public and 18 private (CUE, 2016, Appendix II). Target population was all the faculties/ schools and the respondents were Deans of faculties or school depending on the university. The figure per university varied depending on the number of operational schools and faculties but the total identified was 268 (University Website, 2017). As at the time of ascertaining this number, three universities had not indicated in their websites as to whether there was a school or a faculty. An assumption was made to the effect that the three universities had few degree programmes and a small student population that operated under a single head of academics. This was confirmed at the time of data collection for one of the universities and number of faculties / schools and respondents was adjusted to 271. There was no criteria found in the literature that supported categorization of a faculty or school by universities and therefore, universities named their operational units as either faculty or

school. The total number of faculties /schools in public universities corresponding to 30 universities was 205 and 66 for 18 private universities.

3.5 Data Collection

The study sought to collect primary data and Deans were chosen as the unit of observation because of their responsibility for implementing academic strategies and overseeing the management of Faculty/ School. The choice was informed by the portfolio of responsibilities that provide them with opportunity to represent the faculty at top management decision making forums. Studies conducted by Wepner, Henk and Lovel (2015) and Halupa (2016) observed that the roles of a Dean in a university are important, wide and varied because stakeholders hold them responsible for the learning and education that students receive from their institution. The selection was also supported by views of Zikmud (2003) who explained that a researcher has the freedom to choose respondents with relevant data sought by a study. Similar suggestions were held by Nachmias and Nachmias (2004) who suggested that employees involved in execution of organization's plans are more conversant with operations compared to top managers. Deans were therefore, best suited as source of primary data because they had information regarding management and operations of their universities.

The total number of respondents was 271 of which 205 were from drawn public universities and 66 from Private (University Websites, 2017; Appendix III). During the time of data collection, the number did not vary much compared to the time of compilation and there was no need of revising the totals. Data was collected from all

Faculties/Schools instead of sampling because of diversity in characteristics across the universities. The variation was caused by different number of departments in a faculty or faculties in a school, size and the history of the university. Characteristics also depended on whether a university was public or private and location in rural or urban set up. Data collected from faculties / Schools enabled comparison of public and private universities since the nature of academic responsibilities was similar across the two sectors.

The instrument for data collection consisted of a structured questionnaire that had items based on Likert scale. The scale assumes that a statement represents an aspect of attitude that can be measured. This provided means of rationalizing qualitative data for the purpose of quantitative analysis and generalization of the findings (Cooper & Emory, 1995). It comprised of five parts where sections two to five addressed each objective while section one focused on demographics of the faculty/school and the university.

Administration of the instrument was executed by the researcher assisted by a trained assistant who dropped and picked them from universities in Rift Valley and Western regions of Kenya. The researcher collected data from the universities in the other regions. A few questionnaires were administered by emailing but follow ups by calls and emails to all the respondents was conducted to ensure high response rate.

3.6 Operationalization of Variables

The study had four variables and several constructs under organizational agility, product development processes and performance but operational processes variable was not

subdivided. All the variables were operationalized by use of mult-item indicators that were measured using Likert scale. Boone and Boone (2012) explained that a Likert scale consists of four or more items that can be converted into a composite score to representing an attitude. Joshi, Kale, Chandel and Pal (2015) supported the opinion by explaining that parametric analysis of items in ordinary Likert scale is justified by central limit theorem.

Copper and Emory (1995) observed that Likert scale enables a separation of views and attitudes where favourable and unfavourable opinions are sought. It is also suitable where members of an institution may not be comfortable in providing definite figures that can be accessed by competitors or where there is need for confidentiality; which was the case with universities. Variables were therefore operationalized and presented as shown in Table 3.1 below

.

Table 3. 1: Summary of Operationalization and Measures of Variables

Variable	Operational Definition	Construct/Indicators	Source of Indicators	Type of Scale	Measurement
Organizational agility (independent variable)	Drivers of agility	Sources of agility: government policies market, customers and competitors	Dove (1992) Sharifi & Zhang (1999)	Likert scale. Section two – items 1 to 10 and items 1 to 6	Ordinal
	Enablers/capability	Availability of capabilities.	Yusuf et al. (1999) Sharifi & Zhang (1999)	Likert scale Section two – items 1 to 10	Ordinal
	Responses	Actions taken to cope with drivers of agility.	Sharifi & Zhang (1999)		Ordinal
Product development processes (intervening variable)	Methods used to develop curriculums and programmes.	Procedures followed in developing curriculums and programmes.	Cooper (1990a) Takeuchi & Nonaka (1995).	Section three - items 1 to 9 and items 1 to 5	Ordinal
Operational processes (moderating variable)	Documentation of processes. Automation of processes.	Availability of documents, evidence of automation	Charbonier-Voirin (2011) Anttila & Jussila, (2013).	Section four – items 1 to 11	Ordinal
Performance of chartered universities (dependent variable)	Consumer perspective	Means of ensuring that customer expectations were met	Kaplan and Norton (1992) Kaur & Kumar, (2014). (University of Toronto, 2014).	Likert scale items 1-5	Ordinal
	Internal process	Means of ensuring that services were offered to staff and students	Kaplan & Norton (1992) Kaur & Kumar, (2014). (University of Toronto,	Item 1-6	Ordinal

			2014). Bogt & Scapens (2009)		
	Growth and development	Means of institutional progress	Kaplan and Norton (1992) Kaur & Kumar, (2014). University of Toronto, (2014). Bogt & Scapens (2009)	Item 1-7	Ordinal
	Trends in performance	Indicators of performance.	University of Toronto, (2014). Bogt & Scapens (2009)	Item 1-14	Ordinal

3.7 Reliability

Reliability is the ability of research instrument to yield consistent results when data is collected from the same respondents more than once (Tavakol & Dennick, 2011). The most commonly used indicator is Cronbach's alpha developed in 1951 to explain the internal consistency of items contained in data collection instrument (Cronbach, 1951). The scale of test ranges from 0 to 1 and various scholars have suggested different levels of measures that are acceptable. Nunnaly (1967) explained that Cronbach's level of 0.5 to 0.6 can suffice in measuring reliability. This measure was revised to between 0.6 and 0.7 (Nunnaly, 1978) while Kaplan and Saccuzzo (2009) suggested reliability levels of 0.7 to 0.8. Therefore, the study adopted 0.5 values as the minimum Cronbach's alpha of reliability and additional measures were applied where low values were encountered in order to ascertain reliability.

3.8 Validity

Zikmud (2003) defined validity as the ability of a research instrument to measure what it is supposed to. While some constructs such as distance can be measured objectively, there are others that are based on attitude that have no precise determinants. Ascertaining the validity of such concepts is important in providing a true reflection of the findings. In social sciences, a measure of instrument validity is important in order to minimize systematic errors which cause actual measurement to be consistently higher or lower than what is considered to be a mean average of a given population parameter.

Construct validity can be sub- divided into face, content, predictive, criterion, discriminant and nomological (Mooi, Sarstedt & Mooi-Reci, 2018). Different data collection instruments may require different measures of validity depending on the variable construct in focus. However, all instruments must meet face and content validity which in this study was established.

Face and content validity were determined by use of literature review and consultation with the academic experts on issues of clarity, readability, specification and representativeness. Since data was collected from the entire target population, further test of validity was conducted by use of factor analysis which tested correlation of the items describing a particular construct. This is supported by Field (2009) who explains that component principal analysis has the ability to cluster items that refer to a similar idea.

3.9 Diagnostic Tests

The process began with data editing, coding and classification for purpose of ensuring accuracy, consistency and completeness of a data as a requirement for analysis and interpretation (Zikmund, 2003). Descriptive statistics such as mean scores, frequency and one sample t-test were computed to determine the basic and general characteristics of the data. Tests of linearity, multicollinearity and homoscedasticity were conducted as a pre-requisite for application of parametric tests. Normality was not tested because the study involved collection of data from all faculties/schools in all the chartered universities. Linearity was determined by use of Pearson's Correlation coefficient, whereas multicollinearity was assessed Variance Inflation Factor (VIF), tolerance factor

and Condition Index Number (CIN). Scatter plot of standardized residuals against the fitted values and Levine test were used to assess the degree of homoscedasticity (Field, 2009).

3.10 Data Analysis

Objective one was assessed by use of simple linear regression equation based on test for a relationship between the independent and dependent variable which were organizational agility on performance of chartered universities in Kenya. The equation for the relationship was as follows:

$PUB = \beta_0 + \beta_1 OA + \varepsilon$ and $PIV = \beta_0 + \beta_1 OA + \varepsilon$

Where, PUB was performance of public university; PIV performance of private university; OA organizational agility; β_0 the intercept; β_1, β_2, β_3, and β_4 population parameters; and ε error term (variation caused by underlying unmeasured factors.)

For objective two, which was to determine the intervening effect of product development processes on relationship between organizational agility and performance of chartered universities, Baron and Kenny's (1986) test (path analysis) was carried out as follows:

Step 1: PUB and PIV were regressed on OA to confirm that OA was a significant independent variable or, $PUB = \beta_0 + \beta_1 OA + \varepsilon$ and $PIV = \beta_0 + \beta_1 OA + \varepsilon$ and significance of β_1 was determined.

Step 2: Product development processes were regressed on OA to confirm that OA was a significant intervening variable that is $PD = \beta_0 + \beta_1 OA + \varepsilon$ and significance of β_1 was determined, where PD was product development processes.

Step 3: PUB and PIV were regressed on OA (independent variable) and PD (intervening variable) to confirm whether intervening variable was a significant predictor of PUB and PIV, that is PUB = $\beta_0 + \beta_1 OA + \beta_2 PD + \varepsilon$ and PIV = $\beta_0 + \beta_1 OA + \beta_2 PD + \varepsilon$

Step 4: Output of PUB and PIV that is PUB = $\beta_0 + \beta_1 OA + \beta_2 PD + \varepsilon$ and PIV = $\beta_0 + \beta_1 OA + \beta_2 PD + \varepsilon$ and PUB = $\beta_0 + \beta_1 OA + \varepsilon$ and PIV = $\beta_0 + \beta_1 OA + \varepsilon$ If results for step four are less than those of step one and significant, then full mediation occurs. If otherwise but coefficient of product development processes is insignificant then partial mediation occurs. If results for step four are significant and greater than step one, then no mediation occurs.

To address objective three - moderating effect of operational process (OP) on relationship between organizational agility and performance of chartered universities, hierarchical linear regression model was performed (Baron &Kenny, 1986). PUB = $\beta_0 + \beta_1 OA + \beta_2 OP + \beta_3 (OA*OP) + \varepsilon$ and PIV = $\beta_0 + \beta_1 OA + \beta_2 OP + \beta_3 (OA*OP) + \varepsilon$; where OP was operational process. If the model is significant and addition of interaction term (OA*OP) causes contribution of independent variable and the moderator to be insignificant then then moderation is said to have occurred. In-order to determine the joint effect of organizational agility, product development processes, operational process on performance of chartered universities, that is objective four, the following linear regression model was carried out PUB = $\beta_0 + \beta_1 OA + \beta_2 PD + \beta_3 OP + \varepsilon$ and PIV = $\beta_0 + \beta_1 OA + \beta_2 PD + \beta_3 OP + \varepsilon$. Table 3.2 below shows summary of objectives, hypotheses, models, analysis and interpretations that were done.

Table 3. 2: Summary of Objectives, Hypotheses, Models, Analyses, and Interpretations

Objectives	Hypotheses	Models	Analyses	Interpretations
Determine the relationship between organizational agility and performance of chartered universities	H_{11}: Organizational agility does not significantly affect the performance of public universities H_{12}: Organizational agility does not significantly affect the performance of private universities	(I) PUB = + β_1OA + ε (ii) PIV = β_0 + β_1OA + ε	Simple linear regression	(I) R^2 for goodness-of fit (ii) F-test for overall significance (iii) t-test for individual significance (iv) Marginal changes
Determine the intervening effect of product development processes on the relationship between organizational agility and performance of chartered universities	H_{21}: Product development processes do not significantly intervene on the relationship between agility and the performance of public universities H_{22}: Product development processes do not significantly intervene on the relationship between organizational agility and the performance of private universities	(I) PUB = β_0 + β_1OA + ε (ii) PIV = β_0 + β_1OA + ε (iii) PD = β_0 +β_1OA + ε (iv) PUB = β_0 +β_1OA + β_2PD+ ε (v) PIV = β_0 +β_1OA + β_2PD + ε	Path analysis of Multiple linear regression (Baron and Kenny's, 1986 test)	(I) R^2 for goodness-of fit (ii) F-test for overall significance (iii) t-test for individual significance (iv) Marginal changes (Compare step one and four)

Determine moderating effect of operational processes on the relationship between organizational agility and the performance of chartered universities	H_{31}: Operational processes do not significantly moderate the relationship between organizational agility and the performance of public universities H_{32}: Operational processes do not significantly moderate the relationship between organizational agility and the performance of private universities	(I) $PUB = \beta_0 + \beta_1 OA + \beta_2 OP + \beta_3 (OA*OP) + \varepsilon$ (ii) $PIV = \beta_0 + \beta_1 OA + \beta_2 OP + \beta_3 (OA*OP) + \varepsilon$	Hierarchical linear regression Analysis	(I) R^2 for goodness-of fit (ii) F-test for overall significance (iii) t-test for individual significance (iv) Marginal changes Assess effect of Interaction term OA*OP
Determine the joint effect of organizational agility, product development processes and operational processes on the performance of chartered universities	H_{41}: Organizational agility, product development processes and operational processes do not jointly significantly affect the performance of public universities H_{42}: Organizational agility, product development processes and operational processes do not jointly significantly affect the performance of private universities	(I)$PUB = \beta_0 + \beta_1 OA + \beta_2 PD + \beta_3 OP + \varepsilon$ (ii)$PIV = \beta_0 + \beta_1 OA + \beta_2 PD + \beta_3 OP + \varepsilon$	Hierarchical Regression Analysis	(**I**) R^2 for goodness-of fit (ii) F-test for overall significance (iii) t-test for individual significance (iv) Marginal changes

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

The broad objective of the study was to establish the influence of organizational agility, product development processes and operational processes on performance of chartered universities in Kenya. This chapter, therefore, presents data analysis, findings and discussions that began with section one of the questionnaire that operationalized ideas embodied in the variables and provided response rate as well as demographics of the universities. Data reliability was tested by use of Cronbach's alpha and confirmatory factor analysis. Data validity was assessed through literature review, various stages of proposal presentation and also by use of confirmatory factor analysis.

Organizational agility, product development processes and performance had several constructs operationalized as indicated by items in the questionnaire. Confirmatory factor analysis was conducted to extract latent factors of variable constructs that showed the specific factors associated with public and private universities. Descriptive statistics such as frequencies, percentages, means, one sample t-test and independent samples t-test were used to describe the data. Diagnostic tests were conducted to determine the suitability of data for further analysis, whereas simple and multiple linear regressions were conducted to predict direct and joint relationships of independent and dependent variable, intervening effect was assessed using path analysis and moderation hierarchical regression analysis(Baron & Kenny, 1986).

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4.2 Response Rate

The unit of analysis included all the 48 chartered universities in Kenya and respondents were 271 Deans of Faculties/Schools. This number was obtained from the websites of the chartered universities in 2016 and was verified during data collection (see Appendix III). A total of 271 questionnaires were sent out, 192 returned and the data was tabulated in Table 4.1 below.

Table 4. 1: Response Rate by the Respondents

Deans	Dispatched	Returned	Not Returned	Percent Returned
Public	205	148	57	72.7
Private	66	44	22	65.15
Total	271	192	79	70.8

Source: Field data 2019

From Table 4.1 above, 205 questionnaires were dispatched to public and 66 to private universities. A total of 148 were responded to from public universities and 44 from private, while 79 were not. Overall response rate was 70.8 percent which compared favourably with response rate published in three top international journals studied by Baruch (1999). The findings showed that on average, response rate by top managers was 55.6 percent. Morton, Robinson and Carr (2012) also conducted a similar study that compared response rates achieved in researches over a period of time and found that it had declined from 90 to 70 percent. The findings of these studies indicated that it was increasingly becoming difficult collect primary data from target population in the area of management as a result of work pressure on managers. The findings led to the conclusion that the response rate attained in the study was adequate for deductions on what the objectives set out to achieve.

The response rate was then analysed per university and recorded as shown on Table 4.2 (Appendix II).

Table 4. 2: Response Rate per University

Chartered Universities	Targeted Frequency	Returned	Not Returned	Percent
Public	30	28	2	93.3
Private	18	13	5	72.2
Total	48	41	7	85.4

Source: Field data 2019

The above Table 4.2 indicates that filled questionnaires were received from 28 public universities which corresponded to 148 Faculties/Schools and 13 from private universities corresponding to 44 Faculties/Schools. Two public and five private universities did not respond to the request for data collection and therefore, no questionnaires were sent to them. In total, 41 universities participated in the study and seven did not. Two public and one private university declined to grant permission for data collection. Seven of the 18, private universities were relatively small with no clear administrative structures and they required permission to be granted by the vice chancellors who were not available because of their busy schedules. Generally, response rate attained in public universities was 93.3 percent, private 72.2 percent and overall 85.4 percent.

4.3 Demographics of the Respondents

Section one of the questionnaire aimed at obtaining general information about the universities related to the objective of the study and contained the following statements whether the university is private or public; the ownership of the private universities; the unit that a dean headed; number of departments per faculty; the disciplines housed in the

faculty; the levels of the academic programmes offered by faculty; the fastest growing academic programme and the academic programme that had the highest number of students. The other items focused on affiliation of private universities to religious institution and Table 4.3 below shows the distribution of the responses.

Table 4. 3: Ownership of Universities

Chartered University	Locally	Foreign	Locally and Foreign	Specific Owner		
				Government	Individual	Group
Public	28	0	0	28	0	0
Private	11	2	3	0	3	10

Source: Field data 2019

All the 28 public universities that participated in the study were owned by the government, three private universities belonged to individuals and 10 to groups of people or institutions. Eleven private universities had local ownership, two foreign while three had both. Regarding the ownership of public universities, government owned them all because it has the responsibility of providing education to the citizens and also the resources that were used to develop them were obtained from the citizens(Wandga,1997). It was noticed that individuals owned the least number of universities probably because of heavy investment, strict requirement for establishment and competition. There were nine universities associated with faith based ownership while four had no relationship with religious institutions.

It was concluded that religious groups and institutions owned majority of private universities in Kenya. The finding was supported by an earlier study conducted by Abagi, Nzomo and Otieno (2005) which found that out that, of the 14 chartered private

universities that existed by then, only one was not owned by church or church related groups.

The next statement in the questionnaire aimed at identifying the areas of study found in a university. The term disciplines was used to refer to a body of knowledge that is taught to impart knowledge that create a pool of professionals in a given area of specialization such as business, education, agriculture and many more. Table 4.4 below shows the type and distribution of academic disciplines that were found in the universities and it indicates that 16.7 percent of the programmes in public universities were associated with business studies, followed by physical sciences at 11.1 percent, agriculture 9.7 percent, education and social sciences 7.6 percent each, computer and information technology 6.9 percent while the rest had frequencies below 6 percent.

The same trend was observed in private universities where business studies led with 18.8 percent, followed by social science and physical sciences at 10.5 percent each, law studies 8.3 percent, information technology 6.3 percent and the rest had frequencies of four and below. As Table 4.4 above indicates, public universities had 144 disciplines against 48 in private and physical science related courses such as engineering, dental surgery, veterinary medicine, architecture were predominant while private universities had more theological studies.

Dominance of theological programmes in private universities was explained by Abagi; et al. (2005) who observed that, churches established the earliest tertiary theological

colleges in Kenya which later became chartered private universities. This might have explained the prominence given to theological studies by these universities. There is also a possibility that theological studies in public universities were under other faculties while in private they existed as a standalone faculty.

Table 4. 4: Distribution of Disciplines in Chartered Universities in Kenya

	Public Universities		Private Universities	
Discipline of Study	Frequency	Percent	Frequency	Percent
Business	24	16.7	9	18.8
Physical Science	16	11.1	5	10.5
Economics	2	1.4	-	-
Education	11	7.6	5	10.5
Social Science	11	7.6	7	
Medicine	4	2.8	2	4.1
Agriculture	14	9.7	-	-
Public Health	6	4.2	1	2.1
Environment and Natural Resources	9	6.3	1	2.1
Nursing	2	6.3	1	2.1
Engineering	9	-	-	-
Electrical Engineering	1	.7	-	-
Computer and Information Technology	10	6.9	3	6.3
Communication and Mass Media Studies	4	2.8	-	-
Pharmacy	1	.7	1	2.1
Dental Studies	1	.7	-	-
population Studies	1	.7	-	-
Diplomacy and International Studies	1	.7	-	-
Veterinary Studies	1	.7	-	-
Law Studies	2	1.4	4	8.3
Arts and Humanities	2	1.4	1	2.1
Architecture and Built Environment	4	2.8	-	-
Tourism and Hospitality Studies	4	2.8	1	2.1
Water Resource Management	1	.7	-	-
Cooperative Management	1	.7	-	-
Mining Engineering Studies	2	1.4	-	-
Theological Studies	-	-	5	
All programmes are together	-		1	2.1
Total	144	100.0	48	100.0

Source: Field data 2019

Public universities had a majority of physical science, engineering and medical schools because of the resources required to introduce and maintain them. This finding concurred

with a report by Chacha (2004) which explained that private universities had limited programmes in ICT and physical sciences because of low financing capability of the owners.

Business studies formed the bulk of the faculties in all the universities possibly because of the following reasons. Diverse options of specialization, less initial investment in starting the programmes, relatively lower entry grades compared to those of ICT and physical sciences as well as a high demand for professionals in business administration and management. It is also possible that students studied business administration and management with the aim of opting for business ventures as opposed to taking up formal employment that was becoming rare to find in Kenya and did not pay as much compared to successful businesses. The finding concurred with Mukhwana et al. (2016) that who observed that about 75 percent of programmes in Kenya universities are business related.

Another statement in the questionnaire sought to find out the clusters and levels of programmes per discipline in the universities. The terms, levels of programmes meant that a university offered a certain area of study such as business with progressive stages of advancement such as diploma, degree, masters and doctor of philosophy. Responses to the statement were tabulated as shown in Table 4.5 below. The data indicates the number of disciplines that offered a combination of undergraduate degree, masters and PhD in the same area of study topped the list in public universities with 19.4 percent, while certificate, diploma, undergraduate degree, masters and PhD cluster followed at 16.7 percent. Diploma, undergraduate degree, masters and PhD cluster compared favourably at

14.6 percent. Certificate, diploma, undergraduate degree, masters and PhD combination was the highest cluster in private universities at 37.5 percent and undergraduate degree level was second at 16.7 percent.

Table 4. 5:Level of Programmes Offered by a Faculty/School

Cluster of Programmes	Public		Private		Both	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Certificate, diploma, undergraduate, master, PhD	24	16.7	18	37.5	42	21.9
Certificate, diploma, undergraduate, master, PhD	15	10.4	3	6.3	18	9.4
Certificate, diploma, undergraduate	3	2.1	4	8.3	7	3.6
Undergraduate, master	18	12.5	1	2.1	19	9.9
Diploma, undergraduate	5	3.5	1	2.1	6	3.1
Masters	2	1.4	-	-	2	1.0
Diploma, undergraduate, master, PhD	21	14.6	7	14.6	28	14.6
Undergraduate	20	13.9	8	16.7	28	14.6
Undergraduate, master, PhD	28	19.4	4	8.3	32	16.7
Diploma, undergraduate, master	8	5.6	2	4.2	10	5.2
Total	144	100.0	48	100.0	48	100.0

Source: Field data 2019

Further information from Table 4.5 above indicates that diploma, undergraduate degree, masters and PhD cluster also followed at 14.6 percent. Both public and private universities had certificate, diploma, undergraduate degree, masters and PhD cluster as the most popular combination at 21.9 percent and diploma, undergraduate degree, masters and PhD cluster followed with 16.7 percent. The observed trend of universities offering certificate and diploma programmes, might have resulted from the need to grow the numbers from one level to another as a result of competition that originated from rapid expansion of university education between 2007 and 2016 (Wanzala, 2018). The

other possible explanation could have been a desire for universities to specialize in certain fields of study. For example, some universities were known for specialties such as education, technology, agriculture, medicine, business, law among others that distinguished them as experts in a particular field of knowledge. The high level of investment might also have been a hindrance to possessing a certain area of study by some universities especially the private ones (Chacha, 2004).

Regarding the fastest growing programme, the information obtained is indicated on Table 4.6 below. Programmes were divided according to levels of advancement starting with certificate as the lowest and PhD as the highest.

Table 4. 6:Fastest Growing Programmes

Programme	Public		Private		Both	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Certificate	2	1.4	-	-	2	1.0
Diploma	19	13.2	13	27.1	32	16.7
Undergraduate	113	78.5	24	50.0	137	71.4
Masters	9	6.3	6	12.5	15	7.8
PhD	1	.7	5	10.4	6	3.1
Total	144	100.0	48	100.0	192	100.0

Source: Field data 2019

Data on table 4.6 above shows that the fastest growing programme was undergraduate degree at 78.5 percent in public universities and the same was observed in private ones at 50 percent. This was followed by diploma level at 13.2 percent in public and 27.1 percent in private. Masters degree level was growing faster at 12.5 percent in private universities compared to 9.0 percent in public universities and PhD at 5.0 percent compared to 1.0 percent in public universities. Diploma level was also growing twice as fast in private universities compared to public.

The growth of undergraduate degree programme was probably caused by the growing numbers of students transiting from secondary schools to university. Students joining public universities were sponsored to a great extent by the government which also did the placement through the joint admissions board. As documented in the previous sections, the higher number of undergraduate students in public universities was attributed to a wider range of disciplines offered.

4.4 Reliability and Validity Tests

Both validity and reliability tests are vital determinants of the extent to which a research instrument is accurate in measuring the intended objectives of a study and as such they were performed to verify the suitability of the statements in the questionnaire used to collect data. Cronbach's alpha test was conducted to determine the level of reliability of the statements. Where low values were encountered, Confirmatory Factor Analysis (CFA) was performed to determine whether the statements measuring a certain variable could be retained or excluded. This line of thought was supported by Field (2006) and Tavakol and Dennick (2011) who argued that low Cronbach's alpha values do not necessarily imply that an instrument is unreliable. Such values can be assessed further before items describing a certain construct are declared as unreliable. Low Cronbach's alpha values can be attributed to a small number of items in an instrument or presence of reversal questions and statements.

Cronbach's alpha test was conducted and results presented indicated on Table 4.7 below. From the data on the table, Cronbach's alpha values were 0.854 for organizational agility,

0.341 product development processes, 0.847 operational processes, 0.863 performance and 0.712 for trends in performance.

Table 4. 7: Cronbach's Alpha Values

Variable	Cronbach's Alpha	Number of Items	Interpretation
Organizational agility	0.853	39	Reliable
Government drivers of organizational agility	0.760	12	Reliable
Market drivers of organizational agility	0.604	6	Reliable
Enablers of organizational agility	0.774	12	Reliable
Response to drivers of agility	0.641	9	Reliable
Product development	0.341	14	Not reliable
Product development by stage-gate method	0.379	9	Not reliable
Product development by scrum method	0.665	5	Reliable
Operational process	0.847	18	Reliable
Performance	0.863	18	Reliable
Trends in performance	0.712	13	Reliable

Source: Field data 2019

Conclusion drawn from the data on Table 4.7 above was that, all the items that measured organizational agility, operational processes, performance and trends in performance were reliable. However, the value for product development processes was low which was attributed to the small number of items and some reversal statements that were used to describe two different methods of product development. As indicated stage-gate method had a value of 0.379, scrum 0.665 and product development 0.341 implying that the items were unreliable.

Tavakol & Dennick (2011) explained that Cronbach's alpha value can be under-reported if assumptions of the tan equivalent model on which the test is based are violated. This model assumes that the Cronbach's alpha value will be high if the items being measured test the same trait and the number of items is large. In this study, the attributes of methods of product development processes were not significantly different and the number of items used for measurement was 14. This violated assumptions of tan equivalent model

for stage-gate method. The low value may also have been caused by some reversal statements that were used to identify the methods of product development. Stage–gate method is characterized by iterations while scrum is action oriented but during operations, a clear cut boundary of the activities in a process cannot be achieved (Cooper, 2016). Therefore iterations and actions in a process can be described by activities and tasks that are opposite of each other.

The next step was to ascertain whether the items that measured product development processes were reliable enough to be included in the analysis. The CFA was used to identify the extent to which the items explained similar underlying constructs which had already been identified in literature (Hair et al., 2014). Table 4.8 below shows the output of Kaiser-Meyer-Olkin (KMO) and Barlett's test, carried out to assess if factor analysis could be conducted on data (Field, 2009).

Table 4. 8: Kaiser-Meyer-Olkin and Barlett's Test for Product Development

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.709
Bartlett's Test of Sphericity	Approx. Chi-Square df Sig.	835.519 91 0.000

Source: Field data 2019

The KMO value was 0.709 and Bartlett's test of sphericity had an approximate Chi-Square value of 835.519 with 91 degrees of freedom and p-value of 0.001. The p-value recorded was less than the significance level of 0.05 hence the results were statistically significant, implying that further tests was valid. The CFA test was carried out and factor item total variation of product development processes presented on Table 4.9 below.

Table 4. 9: Item -Total Variation for Product Development

Product Development Statements	Extraction
Programme development is initiated by top management	0.672
Programme development goes through various stages of approval before implementation	0.520
There is a lot of lobbying by faculty before a new programme is approved	0.748
Other faculties were given priority in programme development	0.747
There is restriction by management when faculty wants to initiate a new programme	0.693
Some programmes are stopped before going through all stages of approval	0.610
A programme takes 1-3 years before launch	0.497
There is a department purely for programme development	0.680
A programme takes 1-3 years before launch	0.686
Programmes are initiated by the faculty members after independent market research	0.655
Programme development takes a short time to be approved	0.535
Programme development is done by self-organized teams with frequent consultation with management	0.572
Self-organized teams are in constant consultation with industry when developing programmes	0.710
Programme takes a short time (6 months) to launch	0.639

Source: Field data 2019

Data on Table 4.9 above ranged between 0.748 and 0.535 where 13 of the 14 items had correlations above 0.5.and they were considered as reliable for measuring product development processes variable.

Although validity has various dimensions that apply to different research instruments, face and content validity criteria must be met for any instrument in a study (Mooi et. al., 2018). In this study, face validity was verified through various stages of proposal presentation in the Faculty of Business and Management sciences of University of Nairobi. Scholars drawn from different fields of study in business administration and management science provided in-depth critique and invaluable suggestions that improved the research instrument. The questionnaire was also constructed after thorough review of relevant literature and with guidance from scholars in the field of management science, which ensured content validity. In addition, data was subjected to CFA as indicated on

Table 4.9 above in order that identified the extent to which clusters of items were correlated. Testing of validity by use of this method is supported by Field (2009) who explained that a cluster of items that represent a construct can be isolated by use of confirmatory factor. Validity was therefore confirmed.

4.5 Factors Determining Organizational Agility, Product Development Processes, Operational Processes and Performance of Chartered Universities

It was necessary to ascertain specific aspects of organizational agility that applied to universities as a whole and as sectors because literature is clear that drivers of agility cannot be generalized for industry or sector (Wendler, 2016). The drivers of agility determine how an organization responds hence aspects product development processes, operational processes and performance are related. To achieve this, KMO and Barlett's test of sphericity was done to assess whether there was correlation among the variables. The p-value was used to examine significance – if p-value was less than or equal to 0.05 (level of significance) then variables were correlated, otherwise they were not.

4.5.1 Factors Determining Organizational Agility of Chartered Universities

Twindle & Nichols (2013) as well as Bogt & Scapens, (2009) indicated that universities in various environments were affected by different agility factors that needed to be taken into consideration for purpose of achieving better performance. As noted, public and private universities in Kenya had different ownership with diverse missions hence, organizational agility data was subjected to CFA to establish specific factors that affected each sector**.** The analysis began with KMO and Barlett's test on items of organizational

agility to identify if further test could be done by CFA and results presented as shown on Table 4.10 below.

Table 4. 10: Kaiser-Meyer-Olkin and Barlett's Test for Organizational Agility of Public Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.680
Bartlett's Test of Sphericity	Approx. Chi-Square	2597.933
	df	741
	Sig.	0.000

Source: Field data 2019

The KMO and Barlett's tests results for organizational agility of 0.680, 2597.933 respectively and p-value of 0.001 are indicated in table 4.10 above. Since p-value was less than 0.05, further analysis was carried out and the results obtained presented as shown on Table 4.11 below. These commonality results were then assessed to find out if the items that tested organizational agility were related.

Table 4. 11: Item-Total Correlation for Organizational Agility Items for Public Universities

Statements	Extraction
Whether decreased government funding has caused any change in operations in the faculty	.610
Whether differential degree funding by the government has caused changes in operations of the faculty	.594
Whether Introduction of module 11 (parallel programmes) caused changes in faculty operations	.711
Change of CUE guidelines caused restructuring	.613
Delinked admission to bed capacity caused congestion	.624
Promotion based on CUE policy caused shortage of talent in administration	.690
Placement of students in all universities decreased numbers	.695
Closure of campuses decreased numbers	.612
Regulation by CUE decreased rate of programme introduction	.636
Phasing out pre-university decreased enrolment	.697
Decreased unit exceptions for diploma holders has decreased enrolment	.736
Number of students qualifying for university increased since fees subsidy at secondary school	.535
Flexible modes of learning increased enrolment	.634
Low degree costing in other universities caused lowering of fees	.692
Some degree programmes were phased out due lack of students	.730
Faculty introduced new programmes due to demand	.735
Change in technology led to introduction of new programmes	.523

Nature of students admitted made university to be proactive in operations	.664
University has enough facilities	.696
Administrative processes are supported by best technology	.547
University has enough competent faculty staff	.742
University has supportive welfare departments	.649
University is well stocked with learning resources	.607
Recreation facilities are adequate for staff and students	.668
There is a wide range of programmes or students to choose from	.637
University has adequate equipped laboratories	.791
University has ultra-modern virtual campus	.695
University has collaborated widely with industry	.568
Acceptance of exemptions and credit transfers contributed to high enrolment	.647
Flexible modes of learning contributed to high enrolment	.696
University opened campuses when enrolment increased before 2017	.694
University added modes of learning when enrolment increased before 2017	.737
University expanded facilities when enrolment increased	.627
University increased diploma and certificate causes from 2017	.552
University laid off staff with decrease of module 11 students	.769
Programmes have been phased out after decrease in demand	.755
There is heavy promotion of programmes by the university	.560
University introduced new programmes	.634
University has diversified sources of income after decrease in student enrolment	.624
Extraction Method: Principal Component Analysis.	

Source: Field data 2019

Organizational agility was measured by a total of 39 items and all of them had correlation values of between 0.535 and 0.791 as shown on Table 4.11 above. It was then concluded that the items were adequately correlated to describe the variable. Next, Principal Component Analysis (PCA) was performed in order to identify the variance that was explained by the items. Factors that best depicted the variable were extracted and results presented as shown on Table 4.12 below.

Table 4. 12: Total Variance Explained for Organizational Agility of Public Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	6.030	15.462	15.462	6.030	15.462	15.462	5.009	12.842	12.842
2	5.059	12.971	28.433	5.059	12.971	28.433	3.762	9.647	22.489
3	2.862	7.338	35.771	2.862	7.338	35.771	3.220	8.257	30.746

4	2.802	7.185	42.956	2.802	7.185	42.956	2.541	6.514	37.261
5	2.123	5.444	48.400	2.123	5.444	48.400	2.286	5.862	43.123
6	1.648	4.226	52.625	1.648	4.226	52.625	2.031	5.208	48.331
7	1.456	3.734	56.359	1.456	3.734	56.359	1.880	4.819	53.150
8	1.344	3.446	59.805	1.344	3.446	59.805	1.778	4.559	57.709
9	1.193	3.058	62.863	1.193	3.058	62.863	1.726	4.427	62.136
10	1.110	2.845	65.708	1.110	2.845	65.708	1.393	3.572	65.708
11	.986	2.527	68.235						
12	.898	2.303	70.538						
13	.871	2.232	72.771						
14	.835	2.140	74.911						
15	.758	1.944	76.855						
16	.710	1.822	78.676						
17	.696	1.786	80.462						
18	.627	1.608	82.070						
19	.606	1.553	83.623						
20	.588	1.509	85.131						
21	.543	1.392	86.523						
22	.536	1.373	87.897						
23	.469	1.203	89.100						
24	.445	1.140	90.240						
25	.435	1.116	91.355						
26	.397	1.018	92.373						
27	.374	.960	93.332						
28	.338	.868	94.200						
29	.321	.824	95.024						
30	.316	.811	95.835						
31	.275	.705	96.540						
32	.264	.677	97.216						
33	.220	.564	97.780						
34	.198	.507	98.287						
35	.178	.456	98.743						
36	.147	.377	99.120						
37	.132	.339	99.459						
38	.131	.335	99.794						
39	.080	.206	100.000						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

As shown on Table 4.12 above, 10 of the factors had eigenvalues greater than 1.00 and explained almost 66 percent of the variance. The values after factor 10 accounted for about one percent of individual contribution but overall, they accounted for 34 percent of the variable. The items therefore, had an adequate degree of validity because they explained 66 percent of organizational agility. In addition, data was subjected to varimax rotation with Kaiser normalization to enable better interpretation of the output. Higher

values were obtained after controlling for the smaller ones less than 0.400 and the results presented as shown on Table 4.13 below.

Table 4. 13: Rotated Component Matrix for Organization Agility in Public Universities

	Component					
	1	2	3	4	5	6
University has supportive welfare departments	.800					
University is well stocked with learning resources	.789					
Administrative processes are supported by best technology	.776					
University added modes of learning when enrolment increased before 2017	.765					
Recreation facilities are adequate for staff and students	.749					
University has enough facilities	.691					
University expanded facilities when enrolment increased	.634					
University has collaborated widely with industry	.427					
University has enough competent faculty staff		.759				
University increased diploma and certificate causes from 2017		.715				
There is heavy promotion of programmes by the university		.665				
University has ultra-modern virtual campus		.580				
Flexible mode of learning contributed to high enrolment		.513				
Flexible modes of learning increased enrolment		.509				
Nature of students admitted made university to be proactive in operations			.746			
University has adequate equipped laboratories			.719			
University opened campuses when enrolment increased before 2017			.569			
Change in technology led to introduction of new programmes			.524			.464
University has diversified sources of income after decrease in student enrolment			.503	.475		
Some degree programmes were phased out due lack of students			.468			
Phasing out pre-university decreased enrolment				.817		
Closure of campuses decreased numbers				.686		
Promotion of staff based on CUE policy caused shortage of talent in administration				.447		
Decreased unit exceptions for diploma holders has decreased enrolment					.745	

Change of CUE guidelines caused restructuring					-.671	
Low degree costing in other universities caused lowering of fees					.635	
Regulation by CUE decreased rate of programme introduction						.724
Acceptance of exemptions and credit transfers contributed to high enrolment						.540
University laid off staff with decrease of module 11 students						.445
Faculty introduced new programmes due to demand						
Whether decreased government funding has caused any Change in operations in the faculty						
Whether Introduction of module 11 (parallel programmes) caused changes in faculty operations						
Delinked admission to bed capacity caused congestion						
Whether differential degree funding by the government has caused changes in operations of the faculty						
Number of students qualifying for university increased since fees subsidy at secondary school		.434				
There is a wide range of programmes or students to choose from						
Placement of students in all universities decreased numbers		.427				
Programmes have been phased out after decrease in demand						
University introduced new programmes						

Source: Field data 2019

Organizational agility in public chartered universities was explained by six factor extraction shown in table 4.13 above. The constructs that loaded onto component one included university has supportive welfare departments; university is well stocked with learning resources; administrative processes are supported by best technology; university added modes of learning when enrolment increased before 2017; recreation facilities are adequate for staff and students; university has enough facilities; university expanded facilities when enrolment increased, and university has collaborated widely with industry.

The cluster of the eight statements referred to capabilities of organizational agility in chartered public universities. Therefore, factors that enabled chartered public universities to react to drivers of agility were physical facilities, different modes of learning, welfare support and collaboration with the industry.

Items that loaded to the second component were university has enough competent faculty staff; university increased diploma and certificate courses from 2017; there is heavy promotion of programmes by the university; university has ultra-modern virtual campus; flexible mode of learning contributed to high enrolment; number of students qualifying for university increased since fees subsidy at secondary school and placement of students in all universities decreased numbers. This component grouped together drivers of organizational agility that led public universities to take action when change occurred.

The six items that loaded onto the third factor were nature of students admitted made university to be proactive in operations; university has adequate equipped laboratories; university opened campuses when enrolment increased before 2017; change in technology led to introduction of new programmes; university has diversified sources of income after decrease in student enrolment and some degree programmes were phased out due lack of students. The loadings indicated the responses of public universities to drivers of agility. It was then concluded that public universities reacted to drivers of agility by being proactive to nature of students that were admitted, increased laboratory equipment, added more campuses before 2017, introduced new academic programmes,

diversified sources of income and phased out some of the programmes that did not attract students.

Component four consisted of the following three items phasing out pre-university decreased enrolment; closure of campuses decreased numbers and promotion of staff based on CUE policy caused shortage of talent in administration. This component referred to drivers of agility that were caused by CUE in the process of regulating university education. Universities were required to phase out pre-university programmes, close campuses that did not meet quality standards and promote academic staff based on regulator guidelines (CUE, 2014)

The fifth factor comprised of decreased unit exceptions for diploma holders has decreased enrolment and low degree costing in other universities caused lowering of fees. Change of CUE guidelines caused restructuring, was part of the cluster but it had a negative loading because it referred to drivers of agility that were associated with CUE policies that led to decrease in revenue.

The items that made the sixth component included regulation by CUE decreased rate of programme introduction; acceptance of exemptions and credit transfers contributed to high enrolment and university laid off staff with decrease of module 11 students. This cluster of items referred to drivers of agility that caused variation in number of students in public universities.

The factors that determined organizational agility of chattered public universities were physical facilities, technology, government policies and regulation, variation of student enrolment and introduction or phasing out of academic programmes. Public universities experienced both negative and positive drivers of agility which came from government, market and student expectations. These caused them to respond by acquiring capabilities that enabled them to continue with operations.

In conclusion, through PCA, the extraction supported drivers, enablers/capabilities and responses of agility dimensions similar to Shariffi and Zhang (1999) model that suggested that these three were components of agility. The same opinions had been suggested by other scholars such as Goldman & Preiss (1991), Dove (1992), Goldman et al. (1995) and Gunasekaran (1998). Similar data was further analysed to determine factors that affected chartered private universities. The KMO and Barlett's tests were carried out on items of organizational agility and results presented as shown on Table 4.14 below.

Table 4. 14: Kaiser-Meyer-Olkin and Barlett's Test for Organizational Agility of Private Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.302
Bartlett's Test of Sphericity	Approx. Chi-Square	1519.240
	df	741
	Sig.	0.000

Source: Field data 2019

The KMO and Barlett's tests results for organizational agility in private universities were presented as shown on Table 4.14 above. These were 0.302, and 1519.240, respectively and the p-value of 0.001 obtained was less than 0.05 which implied that the factors

considered were valid in describing the variable. However further analysis was not carried out because the KMO value of 0.302 was low hence description of the factors of organizational agility could have been meaningless in the context of the private universities. Kaiser (1974) explained that a factor index below 0.500 is unacceptable for purpose of interpretation of results in factor analysis. In conclusion, there was a possibility that organizational agility did not have significant on affect private universities.

4.5.2 Factors Determining Product Development Processes in Chartered Universities

Product development processes variable was measured by 14 statements and a further analysis of factors was examined by use of CFA. The first step was to subject the data to KMO and Bartlett's tests and the results for public universities were presented as shown on Table 4.15 below.

Table 4. 15: Kaiser-Meyer-Oklin and Bartlett's Test for Product Development of Public Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.743
Bartlett's Test of Sphericity	Approx. Chi-Square	800.551
	df	91
	Sig.	.000

Source: Field data 2019

The KMO measure of sampling adequacy had a value of 0.743 and p-value of 0.001 at significance level of 0.05 which indicated that further tests by factor analysis was valid. Correlation test was then conducted to identify the factors that determined product

development processes in chartered public universities and results presented as shown in Table 4.16 below.

Table 4. 16: Item-Total Variation of Product Development of Public Universities

Commonality	Extraction
Programme development is initiated by top management	.629
Programme development goes through various stages of approval before implementation	.568
There is a lot of lobbying by faculty before a new programme is approved	.513
Other faculties were given priority in programme development	.774
There is restriction by management when faculty wants to initiate a new programme	.692
Some programmes are stopped before going through all stages of approval	.571
A programme takes 1-3 years before launch	.543
There is a department purely for programme development	.577
A programme takes 1-3 years before launch	.745
Programmes are initiated by the faculty members after independent market research	.621
Programme development takes a short time to be approved	.510
Programme development is done by self-organized teams with frequent consultation with management	.514
Self-organized teams are in constant consultation with industry when developing programmes	.712
Programme takes a short time (6 months) to launch	.496

Source: Field data 2019

Table 4.16 above shows that all of 14 items had correlation values above 0.400 which had been given as the control value and therefore, all the items that measured product development processes were closely correlated. A component principal analysis extraction was done to identify the number of items of product development processes that best described the construct and the results are shown on Table 4.17 below.

Table 4. 17: Total Variance Explained for Product Development of Public Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	3.782	27.015	27.015	3.782	27.015	27.015	3.092	22.084	22.084
2	2.710	19.356	46.371	2.710	19.356	46.371	2.987	21.332	43.416
3	1.972	14.084	60.455	1.972	14.084	60.455	2.385	17.039	60.455
4	.995	7.105	67.559						
5	.878	6.273	73.832						
6	.705	5.035	78.868						
7	.564	4.026	82.893						
8	.475	3.395	86.288						
9	.440	3.141	89.429						
10	.391	2.796	92.225						
11	.356	2.545	94.770						
12	.261	1.866	96.636						
13	.237	1.690	98.326						
14	.234	1.674	100.00						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

All of the 14 factors shown in Table 4.17 above accounted for total variance in product development processes and three factors with eigen value greater than 1.000 accounted for about 60 percent. The first variable explained about 27 percent, the second 19 percent, the third 14 percent and all the others had eigen values of less than 1.000 which explained the other 40 percent. Results were rotated in order to isolate the groups of statements that best explained product development processes and the results presented in Table 4.18 below.

Table 4. 18: Rotated Component Matrix for Product Development of Public Universities

Rotated Component Matrix[a]	Component		
	1	2	3
A programme takes 1-3 years before launch	.863		
Some programmes are stopped before going through all stages of approval	.740		
Programme development is initiated by top management	.736		
Self-organized teams are in constant consultation with industry when developing programmes	-.649		
Programme development is done by self-organized teams with frequent consultation with management	.544	-.479	
Programme development takes a short time to be approved		.854	
Programmes are initiated by the faculty members after independent market research		.819	
There is a department purely for programme development		.714	
There is restriction by management when faculty wants to initiate a new programme		-.571	.474
Programme takes a short time (6 months) to launch			.714
Programme development goes through various stages of approval before implementation			.703
There is a lot of lobbying by faculty before a new programme is approved	-.451		.636
Other faculties were given priority in programme development	-.402		.580
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 6 iterations.			

Source: Field data 2019

The PCA was used for product development processes with varimax rotation and Kaiser normalization where four component extractions occurred with the following statements loading onto factor one. Programme takes 1 to 3 years before launch; some programmes are stopped before going through all stages of approval; programme development is initiated by top management and programme development is done by self-organized teams with frequent consultation with management. The statement, self-organized teams are in constant consultation with industry when developing programmes, had a negative value because it described an aspect of scrum method while the other statements referred to stage-gate method.

The grouping of these statements was a characteristic of programme development by stage-gate method which implied that public universities used it when developing curriculum and other non-degree programmes. The factors that determined the processes of product development by stage-gate method were control by university management, compliance to government regulation and other factors that caused delay in developing and launching the programme. There was also a possibility that same factors affected relationship between teams and management.

Programme development by stage-gate method is characterised by delays in various stages of development where each stage requires approval before proceeding to the next. This concurred with (Cooper, 1990a) who explained that iterations and delays are among the characteristics of stage-gate method of product development processes that are essential. Literature review indicated that stage-gate method is not suitable for agility because it does not permit an organization to introduce a product into the market fast enough when there is an opportunity. However, the method is necessary for quality checks and policy requirements but can be modified in the period of agility.

The second factor had the following cluster of items programme development takes a short time to be approved; programmes are initiated by the faculty members after independent market research and there is a department purely for programme development. The item, there is restriction by management when faculty wants to initiate a new programme had a negative value. This cluster of statements indicated that public universities also used scrum method of product development processes, but management was still in control. Scrum method took into account user's requests, time pressure,

competition, quality, vision and resources that were available in the firm. These were necessary to deliver a product that responded to agility (Takeuchi & Nonaka, 1995). Therefore, public universities took into account agility when developing programmes.

The third factor had a loading of the following items there is restriction by management when faculty wants to initiate a new programme; programme takes a short time (6 months) to launch; programme development goes through various stages of approval before implementation; there is a lot of lobbying by faculty before a new programme is approved and other faculties were given priority in programme development. This cluster of items indicated processes that products went through during development in public universities. Therefore, factors that determined the processes were restriction by management when faculties wanted to start a programme, stages of approval, preference of programmes developed and the period within which the product was supposed to be introduced.

The overall pattern of loading of factors led to the conclusion that product development processes in public universities used a hybrid of stage-gate and scrum methods. Management had the overall control of processes which was necessary for compliance with policy, regulation and standards. A hybrid method put into account iterations and speed that were required in developing and introducing a product to the market that guaranteed some level of competitive advantage. This concurred with opinions of Cooper (2016) which inferred that firms embraced certain aspects of agility when developing products by blending methods of product development that guaranteed better outcome.

The same process was repeated in order to determine the methods that were used in product development processes in chartered private universities. The first step was to subject the data to KMO and Bartlett's tests and the results were presented as shown on Table 4.19 below.

Table 4. 19: Kaiser-Meyer-Oklin and Bartlett's Test for Product Development for Private Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.569
Bartlett's Test of Sphericity	Approx. Chi-Square	208.686
	df	91
	Sig.	0.000

Source: Field data 2019

The KMO measure of sampling adequacy had a value of 0.569 and p-value of 0.001 at significance level of 0.05 and the results indicated that further tests by factor analysis could be carried out. Correlation test was then conducted to identify the extent to which items described product development processes in private universities and results were presented as shown on Table 4.20 below.

Table 4. 20: Item- Total Variation for Product Development for Private Universities

Statements	Extraction
Programme development is initiated by top management	.664
Programme development goes through various stages of approval before implementation	.786
There is a lot of lobbying by faculty before a new programme is approved	.792
Other faculties were given priority in programme development	.817
There is restriction by management when faculty wants to initiate a new programme	.721
Some programmes are stopped before going through all stages of approval	.477
A programme takes 1-3 years before launch	.734
There is a department purely for programme development	.538
A programme takes 1-3 years before launch	.755
Programmes are initiated by the faculty members after independent market research	.676
Programme development takes a short time to be approved	.713
Programme development is done by self-organized teams with frequent consultation with management	.750

Self-organized teams are in constant consultation with industry when developing programmes	.681
Programme takes a short time (6 months) to launch	.665

Source: Field data 2019

All of 14 items had correlation values above 0.600 except one which had a value of 0.535. The highest value was 0.792 and therefore, the items that measured product development processes had a close relationship that validated the description of product development processes in private universities. A CPA extraction was obtained as a further analysis to identify the number of items that best described the variable and the results recorded as shown on Table 4.21 below. The 14 factors that loaded accounted for total variance in product development processes. The four factors with eigen value greater than 1.000 had contributions of 14.352 percent, 11.772 percent, 11.093 percent and 8.783 respectively. The total variance explained by these factors was 69.80 percent while about 30 percent was explained by the rest. The percentage of variance that was explained by the statements was a sufficient contribution to describing product development processes in private universities.

Table 4. 21: Total Variance Explained for Product Development in Private Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	3.330	23.784	23.784	3.330	23.784	23.784	2.517	17.981	17.981
2	2.009	14.352	38.135	2.009	14.352	38.135	2.102	15.017	32.998
3	1.648	11.772	49.907	1.648	11.772	49.907	1.907	13.622	46.621
4	1.553	11.093	61.001	1.553	11.093	61.001	1.679	11.993	58.613
5	1.230	8.783	69.784	1.230	8.783	69.784	1.564	11.171	69.784
6	.818	5.844	75.628						
7	.719	5.137	80.766						
8	.676	4.831	85.597						
9	.549	3.922	89.519						
10	.532	3.800	93.318						
11	.313	2.235	95.553						

12	.248	1.774	97.327						
13	.211	1.509	98.836						
14	.163	1.164	100.000						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

Rotation of the results was then carried out in order to isolate the groups of statements that best explained product development processes and the results were presented as they appear on Table 4.22 below. The statements that loaded onto factor one were programme development is initiated by top management and self-organized teams are in constant consultation with industry when developing programmes. The statements, programme takes 1 to 3 years before launch and some programmes are stopped before going through all stages of approval had negative values which indicated that they had an inverse relationship with the other statements in the cluster. This factor indicated that product development processes in private universities involved collaboration between management and self-organized teams. As a result, any iteration occurred with full knowledge of management which accelerated the rate at which a product was introduced to the market.

Table 4. 22: Rotated Component Matrix for Product Development in Private Universities

Rotated Component Matrix[a]	Component			
	1	2	3	4
A programme takes 1-3 years before launch	-.876			
Some programmes are stopped before going through all stages of approval	-.837			
Programme development is initiated by top management	.698	.485		
Self-organized teams are in constant consultation with industry when developing programmes	.691	.466		
Programme development is done by self-organized teams with frequent consultation with management		.771		
Programme development takes a short time to be approved		.749		
Programmes are initiated by the faculty members after independent market research		.578		
There is a department purely for programme development			.795	

There is restriction by management when faculty wants to initiate a new programme			.692	
Programme takes a short time (6 months) to launch			.568	
Programme development goes through various stages of approval before implementation			.472	
There is a lot of lobbying by faculty before a new programme is approved				.783
Other faculties were given priority in programme development				.744
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 6 iterations.				

Source: Field data 2019

The second factor had the following cluster of items programme development is done by self-organized teams with frequent consultation with management; programme development takes a short time to be approved and programmes are initiated by the faculty members after independent market research. The cluster indicated that private universities used scrum approach to product development.

The third factor had a loading of the following items there is a department purely for programme development; there is restriction by management when faculty wants to initiate a new programme; programme takes a short time (6 months) to launch and programme development goes through various stages of approval before implementation. This factor implied that compliance to regulation and quick launch of the product were put into account by the management. The fourth factor consisted of the following items there is a lot of lobbying by faculty before a new programme is approved and other faculties were given priority in programme development. This factor showed that competitiveness was a factor that was considered when choosing products and the faculty to develop.

The general pattern of loading of factors indicated that curricula, programmes and development of other products in chartered private universities used scrum method. Factors that determined product development processes were control by management, time required to introduce a product to the market and collaboration between management and teams. Compliance and competitive processes were followed which implied that private universities were agile in developing and introducing products that market desired. This approach was supported by Takeuchi and Nonaka (1995) who observed that scrum method took into account user's requests, time pressure, competition, quality, vision and resources available in the firm in order to respond to an external trigger.

4.5.3 Factors Determining Operational Processes in Chartered Universities

Factors determining operational processes were also assessed in public and private universities individually. The KMO and Bartlett's tests were first conducted on 18 items that measured the variable and results obtained were presented as indicated in Table 4.23 below.

Table 4. 23: Kaiser-Meyer-Oklin and Bartlett's Test for Operational Processes for Public Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.839
Bartlett's Test of Sphericity	Approx. Chi-Square	1030.720
	df	153
	Sig.	0.000

Source: Field data 2019

The KMO measure of sampling adequacy had a value of 0.839 while Bartlett's test of sphericity had 1030.720 at p-value of 0.001 as appears on Table 4.23 above. The values

indicated a sufficient condition necessary for test of validity of the statements by CPA. A measure of correlation was then carried out and the results presented as shown in Table 4.24 below.

Table 4. 24: Item-Total Variance Explained for Operational Processes for Public Universities

Statements	Extraction
There is a documented framework that defines work culture of the university	.463
Each work process has a clearly defined input and output	.490
Each work process begins with a goal and ends with a performance indicator	.564
There is a work process catalogue listing systematic way doing work in accordance to university framework	.622
There is a work manual that defines principles, responsibilities, structures and work practices	.631
Work manuals distinguishes clearly operational and managerial processes	.619
Work guidelines distinguishes clearly how managerial and faculty processes interact	.640
Every work process is clearly described by tasks and activities in the work manuals	.546
Every work process is parametised by performance indicators	.547
New employees find work process in place	.709
New employees have to figure out how to do the work assigned	.626
Employees are empowered to improve work flow	.464
Work processes are fully automated	.648
All work processes are fully integrated by enterprise resource planning	.662
Authorized staff can access all information required to execute their jobs	.657
Work flows are student centred	.610
Students can access all their information in secure portals	.716
Students can be served efficiently through an integrated system	.650

Source: Field data 2019

Data on Table 4.24 above indicates that all 18 items had adequate correlations with the lowest value being 0.463 and highest 0.716. It was, therefore, concluded that the statements were closely related and they measured the operational processes variable adequately. After correlation of the items was confirmed, total variance explained was determined and the results were presented as indicated on Table 4.25 below. The

statements were intended to find out whether universities had work processes that served both staff and students as way of gaining competitive advantage when a rapid change occurred. All of the 18 items were extracted and each accounted for certain level of variance. Four factors explained 62 percent of the total variance while 38 percent was explained by the other items.

Table 4. 25: Total Variance Explained for Operational Processes for Public Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	5.976	33.199	33.199	5.976	33.199	33.199	4.220	23.444	23.444
2	2.060	11.442	44.640	2.060	11.442	44.640	2.498	13.880	37.324
3	1.628	9.043	53.684	1.628	9.043	53.684	2.107	11.704	49.029
4	1.202	6.676	60.360	1.202	6.676	60.360	2.040	11.331	60.360
5	.937	5.207	65.567						
6	.825	4.586	70.153						
7	.764	4.247	74.399						
8	.713	3.962	78.361						
9	.550	3.056	81.418						
10	.528	2.936	84.353						
11	.483	2.685	87.038						
12	.462	2.569	89.607						
13	.410	2.278	91.885						
14	.376	2.089	93.974						
15	.330	1.834	95.809						
16	.301	1.673	97.482						
17	.245	1.363	98.845						
18	.208	1.155	100.000						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

Further observation of Table 4.25 above shows that factor number one had the highest eigen value of 5.937 which accounted for 33 percent of the variance. Factor number three and four explained 8.7 percent and 6.2 percent of total variance respectively. The extracted clusters of items were subjected to varimax rotation for easier interpretation and the results presented as shown on Table 4.26 below. Four factors were extracted with the

highest items loading onto factor one. The items had the following factors there is a work manual that defines principles, responsibilities, structures and work practices; every work process is clearly described by tasks and activities in the work manuals; there is a work process catalogue listing systematic way of doing work in accordance to university framework; work guidelines distinguishes clearly how managerial and faculty processes interact; each work process begins with a goal and ends with a performance indicator; work manuals distinguishes clearly operational and managerial processes; every work process is parametised by performance indicators ; new employees find work process in place and employees are empowered to improve work flow. This factor indicated that formalised work structures existed in public universities.

Table 4. 26: Rotated Component Matrix of Operational Processes for Public Universities

Rotated Component Matrix[a]				
Statements	Component			
	1	2	3	4
There is a work manual that defines principles, responsibilities, structures and work practices	.732			
Every work process is clearly described by tasks and activities in the work manuals	.727			
There is a work process catalogue listing systematic way doing work in accordance to university framework	.697			
Work guidelines distinguishes clearly how managerial and faculty processes interact	.686			
Each work process begins with a goal and ends with a performance indicator	.681			
Work manuals distinguishes clearly operational and managerial processes	.628			
Every work process is parametised by performance indicators	.575			
New employees find work process in place	.567	.467		
Employees are empowered to improve work flow	.533			
Each work process has a clearly defined input and output		.797		
New employees have to figure out how to do the work assigned		.778		
Work processes are fully automated		.670		
All work processes are fully integrated by enterprise resource planning			.797	
Students can be served efficiently through an integrated system		.494	.594	

Students can access all their information in secure portals	.417		.526	
Authorized staff can access all information required to execute their jobs				.792
Work flows are student centred				.755
There is a documented framework that defines work culture of the university			.504	.552
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 6 iterations.				

Source: Field data 2019

Table 4.46 above further indicates that the following constructs loaded onto the second component each work process has a clearly defined input and output; new employees have to figure out how to do the work assigned and work processes are fully automated. This component indicated that public universities had automated their work processes.

Component three had a group of the following statements which implied that students could access information they needed electronically. All work processes are fully integrated by enterprise resource planning; students can be served efficiently through an integrated system and students can access all their information in secure portals.

The group of the items that made up component four indicated that work processes were organized in a way that served both staff and students. These items were authorized staff can access all information required to execute their jobs; work flows are student centred and there is a documented framework that defines work culture of the university.

In summary, the information that was derived from statements regarding operational processes in public universities was that certain factors were common in their operational processes. These were existence of formalised structures; clearly defined management

and faculty roles; electronic management systems such as enterprise resource planning; automation of managerial work; information technology systems; processes that served students and institutional work culture.

The same procedures were followed to identify the factors among the 18 items that best described operational processes in chartered private universities. KMO and Bartlett's tests were conducted in order to determine whether they could be subjected to factor analysis and results obtained were presented as indicated on Table 4.27 below.

Table 4. 27: Kaiser-Meyer-Oklin and Bartlett's Test for Operational Processes for Private Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.665
Bartlett's Test of Sphericity	Approx. Chi-Square	1030.720
	df	153
	Sig.	0.000

Source: Field data 2019

The KMO measure of sampling adequacy had a value of 0.665 while Bartlett's test of sphericity had 1030.720 at p-value of 0.001 as indicated on Table 4.27 above. These values showed existence of a sufficient condition for testing validity of the statements by factor analysis. A measure of correlation was carried out and the results presented as appearing on Table 4.28 below.

Table 4. 28 : Factor Loading for Operational Process Statements for Private Universities

Statements	Extraction
There is a documented framework that defines work culture of the university	.690
Each work process has a clearly defined input and output	.846
Each work process begins with a goal and ends with a performance indicator	.790
There is a work process catalogue listing systematic way doing work in accordance to university framework	.765
There is a work manual that defines principles, responsibilities, structures and work practices	.848

Work manuals distinguishes clearly operational and managerial processes	.576
Work guidelines distinguishes clearly how managerial and faculty processes interact	.714
Every work process is clearly described by tasks and activities in the work manuals	.759
Every work process is parametised by performance indicators	.760
New employees find work process in place	.726
New employees have to figure out how to do the work assigned	.701
Employees are empowered to improve work flow	.650
Work processes are fully automated	.694
All work processes are fully integrated by enterprise resource planning	.708
Authorized staff can access all information required to execute their jobs	.697
Work flows are student centred	.554
Students can access all their information in secure portals	.753
Students can be served efficiently through an integrated system	.778

Source: Field data 2019

Data presented on Table 4.28 above indicates that two items had values above 0.800, 10 above 0.700, another four exceeded 0.600 and the other four over 0.500, which implied that they described operational processes adequately. Total variance explained was then determined and results presented as indicated on Table 4.29 below. The statements were intended to find out whether universities had work processes that served staff, students and whether they helped university to gain competitive advantage in times of rapid change. All of the 18 items were extracted and each accounted for certain level of variance. There were four factors that explained 62 percent variance and the others accounted for the 38 percent that remained.

Table 4. 29: Total Variance Explained for Operational Processes for Private Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	cumulative Percent
1	5.696	31.643	31.643	5.696	31.643	31.643	5.630	31.280	31.280
2	3.355	18.640	50.283	3.355	18.640	50.283	3.305	18.360	49.640
3	1.554	8.631	58.914	1.554	8.631	58.914	1.539	8.552	58.193
4	1.265	7.026	65.940	1.265	7.026	65.940	1.275	7.085	65.278
5	1.141	6.337	72.278	1.141	6.337	72.278	1.260	7.000	72.278
6	.985	5.473	77.750						

7	.720	4.001	81.752						
8	.562	3.124	84.876						
9	.508	2.820	87.696						
10	.425	2.362	90.058						
11	.379	2.103	92.161						
12	.346	1.921	94.082						
13	.327	1.818	95.900						
14	.279	1.552	97.452						
15	.185	1.027	98.479						
16	.121	.674	99.153						
17	.077	.427	99.580						
18	.076	.420	100.000						

Extraction Method: Principal Component Analysis.

Source: Field data 2019

Further observation of Table 4.29 above showed that factor number one had the highest eigen value of 5.937 which accounted for 33 percent of the variance. Factor number three and four explained 8.7 percent and 6.2 percent of total variance respectively. After determining the variance, extracted clusters of items were subjected to varimax rotation for easier interpretation and the results presented as shown on Table 4.30 below.

Table 4. 30: Rotated Component Matrix of Operational Processes for Private Universities

Rotated Component Matrix[a]	Component				
	1	2	3	4	5
There is a work manual that defines principles, responsibilities, structures and work practices	.885				
Every work process is clearly described by tasks and activities in the work manuals	.853				
There is a work process catalogue listing systematic way of doing work in accordance to university framework	.833				
Work guidelines distinguishes clearly how managerial and faculty processes interact	.812				
Each work process begins with a goal and ends with a performance indicator	.777				
Work manuals distinguishes clearly operational and managerial processes	.736				
Every work process is parametised by performance indicators	.689		.459		
New employees find work process in place	.654				
Employees are empowered to improve work flow	.560				
Each work process has a clearly defined input and output		.811			

New employees have to figure out how to do the work assigned		.800			
Work processes are fully automated		.772			
All work processes are fully integrated by enterprise resource planning		.699		.447	
Students can be served efficiently through an integrated system		.599			
Students can access all their information in secure portals			.802		
Authorized staff can access all information required to execute their jobs	-.460	.421	-.497		
Work flows are student centred				.815	
There is a documented framework that defines work culture of the university					.899
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 6 iterations.					

Source: Field data 2019

From Table 4.30 above, factor one had the highest number of items that loaded strongly. These were there is a work manual that defines principles, responsibilities, structures and work practices; every work process is clearly described by tasks and activities in the work manuals; there is a work process catalogue listing systematic way of doing work in accordance to university framework; work guidelines distinguishes clearly how managerial and faculty processes interact; each work process begins with a goal and ends with a performance indicator; work manuals distinguishes clearly operational and managerial processes; every work process is parametised by performance indicators; new employees find work process in place and employees are empowered to improve work flow. The overall loadings indicated that private universities had structured work processes that clearly distinguished managerial and operational (faculty) processes and employees were also empowered to ensure that there was efficiency in work flows.

The following constructs loaded onto the second component; each work process has a clearly defined input and output; new employees have to figure out how to do the work assigned; work processes are fully automated; all work processes are fully integrated by enterprise resource planning; students can be served efficiently through an integrated system and authorized staff can access all information required to execute their jobs. This component indicated that work processes were automated and there was emphasis on efficiency.

Component three had a single significant loading that showed that students could access all personal information in secure portals which implied there was no need for them to go to the campuses to seek personal information. The fourth and fifth factors had single items loading also. The item on factor four showed that work flows were student centred while factor five indicated that there was a documented framework that defined work culture of the university.

Overall, the pattern of loadings led to the conclusion that the following determined operational processes in private universities. Structured and formalised work processes, university work culture, need to have processes that served students well, automation of the processes, clearly defined managerial and faculty roles and the ability of employees to ensure that efficiency in work processes was attained.

4.5.4 Factors Determining Performance in Chartered Universities

Factors determining performance in chartered universities were investigated by use of similar procedures to those of other variables. Analysis began with subjecting public

universities data to KMO and Bartlett's tests to determine the adequacy of items that measured performance and the results were presented as indicated on Table 4.31 below.

Table 4. 31: Kaiser-Meyer-Oklin and Bartlett's Test for Performance for Public Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.783
Bartlett's Test of Sphericity	Approx. Chi-Square	1162.975
	df	78
	Sig.	0.000

Source: Data 2019

The KMO results had a sampling adequacy of 0.783 and Bartlett's test of sphericity was 1162.975 with a p-value of 0.001 which was less than significance level of 0.05. Therefore, the tests provided a sufficient condition for proceeding with factor analysis. The extent to which the items were correlated in measuring the variable was then determined and results presented as shown on Table 4.32 below.

Table 4. 32: Item-Total Variance Loading for Performance for Public Universities.

Statements	Extraction
Different modes of learning are offered as per request of students	.629
Students and staff complains are responded to quickly	.631
There is continuous request for feedback from students and staff on services	.595
Degree programme are offered as per the needs of the students	.719
Curriculum is reviewed periodically to incorporate emerging knowledge	.697
Information sharing with students and staff is rapid through technology	.625
Both staff and students have quick access to services required	.697
All complains and requests are executed as they are reported	.683
There is a one-stop customer service desk for receiving inquiries and disseminating information	.439
There is real time access to academic related information by students	.758
Processing of students exams and results can be tracked accurately	.704
There is extensive collaboration with various industries	.701
There is extensive collaboration and linkages with other universities and academic related institutions	.645
New degree programmes are developed to reflect the needs of the market	.521

Curriculum is reviewed periodically to reflect emerging knowledge	.708
There is continuous training of both administrative and academic staff	.614
Technology that facilitates the processes is frequently updated to suit the requirements of the students and staff	.348
Facilities are improved continuously to suit the requirements of the students and staff	.544
Extraction Method: Principal Component Analysis	

Source: Field data 2019

The loadings of 15 statements on Table 4.32 above were between 0 .439 and 0.758 and one item with a load of 0.348 was eliminated because the values had been controlled for 0.400. The relatively high values suggested that statements describing performance variable were adequate.

Table 4. 33: Total Variance Explained for Performance of Public Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	5.079	28.218	28.218	5.079	28.218	28.218	4.103	22.794	22.794
2	3.340	18.556	46.775	3.340	18.556	46.775	2.943	16.349	39.143
3	1.481	8.228	55.002	1.481	8.228	55.002	2.238	12.432	51.574
4	1.356	7.535	62.537	1.356	7.535	62.537	1.973	10.963	62.537
5	.991	5.506	68.043						
6	.861	4.784	72.827						
7	.763	4.241	77.068						
8	.628	3.491	80.559						
9	.586	3.258	83.817						
10	.553	3.074	86.891						
11	.388	2.158	89.049						
12	.379	2.106	91.155						
13	.361	2.003	93.158						
14	.303	1.681	94.840						
15	.296	1.645	96.484						
16	.252	1.402	97.887						
17	.206	1.143	99.030						
18	.175	.970	100.000						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

Variance of the statements was then established and results presented on Table 4.33 above. Data shows that 18 factors contributed in measuring the construct where four of

them accounted for almost 63 percent of the variance. The four statements had eigen values greater than 1.000 but factor one had the highest value of 5.636 while the second had a 3.340 and the two explained about 47 percent of the total variance.

Principal component matrix was then rotated for better interpretation and the results presented in Table 4.34 below. The items that measured performances were based on balanced score card (Kaplan & Norton, 1992) and also incorporated the measures that universities have used over time. Customer, internal processes, growth and development perspectives were considered. Financial perspective was not considered because it supports the other three. A positive performance in the three implies a better financial position especially for a service industry like universities.

Table 4. 34: Rotated Component Matrix for Performance of Public Universities

Rotated Component Matrix[a]	Component			
	1	2	3	4
All complains and requests are executed as they are reported	.822			
Both staff and students have quick access to services required	.764			
There is continuous training of both administrative and academic staff	.734			
Different modes of learning are offered as per request of students	.627			
There is continuous request for feedback from students and staff on services	.618			
Facilities are improved continuously to suit the requirements of the students and staff	.554			
Students and staff complains are responded to quickly	.550			.479
There is a one-stop customer service desk for receiving inquiries and disseminating information	.536			-.461
Technology that facilitates the processes is frequently updated to suit the requirements of the students and staff	.476			
Processing of students exams and results can be tracked accurately		.807		
Information sharing with students and staff is rapid through technology		.756		
Curriculum is reviewed periodically to incorporate emerging knowledge		.721		
There is extensive collaboration with various industries		.707		
There is real time access to academic related information by students		.562		.418
Degree programme are offered as per the needs of the students			.817	

There is extensive collaboration and linkages with other universities and academic related institutions			.811	
New degree programmes are developed to reflect needs of market				.671
Curriculum is reviewed periodically to reflect emerging knowledge				.653
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]				
a. Rotation converged in 6 iterations.				

Source: Field data 2019

Factor one had the highest number of items loading compared to the others as shown on Table 4.34 and they included all complains and requests are executed as they are reported; both staff and students have quick access to services required; there is continuous training for both administrative and academic staff; different modes of learning are offered as per request of students; there is continuous request for feedback from students and staff on services; facilities are improved continuously to suit the requirements of the students and staff; students and staff complains are responded to quickly; there is a one-stop customer service desk for receiving inquiries and disseminating information; technology that facilitates processes is frequently updated to suit the requirements of the students and staff. The pattern of clustering of the statements indicated that service to staff and students was an important factor in determining the performance of public universities.

The items grouping on factor two were processing of student's exams and results can be tracked accurately; information sharing with students and staff is rapid through technology; curriculum is reviewed periodically to incorporate emerging knowledge; there is extensive collaboration with various industries and there is real time access to academic related information by students. The loadings on this factor showed that

processes were one of the factors that determined performance of chartered public universities.

Two items with high values loaded strongly to factor three. These were degree programmes are offered as per the needs of the students and there is extensive collaboration and linkages with other universities and academic related institutions which implied that growth in academic programmes was an important measure of performance in public universities.

Factor four also consisted of two statements which were, new degree programmes are developed to reflect the needs of the market and curriculum is reviewed periodically to reflect emerging knowledge. This component indicated that development of products that catered for market requirement was a factor that determined performance of chartered public universities.

In conclusion, factors that were used as measures of performance in public universities were ability to handle complaints and requests from staff and students, processing inquiries and dissemination of information, updating information technology, processing of exams and tracking of results, improvement of facilities, collaboration with the industry, curriculum reviews, and development of new academic programmes. Therefore, customer satisfaction, internal processes, growth and development were indicators of non-financial measures of performance in public universities in Kenya. The identified

measures were similar to those used by University of Toronto in Canada (University of Toronto, 2014).

Factor analysis was also conducted to establish the factors that determined trends in performance of chartered public universities over a period of five years. The trends captured in the questionnaire referred to five year period prior to data collection in 2019. The information therefore covered the period from 2014 to 2019. The analysis began with KMO and Bartlett's tests measure of adequacy of items and the results presented on Table 4.35 below.

Table 4. 35: Kaiser-Meyer-Oklin and Bartlett's Test for Trends in Performance of Public Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.714
Bartlett's Test of Sphericity	Approx. Chi-Square	710.560
	df	78
	Sig.	.000

Source: Field data 2019

The KMO had a sampling adequacy of 0.714 and Bartlett's test of sphericity 710.560 with a p-value of 0.001 as exhibited in Table 4.35 above. The results indicated a sufficient condition for further tests of factor analysis. Correlation test was then done to identify the extent to which the items measured trends in performance and results recorded in Table 4.36 below. Trends in performance were measured using 13 items and one item had a low correlation value of 0.236 while the rest were above 0.500 as indicated in same table which led to the conclusion that items were valid in describing trends in performance.

Table 4. 36: Item-Total Variance for Trends in Performance of Public Universities

Statements	Extraction
Enrolment in various programmes has increased over the last five years	.749
Number of grandaunts has increased over the last five years	.848
Recruitment of administrative staff has increased over the last five years	.778

Recruitment of faculty staff has increased over the last five years	.751
Support for staff willing to study or attend trainings and workshops has increased over the last five	.608
External funding for research has increased over the last five years	.643
Web metric ranking for the university has improved over the lst five years	.553
More faculties /schools have been established over the last five years	.598
Number of departments in the faculty has increased over the last five years	.846
Number of programmes in the faculty has increased over the last five years	.784
More campuses have been established over the last five years	.555
Information technology facilities in the faculty have increased over the last five years	.236
Research output has increased over the last five years.	.783

Source: Field data 2019

The amount of variance that was explained by the items was then determined and results presented on Table 4.37 below.

Table 4. 37: Total Variance Explained for Trends in Performance of Public Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	3.515	27.042	27.042	3.515	27.042	27.042	2.880	22.151	22.151
2	2.669	20.532	47.574	2.669	20.532	47.574	2.651	20.393	42.544
3	1.330	10.232	57.806	1.330	10.232	57.806	1.755	13.498	56.041
4	1.217	9.364	67.170	1.217	9.364	67.170	1.447	11.128	67.170
5	.929	7.143	74.313						
6	.796	6.126	80.438						
7	.596	4.586	85.024						
8	.456	3.506	88.530						
9	.404	3.108	91.638						
10	.359	2.764	94.402						
11	.307	2.359	96.761						
12	.254	1.952	98.71						
13	.167	1.286	100.00						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

The resultant data was subjected to varimax rotation with Kaiser normalization to enable better interpretation of item loading and results were presented in Table 4.38 below. A total of four factors were extracted where factors one and two had the highest loadings while three and four had two items each.

Table 4. 38: Rotated component Matrix for Trends in Performance of Public Universities

Rotated Component Matrix,				
Statements	Component			
	1	2	3	4
Number of departments in the faculty has increased over the last five years	.879			
Number of programmes in the faculty has increased over the last five years	.853			
More faculties /schools have been established over the last five years	.733			
More campuses have been established over the last five years	.705			
Research output has increased over the last five years.		.837		
External funding for research has increased over the last five years		.786		
Web metric ranking for the university has improved over the last five years		.679		
Support for staff willing to study or attend trainings and workshops has increased over the last five		.673		
Information technology facilities in the faculty have increased over the last five years		.457		
Recruitment of administrative staff has increased over the last five years			.848	
Recruitment of faculty staff has increased over the last five years			.815	
Number of grandaunts has increased over the last five years				.895
Enrolment in various programmes has increased over the last five years				.722
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 5 iterations.				

Source: Field data 2019

Those that loaded on factor one were number of departments in the faculty has increased over the last five years; number of programmes in the faculty has increased over the last five years; more faculties /schools have been established over the last five years and more campuses have been established over the last five years. This factor indicated infrastructure and other aspects that supported academic matters.

Factor two had the following factors loading research output has increased over the last five years; external funding for research has increased over the last five years; web metric ranking for the university has improved over the last five years; support for staff willing to study or attend trainings and workshops has increased over the last five years and information technology facilities in the faculty have increased over the last five years. The factor indicated the trend of growth and development of public universities.

Factors three and four had loadings of two items each with factor three consisting of recruitment of administrative staff has increased over the last five years and recruitment of faculty staff has increased over the last five years. These items implied that human resources increased in public universities over the period. The two items that loaded unto factor four were number of grandaunts has increased over the last five years and enrolment in various programmes has increased over the last five years. The factor referred to increase in number of students in public universities over the period of five years.

In conclusion, the following were trends in performance of chartered public universities from 2014 to 2019. Factors that supported academic affairs such as number of programmes, departments, faculties/schools and campuses, overall institutional growth in terms of research funding, web metric ranking, support for staff development and information technology and number of administrative, faculty staff and students increased.

Factors that were responsible for performance of private universities were determined as well. Same procedures as those of identifying factors that determined performance of public universities were followed. The KMO and Bartlett's tests were conducted to measure the adequacy of items and the results were presented as indicated on Table 4.39 below.

Table 4. 39: Kaiser-Meyer-Oklin and Bartlett's Test for Performance of Private Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.685
Bartlett's Test of Sphericity	Approx. Chi-Square	521.033
	df	153
	Sig.	0.000

Source: Data 2019

The KMO had a sampling adequacy of 0.685 while Bartlett's test of sphericity had 521.033 with a p-value of 0.001. Therefore, the tests provided a sufficient condition for proceeding with factor analysis. The extent to which the items were correlated in measuring the variable was then determined and results presented on Table 4.40 below.

Table 4. 40: Item-Total Variance for Performance of Private Universities

Statements	Extraction
Different modes of learning are offered as per request of students	.755
Students and staff complains are responded to quickly	.693
There is continuous request for feedback from students and staff on services	.655
Degree programme are offered as per the needs of the students	.670
Curriculum is reviewed periodically to incorporate emerging knowledge	.753
Information sharing with students and staff is rapid through technology	.750
Both staff and students have quick access to services required	.584
All complains and requests are executed as they are reported	.668
There is a one-stop customer service desk for receiving inquiries and disseminating information	.599
There is real time access to academic related information by students	.600
Processing of students exams and results can be tracked accurately	.558
There is extensive collaboration with various industries	.743
There is extensive collaboration and linkages with other universities and academic related institutions	.772
New degree programmes are developed to reflect the needs of the market	.778
Curriculum is reviewed periodically to reflect emerging knowledge	.727
There is continuous training of both administrative and academic staff	.545

Technology that facilitates the processes is frequently updated to suit the requirements of the students and staff	.707
Facilities are improved continuously to suit the requirements of the students and staff	.640
Extraction Method: Principal Component Analysis	

Source: Field data 2019

Performance was measured by use of 18 statements and Table 4.40 above shows that all statements had correlation values above 0.500 hence the items were valid in describing the variable. Variance explained by the statements was determined and results presented as appearing in Table 4.41 below. From the data in the table, all the 18 factors contributed in measuring the construct and four factors accounted for almost 68 percent of the variance while the others constituted the other 32 percent.

Table 4. 41: Total Variance Explained for Performance of Private Universities

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	6.905	38.359	38.359	6.905	38.359	38.359	4.932	27.399	27.399
2	2.461	13.674	52.033	2.461	13.674	52.033	2.536	14.089	41.487
3	1.573	8.736	60.769	1.573	8.736	60.769	2.428	13.491	54.978
4	1.261	7.006	67.775	1.261	7.006	67.775	2.303	12.797	67.775
5	.962	5.347	73.122						
6	.886	4.920	78.042						
7	.696	3.865	81.907						
8	.592	3.290	85.197						
9	.535	2.971	88.169						
10	.482	2.676	90.845						
11	.412	2.289	93.134						
12	.321	1.786	94.920						
13	.248	1.377	96.297						
14	.229	1.274	97.571						
15	.173	.961	98.532						
16	.118	.653	99.185						
17	.093	.519	99.704						
18	.053	.296	100.000						
Extraction Method: Principal Component Analysis.									

Source: Field data 2019

Eigen values greater than 1.000 were observed on the four factors but factor one had the highest which explained the greatest variance of about 38 percent, whereas the second had a value of 2.982.

The principal component matrix was then subjected to varimax rotation with Kaiser normalization for better interpretation and the results presented in Table 4.42 below.

Table 4. 42: Rotated Component Matrix for Performance of Private Universities

Rotated Component Matrix[a]				
Statement	Component			
	1	2	3	4
All complains and requests are executed as they are reported	.844			
Both staff and students have quick access to services required	.811			
There is continuous training of both administrative and academic staff	.806			
Different modes of learning are offered as per request of students	.689			
There is continuous request for feedback from students and staff on services	.676			
Facilities are improved continuously to suit the requirements of the students and staff	.647		.448	
Students and staff complains are responded to quickly	.644			
There is a one-stop customer service desk for receiving inquiries and disseminating information	.589			.544
Technology that facilitates the processes is frequently updated to suit the requirements of the students and staff	.554			-.401
Processing of students exams and results can be tracked accurately	.530	.496		
Information sharing with students and staff is rapid through technology		.815		
Curriculum is reviewed periodically to incorporate emerging knowledge		.809		
There is extensive collaboration with various industries			.806	
There is real time access to academic related information by students		.412	.774	
Degree programme are offered as per the needs of the students			.752	
There is extensive collaboration and linkages with other universities and academic related institutions				.850
New degree programmes are developed to reflect needs of market		.404		.707
Curriculum is reviewed periodically to reflect emerging knowledge		.429		.519
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]				
a. Rotation converged in 6 iterations.				

Source: Field data 2019

The highest number of items loaded onto factor one compared to the others as indicated in table 4.42 above. These were all complains and requests are executed as they are reported; both staff and students have quick access to services required; there is continuous training of both administrative and academic staff; different modes of learning are offered as per request of the students; there is continuous request for feedback from students and staff on services; facilities are improved continuously to suit the requirements of the students and staff; students and staff complains are responded to quickly; there is a one-stop customer service desk for receiving inquiries and disseminating information; technology that facilitates the processes is frequently updated to suit the requirements of the students and staff and processing of students exams and results can be tracked accurately. This factor referred to customer satisfaction component of performance and the conclusion drawn from the high number of items that loaded was that focus on student and staff services played a big role in performance of private universities.

The items clustering on factor two were curriculum is reviewed periodically to incorporate emerging knowledge and there is extensive collaboration with various industries. This factor showed that new products that were in demand were part of factors that determined performance of private universities. Factor three had the following loadings there is extensive collaboration with various industries; there is real time access to academic related information by students and degree programmes are offered as per the needs of the students. The factor indicated that academic programmes offered by private universities were part of factors that determined performance.

Factor four loadings were that there is extensive collaboration and linkages with other universities and academic related institutions; new degree programmes are developed to reflect the needs of the market and curriculum is reviewed periodically to reflect emerging knowledge. The fourth factor indicated that introduction of new products (curricula and academic related programmes) demanded by market were part of factors that determined performance of private universities.

In conclusion, measures of performance in private universities were identified as execution of requests and feedback to complaints, access to services by both staff and students, modes of learning offered to students, improvement of facilities, updating of information technology, processing of exams, tracking of results, receiving of inquiries and disseminating of information. Others included collaborations with the industry and introduction of new academic programmes. The pattern of loadings indicated that customer service was the highest determinant of performance, followed by internal processes, modes of offering of academic programmes and introduction of new programmes.

Trends in performance of the universities were also assessed by first determining KMO and Bartlett's tests to examine the adequacy of items and results were indicated in Table 4.43 below. The KMO sampling adequacy of 0.693 and Bartlett's test of sphericity of 337.311 were recorded with a p-value of 0.001 which indicated that further factor analysis tests could be performed.

Table 4. 43: Kaiser-Meyer-Oklin and Bartlett's Test for Trends in Performance of Private Universities

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.693
Bartlett's Test of Sphericity	Approx. Chi-Square	337.311
	df	78
	Sig.	.000

Source: Field data 2019

The procedure began with correlation test to determine the extent to which the items that measured trends in performance were related and results recorded in Table 4.44 below.

Table 4. 44: Total Item- Loadings for Trends in Performance of Private Universities

Statements	Extraction
Enrolment in various programmes has increased over the last five years	.687
Number of grandaunts has increased over the last five years	.907
Recruitment of administrative staff has increased over the last five years	.542
Recruitment of faculty staff has increased over the last five years	.664
Support for staff willing to study or attend trainings and workshops has increased over the last five	.861
External funding for research has increased over the last five years	.822
Web metric ranking for the university has improved over the 1^{st} five years	.673
More faculties /schools have been established over the last five years	.791
Number of departments in the faculty has increased over the last five years	.646
Number of programmes in the faculty has increased over the last five years	.731
More campuses have been established over the last five years	.813
information technology facilities in the faculty have increased over the last five years	.707
Research output has increased over the last five years.	.754

Source: Field data 2019

Each of the 13 items had a correlation value above 0.500 as shown on Table 4.44 which indicated that they were valid in measuring trends in performance. The amount of variance was then determined and results presented in Table 4.45 below. The Table 4.45 shows that all of the 13 factors were extracted but four explained about 74 percent of the total variance. The four factors had eigen values greater than 1.000 but factor one had the highest. Each of the other nine factors that remained accounted for a certain proportion of the variance, which together totalled to 26 percent.

Table 4. 45: Total Variance Explained for Trends in Performance in Private Universities Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	4.919	37.840	37.840	4.919	37.840	37.840	3.206	24.662	24.662
2	2.015	15.496	53.336	2.015	15.496	53.336	2.651	20.390	45.052
3	1.452	11.173	64.509	1.452	11.173	64.509	2.359	18.150	63.202
4	1.211	9.317	73.826	1.211	9.317	73.826	1.381	10.624	73.826
5	.832	6.398	80.224						
6	.613	4.716	84.940						
7	.522	4.013	88.953						
8	.490	3.766	92.719						
9	.275	2.116	94.836						
10	.251	1.928	96.764						
11	.219	1.685	98.448						
12	.132	1.018	99.466						
13	.069	.534	100.000						

Extraction Method: Principal Component Analysis.

Source: Field data 2019

The principal component matrix obtained after the analysis, was then subjected to varimax rotation with Kaiser normalization for better interpretation and the results were Presented in Table 4.46 below.

Table 4. 46: Rotated Component Matrix for Trends in Performance in Private Universities

Rotated Component Matrix, a				
Statements	Component			
	1	2	3	4
Number of departments in the faculty has increased over the last five years	.950			
Number of programmes in the faculty has increased over the last five years	.767			
More faculties /schools have been established over the last five years	.712		.473	
More campuses have been established over the last five years	.655			
Research output has increased over the last five years.	.592	.479		
External funding for research has increased over the last five		.877		

years				
Web metric ranking for the university has improved over the last five years		.799		
Support for staff willing to study or attend trainings and workshops has increased over the last five		.742		
information technology facilities in the faculty have increased over the last five years			.843	
Recruitment of administrative staff has increased over the last five years			.759	
Recruitment of faculty staff has increased over the last five years			.743	
Number of grandaunts has increased over the last five years				.879
Enrolment in various programmes has increased over the last five years		.510		-.598
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 5 iterations.				

Source: Field data 2019

Table 4.46 above indicates that five items loaded unto factor one as follows. Number of departments in the faculty has increased over the last five years; number of programmes in the faculty has increased over the last five years; more faculties/schools have been established over the last five years; more campuses have been established over the last five years and research output has increased over the last five years. This suggested that physical infrastructure that supported academics increased over the period of the five years.

Factor two had the following factors loading external funding for research has increased over the last five years; web metric ranking for the university has improved over the last five years and support for staff willing to study or attend trainings and workshops has increased over the last five years. Overall, private universities as institutions improved in performance over the period of the five years.

The following items loaded into factor three information technology facilities in the faculty have increased over the last five years, recruitment of administrative staff has increased over the last five years and recruitment of faculty staff has increased over the last five years. The component indicated that there was an increase of staff and supportive information technology over the period. Factor four had two items loading number of grandaunts has increased over the last five years and enrolment in various programmes has increased over the last five years. The second item had a negative loading because enrolment and graduation of students have an inverse relationship. This factor indicated that both enrolment and graduating students increased over the period of five years. In conclusion, trends in performance of private universities in the period between 2014 and 2019 were infrastructure that supported academics, use of information technology by staff, staff recruitment, student enrolment, student graduation and overall development of the universities as institutions increased.

4.6 Descriptive Analysis of Variables

University education in Kenya has experienced challenges over the years but the 90s and part of the 20s had more rapid changes with far reaching consequences than the previous decades. The rapid changes motivated the study which sought to establish the relationship between organizational agility and performance of chartered universities in Kenya. To achieve the objectives, data was collected and subjected to various stages of analysis. The process started with descriptive analysis and culminated with prediction of the relationship by use of linear regression analysis.

4.6.1 Organizational Agility and Performance of Chartered Universities

Organizational agility was conceptualized as consisting of the following dimensions government drivers of agility, market drivers of agility, and enablers or capabilities of agility. The dimensions were identified along Sharifi and Zang (1999) model which is supported by earlier and later literature. As already defined, drivers are causes of unanticipated changes and capabilities are aspects that facilitate actions and responses to different drivers of agility. These were investigated and the following is data analysis that began with descriptive statistics.

Mean was used to describe the general nature of the responses to each statement and one sample t-test determined the significance of the responses from assigned mean. The aim was to identify the extent to which each aspect of organizational agility affected public and private universities. The results for each dimension are shown on three tables that correspond to government drivers of agility, market drivers of agility, capabilities of the universities and their responses to the drivers. The items on the questionnaire were constructed using Likert scale and required the respondents to state the extent to which they agreed or disagreed with the opinion expressed.

For purpose of measurement, the Likert scale ranged between one to five where one was strongly disagrees progressing to five, strongly agree. On the one sample t-test score, three was assigned as mean average where all the results below were interpreted to mean a disagreement while those above meant agreement. The p-value was used to identify whether the response was significantly different from the assigned mean average at

significance level of 0.05. The tests were done and results for government drivers of agility presented on Table 4.47 below. These referred to the policies and directives from government and its agency that were passed from time to time based on acts of parliament.

The first item which referred to whether decreased government funding caused any change in operations of the faculty, public universities had a mean response of 4.22, 1.23 in private and t-test statistic of 12.56 and -18.59, respectively. The p-value for the two means was less than 0.05 which implied that the responses were significantly different from the average value of 3.00.

Table 4. 47: Descriptive Statistics for Government Drivers of Agility

Statements	Population			Mean			T-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Whether decreased government funding has caused any change in operations in faculty	28	13	41	4.22	1.23	3.47	12.56	-18.59	4.19	.000	.000	.000
Whether differential degree funding by government has caused changes in operations of the faculty	28	13	41	3.25	1.69	2.86	1.89	-7.23	-.89	.060	.000	.377
Whether introduction of module 11 (parallel programmes) caused changes in faculty operations	28	13	41	3.50	1.65	3.04	4.09	-7.15	.81	.000	.000	.421
Change of CUE guidelines caused restructuring	28	13	41	3.12	3.27	3.16	.85	1.16	1.69	.395	.253	.092
Delinked admission to bed capacity caused congestion in learning facilities.	28	13	41	3.38	1.83	2.99	2.90	-6.02	.178	.004	.000	.859
Promotion based on CUE policy caused shortage of talent in administration	28	13	41	2.26	2.23	2.25	-6.16	-4.03	-6.83	.000	.000	.000
Placement of	28	13	41	3.44	2.08	3.10	3.38	-4.60	1.16	.001	.000	.247

students in all universities decreased numbers												
Closure of campuses decreased numbers	28	13	41	2.38	2.44	2.40	-4.91	-2.44	-5.27	.000	.018	.000
Frequent changes of guidelines by CUE has caused restructuring of academic programmes	28	13	41	3.31	3.33	3.32	2.35	1.48	3.19	.020	.146	.002
Phasing out pre-university decreased enrolment	28	13	41	2.10	2.69	2.24	-7.73	-1.29	-6.83	.000	.203	.000
Decreased unit exceptions for diploma holders has decreased enrolment	28	13	41	2.34	2.92	2.48	-5.37	-.36	-4.42	.000	.723	.000
There has been increase in government sponsored students since introduction of fee subsidy at secondary school level	28	13	41	3.70	2.94	3.51	6.98	-.30	5.88	.000	.769	.000

PUB is public universities; PIV is private universities; and COM is combined

Source: Field Data 2019

Therefore, decreased government funding changed the operations of faculties in public universities but did not have any effect on private universities. The means and t-test statistic for all the universities did not have any significance because funding of the two sectors was mutually exclusive. The results concurred with fact that private universities in Kenya operate on private investment.

The second item was whether differential programme funding by the government has caused changes in operations of the faculty. The average responses were 3.25 in public universities and 1.69 in private. The t-statistics results were 1.89 and -7.23 and -1.18 for all the universities. The p-value of 0.060 for public universities was greater than 0.05 which showed that the responses were not statistically different from the average value of 3.00 and that p-value of private universities was 0.001 implying that the same was statistically significant. Therefore, differential funding of programmes did not affect private universities while in public it did to some extent. Probably some public universities did not have diverse programmes that attracted different amount of government sponsorship while others had.

Allocation of public sponsored students to private universities began in 2018 and it is possible that the programmes that private universities had enrolled government sponsored students had not experienced differential funding as at the time of data collection. Before the policy was formulated, programme funding was per student and not per the type of degree programme. This was reviewed after universities voiced the challenges

experienced in funding some of the costly programmes such as medicine at the same rate as social sciences which were cheaper to run.

The third item sought to find out whether introduction of module 11 programmes (parallel programmes) in public universities caused changes in faculty operations. The descriptive statistics were a mean of 3.50 for public, 1.65 for private and 3.04 for both. The t- test statistics were 4.09, -7.15 and 0.87, respectively. The p-values of 0.000 for the public and private universities recorded were less than significance level of 0.05. This indicated that the mean for public universities was statistically significant. Therefore, introduction of module II programmes caused changes in operations of faculties. The statement did not apply for the private universities since they did not have parallel programme in the same way as public universities.

Paralell degree programmes were first introduced in 1998 by University of Nairobi where first cohort of master of business programme self-sponsored students were admitted. Other universities followed and this gave raise to module II programmes. The aim was to assist public universities bridge the gap in funding operations and also provide education to students who qualified for higher education but could not be accomodated as a result of constraints arising from infrustracture and financing. The module 11 programmes involve attending classes on flexible modes such as evenings and weekends. The mean average response for public university was 3.50 and p-value of 0.000 which indicated that moduel 11 programmes caused changes in operations of the faculty. It was also noted that most of the older universities were established in urban centres and were able to

arttract higher numbers of students in module II programmes. The newer universities were mainly based in rural areas and they rarely had module II students for evening. This might have explained why the mean was 3.50 and not higher as was anticipated. However, the t-statistics values of 4.09 and 0.50 was attributed to the many chartered public universities that began operating with both government and self sponsored students. Therefore, introduction of module 11 programmes had a bigger impact for the few older public universities who admitted gorvenment sponsored students since the time of their establishment.

The fourth item was frequent changes of guidelines by CUE has caused restructuring of academic programmes. This construct recorded a mean of 3.12 for public universities, 3.27 for private and 3.16 combined. The t-statistics were 0.85 for public universities, 1.16 for private and 1.31 for combined. The p-values for both universities were greater than 0.05 which indicated that there was no statistical significance in responses. The results meant that CUE guidelines did not affect both sectors of the universities signicantly. Consequently, it was deduced that universities observed compliance to the regualtions. The fact that each university was individually responsible for compliance might have explained why the responses to the statement were not statistically significant.

Means averages of items five and six were less than the assigned mean of 0.30. These items were phasing out of pre-university decreased enrolment and decreased unit exemptions for diploma holders have decreased enrolment. The p–values for public universities were less than the significance level of 0.05 which indicated that they were

statistically significant. Therefore, phasing out of pre-university programme and failure to grant diploma students unit exemptions did not affect enrolment of degree programmes. However, the p-values for private universities were 0.203 and 0.723 with respect to the two statements and therefore phasing out of pre-university programmes did not decreased enrolment and failure to grant exemptions for diploma students did. The means for the two statements in private universities were less than but close to the assigned of 3.00 which implied that in some universities a decrease in enrolment occurred while in others it did not. It was concluded that public universities had enough students for degree programmes and they did not rely on transition of students from certificate or diploma to degree programmes. On the other hand, it is possible that certificate and diploma students who enrolled in private universities accounted for a significant portion of the students at degree level.

The seventh item was that there has been increase in government sponsored students since introduction of the fee subsidy at seconadry school level. The mean for public university for the item was 3.70 and t-test score of 7.00 while the mean for private university was 2.94 with t-test score of -0.30. The p-values were 0.000 and this meant that faculties had an increase in enrolment in public universities while this was not the case with private universities. It is also possible that some of the respondents were not aware whether subsidy at secondary school was a source of increased enrolment or not.

In summary, drivers of agility from government that affected public universities were decreased and differential funding of programmes; introduction of module II

programmes; placement of government sponsored students to public and private universities; and increase in fee subsidy at secondary schools. Frequent changes in CUE guidelines affected operations of all the universities, whereas phasing out of pre-university programmes and reduced unit exemptions did not affect enrolment for degrees. Decreased government funding to public university had the greatest impact as a driver of agility.

After analysis of government drivers of agility, market drivers were also assessed. These were conceptualized as the factors that resulted from competitive activities of universities that resulted from variation in student enrolment and the need to generate revenues. Table 4.48 below shows descriptive statistics for market drivers of agility. The mean for the item; flexible modes of learning increased enrolment was 3.44 for public universities and 3.42 for private. One sample t-test results for public universities was 1.54 and p-value was less than significance level of 0.05. The t- test statistic for private universities was 1.56 and p-value 0.057. These results implied that there was a statistical significance in public universities and none in private, therefore, flexible modes of learning increased enrolment in public universities while it did not in private universities.

On the item low degree costing in other universities has caused the university to lower fees, the means were 1.91 for public and 2.48 for private universities with t-statistics of 1.35 and 1.41, respectively while the p-value was less than 0.05 for both. The results were statistically significant which implied that degree costing in other universities did not cause the lowering of fees charged. The same applied to item; some degree

programmes were phased out due to lack of students. These had means of 2.38 in public and 2.15 private while the t-test statistics were 1.55 and 1.30, respectively. The p-values on Table 4:48 were all less than 0.05 which meant that there was a statistical significance and therefore, no degree programme was phased out due to lack of students.

The construct; faculty introduced new programmes due to demand, the following descriptive statistics were obtained. The means were 3.51 for public university and 3.52 for private and the t-statistic results were 1.55 and 1.47, respectively. All of the p-values were less than 0.05 which indicated that there was a statistical significance in relation to the assigned mean of 3.00 and so, universities introduced new programmes as a result of demand. The results of the item on change in technology led to introduction of new programmes and nature of students admitted made university to be proactive in operations yielded the following statistical results. The mean averages were 3.47, 3.91 and t-statistic for the two items were 1.51 and 1.21, respectively for public universities. Descriptive statistics for private universities were means of 3.65, 3.96 and t-statistics of 4.80 and 10.48, respectively. The p- values were 0.00 which was less than statistical level of 0.05 and therefore, there was a statistical significance. This led to the conclusion that change in technology resulted to introduction of new programmes in all the universities.

Table 4. 48: Descriptive Statistics for Market Drivers of Agility

Statement	Population			Mean			T-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Flexible modes of learning increased enrolment	28	13	41	3.41	3.44	3.42	1.53	1.55	3.75	.002	.057	.000
Low degree costing in other universities caused lowering of fees	28	13	41	1.91	2.48	2.05	1.35	1.41	-9.49	.000	.014	.000
Some degree programmes were phased out due lack of students	28	13	41	2.38	2.15	2.32	1.56	1.30	-6.34	.000	.000	.000
Faculty introduced new programmes due to demand	28	13	41	3.51	3.52	3.52	1.54	1.47	4.68	.000	.018	.000
Change in technology led to introduction of new programmes	28	13	41	3.47	3.65	3.52	1.51	1.42	4.80	.000	.003	.000
Nature of students admitted made university to be proactive in operations	28	13	41	3.91	3.96	3.92	1.21	1.27	10.47	.000	.000	.000

PUB is public universities; PIV is private universities; and COM is combined

Source: Field Data 2019

On the item that nature of students admitted made university to be proactive in operations, the means were 3.91 in public universities and 3.96 in private. The t-test scores were 1.21 for public and 1.27 for private universities, whereas the p-values were 0.000 for both implying that there was statistical significant. Therefore universities were not proactive to the nature of the students admitted. In conclusion, market drivers of agility that affected operations in public universities were demand for flexible modes of learning and need to introduce new degree programmes because of change in technology. Variable pricing of programmes by other universities did not affect operations and programmes were not phased out as a result of reduction of students.

Enablers or capabilities of agility signify tangible abilities that universities possess that facilitate response to different forms of drivers of agility. Capabilities range from physical infrastructure such as hostels, catering, recreational facilities, laboratories, libraries, competent and skilled staff, processes, collaborations and technology. These capabilities were measured by use of 12 items which addressed the state of aforementioned facilities. Likert scale was used to measure the extent to which respondents agreed or disagreed with the statements. The measure ranged between one- strongly disagree to five- strongly agree and Table 4.49 below show the results for descriptive statistics.

On the statement that university had enough facilities and enough competent faculty staff, the statistics were means 2.24 for public, 2.92 for private while t- test statistic were -8.22 and -0.42, respectively. The p-value for public universities was 0.00 which was less than

statistical significance level of 0.05 while that of private universities (0.68) was greater than 0.05. There was a statistical significance in means of public universities while there was none in private. The conclusion was that public universities did not have enough facilities and staff. The mean for private universities was not different from 3.00 which implied that some universities had enough while others did not.

Table 4. 49: Descriptive Statistics for Enablers of Organizational Agility

Statement	Population			Mean			T-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
University has enough facilities	28	13	41	2.24	2.92	2.41	-8.21	-0.42	-6.74	.000	.678	.000
Administrative processes are supported by best technology	28	13	41	2.45	3.27	2.66	-6.01	1.39	-3.92	.000	.171	.000
University has enough competent faculty staff	28	13	41	2.75	2.67	2.73	-2.29	-1.81	-2.89	.023	.077	.005
University has supportive welfare departments	28	13	41	3.07	3.48	3.17	.69	2.40	1.88	.494	.020	.062
University is well stocked with learning resources	28	13	41	3.33	3.69	3.42	3.51	3.60	4.90	.001	.001	.000
Recreation facilities are adequate for staff and students	28	13	41	2.73	3.17	2.84	-2.71	0.85	-1.79	.008	.399	.076
There is a wide range of programmes that students can choose from the faculty.	28	13	41	3.63	3.15	3.51	6.10	.73	5.46	.000	.469	.000
University has adequate equipped laboratories	28	13	41	2.72	3.17	2.83	-3.04	.85	-1.96	.003	.399	.051
University has ultra-modern virtual campus	28	13	41	2.28	3.04	2.47	-7.16	.25	-5.94	.000	.803	.000
University has collaborated widely with industry	28	13	41	3.14	3.21	3.16	1.26	1.17	1.67	.209	.249	.042

Acceptance of exemptions and credit transfers contributed to high enrolment	28	13	41	2.58	3.42	2.79	-3.58	2.16	-2.03	.000	.036	.044
Flexible mode of learning contributed to high enrolment	28	13	41	3.14	3.85	3.32	1.137	4.65	3.04	.257	.000	.003

PUB is public universities; PIV is private universities; and COM is combined

Source: Field Data 2019

Private universities had a mean of 3.27 on the item whether administrative processes were supported by best technology and t- test statistic of 1.39. Responses to the same item yielded a mean of 2.45 and t-statistic of -6.01 for public universities. The p-value for public universities was 0.000 while that of private was 0.170. The p-value for public universities indicated a statistical significance because it was less than 0.05 (level of significance) while that of private universities was higher. The implication was that the processes of private universities were supported by best infrastructure in technology while in public universities they were not. One sample t-test showed a bigger variation of mean responses in public universities which meant that some of the universities had poorer or limited technological infrastructure compared to others.

Regarding the constructs that university has supportive welfare departments, public universities posted a mean of 3.07 and private 3.48 and t-test statistic value was 0.69 for public and 2.40 for private. The p-value for public was 0.49 while that of private was 0.020 and since the p-value for public universities was greater than 0.05, the mean was not statistically significant while that of private was less than 0.05, which implied that it was statistically significant. Therefore, private universities had supportive welfare departments while some public universities did not.

The statement that university is well stocked with learning resources had the following statistics, public universities had a mean of 3.33 with t-statistic of 3.51 while private had 3.69 and t –test statistic of 4.91. The p-values for both were 0.00 which were statistically significant because they were less than the significance level of 0.05. Therefore,

universities were well stocked with learning resources. However, private universities had better resources compared to public and there was a possibility that some public universities had good learning resources while others did not because the mean of 3.33 was close to the average of 3.00

Statistics for the item that recreation facilities are adequate for staff and students, public universities had a mean of 2.73, t-statistic of -2.71 and p-value of 0.01. The private had 3.17, t-statistic of 0.85 and p-value of 0.40. Therefore, there was a statistical significance of results in public universities but none in private universities. Recreational facilities for staff and students were not adequate in public universities while they were in private.

The statement that there is a wide range of programmes that students can choose from, posted the following results. Public universities had a mean of 3.63, t- test statistic of 6.11 and p-value of 0.01. Private universities had a mean of 3.15, t-statistic of 0.73 and p-value of 0.80. Therefore, public universities had a wide range of programmes that students could choose from while in private universities, there was a lower range to choose from. Large public universities in Kenya were the oldest to be established and this explained why they had the widest range of degree programmes.

The statement, university has adequate equipped laboratories had a mean of 2.72, t-test statistic of -3.05 and a p-value of 0.01 in public universities while private had a 3.17, t-test statistic of 0.85 and p-value of 0.399. It was concluded that public universities did not have adequate laboratories while private had. The possible explanation was that public

universities had higher number of students and more physical science programmes that required laboratories and consequently laboratories were less compared to the number of students and not that private universities had more. Also, as the findings in section one of the questionnaires revealed, a majority of faculties in private universities were based on social sciences and there was a possibility that a smaller range of programmes needed laboratories compared to higher demand in public ones.

The item, university has ultra-modern virtual campus recorded the following results. Mean of 2.28, t-test statistic of 2.47 and p-value of 0.00 in public universities while private universities had a mean of 3.04, t-statistic of 0.25 and a p-value of 0.80. Therefore, public universities did not have ultra-modern virtual campuses while private universities had. On the item that university has collaborated widely with industry, public universities had a mean of 3.14, t-statistic of 1.17 and p-value of 0.21. Private universities had 3.21, t-statistic of 1.67 and p-value of 0.25. The p-values recorded were above significance level of 0.05 and therefore they did not indicate any statistical significance. The conclusion was that both collaborated with the industry to a small extent because means were only slightly above the average value of 3.00.

Acceptance of exemptions and credit transfers contributed to high enrolment statement had a mean value of 2.58, t- test statistic of -3.58 in public universities while private ones had 3.42 and -2.03 respectively. The p-values were 0.00 for public and 0.04 for private, both of which were less than the significance level of 0.05. Therefore, acceptance of

exemptions and credit transfers did not contribute to high enrolments in the public universities while it did in private.

The construct that flexible mode of learning contributed to high enrolment had a mean of 3.14 in public and 3.85 in private universities. The t- test results were 4.65 for public universities and private 3.04, whereas the p-values were 0.257 for public, private had 0.000. P -value for public universities was greater than significance level of 0.05 and in private it was less. It followed that flexible mode of learning did not contribute to high enrolment in public universities while it did in private.

It was concluded that private universities had the following superior enablers compared to public universities technology; supportive welfare programmes for the students; e-learning resources; virtual campuses; recreational facilities and flexible modes of learning. Public universities did not have enough facilities while private had but not as adequate. Both types of universities collaborated well with the industry, but public universities had a wider range of programmes for students to choose from.

Responses are actions that firms undertake to overcome effects of drivers of agility that pose threat to performance. The statements that measured responses were university opened campuses when enrolment increased before 2017; university added modes of learning when enrolment increased before 2017; university expanded facilities when enrolment increased; university increased diploma and certificate causes from 2017; university laid off staff with decrease of module II students; programmes have been

phased out after decrease in demand; there is heavy promotion of programmes by the university; university introduced new programmes; and university has diversified sources of income after decrease in student enrolment. One sample t- test was used to identify whether the responses were significantly different from the assigned average of 3.00 on the Likert scale. The mean responses and one sample t- test statistics results were recorded as indicated in Table 4.50 below.

Table 4.50 shows that the first item that measured responses to drivers of agility was university opened campuses when enrolment increased before 2017. The mean response for public university was 3.01, private 3.23, t- test statistics was 0.11 and 1.01 while p-values were 0.916 and 0.318, respectively. These were greater than 0.05 which implied that both universities opened new campuses before 2017. However, private universities had a greater mean which meant that they opened more campuses compared to public universities.

The statement that university added modes of learning when enrolment increased before 2017 had means of 3.10 in public universities and 3.88 in private. The t- test statistic for public university was 0.74 and 4.86 for private. The p-value was 0.460 for public which was greater than significance level of 0.05, and therefore there was no statistical significant. It was concluded that public universities added modes of learning when enrolment increased before 2017.

Table 4. 50: Descriptive Statistics for Responses to Drivers of Agility

Statement	Population			Mean			t-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
University opened campuses when enrolment increased before 2017	28	13	41	3.01	3.23	3.07	0.11	1.01	0.59	.916	.318	.554
University added modes of learning when enrolment increased before 2017	28	13	41	3.10	3.88	3.29	0.74	4.86	2.63	.460	.000	.009
University expanded facilities when enrolment increased	28	13	41	3.44	3.71	3.51	3.69	3.40	4.90	.000	.001	.000
University increased diploma and certificate causes from 2017	28	13	41	2.71	2.90	2.76	-2.39	-.471	-2.29	.018	.640	.023
University laid off staff with decrease of module 11 students	28	13	41	2.29	2.23	2.28	-6.24	-3.89	-7.37	.000	.000	.000
Programmes have been phased out after decrease in demand	28	13	41	2.46	3.35	2.68	-4.63	1.78	-3.04	.000	.081	.003
There is heavy promotion of programmes by the university	28	13	41	3.10	4.35	3.42	.974	10.05	4.38	.332	.000	.000
University introduced new programmes	28	13	41	3.69	3.88	3.73	6.44	4.61	7.90	.000	.000	.000
University has diversified sources of income after decrease in student enrolment	28	13	41	3.38	3.75	3.47	3.61	4.42	5.26	.000	.000	.000

PUB is public universities; PIV is private universities; and COM is combined.

Source: Field Data 2019

The p-value for private universities was 0.000 which meant that they did not add new modes of learning when enrolment increased before 2017. This implied that they had various modes learning in place long before enrolment increased.

The means for the item that university expanded facilities when enrolment increased were 3.44 for public and 3.71 for private universities. The t-statistics was 0.74 for public, 4.86 for private universities and p -values of 0.000 for both, which suggested that there was a statistical significance since the p-values were less than significance level of 0.05. Therefore, both universities expanded their facilities when enrolment increased. However, private universities expanded theirs more than public because the mean was higher.

The means for statement that; university increased diploma and certificate courses from 2017 statement were 2.71 in public universities and 2.90 in private universities. The t-test statistic was -2.39 for public universities and private 0.47, whereas the p-values of 0.02 was obtained in public university which was less than 0.05, hence the mean was statistically significant. Public universities did not increase diploma and certificated course from 2017. However, private universities recorded a p-value of 0.64, which was greater than level of significance of 0.05. Therefore, private universities increased certificate and diploma courses after 2017. The statement that university laid off staff with decrease of module II students had mean of 2.29 in public universities and 2.23 in private universities. The t- test statistic of -6.24 was obtained for public universities and -3.89 for private universities. The p- values of 0.001 were obtained for both; hence there

was a statistical significance. Universities did not lay off staff after module II students numbers decreased.

The item on programmes have been phased out after decrease in demand had means of 3.10 in public universities and 4.35 in private universities and t- test statistics were -4.63 for public and 1.78 for private universities. The public universities had a p-value of .001 which indicated a statistical significance. It followed that public universities did not phase out any programme after the demand decreased. Private universities had a p-value of .081 which was greater than 0.05 and it implied that some programmes that had a decreased demand were phased out.

The statement that there is heavy promotion of programmes by the university had a mean of 3.10 in public universities and 4.35 in private while t- test results were 0.97 in public universities and 10.05 for private. Public universities had a p-value of 0.332 while private had 0.001. Therefore, public universities did not carry out heavy promotion of their programmes like private universities. The statement that university introduced new programmes had a mean of 3.69 and 3.88 in public and private universities, respectively. Public universities had a t-test score of 0.97 and private universities 10.05. Both sectors had p-values of 0.001 which were statistically significant and therefore, universities introduced new programmes as a response to drivers of agility.

University has diversified sources of income after decrease in student enrolment item recorded a mean of 3.38 in public universities and 3.75 in private. The t –test statistics

results were 3.61 for public and 4.42 for private universities, whereas the p-values were 0.001 which indicated a statistical significance. Therefore, universities diversified their sources of income after enrolment of students decreased.

In conclusion, universities responded to drivers of agility in the following ways, private universities opened more campuses than public before 2017; added more certificate and diploma courses and carried out more promotion of the programmes. The universities did not lay off permanent employees after number of students in module II decreased.

4.6.2 Product Development Processes

In the questionnaire, product development processes was operationalized by statements that addressed source of initiative for commencing of the process of product development, approval stages, responsibility for the actions and the duration it took to launch. If top management initiated and controlled the process, university was likely to have used stage- gate method; hence not well positioned to cope with agility. If faculty members initiated and controlled the process, university was agile but the method (scrum) did not put into account checks and balances required by regulator. If top management and faculty collaborated in programme development by putting into account the market requirements and compliance, then a hybrid of stage-gate/ scrum method was used.

The statements regarding product development processes were based on a Likert scale with measurement range between one -strongly disagree to five- strongly agree. Means and one sample t-test were applied to determine the extent to which the respondents agreed or disagreed with the statements. An average mean of three was set where all the

results below were interpreted to mean a disagreement while those above meant agreement. The mean differences provided indicators of variation in responses, which aided in determining the type of product development method that each type of universities used.

Means and one sample t-test for product development processes by stage -gate method were determined and the results recorded on Table 4.51 below. The statements measured the indicators of stage-gate method such as control of the process by management, stages that the process went through, restrictions and any priority that was given to some faculties. Any special consideration of product development processes by a team or department for product was also measured.

The extent to which programme development was initiated by top management was rated with a mean score of 3.31 in public universities and 3.20 in private. The t-test statistics were 2.39 for public universities and 1.11 for private. The p-value for public universities was 0.02 and was less than significance level of 0.05; hence it was statistically significant implying that programme development was initiated by top management. The p-value for private universities was 0.27 which was greater than the significance level of 0.05 and was not statistically significant; hence programme development was not initiated by top management.

Table 4. 51: Descriptive Statistics for Product Development Processes by Stage Gate Method

Statement	Population			Mean			T-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Programme development is initiated by top management	28	13	41	3.31	3.25	3.30	2.39	1.10	3.30	.018	.274	.000
Programme development goes through various stages of approval before implementation	28	13	41	3.94	3.79	3.90	8.90	4.70	3.90	.000	.000	.000
There is a lot of lobbying by faculty before a new programme is approved	28	13	41	2.40	2.25	2.36	-5.23	-4.42	2.36	.000	.000	.000
Other faculties were given priority in programme development	28	13	41	2.12	1.94	2.07	-8.67	-6.47	2.07	.000	.000	.000
There is restriction by management when faculty wants to initiate a new programme	28	13	41	2.47	2.31	2.43	-4.59	-3.44	2.43	.000	.000	.000
Some programmes are stopped before going through all stages of approval	28	13	41	3.08	2.96	3.05	.71	-.20	3.05	.479	.842	.625
There is a department purely for programme development	28	13	41	2.26	2.92	2.43	-5.76	-.39	2.43	.000	.699	.000
There is a department purely for programme development	28	13	41	2.26	2.92	2.43	-5.76	-.39	2.43	.000	.699	.000

Source: Field data 2019

The statement that programme development goes through various stages of approval before implementation was on average 3.94 and 3.79 in public and private universities, respectively. One sample t-test statistics were, 4.70, and 3.90 for public and private universities, whereas the p-values for both were 0.000 which implied that programme development went through various stages of approval before implementation. With respect to the statement that there is a lot of lobbying by faculty before a new programme is approved; mean scores were 2.40 for public universities, 2.25 for private and 2.36 for combined universities. In addition, the t-test scores were -5.23 for public universities, and -4.418 for private. The results were significant since the p-values were less than significance level of 0.05. The conclusion was that faculties did not lobby for approval when they wanted to develop new programmes. Since the desire for each faculty is to develop programmes and grow, there is a possibility that there were other considerations that were put into account before management granted permission and lobbying did not necessarily compile the managers to change their decision.

The statement that some programmes were stopped before going through all stages of approval, had a mean of 3.08 in public universities and 2.96 in private. The t-test statistics was 0.710 for public universities and –0.200 for private and the p-values were 0.479 for public and 0.842 for private universities. Both p-values were greater than 0.05 hence, there was no statistical significance of the means which implied that some programmes were stopped before going through all the stages of product development processes.

Regarding the statements that there is a department purely for programme development, the means were 2.26 for public universities and 2.92 for private, whereas the t-statistics

were -5.76 and -.39, respectively. The p-value for public universities was 0.001 which was statistically significant and therefore, there was no department set purely for programme development. For private universities, the p-value of 0.699 was not statistically significant but given that the mean response of 2.92 was close to the average mean of three, it is possible that they had set a way of developing programmes.

The statement that a programme takes one to three years before launch had a mean of 4.388 in public universities and 3.58 in private universities. The p–values of 0.414 for public and 0.931 for private were not statistically significant hence; a programme took 1 to 3 years before launch. While university governing bodies had a mandate to choose degree programmes that needed to be developed, CUE had the ultimate say in permitting the launched (CUE, 2014).

Scrum method of product development was measured by use of indicators such as identification of source of initiation of the process, the period it took to develop the programme and participation of independent teams who are able to monitor the demand by the market. Table 4.53 below shows mean responses and one sample t-test statistics for each of the items.

The mean scores of the following statements as appearing on Table 4.53, were programmes are initiated by the faculty members after independent market research, had mean scores of 3.91 for public universities and 3.69 for private while the t-test scores were 8.65 and 3.79, respectively. Both types of universities had p-values of 0.001, which

implied a statistically significance hence programmes were initiated by the faculty members after independent market research.

On the statement that programme development takes a short time to be approved, the means were 2.99 for public universities and 3.21 for private. The results for t-test scores were 0.06 for public universities and 1.01 for private while the p-values were 0 .95 for public and 0.31 for private universities. Both of the p-values were greater than 0.05, hence the means were not statistically significant which inferred that programme development took a short time to be approved by the management.

Table 4. 52: Descriptive Statistics for Product Development Processes by Scrum Method

Statement	Population			Mean			t-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Programmes are initiated by the faculty members after independent market research	28	13	41	3.91	3.69	3.85	8.65	3.79	9.38	.000	.000	.000
Programme development takes a short time to be approved	28	13	41	2.99	3.21	3.05	-.06	1.01	.45	.954	.317	.652
Programme development is done by self-organized teams with frequent consultation with management	28	13	41	3.49	3.48	3.49	4.16	2.30	4.76	.000	.026	.000
Self-organized teams are in constant consultation with industry when developing programmes	28	13	41	2.83	3.02	2.88	-1.44	.10	-1.19	.152	.924	.237
Programme takes a short time (6months) to launch	28	13	41	2.78	2.85	2.80	-1.65	-.78	-1.83	.101	.437	.069

Source: Field data 2019

The item programme development is done by self-organized teams with frequent consultation with management, had a mean of 3.49 in public universities and 3.48 in universities private and the t-test scores were 4.16 and 2.30, respectively. The p-values were 0.000 for public universities and 0.03 for private. Both were statistically significant and therefore, programme development was done by self-organized teams with frequent consultation with management in both types of the universities. This implied that a hybrid of stage gate and scrum methods was used to develop products.

The statement that programme takes a short time (6 months) to launch, had means of 2.78, 2.85 and t-test values of -1.65 and -0.78 in public and private universities, respectively. The p-values of 0.00 and 0.04 were less than the significance level of 0.05; hence they were statistically significant meaning that programmes did not take a short time (6 months) to be launched.

4.6.3 Operational Processes

The statements that measured operational processes were constructed by use of Likert scale which aimed at establishing whether universities had operational processes that enabled them to be agile. The opinions that were expressed in the statements were quantified by values that ranged between 1.0=strongly disagree to 5.0= strongly agree. Means and one sample t-test statistics were determined, where 3.00 was set as the mean average and all the results below 3.00 were interpreted to mean a disagreement while those above 3.00, agreement. The mean scores, t-test results and p-values were presented as appearing in Table 4.53 below.

Table 4. 53: Descriptive Statistics for Operational Processes Descriptive Statistics for Operational Processes Descriptive Statistics for Operational Processes

Statement	Population			Mean			t-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
There is a documented framework that defines work culture of the university	28	13	41	4.11	3.85	4.05	18.03	5.63	17.41	.000	.000	.000
Each work process has a clearly defined input and output	28	13	41	3.92	4.15	3.97	14.44	10.29	17.56	.000	.000	.000
Each work process begins with a goal and ends with a performance indicator	28	13	41	3.67	3.75	3.69	8.01	5.563	9.70	.000	.000	.000
There is a work process catalogue listing systematic way doing work in accordance to university framework	28	13	41	3.83	3.79	3.82	11.82	5.95	13.20	.000	.000	.000
There is a work manual that defines principles, responsibilities, structures and work practices	28	13	41	3.88	3.83	3.86	13.89	5.79	14.61	.000	.000	.000
Work manuals distinguishes clearly operational and managerial processes	28	13	41	3.78	4.04	3.84	11.00	10.12	14.21	.000	.000	.000
Work guidelines distinguishes clearly how managerial and faculty processes interact	28	13	41	3.88	3.98	3.91	13.73	6.79	15.09	.000	.000	.000
Every work process is clearly described by tasks and activities in the work manuals	28	13	41	3.72	3.71	3.72	10.12	4.42	10.79	.000	.000	.000
Every work process is parametised by performance indicators	28	13	41	3.44	3.65	3.49	5.399	3.64	6.50	.000	.001	.000
New employees find work process in place	28	13	41	3.78	3.58	3.73	9.68	3.41	9.88	.000	.001	.000
New employees have to figure out how to do the work assigned	28	13	41	2.18	3.06	2.40	-8.54	.30	-6.43	.00	.769	.000
Employees are empowered to improve work flow	28	13	41	3.06	3.63	3.20	.62	4.51	2.58	.532	.000	.014
Work processes are fully automated	28	13	41	2.59	3.35	2.78	-4.99	2.12	-2.81	.00	.039	.014
All work processes are fully integrated by enterprise resource planning	28	13	41	3.10	3.48	3.20	1.10	3.22	2.44	.274	.002	.015

Authorized staff can access all information required to execute their jobs	28	13	41	3.86	4.23	3.95	9.56	12.31	13.09	.000	.000	.000
Work flows are student centred	28	13	41	3.48	4.31	3.69	5.15	12.64	8.73	.000	.000	.000
Students can access all their information in secure portals	28	13	41	3.42	4.08	3.59	4.44	7.45	7.12	.000	.000	.000
Students can be served efficiently through an integrated system	28	13	41	3.28	3.60	3.36	2.73	3.44	4.06	.007	.001	.000

Source: Field data 2019

Results for most of the statements on Table 4.53 above indicated a similar trend where the means in public universities ranged between 3.00 and 4.00 except for two. Therefore respondents agreed with what the statements sought to find out and were supported by p-values (<0.05) except for the two statements, which were new employees have to figure out how work is done and processes are fully automated.

The t-test results of the following statements had lower values compared to the others new employees have to figure out how to do the work assigned; employees are empowered to improve workflow; all work processes are fully integrated by enterprise resource planning; and students can be served efficiently through an integrated system. Other statements had t- test scores of between 9.00 and 18.00. The p-values were less than significance level of 0.05 which suggested that the means were statistically different from the assigned average mean of 3.00.

The results led to the conclusion that public universities had a documented framework that defined work culture which was interpreted in catalogues and manuals. The work processes were clearly defined by inputs, outputs, goals and performance indicators. Catalogues listed the order in which work was done and the work manuals defined principles, responsibilities, structures and work practices. They also provided work guidelines that distinguished operational processes from managerial processes. The processes were clearly described by tasks, activities and parametised by performance indicators.

The statements that referred to how staff was empowered to do their work led to the conclusion that authorized staff was able to access all information they required to execute their jobs but they were not empowered to improve the workflows. New employees found work in place and they did not have to figure out how it was performed. Regarding the workflows, public universities had not integrated all of their work processes however, the processes were student centred. Students were able to access all the information in secure portals and they were also served efficiently through an integrated electronic system.

The same procedures were followed in assessing the operational processes in private universities. Most of the operational processes were similar while others were different. Those that were similar implied that all private universities had a documented framework that defined work culture and described it fully in catalogues and manuals. However, unlike the public universities, private universities had empowered their employees to improve the work processes. Since new employees did not find all the work processes in place, they had to figure out how it was to be executed or improved. Students were served by a better fully integrated electronic system.

The differences between operational processes in public and private universities were explained by the need for private universities to be competitive in order to increase their performance which they did by serving students better through integrated electronic system. This required empowered employees who had the ability to alter work processes when rapid changes occurred in social, economic and political environments. Public

universities like any other public institution focused more on controlled work flows where employees performed work by following already established procedures. This finding concurred with that of Chacha (2004) who explained that private universities attracted many students despite higher fees because of poor systems in public universities.

4.6.4 Performance in Chartered Universities

Performance was conceptualized as the dependent variable and it was operationalized by use of Kaplan and Norton (1992) model. The three non-financial measures were adopted in the study as follows; consumer perspective referred to means of ensuring that customer expectations were met by the universities. Internal processes were interpreted to mean, the ways services were offered to staff and students. Growth and development perspective was taken as a measure of university progress. Likert scale was used to quantify the opinions and the measure on the scale ranged between one (strongly disagree) to five (strongly agree) and 3.00 was chosen as mean average to enable interpretation of one sample t-test scores. Where results were below three they were interpreted to mean a disagreement while those above agreement. Results of measurements were presented in Tables 4.54, 4.55 and 4.56 below.

As indicated in Table 4.54, the following were statistics for responses to various statements. The item, different modes of learning are offered as per request of students had a mean of 2.24 for public universities and 2.85 for private while the t-test scores were -7.95, -0.70 and p-values 0.00, 0.48, respectively.

Table 4. 54: Descriptive Statistics for Customer Perspective

Statement	Population			Mean			T-test			Sig. (2-tailed		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Different modes of learning are offered as per request of students	28	13	41	2.24	2.85	3.30	-7.95	-0.71	-6.75	.000	.478	.000
Students and staff complains are responded to quickly	28	13	41	3.19	3.35	3.90	1.85	2.09	2.63	.076	.042	.019
There is continuous request for feedback from students and staff on services	28	13	41	2.92	3.67	2.36	-0.77	4.28	1.26	.444	.000	.211
Degree programme are offered as per the needs of the students	28	13	41	2.61	3.44	2.07	-3.66	2.10	-1.8	.000	.041	.065
Curriculum is reviewed periodically to incorporate emerging knowledge	28	13	41	3.87	4.31	2.43	9.54	9.16	12.53	.000	.000	.000

PUB is public universities; PIV is private universities; and COM is combined

Source: Field Data 2019

The value for public universities was statistically significant, therefore, different modes of learning were not offered as per the request of the students while they were in private universities. Some private universities might have offered different modes of learning as per the request of the students while others did not because the mean of 2.85 was close to the assigned mean of 3.00.

Students and staff complain are responded to quickly item, had means of 3.19 in public and 3.35 in private universities. Public universities had t-test score of 1.85 and p-value of 0.07. Private universities had t-test score of 2.09 and p-values of 0.04. The p-value in public universities was not statistically significant and therefore, students and staff complains were quickly responded in some universities while in others they were not because the mean of 3.19 was close to the assigned mean of 3.00. Therefore, it was concluded that private universities responded fast enough when staff or students raised complains.

Concerning the statement that there is continuous request for feedback from students and staff on services, public universities had a mean of 2.92 and private universities 3.67. The t-test statistics were -0.77 for public universities and 4.28 for private universities, whereas the p-values were 0.44 and 0.001, respectively. The p-value for public universities was not statistically significant because it was greater than significance level of 0.05 hence students and staff were continuously requested for feedback in some universities while in others they were not because the mean of 2.92 was close to the assigned mean of 3.00. In private universities p-value was less than significance level of 0.05 which was

statistically significant implying that there was a continuous request for feedback from both students and staff.

The statement on degree programmes are offered as per the needs of the students, posted a mean for public universities as 2.61 and private universities as 3.44. The t-test statistics were 3.66 in public universities and 2.10 in private, with p-values of 0.00 and 0.04, respectively. The p-values for the two sectors were statistically significant because they were less than significance level of 0.05 and therefore, private universities offered degree programmes as per the needs of the students while public did not.

The statement, curriculum is reviewed periodically to incorporate emerging knowledge had means of 3.87 in public universities and 4.31 in private universities, with t-test scores of 9.54 and 9.16, respectively. The p-values for both public and private universities were less than the significant level of 0.05, meaning that both types of universities reviewed curriculum periodically to incorporate any new knowledge. In summary, private universities offered different modes of learning as per the needs of the students whereas public universities did not. Private universities requested for feedback from students and staff while public universities did not. Both public and private universities reviewed their curricula periodically.

The other perspective of performance that was measured was the extent to which universities aligned their internal processes in response to drivers of agility. The questionnaire contained the following statements information sharing with students and

staff is rapid through technology; both staff and students have quick access to services required; all complains and requests are executed as they are reported; there is a one-stop customer service desk for receiving inquiries and disseminating information; and there is real time access to academic related information by students and processing of students examinations and results can be tracked accurately. Table 4.55 below shows results of means and one sample t-test for the items.

The Table 4.55 shows the results of descriptive statistics for alignment of internal processes in response to drivers of agility. Information sharing with students and staff is rapid through technology statement had a mean of 3.67 in public universities and 4.19 in private. The t-test scores were 7.51 and 9.77, while the p-values were 0.001 for both universities. The means were, therefore, not statistically significant because the p-values were less than significance level of 0.05, hence universities shared information rapidly with staff and students.

Both staff and students have quick access to services required statement had means of 3.17 in public universities and 3.88 in private, with t- test scores of 1.73, and 7.68 while the p-values were 0.09 in public and 0.00 in private. The p-value in public universities was greater than 0.05 hence mean for the statement was not statistically significant. However, it was close to 3.00 which implied that staff and students in some universities could access services faster than others. The value for private universities had a statistical significance because p-value was less than significance level of 0.05 and therefore, both staff and students had quick access to services.

Table 4. 55: Descriptive Statistics for Alignment of Internal Processes

Statement	Population			Mean			T-test			Sig.(2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Information sharing with students and staff is rapid through technology	28	13	41	3.67	4.19	3.80	7.51	9.77	10.64	0.000	0.000	0.000
Both staff and students have quick access to services required	28	13	41	3.17	3.88	3.35	1.73	7.68	4.20	0.085	0.000	0.000
All complains and requests are executed as they are reported	28	13	41	2.87	3.31	2.98	-1.37	1.82	-0.24	0.172	0.075	0.806
There is a one-stop customer service desk for receiving inquiries and disseminating information	28	13	41	2.74	2.88	2.77	-2.46	-0.66	-2.45	0.015	0.513	0.015
There is real time access to academic related information by students	28	13	41	3.05	3.69	3.21	0.47	5.745	2.44	0.639	0.00	0.016
Processing of students exams and results can be tracked accurately	28	13	41	3.87	4.19	3.95	9.27	10.79	12.48	0.00	0.00	0.00

PUB is public universities; PIV is private universities; and COM is combined

Source: Field Data 2019

On the statement that all complains and requests are executed as they are reported had a mean of 2.87 in public universities and 3.31 in private universities. The t-test results were -1.37 for public and 1.82 whereas the p-values were 0.17 and 0.08, respectively. The p-values for both universities were greater than 0.05, hence the means were not statistically significant but they were close to the assigned mean of 3.00. This meant that in some public universities execution of complains and requests was fast while in others it was not. In private universities, complains and requests were executed as fast was possible.

The statement that there is real time access to academic related information by students had the following means 3.05 for public universities and 3.69 for private. The t-test scores were 0.47 and 0.75 while the p-values were 0.64 and 0.001 for public and private universities, respectively. The p- value for public was not statistically significant because it was above 0.05 and therefore, real time access to academic related information was possible in some universities while in others it was not because the mean was close to the assigned mean of 3.00. The p-value for private universities was statistically significant which meant that there was real time access to academic related information.

On the item that processing of student examinations and results can be tracked accurately posted the following results, the public universities had a mean of 3.87 and private 4.19. The t-test results were 3.95 for public universities and 9.27 for private, while the p-values for both universities were 0.001. This implied that the means were statistically significant and therefore, processing of student examinations and results could be tracked accurately

in all the universities. Concerning the alignment to internal processes, the following conclusion was drawn - private universities shared information faster than public universities, complains were received and executed faster and real time access for information through technology was also better. However, examinations processing and results were well tracked in public and private universities. The other aspect of performance that was assessed was growth and development and results are presented on Table 4.56 below.

Table 4.56 indicates that the means for the following statements ranged from 3.58 to 4.13 for both sectors. There is extensive collaboration with various industries; there is extensive collaboration and linkages with other universities and academic related institutions; new degree programmes are developed to reflect the needs of the market; curriculum is reviewed periodically to reflect emerging knowledge and technology that facilitates the processes and technology is frequently updated to suit the requirements of the students and staff.

Table 4. 56: Descriptive Statistics for Growth and Development

Statement	Population			Mean			T-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
There is extensive collaboration with various industries	28	13	41	3.39	3.58	3.44	4.134	4.10	5.53	0.000	0.000	0.000
There is extensive collaboration and linkages with other universities and academic related institutions	28	13	41	3.81	3.83	3.82	10.23	6.06	11.92	0.000	0.000	0.000
New degree programmes are developed to reflect the needs of the market	28	13	41	4.08	4.02	4.06	13.23	6.66	14.79	0.000	0.000	0.000
Curriculum is reviewed periodically to reflect emerging knowledge	28	13	41	3.90	4.13	3.95	9.10	8.12	11.67	0.000	0.000	0.000
There is continuous training of both administrative and academic staff	28	13	41	3.02	3.46	3.13	0.18	2.60	1.32	0.859	0.012	0.189
Technology that facilitates the processes is frequently updated to suit the requirements of the students and staff	28	13	41	3.53	3.90	3.62	5.74	6.11	7.87	0.000	0.000	0.000
Facilities are improved continuously to suit the requirements of the students and staff	28	13	41	2.79	3.88	3.06	-2.16	6.63	0.72	0.033	0.000	0.470

PUB is public universities; PIV is private universities; and COM is combined.

Source: Field data 2019

The p-values for all the statements were 0.00, which were less than 0.05 and indicated that the means were statistically significant. Therefore, public and private universities had extensive collaboration and linkages with various industries, universities and academic related institutions. They also developed new degree programmes that reflected the needs of the market, reviewed curriculum periodically to reflect the emerging knowledge and updated technology frequently to facilitate the processes that suited the requirements of the students and staff.

On the statements that there is continuous training of both administrative and academic staff, the mean scores were 3.02 and 3.46 for public and private universities, respectively. The t-test scores were 0.18 for public universities and 2.60 for private universities, whereas the p-values were 0.859 and 0.012, respectively. The p-value for public universities was greater than 0.05, hence the mean was not statistically significant meaning that training of both administrative and academic staff but since the means were very close to 3.00, it implied that some universities conducted the training continuously while others did not. The p-value for private universities was less than 0.05, hence there was a statistical significant and it was concluded that they conducted training continuously.

On the statement that facilities are improved continuously to suit the requirements of the students and staff, the means were 2.79 for public universities, 3.88 for private universities while the t-test results were -2.16 and 6.63, respectively. The p-values were 0.033 for public universities and 0.001 for private meaning that both were statistically

significant because they were less than significance level of 0.05. This implied that universities did not improve facilities continuously. However, the mean for private universities was above the assigned mean of 3.00 which was interpreted to mean that some facilities were improved continuously while others were not.

4.6.5 Trends in Performance of Chartered Universities

Trends in performance were included in the study for purpose of providing a general overview of performance of universities in Kenya for the period of five years**.** Data was collected in 2019, hence five years referred to the period between 2014 and 2019. The statements that measured the trends used a Likert scale. Opinions were assigned numbers that ranged between one (strongly disagree) to five (strongly agree). Results below three were interpreted to mean a disagreement while those above three agreement. Descriptive tests and one sample t-test were performed and results presented as shown in Table 4.57 below.

As shown on Table 4.57, the following statements had means that ranged between 3.35 and 4.02 in public and private universities. Enrolment in various programmes has increased over the last five years; number of grandaunts has increased over the last five years; more faculties/schools have been established over the last five years; and number of departments in the faculty has increased over the last five years.

Table 4. 57: Descriptive Statistics for Trends in Performance

Statements	Population			Mean			T-test			Sig. (2-tailed)		
	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM	PUB	PIV	COM
Enrolment in various programmes has increased over the last five years	28	13	41	3.69	4.02	3.78	7.14	8.19	9.72	0.00	0.00	0.00
Number of grandaunts has increased over the last five years	28	13	41	3.81	3.75	3.79	8.55	4.48	9.67	0.00	0.00	0.00
Recruitment of administrative staff has increased over the last five years	28	13	41	3.14	3.5	3.23	1.44	3.17	2.77	0.15	0.00	0.00
Recruitment of faculty staff has increased over the last five years	28	13	41	3.26	3.77	3.39	2.80	5.49	4.89	0.01	0.00	0.00
Support for staff willing to study or attend trainings and workshops has increased over the last five	28	13	41	2.63	2.88	2.69	-3.57	-0.67	-3.39	0.00	0.51	0.00
External funding for research has increased over the last five years	28	13	41	2.58	2.52	2.57	-3.95	-2.54	-4.71	0.00	0.01	0.00
Web metric ranking for the university has improved over the last five years	28	13	41	3.11	3.17	3.13	1.12	0.94	1.44	0.27	0.35	0.15
More faculties /schools have been established over the last five years	28	13	41	3.28	3.63	3.36	2.58	3.52	3.94	0.01	0.00	0.00
Number of departments in the faculty has increased over the last five years	28	13	41	3.35	3.69	3.43	3.04	4.28	4.55	0.00	0.00	0.00
Number of programmes in the faculty has increased over the last five years	28	13	41	3.55	3.92	3.64	-3.95	6.18	7.10	0.00	0.00	0.00
More campuses have been established over the last five years	28	13	41	2.58	2.42	2.54	1.12	-2.89	-4.68	0.00	0.01	0.00
information technology facilities in the faculty have increased over the last five years	28	13	41	3.75	4.1	3.84	2.58	11.59	13.67	0.00	0.00	0.00
Research output has increased over the last five years.	28	13	41	3.16	3.56	3.26	3.04	3.15	2.93	0.12	0.00	0.00

PUB is public universities; PIV is private universities; and COM is combined.

Source: Field data 2019

The t-test scores on table 4.57 showed that p-values were less than 0.05 which meant that the mean averages of the items were statistically significant. It was, therefore concluded that between 2014 and 2019, enrolment in various programmes, number of graduating, faculties/schools, departments and web metric ranking increased in the universities

On the item; recruitment of administrative staff has increased over the last five years had a mean of 3.14 in public and 3.50 in private universities. The t-tests results were 1.45, 3.17 while p-values were 0.15 and 0.00 for public and private universities, respectively. The p-value for public universities was not statistically significant. The mean of 3.14 was slightly greater than 3.00 which implied that recruitment of administrative staff increased in some universities while in others it did not. The p-value for private universities indicated a statistical significance which meant that recruitment of administrative staff increased between 2014 and 2019.

The item; support for staff willing to study or attend trainings and workshops has increased over the last five years had means of 2.63 in public and 2.88 in private universities. The t-test scores were -3.57, -0.67 while p-values were 0.00 and 0.51 for public and private universities, respectively. The p-value for public universities was statistically significant and, therefore support for staff willing to attend training and workshops decreased over the period. However, the results were not significant for private universities. The finding was consistent with report by Chacha (2004) which indicated that universities were not proactive in training of their manpower.

With respect to the statement external funding for research has increased over the last five years, the means were 2.58 in public universities and 2.52 in private. The t-test scores were -3.95, -2.55 while p-values were 0.00 and 0.01 respectively, which indicated that they were statistically significant. Therefore, external funding did not increase between 2014 and 2019 in both. On the statement that web metric ranking for the university has improved over the last five years, the results were as follows. Means 3.11 for public universities, 3.17 for private and the t-test scores were 1.12 and 0.94 with p-values of 0.27 and 0.35 respectively. The means were not statistically significant because the p-values were greater than significance level of 0.05 and therefore web metric ranking increased for universities over the period.

On the statement that more campuses have been established over the last five years, the statistics were as follows. Public universities had a mean of 2.58 and 2.42 for private. The t-test results were 1.12, -2.894 while p-values were 0.00 and 0.01, respectively. It was, therefore concluded that both private and public universities did not establish new campuses between 2014 and 2019. The regulatory body enforced quality measures which led to closure of campuses that did not meet the standards (CUE, 2014). Number of students transiting from secondary schools to university also decreased and most satellite campuses could not be sustained with unutilized capacity (Wanzala, 2018)

In conclusions between 2014 and 2019, enrolment in various programmes, number of graduates, faculties/schools, departments and web metric rankings increased in the universities. For the same period, recruitment of administrative staff increased in some

public universities while in others it did not. In private universities, recruitment of administrative staff increased. Support for staff that were willing to attend training and workshops decreased over the period in public universities while in private universities it decreased only for some. External funding did not increase in the five-year period in both public and private universities.

4.7 Diagnostic Tests

Analysis of data by use of linear regression models like any other parametric test depends on whether certain assumptions such as normality, linearity, non-collinearity and homoscedasticity are met (Field, 2009). Normality test allow for inferences about the population when a sample is the unit of observation. In most cases non-linear associations occur in social science studies (Osborne & Water, 2002) and consequently, linearity test is important in estimating relationship between independent and dependent variables. In the absence of it, underestimation causes type II error for one independent variable and an overestimation of type I error in instances where there are multiple independent variables.

Multicolinearity refers to relationships among independent variables which cause results instability when data is subjected to various parametric tests whereas homogeneity ensures that standard errors are not over or under-estimated. Collinearity of independent variables affects the extent to which the joint effect influences the outcome of the relationship between individual independent variables and the dependent variable (Hair et al., 2014). Ensuring that this assumption is not violated, errors in measurement, over or

under estimation of the significance of the variations and effect size of the sample are minimized.

Linear association among independent and dependent variables can be established by use of scatter plots (Hair et al., 2014.) or Pearson's correlation coefficient which is measured on a scale of -1 to +1. The closer the value is to 1, the stronger the relationship and the sign indicates the direction of the association. The study used Pearson's correlation coefficient and the results for public universities were presented on as shown in Table 4.58 below.

Table 4. 58: Correlation of Organizational Agility, Product Development Processes and Operational Processes on the Performance of Public Universities

			Performance	Organizational Agility	Operational Processes	Product Development
Public	Performance	Pearson Correlation	1			
		Sig. (2-tailed)				
		N	148			
	Organizational Agility	Pearson Correlation	.553**	1		
		Sig. (2-tailed)	.002			
		N	148	148		
	Operational Processes	Pearson Correlation	.575**	.347	1	
		Sig. (2-tailed)	.001	.070		
		N	148	148	148	148
	Product Development	Pearson Correlation	.505**	.604**	.140	1
		Sig. (2-tailed)	.006	.001	.478	
		N	148	148	148	148

Source: Field Data 2019

Data on Table 4.58 above shows that performance had a significant positive correlation of 0.553 with organizational agility; 0.505 with product development processes and 0.575

with operational processes, implying that linearity assumption was not violated. Similar Correlation test was performed for private universities and results presented on Table 4.59 below.

Table 4. 59: Correlation of Organizational Agility, Product Development Processes, Operational Process and Performance of Private Universities

			Performance	Organizational Agility	Operational Processes	Product Development
Private	Performance	Pearson Correlation	1			
		Sig. (2-tailed)				
		N	44	44		
	Organizational Agility	Pearson Correlation	-.484	1		
		Sig. (2-tailed)	.094			
		N	44	44		
	Operational Processes	Pearson Correlation	.754**	-.119	1	
		Sig. (2-tailed)	.003	.697		
		N	44	44	44	
	Product Development	Pearson Correlation	.720**	-.518	.342	1
		Sig. (2-tailed)	.005	.070	.253	
		N	44	44	44	44

Source: Field data 2019

The results on Table 4.59 above indicate that performance had an insignificant negative correlation of - 0.484 with organizational agility; a significant positive correlation of 0.720 with product development processes and 0.754 with operational processes. Linearity assumption was violated with respect to organizational agility but it was observed for the other variables.

After testing for linearity, collinearity tests were performed. Collinearity refers to correlations or multiple relationships among independent variables that affect beta

weights and cause errors in multiple regression analysis. Multicolinearity has been observed to produce a big variation on dependent variable in hierarchical linear regressions. Levels of multicolinearity in data sets can be assessed by use of tolerance, VIF and CIN values (Hair et al., 2014). Therefore, multicolinearity tests were performed on data and results presented on Tables 4.60 and 4.61 below. Table 4.49 presents tolerance and VIF for organizational agility, product development processes and operational processes.

Table 4. 60: Tolerance and Variance Inflation Factor for Organizational Agility, Product Development and Operational Processes

Variables	Collinearity Statistics	
	Tolerance	Variance Inflation Factor
Organizational Agility	0.946	1.057
Product Development	0.963	1.039
Operational Processes	0.949	1.054

Source: Field Data 2019

Data in Table 4.60 above indicates tolerance value for organization agility as 0.946, product development processes 0.963 and operation processes 0.949. The VIF values were 1.057 for organizational agility, 1.039 for product development processes and 1.054 for operational processes. The CIN was also computed to further assess multicollinearity of the independent variables and the results presented on Table 4.50 below.

Table 4. 61: Condition Index for Organizational Agility, Product Development, Operational Process and Performance

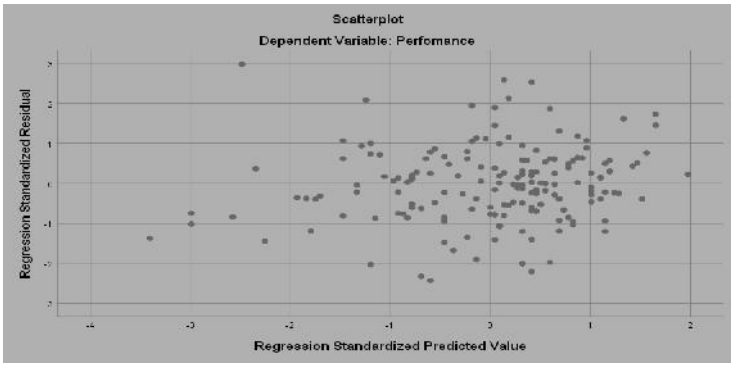
Collinearity Diagnostics [a]						
Model	Dimension	Condition Index Number	Variance Proportions			
			(Constant)	Organizational Agility	Product Development	Operational Processes
1	1	1.000	.00	.00	.00	.00
	2	12.595	.01	.91	.16	.05
	3	14.534	.00	.02	.50	.61
	4	22.162	.99	.07	.34	.34
a. Dependent Variable: Performance						

Source: Field data 2019

Table 4.61 above indicates that CIN values for all the variables ranged between one and 22 and all the pairs of proportional variances were below 1.0. Field (2009) explained that if tolerance value is less than one and VIF is less than 10, multicolinearity cannot cause a problem in linear regression analysis. If CIN is greater than 15, multicolinearity poses a tolerable problem but if it is greater than 30 a remedial action is necessary before linear regression analysis can be carried out. In conclusion, tolerance for the variables was below one; VIF values were less than 10; and CIN was less than 30. In addition, the variance proportions were less than one and therefore, there was no multicollinearity among organizational agility, product development processes and operational processes.

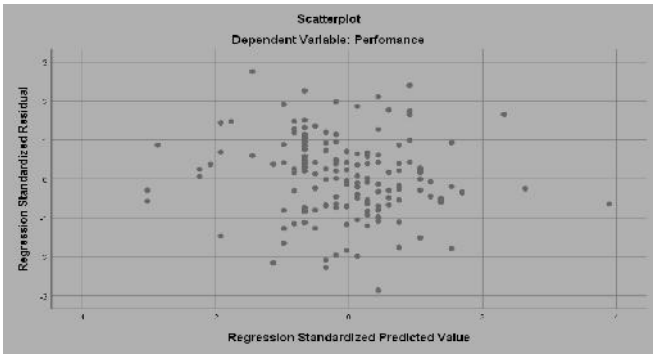
Homoscedasticity is another condition that that must be established so that the error term does not vary much as the value of independent variables change. The test for homoscedasticity accuracy is dependent on the nature of variability of the predictor and predicted variables at different levels. This variability is referred to as homogeneity when the change occurs by almost a similar factor (Field, 2009). Homoscedasticity can be established by use of scatter plots which appear rectangular in shape and within three standard deviations when the assumption is met. In this study, scatter plots were used to determine graphically whether this condition was met or not and plots of the same are as shown on Figures 4.1 to 4.3 below.

Figure 4. 1: Scatter Plot of Organizational Agility and Performance



Field data 2019

Figure 4. 2: Scatter Plot for Product Development and Performance

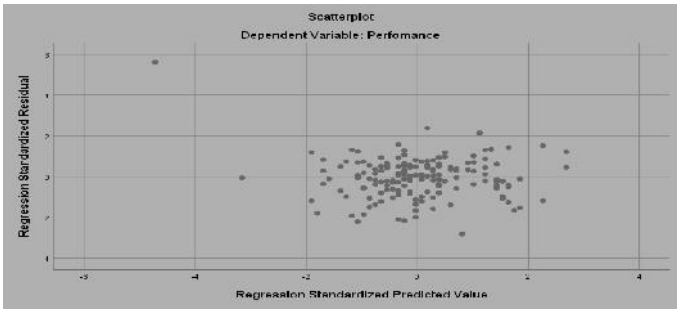


Source: Field data 2019

Scatter plots in Figures 4.1 and 4.2 above show that a pattern less shape formed within -3 to + 3 deviations which indicated that homoscedasticity assumption was not violated.

Similar graph was plotted for operational processes and performance and presented as shown on Figure 4.3 below.

Figure 4. 3: Scatter Plots for Operational Process and Performance



Source: Field data 2019

Graph on figure 4.3 show a pattern less shape lying within two standard deviations hence homogeneity was confirmed.

4.8 Regression Analysis of Variables

Linear and multiple regression analysis were conducted to predict the nature of relationship between organizational agility and performance of chartered universities, mediation of product development processes and moderation of operational processes to the relationship.

4.8.1 Organizational Agility in Public and Private Universities

Literature review indicated that organizational agility consists of three dimensions which were identified as drivers, enablers/capabilities and responses. Descriptive analysis of the results indicated a variation in response by public and private universities. Consequently, assessment of the data set was necessary to identify whether to analyse it or separate into public and private universities. Field (2009) explains that independent samples t-test can be used to determine if there is a significant difference between means of two samples which serves as an indicator of variance. This was done and results presented on Tables

4.62 and 4.63 below, where Table 4.62 shows the descriptive statistics for the data while Table 4.63 contains Levene's test of equality of variances and t-test statistics.

Table 4. 62: Means and Standard Deviations of Organizational Agility in Public and Private Universities

Statement	Type of University	Population	Faculties	Mean	Standard Deviation
Government drivers of organization of agility	Public	28	148	37.00	8.983
	Private	13	44	28.29	9.558
Market drivers of organizational agility	Public	28	148	18.59	4.793
	Private	13	44	19.19	5.689
Organizational enablers of agility	Public	28	148	34.06	6.918
	Private	13	44	39.02	10.430
Response to drivers of agility	Public	28	148	27.19	6.472
	Private	13	44	31.27	5.378
Organizational agility	Public	28	148	116.82	21.044
	Private	13	44	117.77	23.942

Source: Field data 2019

The two tables were interpreted simultaneously where Table 4.62 above presents the sector of the university, population, means and standard deviations of organizational agility and its dimensions. Table 4.63 below indicates Levene's test for equality of variances and t-test results for equality of means.

Table 4. 63: Independent Samples T-test for Organizational Agility in Public and Private Universities

Organizational Agility		Levene's Test for Equality of Variances	T-test for Equality of Means	
		Sig	Sig (2-tailed)	Mean difference
GDOA	Equal variances assumed	.011	.000	8.708
	Equal variances not assumed		.000	8.708
MOA	Equal variances assumed	.498	.477	-.597
	Equal variances not assumed		.515	-.597
OAE	Equal variances assumed	.845	.000	-4.965
	Equal variances not assumed		.003	-4.965
RDA	Equal variances assumed	.588	.000	-4.076
	Equal variances not assumed		.000	-4.076
OA	Equal variances assumed	.799	.794	-.951

	Equal variances not assumed		.807	-.951

GODA is government drivers of organizational agility; MOA is market drivers of organizational agility; OAE is organizational enablers of agility; RDA is response to drivers of agility and OA is organizational agility.
Source: Field data 2019

Table 4.63 above shows that government drivers of agility had a mean of 37.00 in public universities and 28.29 in private while standard deviations were 8.98 and 9.56, respectively. Numerically, the mean of public universities was higher than that of private universities and the standard deviations had a difference of about 1.5. Levene's test of equality of variances had a p-value of 0.011 which was less than significance level of 0.05 and therefore, equal variances was not assumed. The t-test score of 5.55 with a p-value of 0.001 (<0.05) was recorded and it was concluded that the means were statistically significant hence government drivers of agility affected public universities more than the private universities. The explanation was that the disbanded CHE closely monitored and regulated the private universities such that, when government instituted education regulatory measures for all universities, they were already compliant as opposed to the public universities. Government regulation as an agility driver was felt more in public universities when CUE replaced CHE and began monitoring compliance from 2013. Reduction of funding by government was also another source of rapid change.

Market drivers of organizational agility data had a mean score of 18.59 and a standard deviation of 4.79 in public universities while private universities had 19.15 and 0.69 respectively. The p-value on Levene's test was 0.498 (> 0.05) and therefore equal variances was assumed. The t-test result was -0.654 with a p-value of 0.515 which was greater than significance level of 0.05 and therefore the difference of the means was not

statistically significant. The interpretation was that public and private universities bore the same impact of market drivers of organizational agility possibly because of similar expectations of self-sponsored students. Public universities introduced module II programmes and admitted self-sponsored students who demanded value for their money comparable to those in private universities (Yiego, 2016). Similar findings by Bogt & Scapens (2009) and Chakrabarti (2002) about universities in UK and US respectively, indicated that students who paid for their education behaved differently compared to those who had sponsorship.

Enablers/capabilities of organizational agility had means of 34.06 and 39.02 with standard deviations of 6.92 and 10.43 in public and private universities respectively. Levene's tests outcome had a p-value of 0.845 which was greater than the significance level of 0.05 and therefore equal variances was assumed. T-test scores of -3.76 and p-value of 0.001 were obtained where the p-value was less than 0.05, which indicated a statistical significance between the means. Numerically, the mean for private universities was higher, which suggested that private universities had superior enablers/capabilities of organizational agility compared to public universities. These might have positioned the private universities to cope better with drivers of agility, a view that was supported by Chacha, (2004).

Means for responses to drivers of organizational agility were 27.19 for public universities and 31.27 for private while standard deviations were 6.47 and 5.39 respectively. Numerically, mean for a private university was higher but with a lower

standard deviation compared to that of the public universities. Levene's test had a p-value of 0.588 which was greater than 0.05 hence equal variances was assumed. The t-test score of -3.93 and p-value of 0.001 were recorded and since the p- value was less than 0.05 it meant that the difference was statistically significant. The mean for private universities was higher implying that the response to drivers of agility was better compared to that of public universities.

The overall mean for organizational agility was 116.82 for public universities with a standard deviation of 21.04. Private universities had a mean of 117.77 and a standard deviation of 23.94 while Levene's test provided a p-value of 0.799 which was greater than the significance level of 0.05 and therefore equal variance was assumed. The t-test score was -0.262 with a p-value of 0.794 (>0.05) and the conclusion was that the difference of means for public and private universities was not statistically significant. Consequently dimensions of organizational agility affected the universities in the same way, but individual dimension were contingent to each sector.

In conclusion, government drivers of agility affected public universities more compared to private universities. Private universities had different capabilities that aided them to react differently to the drivers of agility. However, market drivers of agility impacted on the universities in similar ways and as a result further analysis on the relationship between organizational agility and performance was conducted separately, consequently population (N) was 30 universities for public and 18 for private. The 28 universities that participated in the study in public universities corresponded to 148 faculties/school and

similarly 13 for private universities had 44 (Table 4.1 and 4.2) hence data for each for each category was considered as sufficient for regression.

4.8.2 Organizational Agility on the Performance of Public Universities

The relationship between organizational agility and performance of public universities was established by use of linear regression and results presented in Table 4.64 below.

Table 4. 64: Regression of Organizational Agility on Performance of Public Universities

Model	R	R Square	Adjusted R Square		
1	.553[b]	.306	.279		
ANOVA a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	810.985	1	810.985	11.464	.002[c]
Residual	1839.301	146	70.742		
Total	2650.286	147			
Coefficients a					
Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)	28.115			3.189	.004
Organizational Agility	.255		.553	3.386	.002
a. Whether the university is public or private = public					
b. Predictors: (Constant), Organizational Agility					
Dependent Variable: Performance					

Source: Field data 2019

Table 4.64 above shows R squared value of .306, which meant that organizational agility explained 30.6 percent of variation in performance. The overall model was significant because p-value was less than significance level of 0.05. Consequently, null hypothesis (H_{11}) which stated that there was no significant effect of organizational agility on performance of public universities was rejected and therefore, organizational agility influenced performance of chartered public universities. On individual results were significant because p-value was less than 0.05 (level of significance) and the predictive

equation was PUB = 28.115 + .255OA meaning that one unit increase in organizational agility led, on average to a change of .255 units in performance.

Description of organizational agility showed that student population in public universities increased because of government fee subsidy in secondary schools and Introduction of module II programmes. This increased revenue collection that enabled public universities to raise more funds to bridge the deficit from exchequer and open new campuses before 2017 (Yiego, 2016). Consequently positive relationship between organizational agility and performance was attributed to greater student enrolment.

4.8.3 Organizational Agility on the Performance of Private Universities

Relationship between organizational agility and performance of private universities was determined through similar tests as those used for public universities. The results obtained were presented in Table 4.65 below.

Table 4. 65: Regression of Organizational Agility on Performance of Private Universities

Model	R	R Square	Adjusted R Square		
1	.484b	.234	.164		
ANOVA a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	336.702	1	336.702	3.361	.094[c]
Residual	1101.963	42	100.178		
Total	1438.665	43	100.178		
Coefficients a					
Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)	98.953			5.568	.000
Organizational Agility	-.264		-.484	-1.833	.094
a. Whether the university is public or private = private					
b. Predictors: (Constant), Organizational Agility					
Dependent Variable: Performance					

Source: Field data 2019

The output of regression analysis on Table 4.65 above show that R squared was .234 but explanatory power of organizational agility on performance of private universities was insignificant because the overall model was not fit (P=0.094, >0.05). Therefore the null hypothesis (H_{12}), that there was no significant effect of organizational agility on the performance of private universities could not be rejected meaning that organizational agility did not affect the performance of private universities.

The insignificant effect of organization agility and performance of private universities was attributed to earlier findings that government drivers of agility did not affect private universities because they had complied with the policies (Mukhwana et al., 2016). They also had better enablers and response to drivers of organizational agility and when the opportunity to increase number of students arose, they responded by offering superior facilities and flexible modes of learning which attracted more students (Odhiambo, 2018). These might have counteracted negative influence of organizational agility on performance and explained the insignificant outcome of organizational agility on the performance contrary to the expectation.

4.8.4 Organizational Agility, Product Development Processes and Performance of Public Universities

Intervening effect of product development processes was assesed by applying four-step path analysis as proposed by Baron and Kenny(1986). Conditions for the test are that the indepedent variable and the mediator must be significant predictors of dependent variables . Independent variable should also be a significant predictor of the mediator. If the joint effect of the independent variable and mediator are insignificant after

controlling for the mediator, then a complete mediation occurs but if otherwise and effect of independent variable reduces, then partial mediation is said to occur. If Joint and individual variable effect are significant with increased contribution after controlling for the mediator, then no mediation occurs. MacKinnon, Warsi & Dwyer (1995) demostrated that in mediation test through path analysis, the direct and indirect paths are equal in presence of a suspect mediator variable which does not cause any effect and that standardized coefficients are more reliable in computation of the net outcome. The mediation test was then determined by assessing the level of significance and the magnitudes of direct and indirect effect.

Step one had been determined where organizational agility was found to be a significant predictor of perfomance where it accounted for 30.6 percent variance and a standardized beta coefficient of .553 (Table 4.64). Step two was regression of organizational agility on product development processes and in step three product development processes was regressed on performance, controlling for organizational agility. Step four involved the joint effect of product development processes and organizational agility on performance. Reasults for step one (direct effect) and three (indirect effect) were compared to assess the difference and consequently determine whether full, partial or lack of mediation occurred.These steps were determined and results presented as shown in Table 4.66 below.

Table 4. 66: Mediation of Product Development Processes on Organizational Agility and Performance of Public Universities

Model 1	R	R Square	Adjusted R Square
1	.604[b]	.364	.340

2	.505b		.256	.227	
3	.594b		.352	.300	
ANOVA a					
Model 1	Sum of Squares	df	Mean Square	F	Sig.
Regression	254.885	1	254.885	14.906	.001[c]
Residual	444.589	145	17.100		
Total	699.475	147			
Coefficients a					
Model 1	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)	25.362			5.852	.000
Organizational Agility	.143		.604	3.861	.001
ANOVA b					
Model 2	Sum of Squares	df	Mean Square	F	Sig.
Regression	677.197	1	677.197	8.924	.006[c]
Residual	1973.089	145	75.888		
Total	2650.286	147			
Coefficients b					
Model 2	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)	16.324			1.177	.250
Product development	.984		.505	2.987	.006
ANOVA c					
Model 3	Sum of Squares	df	Mean Square	t-value	Sig.
Regression	933.719	2	466.860	6.799	.004c
Residual	1716.567	145	68.663		
Total	2650.286	147			
Coefficients c					
Model 3	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)					
Organizational Agility	.525		.390	1.119	065
Product development	.180		.270	1.337	.193
a. Whether the university is public or private = public					
b. Predictors: (Constant), Organizational Agility; Product development					
Dependent Variable: Performance					

Source: Field data 2019

Table 4.66 above shows the results of path analysis for the test of mediation for product development processes on the relationship between organizational agility and performance of public universities. Model 1 shows that organization agility was a significant predictor of product development processes (p-value; 0.006 <0.05). Model two indicated that product development processes was a significant predictor of performance controlling for organizational agility (ß=0.505).

Model 3 was the joint variance of performance that was accounted for by product development processes and organizational agility. The R squared was 0.325 implying that 32.5 percent of variance was explained by product development processes (ß=0.270) and organizational agility (ß=0.390). Overall, the model was significant since p-value was less than 0.05 – level of significance. On individual significance, both organizational agility and product development processes were insignificant (p-value, > 0.05). In step one; organizational agility explained 30.6 percent variance in performance with a contribution of 0.553 while in presence of product development it increased marginally to 32.5 percent while individual contribution reduced and became insignificant because the p-values were greater than significance level of 0.05.

Magnitudes of direct effect of organizational agility on performance and indirect effect through product development processes were assessed as suggested by MacKinnon et al. (1995). If direct effect is C then indirect effect is C'. If Effect of organizational agility on product development processes is A and effect or product development processes on performance is B then, indirect path is-; C=C'+A*B -; C=.390 + .505*.270, C=0.526. In

conclusion, the variance in performance through the indirect path was 0.526 while through the direct path was 0.553 implying that there was partial mediation by product development processes.

Therefore, null hypothesis (H_{21}) was rejected and consequently, product development processes intervened on the relationship between organizational agility and performance of public universities. Model 2 shows that product development accounted for 25.6 percent of variance in performance with a predictive equation of PUB=16.324 +.984PD implying that for every unit of product development, performance increased by 0.984 units. Intervening effect of product development processes on relationship between organizational agility and performance of private universities was not done because the model that tested the relationship between organizational agility and performance was not significant.

Results of mediation test implied that public universities react to organizational agility by developing products (degree programmes) but not as fast as was necessary. This finding concurred with Amimo (2012) that curricula offered by many universities in Kenya was not meeting the market expectations and most graduates lacked prerequisites skills required by job market. The probable explanation was that most universities that were affected by agility were the older ones, established when the demand for higher education was high. Also the specialized programmes like medicine, education, business among others continued to attract many students despite the changes in the job market (Mukhwana et al., 2016).

The partial mediation also meant that there were other factors besides availability of a product that influenced performance. Marvin (2003) explained that there are various factors that strongly influence performance of universities compared to business firms. These include fuzzy unclear and undifferentiated goals as well as labour intensity that consist of diverse professionals who make it unnecessarily complicated to achieve objectives. There is also inherent conflict between faculty academic staff and administrators where professors place high value on autonomy and academic freedom.

Universities also operate in complex rapidly changing environment where mass education, state funding reduction, distance learning and capital equipment cost are some of the components that persistently and strongly impact on programs, delivery systems and internal relationships. Universities in Africa faced a serious funding problem as observed by Olweny (2011) whose study findings concluded that private universities were facing challenges of inability to fund programmes in that did not attract many students because they relied on tuition fees to meet costs such as staff salaries.

The older universities were also founded on rigid collegium model where knowledge was created and imparted for the sake of it (Lazega, 2005). Based on propositions of collegial theory (Baldrige, 1971) and findings by OECD (2003), prestige and performance of scholars was base their on accomplishment in research and publication which encouraged specialization on a certain line of knowledge. However, fast programme development requires flexibility and at times learning of new knowledge which old scholars might not have accommodated.

The same results from private universities were consistent with failure to reject null hypothesis (H_{12}) which showed that agility did not affect performance of private universities. There is a possibility that these universities developed more programmes in response to changes that were occurring. Mukhwana et al., (2016) referring to state of Kenyan universities observed that many developed programmes that were market driven with the aim of increasing revenue even when they did not have adequate capacity to offer them.

4.8. 5 Organizational Agility, Operational Processes and Performance of Public Universities

The test of moderation suggested by Baron & Kenny (1986) was conducted to determine whether operational processes moderated the relationship between organizational agility and performance of public universities. The test involves hierarchical regression analyses where the independent variable and the suspected moderator must have a significant variance on the dependent variable. Standardised scores of independent variable and the moderator are then multiplied to create a new variable which is jointly regressed on the dependent variable. If the interaction term is found to be significant while the coefficients of the other variables become insignificant, moderation is said to occur.

The moderation test conducted yielded results in Table 4.67 below which shows that the joint effect of organizational agility and operational processes accounted for 33.2 percent of performance where R squared was 0.332. Model 1 was significant since p-value was less than significance level of 0.05. The joint relationship pointed to an increase in contribution to variance explained by organizational agility from 14 percent to 33.2

percent. When the interaction term of organizational agility and operational process was introduced, the variance increased further to 40.6 percent but individual contribution of organization agility and operational processes became insignificant.

The overall model was significant (p-value, <0.05) and therefore, the null hypothesis (H_{31}), which stated that operational processes did not moderate the relationship between organizational agility and performance of public universities, was rejected with respect to operational processes.

Table 4. 67: Regression of Organizational Agility and Operational Processes on Performance of Public Universities

Model	R	R Square	Adjusted R Square
1	.687b	.472	.430
2	.757b	.573	.520

ANOVA a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1252.205	2	626.103	11.196	.000c
Residual	1398.081	145	55.923		
Total	2650.286	147			

Coefficients a				
Model 1	Unstandardized Coefficients	Standardized Coefficients	t-value	Sig.
(Constant)	-1.669		-.127	.900
Organizational Agility	.186	.402	2.597	.016
Operational process	.611	.435	2.809	.010

ANOVA b					
Model 2	Sum of Squares	df	Mean Square	F	Sig.
Regression	1518.622	3	506.207	10.735	.000c
Residual	1131.664	144	47.153		
Total	2650.286	147			

Coefficients b				
Model 2	Unstandardized Coefficients	Standardized Coefficients	t-value	Sig.
(Constant)	172.429			.029
Organizational Agility	-1.351	-2.927	-2.079	.048
Operational Processes	-2.213	-1.576	-1.837	.079
AO*OP	.025	4.458	2.377	.026

a. Whether the university is public or private = public

b. Predictors: (Constant), AO*OP, Organizational Agility, Operational Processes
Dependent Variable: Performance

Source: Field data 2019

On individual significance organizational agility and operational processes were insignificant and the predictive equation was PUB = 172.429 + 4.458O*OP, meaning that if organizational agility, operational processes and interaction term of organizational agility and operational processes were increased marginally, performance in public universities would, on average go up by 4.458 and therefore both organizational agility and operational process combined influenced performance. Moderation effect of operational processes in private universities was not examined because the model that tested the relationship between organizational agility and performance was not significant.

4.8.6 Organizational Agility, Product Development Processes, Operational Processes and Performance of Universities

The fourth objective was to determine the joint effect of organizational agility, product development processes and operational processes on the performance of universities. Since a difference was noted in descriptive statistics of independent variables of public and private universities, independent samples t-test was conducted to identify if there was a significant difference in performance of the two sectors. Non-financial measures of performance namely customer satisfaction, internal processes, growth and development (Kaplan & Norton, 1992) were used as constructs of dependent variable. Results obtained were presented as shown in Tables 4.68 and 4.69 below both of which were used simultaneously to interpret the findings.

Table 4. 68: Means and Standard Deviations for Performance in Public and Private Universities

Perspectives	Type of University	Population	Faculties	Mean	Standard Deviation
Customer perspective	Public	28	148	14.83	3.762
	Private	13	44	17.63	4.761
Alignment to internal process	Public	28	148	19.37	4.152
	Private	13	44	22.13	3.846
Growth and development	Public	28	148	24.53	4.522
	Private	13	44	26.79	4.851
performance	Public	28	148	58.72	10.662
	Private	13	44	66.54	11.735

Source: Field data 2019

Table 4.68 above presents the sector of the university, study population, means and standard deviations of the responses to the statements that sought to establish performance in the universities. Table 4.69 indicates Levene's test results for equality of variance and means.

Table 4. 69: Independent Samples T-Test for Public and Private Universities

Performance		Levene's Test for Equality of Variances	T-test for Equality of Means		
		Sig.	T-Value	Df	Sig (2-tailed)
Customer perspective	Equal variances assumed	.011	-4.154	39	.000
	Equal variances not assumed		-3.696	67.640	.000
Alignment to internal process	Equal variances assumed	.498	-4.056	39	.000
	Equal variances not assumed		-4.215	86.331	.000
Growth and development	Equal variances assumed	.845	-2.940	39	.004
	Equal variances not assumed		-2.839	76.072	.006
Performance	Equal variances assumed	.588	-4.294	39	.000
	Equal variances not assumed		-4.092	74.569	.000

Source: Field data 2019

Customer perspective construct in public universities had a mean of 14.83 and standard deviation of 3.76 while private universities had 17.63, and standard deviation of 4.76. Numerically the mean for private universities was higher than that of public universities and the dispersion of responses was also slightly higher. The p-value on Levene's test for equality of variances had a p-value of 0.011 which was less than significance level of 0.05 and therefore equal variance was not assumed. The t-test score was -3.696 with a p-value of 0.001 ($P< 0.05$) hence the means were significantly different and private universities performed better in customer satisfaction compared to public universities. The dispersion in responses in each category implied that the level of customer service varied from one university to another.

Alignment to internal process had a mean of 19.37 and standard deviation of 4.152 in public universities, whereas in private it was 22.13 with a standard deviation of 3.846. Levene's test of equality of variance had a p-value of .498 which was greater than the significance level of 0.05 and therefore, equal variances was assumed meaning that responses did not deviate significantly from the means. The t-test value of -4.056 and p-value of .001 were recorded which indicated that means for the two samples were statistically significant. Private universities had a higher mean; therefore alignment of internal processes to the entire operational process was better compared to that of public universities.

Growth and development had mean values of 24.53 and 26.79 whereas standard deviations were 4.522 and 4.851 for public and private universities, respectively.

Levene's test of equality of variances had a p-value of 0.845 (> 0.05) and therefore equal variance was assumed. The t-test results had a value of -2.940 and a p-value of .004 which was less than the significance level of 0.05. Consequently, the means were not statistically significant and since the mean for private universities was higher, it was deduced that they posted better performance in growth and development perspective.

After the means were established and interpreted, similar procedure was followed to assess the difference for overall performance. Public universities had a mean of 58.72 and standard deviation of 10.662 while private had 66.54 and standard deviation of 11.735. The standard deviations for the two types of universities were large which meant that performance for individual universities varied. The standard deviations between public and private universities had a difference of about one standard deviation which implied that the variation from the mean was relatively similar. Levene's test for equality of variances was established and a p-value of 0.588 obtained was greater than significance level of 0.05 and therefore the variances were not statistically significant indicating that equal variance was assumed. The t-test result that determined equality of means was -4.294 and p-value of .001 (<0.05) consequently, means were statistically significant. The overall mean for private universities was higher suggesting that they performed better than public universities. In conclusion, independent samples t-test results indicated that there was a significant difference in performance of public and private universities hence analysis of joint effect for the combined was not supported.

4.8.7 Organizational Agility, Product Development Processes, Operational Processes and Performance of Public Universities

In this section, linear regression of joint effect of organizational agility, product development processes and operational processes on performance of the public universities was conducted and results presented on Table 4.70 below. The model summary had R squared of .537 which implied that 53.7 percent of variance in performance of public universities was explained by joint effect of organizational agility, product development processes and operational processes. The F-value was 9.283 and p-value of 0.000 hence the overall model was significant and the null hypothesis (H_{41}) was rejected. On the individual significance, all the variables were insignificant (>0.05), except operational processes.

Table 4. 70: Joint Effect of Organizational Agility, Product Development Processes, and Operational Processes on the Performance of Public Universities.

Model	R	R Square	Adjusted R Square		
1	.733b	.537	.479		
ANOVA a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1423.516	3	474.505	9.283	.000c
Residual	1226.770	144	51.115		
Total	2650.286	147			
Coefficients a					
Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)	-19.215			-1.213	.237
Organizational Agility	.092		.193	1.083	.289
Product development	.623		.176	1.831	.080
Operational processes	.646		.456	3.096	.005
a. Whether the university is public or private = public and private combined					
b. Predictors: (Constant), Organizational Agility					
Dependent Variable: Performance					

Source: Field data 2019

The aforementioned discussion indicated that for every one unit change in operational processes, performance would go up by .645 units. Therefore operational processes had

the greatest contribution to performance, while organizational agility and product development processes had contribution through other paths that were not investigated in the study.

4.8.8 Organizational Agility, Product Development Processes, Operational Processes and Performance of Private Universities

Similar to the test of joint effect of the variables on performance of public universities, the same was repeated for private universities and results indicated as shown on Table 4.71 below. The joint effect of organizational agility, product development processes and operational processes explained 83.9 percent of the variance and only 16.1 percent was attributed to other factors beyond the scope of the study. The overall model was significant (p-value, <0.05) and therefore, the null hypothesis (H_{42}) was rejected. Consequently, combined effect of organizational agility, product development processes and operational processes influenced performance of private universities.

On individual significance, the constant and organizational agility were not significant because p-values were more than 0.05 and the predictive equation was PIV = .767PD + .641OP meaning that a unit change of product development processes increased performance, on average by .767 units of product development and .641 units of operational processes.

Table 4. 71: Regression of Organizational Agility, Product Development Processes and Operational Processes on the Performance of Private Universities

Model	R	R Square	Adjusted R Square
	.916c	.839	.785

ANOVA a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1206.730	3	402.243	15.609	.001d
Residual	231.936	40	25.771		

Total	1438.665	43			
Coefficients a					
Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
(Constant)	2.991			.144	.888
Organizational Agility	-.108		-.198	-1.261	.239
Product development	.767		.417	2.517	.033
Operational processes	.641		.588	4.115	.003
a. Whether the university is public or private = private					
b. Predictors: (Constant), Product development, Organizational Agility and operational processes					
Dependent Variable: Performance					

Source: Field data 2019

Therefore, the greatest change in performance was attributed to operational processes which had the highest standardized coefficient of .588 followed by product development processes at 0.417.

4.9 Discussion of the Results

Kenyan university education faced rapid changes over the years that cumulatively led to numerous challenges and opportunities in the 20^{s} (Wanzala, 2018). This motivated the study that proposed that organizational agility, product development processes and operational processes had a relationship with the performance. Four objectives and associated hypotheses were formulated with the aim of determining the nature of association between independent variables and dependent variable.

4.9.1 Organizational Agility and Performance of Chartered Universities in Kenya

The first objective and the corresponding null hypothesis (H_{11}, H_{12}) sought to determine whether organizational agility had any contribution to the performance of chartered public and private universities. Organizational agility contributed 30.6 percent to

performance of public universities where a one unit increase led, on average to a change of 0.255 units of performance and the null hypothesis (H_{11}) was rejected. However, a negative insignificant contribution of 23.4 percent (R squared=.234) observed for to private universities led to failure to reject null hypothesis (H_{12}).Therefore organizational agility influenced performance of public universities and not for private universities.

The resultant mixed results concurred with empirical studies elsewhere in the world which explained that agility is a multifaceted concept that has diverse dimensions. Huang & Li (2008) studied on tracking of the evolution of research issues on agility with the aim of determining what was known and what needed to be discovered and Wendler (2013) on agility from different perspectives, arrived at similar conclusion. The outcomes were also supported earlier findings by Goldman et al. (1995), Sharifi & Zhang (1999) and others that followed such as Sajdak (2015) whose studies concluded that the impact of agility on various manufacturing firms depended on type of industry, environment, contextual circumstance, time interval and the triggering events.

Agility studies on challenges affecting university education in Kenya by Nganga, (2010), Nyangau, (2012) and Odhiambo (2018) described the impact on universities as having an indirect association with high demand that did not match the corresponding investment in facilities, manpower and government funding. Data from Kenya National Bureau of Statistics (2015) showed that, student admissions to universities rose by 213 percent in the period between 2009/2010 and 2014/2015 academic years. The numbers were enormous in comparison to the resources needed to support them and it is possible that

the sudden increase instigated the challenges and opportunities that led to establishment of satellites campuses whose quality standards did not meet the compliance criteria (CHE, 2014).

The contributions to the body of knowledge concerning objective one was that organizational agility created opportunities in university education in Kenya, contrary to the believe that it was the source of numerous problems witnessed in public universities. It also does not affect firms that are adaptable to rapid change and its influence on service industries is similar to manufacturing firms. The study also provided a quantitative approach that led to generalization of findings as opposed to the studies reviewed whose methodologies and designs were exploratory, qualitative and or case studies.

4.9.2 Organizational Agility, Product Development Processes and Performance of Chartered Universities in Kenya

Objective two and null hypothesis ($H_{21,}$ H_{22}) aimed at ascertaining whether there was a mediation effect of product development processes on organizational agility and the performance of universities. Mediation test (Baron & Kenny, 1986) showed that the overall model was significant but individual contributions were insignificant. Conclusion drawn was that product development processes did not mediate on the relationship between organizational agility and performance of public universities. However, from the regression model of product development processes on performance, 25.6 percent (R squared = .256) was accounted for by product development processes.

The finding was well supported by propositions of collegial theory (Lazega, 2005) which suggested that the origin of universities was based on collegium ideology, where scholars created knowledge for the sake of it, with a motivation of contributing to the well-being of the society. This implied that degree programmes were created after a long assessment of a phenomenon and its impact on the society rather than flexibility and adaptation to an emerging agile factor. Similarly, studies on relevance of degree programmes offered in Kenyan public universities showed that a majority of them, did not reflect the social and economic status of the country (Kinyanjui, 2007: Amimo, 2012) which further suggested that programme development was not necessarily triggered by rapid changes in the environment. Durkin et al. (2016) investigating on product development in six universities in UK -to determine whether the fuzzy front end of product development processes was supported by innovation and whether it was market oriented, found that innovation originated from staff, programme directors assumed responsibility of development, faculty approved the programmes in principle and development followed a formal process. The finding attested to the fact that collegium orientation existed in UK universities where scholars took time to assess uncertain environmental circumstance before developing a new curriculum. Mediation effect was not tested for private universities because organizational agility on performance was not statistically significant.

4.9.3 Organizational Agility and Operational Processes on Performance of Chartered Universities in Kenya

Objective three and null hypothesis ($H_{31,}$ H_{32}) was on moderation effect of operational processes on organizational agility and the performance of public and private universities.

Joint effect of organizational agility and operational processes provided an increase of 33.2 percent (R^2=0.332) and on introduction of the interaction term the variance increased to 40.6 percent with individual contribution of.186 and .611. Therefore, if organizational agility, operational processes, and interaction term of organizational agility and operational process increased marginally, performance in public universities would, on average go up by 0.158, 0.683, and 6.019 respectively. This indicated that operational processes moderated the relationship between organizational agility and performance of public universities significantly and null hypothesis (H_{31}) was rejected. Null hypothesis (H_{32}) was not tested with respect to private universities.

The finding affirmed empirical research by Seethamraju (2006) who investigated on the influence of enterprise systems on business agility in manufacturing industries in Australia and found that an efficient business process enabled a firm to achieve quality and lower costs while observing speed and flexibility. Similarly, Seethamraju and Seethamraju (2009) found that standardized repetitive processes made a manufacturing system efficient and contributed to appropriate response to drivers of agility. The large variance of contribution of organizational agility and operational processes to the performance of public universities suggested that greater focus was required on improving operational processes in order to post higher performance in presence of agility.

4.9.4 Joint Effect of Organizational Agility, Product Development Processes and Operational Processes on Performance of Chartered Universities in Kenya

The proposed fourth objective and null hypothesis ($H_{41,}$ H_{42}) was to determine the joint effect of organizational agility, product development processes, operational processes and performance of universities. The analysis generated R squared of 0.537 which implied that 53.7 percent of variance in performance of public universities was explained by the joint effect of variables. The model was significant with a p-value of less than 0.05 but contribution of individual variables was insignificant except for operational processes which explained 0.456 of performance for every unit increase. Further, 83.9 percent variance in performance of private universities was explained by the same joint effect. Similar to public universities, the greatest change in performance was attributed to operational processes which had a standardized coefficient of 0.588 while contribution by other variables was insignificant and consequently null hypotheses ($H_{41,}$ H_{42}) were rejected.

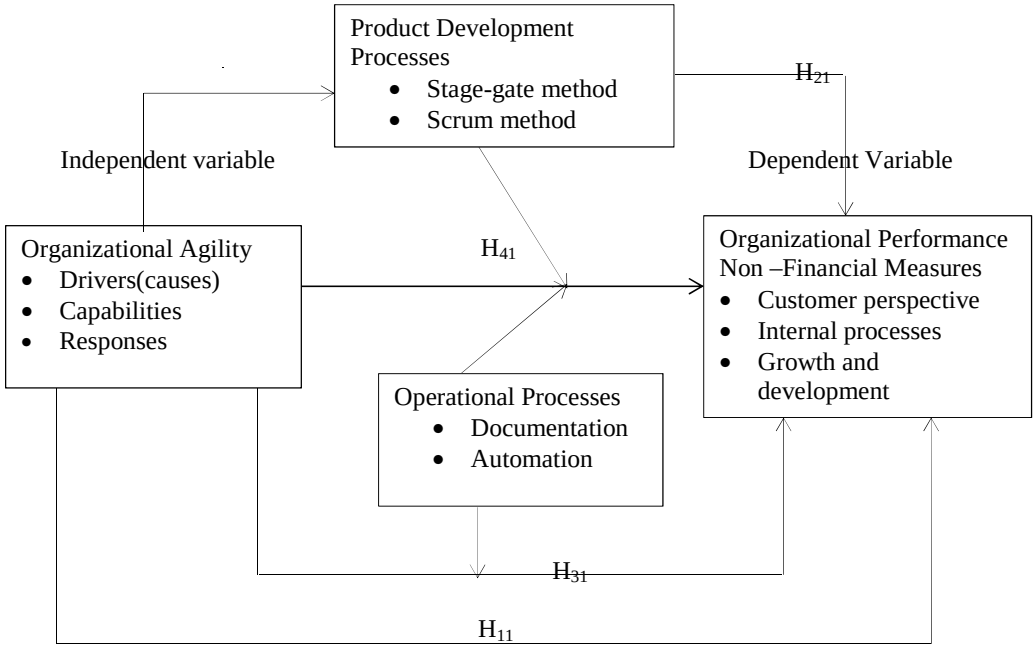
The contribution of the study regarding objective four is that the joint effect of the variables influenced performance of chartered universities in Kenya. However, operational processes had the greatest influence compared to the organizational agility and product development processes. Since the overall model for public universities was significant and explained a big variance in performance with insignificant individual contribution of the other variables implied that, there were other paths that they interacted with operational processes apart from what was hypothesised in the study.

Private universities however were well prepared to deal with any negative effects of agility possibly by taking advantage of opportunities because the model explaining organizational agility was insignificant. This finding supported a report by Chacha (2004) which explained that private universities attracted more students despite charging higher fees. It's possible that their better facilities resulted to efficiency and they possessed degree products sought after. Contribution of operational processes in public universities was perhaps related to introduction of module (II) programmes and self-sponsored students compelled the universities to focus more on operational processes for purpose of improving service delivery.

4.10 Summary of Findings

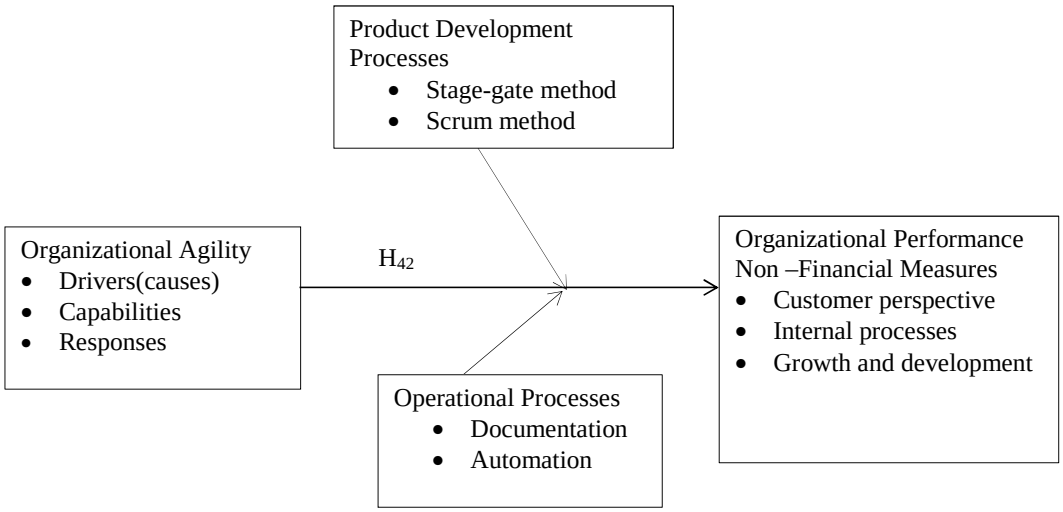
The broad objective of the study was to establish the relationship between organizational agility, product development processes, operational processes and performance of chartered universities in Kenya. Product development processes was hypothesised as having an intervening relationship and operational processes as a moderator. In addition, organizational agility, product development processes and operational processes were hypothesized as having a joint effect on performance. From the results, conceptual framework for public was retained as proposed but that of private universities was revised as presented in Figures 4.4 and 4.5 below. Likewise, summary of the objectives, hypothesis, tests and results are presented on Table 4.72.

Figure 4. 4: Conceptual Framework for Public Universities



Conceptual framework on Figure 4.4 above presents the findings of the study with respect to public universities. All the null hypotheses (H_{11} $H_{21,}$ H_{31} , H_{41}) were rejected and a conceptual framework was retained.

Figure 4. 5: Revised Conceptual Framework for Private Universities



Regarding proposed null hypothesis for private universities, there was failure to reject H_{12} while H_{22}, H_{32} were not tested and H_{42} was rejected. The original conceptual framework was revised as shown on Figure 4.5 above.

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Table 4. 72: Summary of Objectives, Hypothesis, Statistical Tests and Decisions

Objectives	Null Hypotheses	Type of University	Decision
Determine the relationship between organizational agility and the performance of public universities	Organizational agility does not affect the performance of public universities	Public	Rejected the null hypothesis
Determine the relationship between organizational agility and the performance of chartered universities	Organizational agility does not affect the performance of private universities	Private	Failed to reject null hypothesis
Determine intervening effect of product development processes on the relationship between organizational agility and the performance of chartered universities	Product development processes do not intervene on the relationship between organizational agility and the performance of public universities	Public	Reject the null hypothesis
Determine the intervening effect of product development processes on the relationship between organizational agility and the performance of chartered universities	Product development processes do not intervene on the relationship between organizational agility and the performance of private universities	Private	Test not tested
Determine the moderating effect of operational processes on the relationship between organizational agility and the performance of chartered universities	Operational processes do not moderate the relationship between organizational agility and the performance of public universities	Public	Rejected the null hypothesis
Determine the moderating effect of operational processes on the relationship between organizational agility and the performance of chartered universities	Operational processes do not moderate the relationship between organizational agility and the performance of private universities	Private	Test not conducted
Determine the joint effect of organizational agility, product development processes and operational processes on the performance of chartered universities	Organizational agility, product development processes and operational processes do not jointly affect the performance of public universities	Public	Rejected the null hypothesis
Determine the joint effect of organizational agility, product development processes and operational processes on the performance of chartered universities	Organizational agility, product development processes and operational processes do not jointly affect the performance of private universities	Private	Rejected the null hypothesis

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the findings of the study, contribution, conclusion, recommendations, limitations and suggestions for further research. The study was guided by four objectives where the first was to determine the relationship between organizational agility and performance of chartered universities in Kenya; second establish relationships among organizational agility, product development processes and performance of chartered universities in Kenya; third establish relationships among organizational agility, operational processes and performance of chartered universities in Kenya and the fourth to establish the joint effect of organizational agility, product development processes and operational processes on the performance of chartered universities in Kenya.

5.2 Summary of Findings

The unit of analysis was the 48 chartered universities in Kenya (CUE, 2016), unit of either a faculty or a school Deans (heads of Faculty/School) were the respondents. A structured questionnaire with statements constructed on a likert scale was used to collect data, out of which 192 were completed and returned. Demographics indicated that all public universities were owned by government, 11 private universities had local ownership, two were owned by foreigners, three had both local and foreign ownership while a majority were owned by religious institutions.

Distribution of academic disciplines showed that business studies were leading in public universities followed by physical sciences, agriculture, education, social sciences, computer and information technology and the rest had relatively low frequencies. Similar trend was observed in private universities where business studies were the largest followed by social sciences, physical sciences, law studies, information technology and the rest had low occurrence. It was also noted that most of the physical science related courses such as engineering, dental surgery; veterinary medicine and architecture were predominant in public universities while theological studies were dominant in private universities.

Concerning the levels of progression offered by a university in a given field; degree, masters and PhD cluster was the highest followed by diploma, degree, masters and PhD in both public and private universities. Under graduate degree programmes had the highest growth in public universities followed by diploma while in private it was masters degrees at post graduate level. Diploma programmes were growing twice as fast in private universities.

Data was analysed by use of descriptive analysis, factor analysis and regression analysis. Literature review indicated that a difference existed between public and private universities in terms sources of financing, nature of students and ownership among others. This necessitated factor analysis to isolate factors that best described the state of the variables in each sector. Physical facilities, technology, government policies and regulation, variation of student enrolment and introduction or phasing out of academic

programmes were isolated as drivers of agility that affected public universities. The findings were supported by Shariffi & Zhang (1999) model which originally identified drivers, enablers/capabilities and responses as dimensions of agility. Factor analysis for organizational agility was not performed on private universities data because the KMO value of 0.302 was too low and did not meet the threshold for further analysis.

Concerning product development processes, factor analysis indicated that public universities used a hybrid of stage–gate and scrum method when developing the programmes while private universities used scrum more, which implied that private universities developed programmes faster than public universities. Since there were indicators of use of a hybrid method, it is possible that stage-gate method was used partly for purpose of compliance and quality checks which implied that universities felt the impact of the regulator (CUE, 2016)

Factors extracted with respect to operational processes showed that formalised structures; different roles of management and faculty; electronic management systems such as enterprise resource planning; automation of work; information technology systems; need to have processes that served students and institutional work culture existed in both public and private universities. However private universities had empowered their employees to ensure efficiency in work processes.

Regarding measures of performance, factor analysis confirmed that customer satisfaction, internal processes, growth and development were indicators of non-financial

measures of performance in both public and private universities. However, factors that ensured customer satisfaction ranked highest in private universities compared to the other measures. This finding was in agreement with Kaplan and Norton (1992) model of measures of performance which identified the four perspectives as necessary for providing an overview of organizational performance. Trends in performance of universities between 2014 and 2019 showed that the factors that supported academic affairs increased. These were number of programmes, departments, faculties/schools and campuses, overall institutional growth, support for staff development and information technology, number of administrative staff, faculty staff and students. However research funding and web metric ranking increased for public universities but not for private universities.

Results of independent two-sample t-test indicated that the difference between average means of public and private universities was statistically significant and consequently regression analysis was determined for each. Results for objective one indicated that organizational agility explained 30.6 percent of variance in performance of public universities and one unit increase led, on average to a change of 0.255 units in performance and therefore the null hypothesis (H_{11}) was rejected. The overall model for private universities was not significant and there was failure to reject null hypothesis (H_{12}). Therefore organizational agility did not affect performance of private universities.

On the second objective, 25.6 percent of variance in performance of public universities was explained by the joint effect of organizational agility and product development

processes but there was partial mediation of product development as hypothesised. Mediation was not tested for private universities because the model that tested the relationship between organizational agility and performance was not significant.

The third objective regarding moderation effect of operational processes indicated that the joint relationship led to an increase in contribution to variance explained by organizational agility from 25.6 percent to 47.2 percent. When the interaction term of organizational agility and operational processes was introduced, the variance increased further to 57.3 percent. The individual significance of organizational agility and operational processes became insignificant while interaction term was significant. Therefore moderation effect had bigger contribution to performance than individual contribution of organizational agility and operational processes. Moderation effect of operational processes in private universities was not examined.

The fourth objective indicated that the joint effect of variables explained 53.8 percent of variance in performance of public universities and on the individual significance; all the variables were not except operational processes which had a standardized score of 0.456. From the unstandardized coefficients, every one unit change in operational processes, performance would on average change by 0.646 units.

In private universities, joint effect of organizational agility, product development processes and operational processes explained 83.9 percent of the variance in performance. On individual significance, the constant and organizational agility were not

significant and the predictive equation was PIV =0.767PD + 0.641OP meaning that a unit change of product development processes increased performance, on average by 0.767 units. Similarly, a unit change of operational processes resulted, on average to a change of 0.641 units in performance. Therefore, the greatest change in performance was attributed to operational processes because it had the highest standardized coefficient of 0.588 followed by product development processes at 0.417. In summary null hypotheses (H_{11}, $H_{21,}$ $H_{32,}$ H_{42}) were rejected with respect to public universities and (H_{42}) for private. There was failure to reject null hypothesis H_{12}, while $H_{22,}$ and H_{32} were not tested for private universities.

5.3 Conclusion of The findings

Research findings established that organizational agility had a positive significant relationship with performance of public universities while it had none in private. Product development had partial mediation effect on the relationship between organizational agility and performance of public universities. Joint effect of organizational agility, product development processes and operational processes had a positive significant relationship with performance of both public and private universities but operational processes had the highest contribution in each.

Based on the findings it is possible that public universities took advantage of opportunities that were created by agility but with less adaptation and flexibility. They might also have funded their costs or diverted the revenue to other uses which caused a lower contribution to performance than was expected. On the contrary, private

universities were well prepared to deal with challenges associated with agility and probably took advantage of the opportunities. The different approach to organizational agility by public universities might have been caused by collegium foundation, government financing and the mission to serve the citizens. Conversely, private universities had to fully finance their operations and they had to devise strategies that positioned them to deal with effects of organizational agility.

Analysis of dimensions of agility indicated that government drivers of agility had greater impact on public universities compared to private ones. Private universities were found to have superior capabilities and responses to drivers of agility compared to public universities. Market drivers of organizational agility had similar influence on both sectors of higher education. The difference in the way the components of organizational agility affected the two sectors explained the difference in the overall influence of organizational agility on performance.

The intervening effect of product development processes on the relationship between organizational agility and performance was examined. Product development processes showed partial intervening effect in public universities while in private universities the model did not apply. This difference was attributed to collegium orientation of public universities who developed curriculum for the love of knowledge because universities admit all students qualifying from the secondary schools. It is also possible that there are other factors such as governance that contributed to mediation other than products. On the other hand, private universities had to formulate strategies that ensured that they had

enough students. It is possible that they created programmes that were demanded by the market and the rapid changes that happened in higher education were not the initial trigger for product development. The findings were consistent with studies in product development processes for manufacturing firms which indicated that product development processes occurred when there are indicators of demand in the market (Chang et al., 2013).

Operational processes had the highest contribution to performance in both public and private universities but it accounted for a bigger variance in private universities. This was credited to better automation of work processes, information technology systems, processes that served students and more empowered employees. Therefore operational processes were the differentiating factor between the performance of public and private universities.

5.4 Implications of the Study

The study had four objectives which were investigated through relevant procedures of research enquiry and deductions arrived at. Summary and conclusions drawn were as discussed in sections 5.2 and 5.3 above. Having interpreted the findings, details of the contributions to management scholars, policy makers and practitioners are discussed below.

5.4.1 Implications to Theory

There were various contribution made by the study to the body of knowledge arising from the four variables and the constructs examined. The findings were that

organizational agility had significant effect on performance of public universities while the same was insignificant for private universities. Government drivers of agility affected public universities more compared to private while market drivers affect both. Government policies, regulation and directives as a significant driver of organizational agility is under researched because the knowledge was lacking in the literature reviewed. Unlike past contribution by conceptual literature (Bessant et al. 2001: Huang & Li, 2008: Wendler, 2013) and empirical studies (Nafei, 2016: Wendler, 2016; Mckinsey & Company, 2018) that focused on markets, social cultural changes, consumers perception as drivers of agility, the study identified government policies and regulation as an equally significant driver of agility that pause challenge to organizations.

Since there was no evidence to suggest significant negative effect of drivers of agility on private universities, scholars should amplify success cases during times of unanticipated occurrence so that the firms that are struggling can learn from them. There is a possibility that agility creates more opportunities than is documented in current literature, because public universities posted better performance when rapid changes occurred.

Product development processes had a partial mediation on the relationship between organizational agility and performance of public universities and consequently other related service industries. Therefore, besides product development processes, there are other factors that mediate the relationship between organizational agility and performance of organizations. Joint effect of organizational agility, product development processes and operational processes influence performance of universities. Operational processes

moderates the relationship between organizational agility and performance of universities and it is a key differentiating factor in performance of both.

The results confirmed the ideas expressed in general systems theory, theory of constrains, socio-technical theory and collegial theory. Although the universities are autonomous institutions they have external support from governments, religious organizations and industries that absorb the graduates. Education is the core functions of the universities that draws students from the external and releases them after graduating to the job market conforming to the proposition of general system theory.

While collegial theory explains the foundation of university education, theory of constrains is embedded in operational processes and supports continuous improvement through discovery of constrains in the system, correcting them and searching for more until the system is optimized. The general system theory and social technical theory explains the interaction of organizational agility, product development processes, operational processes and performance in context of internal and external operating environments of the universities.

The findings refuted some assumptions of collegial theory that supports preservation of knowledge through selflessness, commitment to discoveries and rigid culture of scholarship. While these are critical to preservation and progress of knowledge, collegium culture of inflexibility and slow adaptation to change, may threaten survival of the traditional universities because of inability to rapidly create degree programmes that

meet market needs. Even though agility requires firms to be flexible and adaptable to rapid change, universities cannot react in a similar manner because certain traditions such as rigour in research inquiry and academic processes are necessary in preserving knowledge and integrity for sustenance of life. A close linkage of the four theories exists in explaining management and performance of universities but the applicability of the whole of collegial theory need to be examined.

5.4.2 Implications to Policy

The key finding of the study is that organizational agility which is characterized by a rapid change does not affect performance of organizations negatively as widely believed. Public universities had a positive performance when rapid changes occurred in the education sector and the same events had no significant effect on private universities. If organizations are adaptable and flexible, they can take advantage of opportunities created by agility to post a better performance. The negative effects impacts on organizations that are not well prepared in anticipating change.

The following drivers of organizational agility had the greatest impact on public universities. Reduction in government funding, module II programmes, flexible modes of learning, introduction of new programmes, changes in guidelines by the regulator and nature of students joining universities.

Following the findings, government policies should enable public universities to strengthen privately sponsored student programmes, add flexible modes of learning and

introduce new programmes when opportunities arise because they may not be long lasting especially in social sciences and information technology. Such programmes can be developed through scrum method of product development to ensure rapid launch to beat the threat of obsolescence resulting from short product life cycle. A collaboration policy between the regulator and universities will lead to quick introduction of relevant programmes to the market.

The regulator should play a bigger role of a facilitator than a supervisor. Policies at government and management levels concerning flexible capacities in public universities should reduce wastage and enhance productivity. Both public and private universities should have a function/department set purely for innovation and programme development. This will enable universities to monitor trends in the environment and react by developing appropriate products that have practical application in the market.

Public universities should be fully empowered to run autonomous public and private facilities where the public entity plays the role of investor in the private entity. This will enable earning of revenue from resources owned by government by providing university education to private students willing to pay for services similar to what is paid to private universities. This is important for degree programmes not offered by private universities such as in physical sciences and technology.

Majority of private universities are owned by churches or religious groups with a narrow range of courses on offer. Policies aimed at foreign investment in university education

will lead to development of international universities which can tap into African market and accelerate the achievement of world class universities. Bigger investors will also spur the required innovation especially in public universities because it will motivate the academicians to improve continuously for purpose of being relevant.

5.4.3 Implications to Practice

Managers can develop frameworks that enable universities to combine product development processes and operational processes to innovate the services offered to staff and students in a way that generates a competitive advantage. The unique offering can help them create a market niche which can contribute to the much needed sustainable source of revenue.

Both public and private universities should put in place flexible capacities to accommodate any rapid change that causes variation in number of students. Public universities in particular should utilize the capacity and resources when government students are not in session or add a semester to government students willing to pay and finish their studies earlier than the calendar years that they follow. Universities can also venture into content creation and administration of examinations without bearing the entire burden of teaching. Differentiation by each university is will assist in serving different market niche because there is a high demand for higher education in Kenya, East Africa and Africa. Unique programmes in mining, medicine, Agriculture, Environmental studies and culture can attract international students.

Operational processes distinguished the public and private universities. Public universities should continuously improve their processes especially those that serve the leaners and staff through automation and information technology. Staff should be empowered to improve processes for the purpose of facilitating faster service delivery.

Management of needs and expectations of students joining the universities should also be put into consideration. This is in line with findings of Marvin (2003) and Murkerjee (2014) which concluded that undergraduate, pedagogical studies and internationalization of university education was on the increase and the voice of the learners cannot be ignored when designing programmes and modes of learning.

5.5 Limitations of the Study

The first limitation was that various components of agility namely drivers, capabilities and responses were studied at the same time. Specific contribution of each to organizational agility could not be determined with certainty owing to the breath of the study. Also, the three non-financial perspectives of performance were included in the measurement which may have contributed to the nature of results obtained. Organizational agility may be having different effect on customer perspective, internal processes, growth and development of a university. The variables were studied purely from operations point of view without incorporating human element such as management and leadership styles. Future studies can focus on single dimension of agility, the role of human resources in taking advantage of opportunities created by agility and mitigation of

negative effects caused by agility. One or two perspectives of performance can be studied as dependent variable with respect to a factor of agility.

The other limitation was experienced in data collection. All the universities required a clearance from the deputy vice chancellor in charge of research and innovation or an equivalent office despite having a permit from National Commission for Science, Technology and Innovation (NACOSTI) and an introduction letter from the University of Nairobi where the researcher was a doctoral candidate. Getting appointment with the Deans was difficult and public universities proved to be unnecessarily bureaucratic. This coupled with the geographical distribution of the universities, prolonged the period of data collection to eleven months. The third limitation related to procedures and analysis but care was taken as much as possible to reduce biases. Robustness of regression analysis also helped in minimizing methodological errors.

5.6 Suggestions for Further Studies

The joint effect of organizational agility, product development processes and operational processes remains the main contribution of this study. The study also revealed that the variables affected public and private universities differently but operational processes had the greatest influence. Future studies of certain aspects associated with variables should consider studying the sectors separately.

Conceptual and empirical literature is very clear that agility phenomenon is understudied beyond manufacturing firms where there has been an attempt to discover its nature. Since

agility is characterized by rapid change that require flexibility and adaptability in response, there is need to continuously study emerging causal factors resulting from changes in social, economic and operating environments locally and internationally. Their impact on universities as well as across industries should open diverse areas of study.

Effect of individual dimensions of organizational agility namely drivers, enablers and responses on performance need to be investigated further. Each of them has diverse scope which offers continuous opportunity in research because of the rapid changes that occur in business environments. Relationship between organizational agility and product development processes, organizational agility and operational processes as well as product development processes and operational processes need a further examination. Findings indicated that there were other ways in which they jointly influenced performance of universities**.**

Since measuring performance of a university has peculiar characteristic owing to the origin and the mission, further studies are necessary in order to capture the precise measure that reflect value addition of the processes carried out by the institutions**.** Different perspectives of performance as identified by Kaplan and Norton (1992) should be studied separately depending on the mission of universities.

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APPENDIXES

Appendix I Questionnaire for University Deans

Dear Participant,

The aim of this questionnaire is to collect data from chartered universities in Kenya in order to determine the relationship between organizational agility and performance. The data collected will be for academic purpose only and the identity of the university will be treated with utmost confidence. Your participation is highly appreciated as you assist me to fulfil the requirement for the award of the PhD in Business Administration degree. The online respondents can send the completed questionnaires to marykibuine@gmail.com in pdf format. Kindly provide one answer per item. Thank you very much.

SECTION ONE

1. Information Concerning the University. Respond to the following items by ticking [√] in the appropriate box as provided per statement.

1. Sector of the university. Public [ ] Private [ ]
2. If private indicate the ownership. Locally owned [ ] Foreign owned [ ]
   Faith based [ ] Non Faith based [ ]
3. Indicate unit structure that a dean heads. School [ ] Faculty [ ]
4. Indicate the number of departments per faculty. 1- 3 [ ] 4-6 [ ]
   Others……..
5. Indicate the field of discipline that the faculty or school belongs to. Business [ ]
   Science and Mathematics [ ] Social Science [ ] Developmental Science [ ]

Economics [ ] Education [ ] Medicine [ ] Agriculture [ ] Engineering [ ] Information, Communication and Technology [ ]

Other……

6. Indicate the programmes that are found in your Faculty/ School. Certificates[ ] Diploma[ ] degree[ ] masters [ ] PhD [ ]
7. Indicate the programme that has the highest number of students in your faculty/school

   Certificates [ ] Diploma [ ] Degree [ ] Masters [ ] PhD [ ]
8. Indicate the fastest growing programme in the faculty/ school

   Certificates [ ] Diploma [ ] Degree [ ] Masters [ ] PhD [ ]
9. Indicate the location of the university main campus Urban [ ] Rural [ ].

SECTION TWO: Organizational Agility

Organizational agility refers to external causes of instability to the university, capabilities and the responses that the university possess in order to survive in a competitive environment. In regard to this, indicate by use of √ the extent to which you agree or disagree with the following statements concerning your university. If a statement does not apply at all to your university write N/A.

Drivers of organizational agility						
Government related organizational agility drivers		Strong Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1.	Decreased government funding has caused changes in operations of the faculty.					
2.	Allocation of government funds depending on the degree programme has caused changes in faculty operations.					
3.	Introduction of self-sponsored student's degree programmes caused changes in faculty operations.					

4.	Frequent Change of guidelines by CUE has caused restructuring of academic programmes.					
5.	Delinking of student enrolment with bed capacity increased congestion in learning facilities.					
6.	Promotion of faculty staff based on CUE regulations has led to shortage of talent in administration of academic operations.					
7.	Placement of government sponsored students in both public and private universities has decreased number of students in the faculty.					
8.	Closure of university affiliated campuses has decreased the number of students in the faculty.					
9.	Strict regulation by CUE has affected rate of introduction of new degree programmes in the faculty.					
10.	Phasing out of pre-university programme has affected enrolment in degree programmes.					
11.	Restricting unit exemptions for diploma students has contributed to less enrolment to degree programmes.					
12.	There has been increase in government sponsored students since introduction of fee subsidy at secondary school level.					
Market related organizational agility drivers						
1.	Flexible modes of tuition (full time and part time) have increased enrolment.					
2.	Low degree costing in other universities has caused the university to lower fees.					
3.	Some of degrees programmes have been phased out due to lack of students.					

4.	Faculty has introduced new programmes because of demand by industry.					
5.	Change in technology has led to introduction of new programmes in the faculty.					
6.	The nature of students admitted has caused the university to be proactive.					
Organizational Agility Enablers/Capabilities						
1.	There are enough teaching facilities in the university.					
2.	Teaching and administrative work processes are supported by the best available technology.					
3.	University has enough competent faculty staff.					
4.	University has adequate supportive department like counselling, chaplaincy and welfare.					
5.	University has well stocked library including access to e-resources.					
6.	There are adequate recreation facilities for students and staff.					
7.	There is a wide range of degree programmes that students can choose from.					
8.	University has adequate equipped laboratories.					
9.	University has ultra- modern virtual campuses.					
10.	University has collaborated widely with the industry.					
11.	Acceptance of exemptions and credit transfers for diploma students has contributed to large numbers in degree programmes.					
12.	Offering of flexible modes of learning has contributed to higher number of students.					
Responses to Drivers of Agility						
1.	University opened campuses when students enrolment					

	increased before 2017					
2.	University added modes of learning when students enrolment increased before 2017					
3.	University expanded facilities when enrolment increased.					
4.	University has increased the diploma and certificate courses from 2017					
5.	University has laid off staff with decrease of students in parallel programmes					
6.	University has faced out some programmes because of decreased demand					
7.	University is very aggressive in promoting the programmes on offer.					
8.	University has introduced new programmes					
9.	University has diversified sources of income since enrolment decreased					

SECTION THREE: Product Development

To what extent do you agree or disagree with the following statements regarding the process of development of various academic programmes in the university.

Product development						
Product development by stage-gate process		Strongly disagree	disagree	Neither agree nor disagree	Agree	Strongly disagree
1.	Programme development is initiated by top management					
2.	Programme development goes through various stages of approval before implementation.					
3.	There is a lot of lobbying by the faculty before management approves development of a new programme.					
4.	Other faculties are given priority to develop programmes compared					

	to mine.					
5.	There are restrictions by management when faculty wants to initiate development of a new programme.					
6.	Some programmes are stopped before going through all stages of approval.					
7.	Programme development is done by teams selected by management.					
8.	There is a department(s) purely for Programme development.					
9.	A programme takes a long time (1-3years) before being launched.					
Product development by scrum method						
1.	Programmes are initiated by the faculty members after doing independent market research.					
2.	Programme development takes a short time to be approved by management.					
3.	Programme development is done by self-organized teams at faculty level with frequent consultation with management.					
4.	The self – organized teams are in constant consultation with the industry when developing programmes.					
5.	Programme takes a short time (About 6 months) to develop and introduce to the market.					

SECTION FOUR: Operational Process

To what extent do you agree or disagree with the following statements concerning the work processes in the university?

Business Process		Strongly disagree	disagree	Neither agree or disagree	agree	Strongly agree
1.	There is a documented framework that defines the work culture of the university.					
2.	Each work process has a clearly defined input and output					
3.	Each work process begins with a					

	goal and ends with a performance indicator.					
4.	There is work process catalogue listing systematic way of doing work in accordance to operational framework of the university.					
5.	There is a work process manual that defines principles, responsibilities, structures and practices that are used to do work.					
6.	The university work manuals distinguishes clearly the operational processes and managerial processes					
7.	The university work guidelines distinguish clearly how managerial and faculty processes interact.					
8.	Every work process is clearly described by tasks and activities in the work manuals.					
9.	Every operational process is parametised by performance indicators.					
10.	New employees find work process in place.					
11.	New employees have to figure out how to do the work assigned.					
12.	Employees are empowered to improve the work flow.					
13.	Work processes are fully automated.					
14.	All work processes are fully integrated by enterprise resource planning (ERP) System.					
15.	Authorized staff can access information they require to execute their jobs.					
16.	Work flows are student centred					
17.	Students can access all their information on secure portals.					
18.	Students can be served efficiently through an integrated system.					

SECTION FIVE: PERFORMANCE

To what extent do you agree or disagree with the following statements concerning performance of the university**.**

Measure of performance						
Consumer perspective		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1	Different modes of learning are offered as per requests of the student per semester.					
2	Students and staff complains are responded to quickly					
3	There is continuous request for feedback from students and staff on university services					
4	Degree programmes are offered as per the needs of the students.					
5	Curriculum is reviewed periodically to incorporate emerging knowledge.					
Alignment of Internal Processes to Consumer Service						
1	Information sharing with students and staff is rapid through technology.					
2	Both staff and students have quick access to services required.					
3	All complains and requests are executed as they are reported.					
4	There is one-stop customer service desk for receiving inquiries and disseminating information.					
5	There is real time access of academic related information by students.					
6	Processing of students exams and results can be accurately tracked.					
Growth and Development Perspectives						
1	There is extensive collaboration with various industries.					
2	There is extensive collaboration and linkages with other universities and academic related institutions.					
3	New degree programmes are developed to reflect the needs of the market.					
4	Curriculum is reviewed periodically to reflect emerging knowledge.					

5	There is continuous training of the both administrative and academic staff.					
6	Technology that facilitates the processes is frequently updated to suit the requirements of the students and staff.					
7	The facilities are improved continuously to suit the requirements of the students and staff.					

Appendix II Accredited Universities in Kenya – October 2016

	Public Chartered Universities	Year of Establishment	Year of Award of Charter
1	University of Nairobi (UoN)	1970	2013
2	Moi University (MU)	1984	2013
3	Kenyatta University (KU)	1985	2013
4	Egerton University (EU)	1987	2013
5	Jomo Kenyatta University of Agriculture and Technology (JKUAT)	1994	2013
6	Maseno University (Maseno)	2001	2013
7	Dedan Kimathi University of Technology	2007	2012
8	Chuka University	2007	2013
9	Technical University of Kenya	2007	2013
10	Technical University of Mombasa	2007	2013
11	Pwani University	2007	2013
12	Kisii University	2007	2013
13	Masinde Muliro University of Science and Technology (MMUST)	2007	2013
14	Maasai Mara University	2008	2013
15	South Eastern Kenya University	2008	2013
16	Meru University of Science and Technology	2008	2013
17	Multimedia University of Kenya	2008	2013
18	Jaramogi Oginga Odinga University of Science and Technology	2009	2013
19	Laikipia University	2009	2013
20	University of Kabianga	2009	2013
21	University of Eldoret	2010	2013
22	Karatina University	2010	2013
23	Kibabii University	2011	2015
24	Kirinyaga University	2011	2016
25	Machakos University	2011	2016
26	Murang'a University of Technology	2011	2016
27	Rongo University	2011	2016
28	Taita Taveta University	2011	2016
29	The Co-operative University of Kenya	2011	2016
30	University of Embu	2011	2016

	Private Chartered Universities	Year of Establishment	Year of Award of Charter
1	University of Eastern Africa, Baraton	1980	1991
2	United States International University	1969	1999
3	Catholic University of Eastern Africa (CUEA)	1984	1992
4	Daystar University	1967	1994
5	St. Paul's University	1930	2007
6	Pan Africa Christian University	1978	2016
7	Scotts Christian University	1989	1997
8	Africa International University	1983	2011
9	Kenya Highlands Evangelical University	1970	2011
10	Africa Nazarene University	1993	2002
11	Kenya Methodist University	1997	2006
12	Strathmore University	2002	2008
13	Kabarak University	2002	2008
14	Great Lakes University of Kisumu	2006	2012
15	KCA University	2007	2013
16	Mount Kenya University	2008	2011
17	Adventist University of Africa	2008	2013
18	KAG - EAST University	1989	2016

Source: CUE March 2017

Appendix III Colleges/Schools/Faculties of Chartered Universities in Kenya

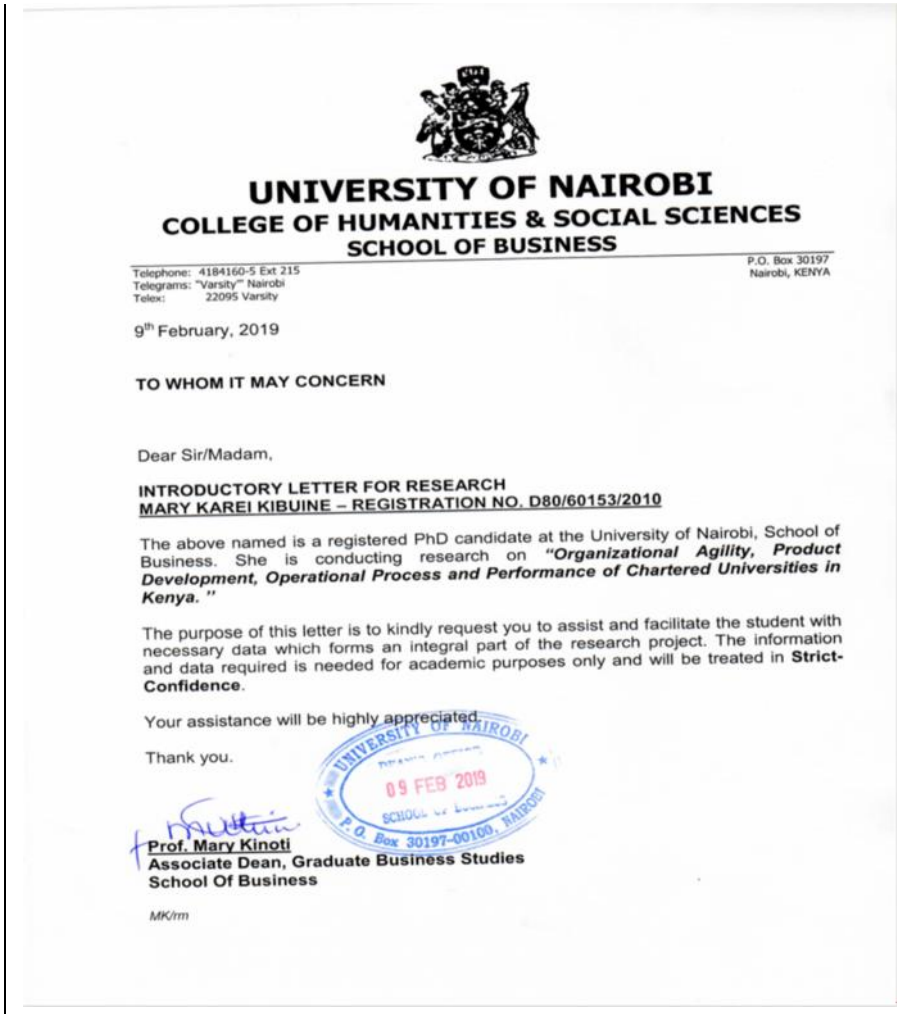
	Public Chartered Universities	Number of Colleges	Number of Schools/Faculties	Dean
1	University of Nairobi (UoN)	6	22	22
2	Moi University (MU)		11	11
3	Kenyatta University (KU)		12	12
4	Egerton University (EU)		8	8
5	Jomo Kenyatta University of Agriculture and Technology (JKUAT)		14	14
6	Maseno University (Maseno)		3	3
7	Dedan Kimathi University of Technology		5	5
8	Chuka University		5	5
9	Technical University of Kenya		3	3
10	Technical University of Mombasa		5	5
11	Pwani University		6	6
12	Kisii University		8	8
13	Masinde Muliro University of Science and Technology (MMUST)		9	9
14	Maasai Mara University		5	5
15	South Eastern Kenya University		5	5
16	Meru University of Science and Technology		8	8
17	Multimedia University of Kenya		5	5
18	Jaramogi Oginga Odinga University of Science and Technology		9	9
19	Laikipia University		4	4
20	University of Kabianga		7	7
21	University of Eldoret		9	9
22	Karatina University		5	5
23	Kibabii University		4	4
24	Kirinyaga University		6	6
25	Machakos University		8	8
26	Murang'a University of Technology		5	5
27	Rongo University		6	6
28	Taita Taveta University		4	4
29	The Co-operative University of Kenya		2	2
30	University of Embu		6	6

Appendix III Cont.'…

	Private Chartered Universities	Number of Colleges	Number of Schools/Faculties	Dean
1	University of Eastern Africa, Baraton		5	5
2	United States International University		4	4
3	Catholic University of Eastern Africa (CUEA)		6	6
4	Daystar University		5	5
5	St. Paul's University		3	3
6	Pan Africa Christian University		-	-
7	Scotts Christian University		2	2
8	Africa International University		4	4
9	Kenya Highlands Evangelical University		-	-
10	Africa Nazarene University		3	3
11	Kenya Methodist University		4	4
12	Strathmore University		5	5
13	Kabarak University		6	6
14	Great Lakes University of Kisumu		2	2
15	KCA University		4	4
16	Mount Kenya University		11	11
17	Adventist University of Africa		2	2
18	KAG - EAST University		-	-

Source: University websites August, 2016

Appendix IV Permits for Data Collection



UNIVERSITY OF NAIROBI
COLLEGE OF HUMANITIES & SOCIAL SCIENCES
SCHOOL OF BUSINESS

Telephone: 4184160-5 Ext 215
Telegrams: "Varsity" Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, KENYA

9th February, 2019

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

INTRODUCTORY LETTER FOR RESEARCH
MARY KAREI KIBUINE – REGISTRATION NO. D80/60153/2010

The above named is a registered PhD candidate at the University of Nairobi, School of Business. She is conducting research on ***"Organizational Agility, Product Development, Operational Process and Performance of Chartered Universities in Kenya."***

The purpose of this letter is to kindly request you to assist and facilitate the student with necessary data which forms an integral part of the research project. The information and data required is needed for academic purposes only and will be treated in **Strict-Confidence**.

Your assistance will be highly appreciated.

Thank you.

UNIVERSITY OF NAIROBI
09 FEB 2019
SCHOOL OF BUSINESS
P. O. Box 30197-00100, NAIROBI

Prof. Mary Kinoti
Associate Dean, Graduate Business Studies
School Of Business

MK/rm

Appendix V National Commission for Science, Technology and Innovation Permit

THIS IS TO CERTIFY THAT:
MS. MARY KAREI KIBUINE
of UNIVERSITY OF NAIROBI, 5373-100
NAIROBI,has been permitted to conduct
research in *All Counties*

on the topic: *ORGANIZATIONAL AGILITY, PRODUCT DEVELOPMENT, OPERATIONAL PROCESSES AND PERFORMANCE OF CHARTERED UNIVERSITIES IN KENYA*

for the period ending:
26th February,2020

.....
Applicant's Signature

Permit No : NACOSTI/P/19/61515/28352
Date Of Issue : 26th February,2019
Fee Recieved :Ksh 2000

.....
Director General
National Commission for Science, Technology & Innovation

National Commission for Science, Technology and Innovation Permit Cont…

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. **The License is valid for the proposed research, location and specified period.**
2. **The License and any rights thereunder are non-transferable.**
3. **The Licensee shall inform the County Governor before commencement of the research.**
4. **Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.**
5. **The License does not give authority to transfer research materials.**
6. **NACOSTI may monitor and evaluate the licensed research project.**
7. **The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.**
8. **NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.**

National Commission for Science, Technology and innovation
P.O. Box 30623 - 00100, Nairobi, Kenya
TEL: 020 400 7000, 0713 788787, 0735 404245
Email: dg@nacosti.go.ke, registry@nacosti.go.ke
Website: www.nacosti.go.ke

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH LICENSE

Serial No.A 23296

CONDITIONS: see back page

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TAITA TAVETA UNIVERSITY
OFFICE OF THE VICE CHANCELLOR

Ref: TTU/Adm/GC **2nd May, 2019**

Mary Karei Kibuine
University of Nairobi
Tel: 0733-923627/0726-152940

Dear Ms. Kibuine,

REF: AUTHORIZATION TO COLLECT DATA FOR A PhD. THESIS

Reference is made to your letter on the above subject.

Your request has been reviewed and accepted, therefore, authority is hereby granted for you to undertake data collection for your research from all our Deans in Taita Taveta University.

You are required to:

1. Provide all necessary clearances for research obtained where applicable
2. Submit copies of all presentations, publications and thesis to the Deputy Vice Chancellor (Academic, Research and Outreach), when you complete your research.

Yours sincerely,

Prof. Christine A. Onyango, PhD.
AG. VICE CHANCELLOR

Copy to: All Deans – Taita Taveta University

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

Office of the Deputy Vice Chancellor
ACADEMIC AFFAIRS

Our Ref: DVC/ACAD/070/2019

March 8, 2019

Mary Karei Kibuine
P. O. Box
NAIROBI
marykibuine@gmail.com

Ref: Request for Permission to Collect Data at The Catholic University of Eastern Africa (CUEA)

Thank you for your request to collect research data at The Catholic University of Eastern Africa.

I am glad to inform you that your request has been granted and that you are free to collect data of willing candidates at The Catholic University of Eastern Africa provided you observe the normal ethical cautions and discretions.

It is also important to seek approval from the Heads of Sections by proof of this letter to ensure smooth flow of normal operations.

I wish you well with your study and I look forward to sharing your findings with the Catholic University of Eastern Africa.

Best wishes.

Sincerely yours,

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA * OFFICE OF THE DEPUTY VICE CHANCELLOR ACADEMIC AFFAIRS * P.O. BOX 62157 00200 NAIROBI

Prof. Kaku Sagary Nokoe, FGA
Deputy Vice-Chancellor/Academics Affairs

cc: HRM

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA (CUEA) P.O. BOX 62157 00200 Nairobi – KENYA
Tel: 020-2525811-5, 8890023-4, Fax: 8891084, Email: academics@cuea.edu Website: www.cuea.edu
Founded in 1984 by AMECEA (Association of the Member Episcopal Conference in Eastern Africa)

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
P.O. Box 62000-00200 Nairobi Kenya, Tel: +254-067-5870001-4, +254-67-53-52711,
Office of the Registrar (Administration)

JKU/ACA/3D **10TH APRIL, 2019**

Mary Karei Kibuine
C/o marykibuine@gmail.com

Dear Ms. Kibuine

RE: PERMISSION TO COLLECT DATA

Reference is made to your letter dated 4th March, 2019 in which you sought permission to collect data for your PhD research project entitled **"Organizational Agility, Product Development, Operational Processes and Performance of Chartered Universities in Kenya".**

Approval has been granted for you to collect data on the understanding that all the data collected will be for academic purpose only and will be kept confidential throughout the project and after completion of the project. This is on condition that the University Library will receive a copy of your final thesis for future reference.

Yours sincerely,

DR JOSEPH OBWOGI, PhD
REGISTRAR (ADMINISTRATION)
JO/mw

Copy to: - Deputy Vice Chancellor (Admin)

MULTIMEDIA UNIVERSITY OF KENYA
P .O. BOX 15653 - 00503, NAIROBI, KENYA.
(MMU is ISO 9001:2008 Certified)

OFFICE OF THE DEPUTY VICE CHANCELLOR (AA, R&I)

REF: MMU/DVC AA R&I/RESEARCH/VOL.1 18th March, 2019

Ms. Mary Karei Kibuine
Tel. 0726 152 940
marykibuine@gmail.com

Dear Ms. Kibuine

RE: REQUEST FOR COLLECTION OF DATA IN THE UNIVERSITY

Reference is made to the above subject matter pursuant to your letter dated 4th March, 2019 and in which you sought permission for data collection from the University.

We note that you are a registered PhD. student at University of Nairobi and we are pleased to inform you that your request has been granted and permission approved for collection of data within Multimedia University of Kenya, Main Campus.

You are required to report to the Registrar Administration before you commence your data collection. You will be required to observe the University Rules and Regulations. Upon completion of your study, ensure that you submit a copy of your Project Report/Dissertation/Thesis to Multimedia University of Kenya.

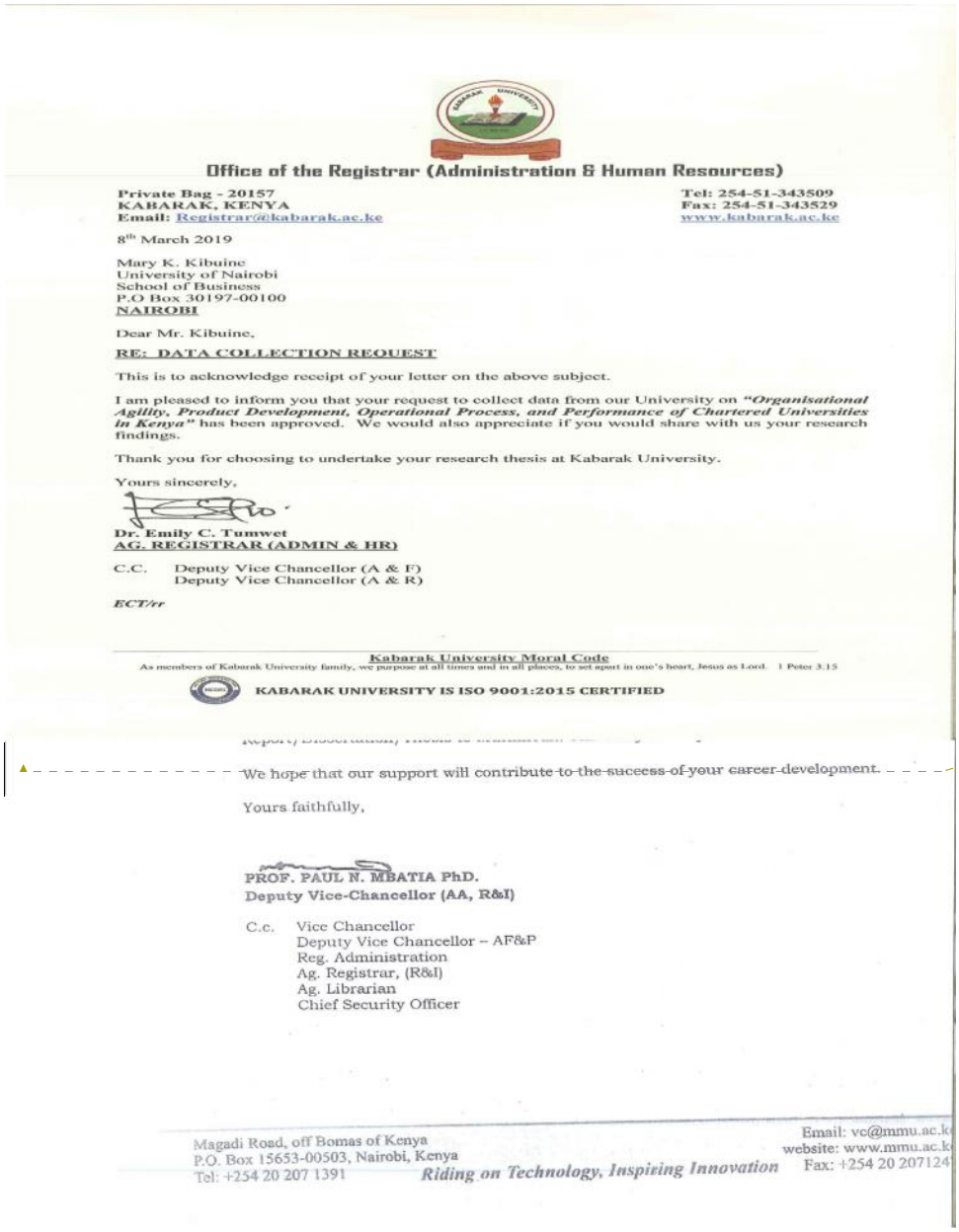
We hope that our support will contribute to the success of your career development.

Yours faithfully,

PROF. PAUL N. MBATIA PhD.
Deputy Vice-Chancellor (AA, R&I)

C.c. Vice Chancellor
Deputy Vice Chancellor – AF&P
Reg. Administration
Ag. Registrar, (R&I)
Ag. Librarian
Chief Security Officer

Magadi Road, off Bomas of Kenya
P.O. Box 15653-00503, Nairobi, Kenya
Tel: +254 20 207 1391
Email: vc@mmu.ac.k
website: www.mmu.ac.k
Fax: +254 20 207124
Riding on Technology, Inspiring Innovation



Office of the Registrar (Administration & Human Resources)

Private Bag - 20157
KABARAK, KENYA
Email: Registrar@kabarak.ac.ke

Tel: 254-51-343509
Fax: 254-51-343529
www.kabarak.ac.ke

8th March 2019

Mary K. Kibuine
University of Nairobi
School of Business
P.O Box 30197-00100
NAIROBI

Dear Mr. Kibuine,

RE: DATA COLLECTION REQUEST

This is to acknowledge receipt of your letter on the above subject.

I am pleased to inform you that your request to collect data from our University on ***"Organisational Agility, Product Development, Operational Process, and Performance of Chartered Universities in Kenya"*** has been approved. We would also appreciate if you would share with us your research findings.

Thank you for choosing to undertake your research thesis at Kabarak University.

Yours sincerely,

Dr. Emily C. Tumwet
AG. REGISTRAR (ADMIN & HR)

C.C. Deputy Vice Chancellor (A & F)
Deputy Vice Chancellor (A & R)

ECT/rr

Kabarak University Moral Code
As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. 1 Peter 3:15

KABARAK UNIVERSITY IS ISO 9001:2015 CERTIFIED

Report/ Dissertation/ Thesis to ~~[illegible]~~

We hope that our support will contribute to the success of your career development.

Yours faithfully,

PROF. PAUL N. MBATIA PhD.
Deputy Vice-Chancellor (AA, R&I)

C.c. Vice Chancellor
Deputy Vice Chancellor – AF&P
Reg. Administration
Ag. Registrar, (R&I)
Ag. Librarian
Chief Security Officer

Magadi Road, off Bomas of Kenya
P.O. Box 15653-00503, Nairobi, Kenya
Tel: +254 20 207 1391

Riding on Technology, Inspiring Innovation

Email: vc@mmu.ac.k
website: www.mmu.ac.k
Fax: +254 20 207124

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GREAT LAKES UNIVERSITY OF KISUMU (GLUK)

Great Lakes University of Kisumu
P.O Box 2224-40100
KISUMU-Kenya

9th April, 2019

Mary Karei Kibune
marykibune@gmail.com
0726152940

RE: PERMISSION TO COLLECT DATA FROM THE UNIVERSITY

I write in reference to your letter dated 4th March 2019, requesting to be granted permission to collect data from the Deans in the University

I am pleased to inform you that you have been given a go ahead to collect relevant data from the University so as to help you in your Research proposal. You should therefore conduct yourself well within this period and adhere to the Rules and Regulations of the University.

Sincerely

Great Lakes University of Kisumu
Deputy Vice Chancellor
Academic Affairs
P. O. Box 2224-40100
Kisumu, Kenya

Dr. Samson Kisirkoi
Ag Deputy Vice Chancellor Academic Affairs

Main Campus, Kibos (Miwani Road); P.O.Box 2224-40100 Kisumu, Kenya, Tel. Number: 0722 683 813 OR 0736 550 505/ 0770 410 698
Milimani Campus (Off Tom Mboya Drive, Milimani Estate - Kisumu)
Nairobi Campus: Centro House, Westlands P.O.Box 36163 - 00200 Nairobi; Tel Number: 0723 686 443
Kisumu CBD Campus: Mega Plaza, 5th Floor, Tel Number: 0712 054623
Email: vc@gluk.ac.ke, shortcourses@gluk.ac.ke.
Website: www.gluk.ac.ke