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INFLUENCE OF STRATEGIC INNOVATIONS ON GROWTH OF PUBLIC UNIVERSITIES IN KENYA THROUGH INCOME GENERATING UNITS

[1] Kamau Robert Chege [2] Dr. Mang'ana Robert, Phd

[1] Master of Business Administration (Strategic Management), Jomo Kenyatta University of Agriculture and Technology

[2] Lecturer, Jomo Kenyatta University of Agriculture and Technology

Abstract

The main objective of the study was to examine influence of strategic innovations on the growth of public universities in Kenya through IGUs. The specific objectives sought to infer process and technological innovations on the growth of public universities in Kenya through IGUs. Descriptive research design was applied on a population of management officers from eighteen (18) public universities in Kenya. The data collection instrument was structured questionnaires. A secondary data sheet was used to collect data relevant to the study from print resources. The target population was composed of both relevant public universities management officers and from the respective IGUs' management officers. The collected data was descriptively and inferentially analysed using SPSS. Relationships between the variables was established through utilization of inferential statistics. The correlation coefficient was used to measure the relationship between independent variables and dependent variable while regression analysis was used to measure the strength between the dependent and independent variables. The collected and analysed data was presented in form of tables and figures. The study found that Process and Technological innovations had a significant positive impact, underlining their potential to drive substantial growth. An increment of a single unit in process and technological innovation correlated with notable growth expansions, emphasizing their importance in growth of public universities in Kenya. The findings concluded that innovative processes, commercialization and technological innovation play a key role in attaining institutional growth. Comprehending these determinants is important in formulation of effective growth strategies in public universities in Kenya through their IGUs. Key focus being, optimization of processes and leveraging technological advancements to fuel substantial expansion. Finally, the study recommended that public universities in Kenya should streamline business processes in the IGUs and strategically integrate relevant technologies that support the mission and vision of the IGUs. Public Universities should adopted commercialization of products and services to achieve institutional growth, through IGUs.

Key Words: Strategic Innovations, Process Innovations, Technological Innovations Growth, Public Universities Income, Generating Units

Background

In Kenya, higher education at inception, was at no cost to the enrolled students. The government bore the costs for tuition and living expenses of the students. The students got trained and later absorbed in government. This was in preparation of the transition from colonial masters, where a trained workforce would run the self-rule government (Murage, 2015). Institutions of higher education create new knowledge, analyse existing knowledge and improve knowledge through research. The scientifically proven knowledge is curated and passed down to society members in form of skills (Shisia, 2014). When applied it improves lives in different sectors by generating economic activities. In this regard, governments have always set aside funds to drive this philosophy, where in Kenya every county is proposed to have a public university (Gati, 2019), leading the societies advancing fast - improving the quality of lives of its citizens.

It is through this philosophy that the government set up public universities in to educate its citizens at its expense, for posterity. At Kenyan independence, the literacy levels were quite low and this changed with continued push by government to enlighten and fund the education of its people (Mulinge et al, 2017). On implementation, most students from secondary education have transitioned into higher education compared to colonial times. This has increased literacy levels leading to improved way of life and further increasing demand for higher education among citizens. Public universities play a key role in creation of human capital that is instrumental to achieve country strategic goals. Due to this, reliance on state funding is quite high (Murage, 2015).

However as the quality of life improves due to educational empowerment, newer niche needs emerge since the citizens have caught on the progressive characteristic of an educated society (Hoareau et al, 2013). Social classes have become prevalent and prominent, calling for differentiated needs that the government has to manage. Over the years the number of persons who have gained higher education and improved their literacy levels has shot up. The government's need for a literate society is constant. Where a society is enlightened, emerging needs also spring up. As a result the government seeks to continuously address the citizens' needs through service delivery (Gati, 2019) using the available limited resources.

Therefore in its proper governance and management of resources, the government proposed and is implementing the reduction of public funding in public universities in Kenya. This is a radical change of government policy in a bid to reduce over dependence of government revenue to fund public universities (Shisia, 2014). Through the change, the government is advocating for public universities to explore and implement methods of independently funding their operational budget. These changes aim to seek a solution to a worldwide phenomenon of increasing costs of quality university education over and beyond the corresponding rates of increase of available revenues to fund university education (Thuva, 2017). Funding shortfalls was occasioned by increased enrolments more than the government's ability to maintain its proportional financial obligations to the institutions (Murage, 2015).

The government cannot sustainably fund the entire budget of institutions especially in the current status of continuous quick progression of its society – demand for limited resources is high against multiple diverse citizens' needs. To meet this educational need, the government has encouraged the private sector to join the higher education sector and assist meet the educational need (Mulinge et al, 2017). In return, the government offers incentives to the private universities through higher education policies. As a result, increased number of private universities have entered the higher education space and have complemented the public universities (Shisia, 2014).

The existence of public universities is very critical. It equips majority of common citizens with knowledge and skills that lead to a vibrant economy (Areri D, 2019). This key role cannot be left to the private universities alone because most are operated for profit, cutting off majority of the citizens due to unaffordability. Most importantly, the public universities create a library of

knowledge in different fields. This knowledge is referred to develop effective policies for the country and comparatively rate and share with other countries.

Therefore, the government promoted new policies within the sector. A reduction of monies to fund public universities is being implemented. Concurrently the government is encouraging public universities to exercise innovation, commercialize and generate own source revenue (OSR) to complement public funding (Murage, 2015). This aims to stimulate growth within public universities and cushion against over reliance on government funding.

OSR is being collected in the public universities through Income Generating Units (IGUs) among other initiatives. Through IGUs, public universities diversify and respond adequately to market needs beyond the primary role of human resource training. The IGUs offer commercialized products and services in line with market demand.

IGUs have been established and are operational, however most studies conducted in the past, have focussed on IGU performance where the financial parameter has been the main evaluation metric. This has led to minimal studies that have attempted to link IGUs to the growth of the public universities in Kenya. The IGUs were set up to enrich diversification and utilise competitive advantage (Thuva, 2017). Through strategic innovations markets can be developed and market share increased. IGUs are taking this advantage and are executing strategic innovations. Execution of these strategic innovations as evident from published studies, can determine survival of firms in competitive environments.

Statement of the Problem

Public universities in Kenya are institutions of higher learning mandated and receive funding from government to build and transfer skills to its citizens (Mulinge et al, 2017). Consequently, the government has improved the standards of basic education, a critical foundation of learners to gain admission into these universities. The improved quality in basic education among citizens has led to increased number of qualified students who met the enrolment cut off points to continue into university education. In 1970, public universities enrolment stood at 3,443 students. By 1989/1990 the number increased to about 20,000 students (MoE, 2012). In the financial year, 1998/1999, public universities had enrolled 42,020 (Mutula, 2002). By 2011/12 public universities had a student population of 240,551 which continued to increase. year on year, to 276,349 by 2013 (ICEF Monitor, 2016).

With a large number of students meeting the cut off points to take up undergraduate courses in public institutions (Boit and Kipkoech, 2012), the competition is stiff and only few are selected in tandem with available resources. The rapid growth in higher education sector relates to the increased demand resulting from increased number of student registering for various programmes (Munene, 2016). The reduction of government funding has increased the expectations by students for quality services their by increasing pressure in universities (Gati, 2019). Moreover, the proliferation of private universities has heightened competition within the sector.

Public universities are additionally, competing among themselves to attract a growing number of qualified students under government sponsorship (Mulinge et al, 2017). Higher education is expensive resulting to the government subsidizing it. With this in mind, the competition for student enrolment sparked more by the government's proposal to reduce funding (MoE, 2012). As a society develops, competing needs and wants emerge, increasing demand of limited resources at government's disposal. The government therefore has to promote growth by autonomy (World Bank, 2019). It does this by reducing its monetary facilitation in universities and pushing for institutions' self-sustenance through policy and directives.

Reduced funds from government has greatly affected operations of universities (Areri, 2019), prompting the growth of universities into new frontiers beyond the traditional rigid mandate of

teaching and research. Public universities in Kenya can realise growth through exercise of innovations originating from internal competences that are competitively advantageous in order to compete and survive (Hoareau et al, 2013). Growth of public universities in Kenya can be diversified into more avenues and be commercially exploited to supplement operational cash crunches being experienced by the institutions. In (Areri, 2019) and (Shisia, 2014) studies, strategic innovations were identified as positive drivers of performance.

In Kenya, public universities get proportionally funded commensurate to the number of students enrolled. Students undertaking undergraduate studies form majority of students, and of whom largely sponsored by government (Muange, 2017). This indicates that a slash of funds, pressures the universities to seek more resources to sustain operations. Competition in student enrolment, coupled with inadequate funding of the universities by the government, has affected the performance of these institutions (Shisia, 2014).

In response to achieve diversity and spur growth into new frontiers, public universities in Kenya have set up IGUs (ICEF Monitor, 2016). The units are anchored on the expertise of the universities to offer professional skills through consultancy and offer commercialized consumer products and services to the community (Muange, 2017). These products and services are derived from application of knowledge bred in the university. This spurs up economic activities and builds capacities (Dindi, 2013). Through the initiative the brand of the universities is improved. This can translate to more enrolment by students and engagement of stakeholders from both governmental and non-governmental who fund and contribute to institutions' fluid operations (Abdul et al., 2021).

IGUs have been operational since 1990s (Murage, 2015). However, previous studies have not linked the consequent growth in the universities to IGUs. The resultant impact of IGUs on the diversification of universities in addressing its challenges lacks empirically documentation. Past studies have focussed on the operational efficiency of the IGUs while others focussed on the financial performance of the IGUs. In a study by (Muange, 2017), it was established that a significant negative relationship existed between operating costs and financial performance of the IGUs. Additionally the study established a significant positive relationship between internal controls and financial performance of IGUs in public universities. Moreover, the study identified an insignificant relationship between liquidity and unit structure to the financial performance of IGUs in public universities.

Therefore, studies linking IGUs to the growth in Public universities in Kenya are missing. The effectiveness of IGUs operating in public universities to address challenges IGUs were set out to address, is not clear. One such study that attempted to address this gap was (Murage, 2015), however the study limited to Egerton University and its former constituent colleges. The study evaluated the contribution of IGUs in financing Public Universities in Kenya. This information gap cripples the universities from realizing strategic gains or losses experienced. This study seeks to bridge this information gap. Improved decision-making can direct strategies towards the desired growth.

Innovation is acknowledged, by strategic management literature, as a critical enabler for firms to create, value and sustain competitive advantage in an increasingly complex environment that is rapidly changing (Yilmaz, 2005). Most studies have analysed strategic innovations impacting performance of firms. Growth can eventually lead to improved financial performance, however financial performance cannot wholly represent growth of public universities. A contextual gap exists in these studies, where performance was evaluated and focus was on financial performance while growth of public universities is broad - not limited to finance. Studies on growth encompass additional metrics, not limited to the financial metric only.

Objectives

General Objective

The general objective of the study is to examine Influence of Strategic Innovations on the Growth of Public universities in Kenya through IGUs.

The specific objectives of the study are:

1. To determine influence of Process Innovations on the growth of Public universities in Kenya through IGUs.
2. To investigate influence of Technological Innovations on the growth of Public universities in Kenya through IGUs.

Literature Review

Theoretical Framework

Survival Based Theory

This theory primarily postulates that an organization needs to continually adapt to the ever changing competitive environment in order to survive in its operations. The theory was first advanced by Herbert Spenser (Khairuddin, 2005). It emphasized on the assumption: for an organization to survive, strategies have to be deployed aiming efficient operations of the organization and rapid adaptive response to the changing environment (Abdulleh, 2007). This further demonstrates that an organization cannot only rely on one strategy, it requires adoptions of multiple strategies to respond to the changes in the environment for its survival.

The theory is applied in turning around organizations since most of the challenges faced are related to its inefficient systems which can be reengineered to aid the organization back on track in a dynamic environment (Evalyne, 2018). A competitive advantage strategy by a firm is very important in the performance of the firm in a competitive market. The reason any company employs a turn-around strategy is to change the company financial situation from bad to good (Evalyne, 2018).To achieve the ultimate goal of survival and improvement of profitability, an organization has to pursue efficiency in a competitive industry (Baker, 1995). The Survival Based Theory contributes to the study by highlighting the primary driving motive –that is survival - for the adoption of strategic innovations in response to the changes in the sector. Public universities in Kenya have achieved gains since inception. This needs to be preserved while more growth is continuously sought. However the competition in the sector is tough and survival has to be guaranteed first for growth to be later addressed.

This theory supports product innovation whereby through product offering of new and improved goods and services, an organization can tap into new markets or rebrand within a market. This will result in the organization surviving the turbulent times as it engages with the new market engagement. The theory also speaks to process innovation, where an organization reengineers its business activities to adapt and respond effectively to the market, enhancing survival in tough business times.

Theory of the Innovative Firm

William Lazonick, an economist presented this theory. It proposed to explain a firm's performance isn't achieved only by increase in output resulting from increase in inputs, but also through the innovativeness adopted by the firm (Lazonick and O'Sullivan, 2000). Innovation of the firm contributes greatly to its performance. The function of a firm is to transform resources into goods and services for sale. Superior economic performance result from innovative enterprises that creates high quality products at low costs (Lazonick W, 2005). Through innovation, the firm gains competitive edge over its competitors and a continuous culture of innovation can sustain its

competitiveness in the industry. An innovative firm will innovate to retain its market share in a competitive industry or gain strategic market position (Porter M, 1990). External market positioning should be a key reference in the adaptive development and implementation of the strategies by a business. This positively contributes towards attainment of sustainable competitive advantage in the industry and respective maximum profits (Baker, 1995).

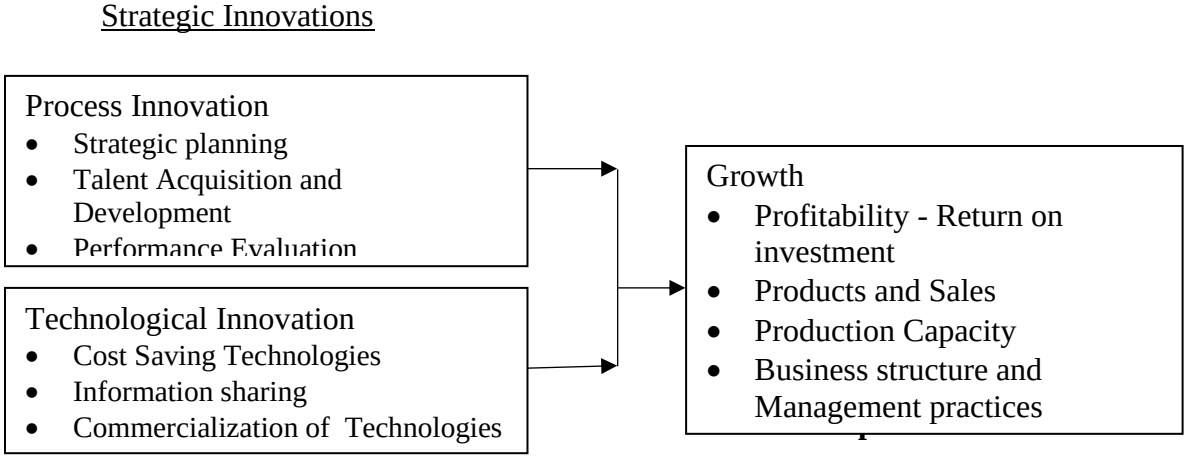
Firms deploy innovative strategies uniquely, leading to attainment of their bottom lines. This theory contributes to the study by cementing that a firm is required to be innovative in production of products that are competitive in the market , which leads to growth in its operations (Areri D, 2019). Innovation contributes to increased quality, differentiation and reduced costs of production. This builds the firm's competitive advantage leading to dominant performance in the market (Kaplan, 2007).

This theory promotes the ideology of technological innovation that entails the introduction of new and improved methods of performing tasks that drive the business end goals into fruition. It suggests, by a firm being innovative, it will find new ways to overcome bottlenecks and barriers that exist in the market and production processes.

Conceptual Framework

A conceptual framework is a hypothesized model that identifies the concepts under study and their relationship (Wangila, 2018). It indicates the independent variables which influence the dependent variable.

The purpose of conceptual framework is to help the reader to quickly see the proposed relationship between the independent variables and the dependent variable (Mugenda Mugenda, 2003)



Process Innovation

Process Innovation is the exercise of reengineering and improving internal operations of business activities (Njogu, 2014). It refers to the reorganization and repurposing of internal resources and the modes of operation to better deliver the defined business mandate. The exercises range from project management, strategic planning, customer services and employee assessment. These activities are either re-evaluated or new processes are introduced to effectively address the challenges being faced by the business. This is in line with (Sawang, 2011) study. Process innovation drives the creation of standardized efficient systems of work within business operations, resulting in maximum output with minimal input.

(Sergeeva, 2010) posits introduction of new processes or reengineering of existing systems of work is a risk activity that has to be undertaken in a meticulous manner for successful results. The activity has to be all inclusive. All the stakeholders in these processes have to be engaged and trained on the process changes while management should evidently show support and analyse the

changes being implemented by monitoring and evaluating them. (Kanyi, 2022) records that business process reengineering is a source of innovation and it resulted from the traditional understanding that business processes were inhibited by organizational and cultural boundaries.

Technological Innovation

Technological Innovation is a process by which industry generates new and improved products and production processes (Wangila, 2018). Technology can be termed as the methodology and application of specific knowledge into an activity to achieve a desired defined outcome. Enterprises can achieve self-development and also promote development and progress of societies by applying scientific and technological innovations in actual production (Ni, 2018). It will therefore entail use of unique production techniques to give out desired goods and services and the use of information technology to help in production process and information distribution. This is both within the organization, during business processes and also externally through dissemination of information to the public, that serves as the external environment. In service organizations, technological innovations are primarily innovations associated with information technology (Miles, 2001).

Effective technological innovation includes either the diffusion process or the spread of the innovation commercially (Zairi, 1992). Commercialization of the technology leads to sharing of information about the product and leads to increased uptake of technologies. Continuous commercialization of successive and effective technological innovations will highly improve the adoption and use of the technologies leading to a firm creating a dominant market position.

Empirical Literature

Process Innovation and Growth of Public Universities in Kenya Through IGUs

In the study of innovation activity and firm growth across key sectors of the Kenyan economy, (Gichana, 2013) established that most firms in Kenya have adopted innovation as the key driver of competitiveness. The study strongly correlated the growth of a firm to the innovation activity within the firm. In particular, process innovation was analysed where firms recorded a 92.4% successful implementation rate in their business practices. These innovations encompassed business practises, work responsibilities, decision making and external relations of the firms. These firms had also employed higher number of graduates by the end of 2011 compared to those firms not undertaking innovations. It was an indication that competent skills are required to drive implementation of various innovations towards achieving growth of firms. The study indicated that as innovations are being encouraged and rolled out, the firm has to adapt to support these innovations to operate in the desired efficient status.

Additionally, the study ultimately proposed that innovation process stakeholders, research institutions, producers and regulatory government agencies should create linkages and synergize. This enables the process of innovation and commercialization function better. This was anchored on the positive results of innovation in the success of business, from the small scaled collaborations already being utilised.

Process innovation has a direct and immediate impact on productivity performance of small and medium sized enterprises due to their organizational simplicity (Castillejo, 2013). (Njogu, 2014) aligns with the push for government to promote innovation amongst small and medium enterprises. This can be achieved through creation of business environments that encourage entrepreneurship, creation of relevant policies, implementation of those policies and ultimately public sensitization.

In the study by (Nafula, 2017), all four types of innovations (Product, Process, Technological and Marketing) were established as critical in achieving firm competitiveness. Among the four innovations, process innovation had the highest impact on firm competitiveness. It was established that process innovation is very relevant to firms facing stiff competition and has direct and

immediate impact on productivity performance. Process innovation strategies contributed to a 7.8% improvement in firm influence on growth. From the study a unit change in process innovation strategies had a 7.8% improvement on firm's growth, as per (Lawrence, 2020) study.

However, in the implementation of decisions and operations, the public sector is faced with a lot of bureaucracies where decision making is slow and so is the commitment of funds towards strategy implementation. Therefore it is also important to inspect relevant literature with regards to the public sector, strategic innovations and growth.

It is evident from a study carried out in Nairobi City Council, performance in the public sector improves if process innovations are improved. It was also noted that civil servants need to be involved in designing the strategies for innovation practises. (Wangila, 2018) recommends that technology transfer needs to be managed and a culture of adopting innovative practises be encouraged in Nairobi City County. The study found that process innovation had a moderate positive significant relationship with performance. (Waithaka, 2017) supports innovation practices in public sector by proposing universities to implement management support systems, increase resources for implementation, recruitment of competent staff and regular training of the staff to ensure they are up to date in industry knowledge. This acts as the backbone to smooth implementation of innovation activities leading to improved status.

(Shisia, 2014) identified that a positive relationship existed where performance improved with proper implementation of strategic innovations. The strategic innovations encompassed product, process, marketing and organization innovations. From the study, process innovation had a moderate impact to the performance improvement of public universities. The study offered an alternate view suggesting solely conventional management tools cannot be used to enhance organizational performance.

A number of innovations have been developed in Kenyan universities but a small number have been protected and commercialized (Ateka., 2021). He studied that the reasons for low commercialization was poor university-industry collaboration, lack of a commercialization strategy, inadequate funds, poor entrepreneurship skills of scientists and low incubation capacity. However from previous studies there exists proof of improved performance if the strategic innovations are implemented well and facilitated. The study recommended that universities should develop commercialization and entrepreneurship strategies and policies to help focus on industry and market needs.

Process innovation from the various studies indicates it as a critical supporting innovation that enables the flourishing of other innovations towards achieving the bottom line of the businesses. Firms therefore need to align their structure and operations in support of the other innovations being deployed to result in the desired successful outcomes. This study will analyse process innovation through three sub-variables. These are Strategic Planning, Talent acquisition and development and Performance Evaluation. Talent Training and development and Performance Evaluation are valid indicators of process innovation as evidenced in (Wangila, 2018) study. Strategic planning, as a sub variable, applied in (Kanyi, 2022) study, also speaks to process innovation, therefore validated for use in this study too.

Technological Innovation and Growth of Public Universities in Kenya Through IGUs

Kenya's Vision 2030, in a bid to improve productivity and competitiveness of key sectors, seeks to increase the utilization of Science, Technology and Innovation (Nafula, 2017). In a study by (Wangila, 2018), 69.4% of respondents agreed that new production techniques increased productivity only if supported by changes in organizations. Production techniques are driven through implementation of innovated technologies. This directs that firms that are actively involved in implementation of developed technologies within their operations stand to increase

their productivity in delivery of their trade. Process design is heavily influenced by technology, and through proper implementation the ease of doing work and more output can be achieved. In (Gichana, 2013) study, he evaluated that effects of innovation had a component termed as process-oriented effects whereby 56.7% of firms rated it of high importance to the level of successful outcomes. This was due to their nature of increasing capacity of production or service.

(Areri, 2019) study indicates that strategic innovations can be used to help a firm solve challenges. In the study, public universities are faced with reduced funding and thus the institutions aim for OSR through strategic innovations. It assessed influence of technological and diversification innovations on revenue streams sources of the selected public universities. From the analysis there is a positive relationship of technological innovations on revenue stream sources. The findings strongly indicated that an increase in technological innovation led to the increase in organization revenue stream sources. Technology was leveraged to open up new sources of revenue such as consultancy while at the same time streamlining the existing sources of revenue, ultimately posting improved performance over time. Through strategic innovations, it was evaluated that volume of income of the public universities improved. University management was therefore encouraged to adopt strategic innovations, key being technological innovation, to achieve new revenue stream sources and also achieve long term survival.

(Gati, 2019) indicated that strategic innovation is determined by technology and had improved service delivery at Kenyatta University. The study asserted that development based on strategic innovation is the best way of helping institutions of higher learning improve in service delivery. The study focussed on service delivery, propelled by strategic innovations in public universities where Kenyatta University was analysed as a case study, acknowledged that public universities reforms had been and was an on-going policy objective for the government of Kenya. Through technological innovations universities obtain competitive advantage from being effective and efficient. This was highly encouraged in the recommendations of the study that technological innovations be successfully adopted towards solving some of the challenges the higher learning institutions were facing.

In this study, under Technological Innovation, the sub variables under study will be Cost Saving Technologies, Information Sharing, and Commercialization of Technology. Information sharing and Commercialization of technology are valid sub variables as applied in (Wangila, 2018) study, to illuminate Technological Innovation as a variable. Cost saving technologies is also a valid sub variables to speak to the study variable, Technological Innovation, in (Areri, 2019) study.

Research Methodology

The study adopted a descriptive research design. The study included eighteen (18) out of a total thirty-five (35) public universities in Kenya. The population comprised of management officers from eighteen (18) public universities in Kenya, which had existing and operational IGUs. To respond adequately to the study's research questions, the target population comprised of management officers from both the respective IGUs and the public universities associated with oversight of the IGUs. Through stratification in both the public universities and the IGUs, top, middle and lower level management officers were the study's target population. Strict emphasis on selection of the respondents, relevant to the study, was done. This was because the organizational structures of each of the 18 public universities are heterogeneous.

The target total population was three hundred and sixty (360) officers. Through stratification and from each public university involved in the study, twenty (20) respondents were included in the survey. These respondents composed of top, middle and lower level management officers in both the IGU and the Public Universities. The respondents were best suited to respond effectively to the research questions due to their wide network of information in relation to the study topic. The

respondents are key decision makers in the area of study and have a wide understanding of the sector. From the population a sampling frame of three hundred and sixty (360) management officers was derived. All these members were relevant in the university's administration framework to oversight IGUs and others relevant to the IGUs management framework.

The study sample was 187 out of a target population of 360, 51.94% of the population. The sample was calculated using (Mugenda Mugenda, 2003) suggested mathematical formula for determining sample size. The sample was equally distributed among the targeted respondents in the 18 public universities in Kenya. Stratification, judgemental and purposive sampling techniques were used to include relevant management officers from the 18 public universities in Kenya and respective IGU management officers. Self-administered questionnaires were used to collect data. The questionnaires comprised of both open and close ended questions thereby enabling the respondents to express themselves openly and honestly while also allowing the researcher to record and statistically analyse the responses

Primary data was derived from the questionnaires while secondary data was sourced from published and print media. On approval of the research proposal by the university, a permit from the public institution National Commission for Science, Technology and Innovations (NACOSTI) to conduct the research was sought. Introductory letters were also sent out to the Public Universities in the study, seeking to incorporate relevant staff in the survey. Drop and pick administration of the questionnaires was carried out and to ensure more responses, follow up reminder emails of digitized surveys were sent having a guarantee of the respondents' confidentiality being maintained

The survey pilot test was carried out in 10-15% of the sample size. From a sample size of 187, 19 participants formed the pilot sample. Respondents of the pilot study were excluded from the main study. This aligned with (Mugenda Mugenda, 2003) view of a pilot test carried out in a survey.

The collected data was examined and checked for completeness and comprehensibility. The data was then summarized, coded and tabulated. Statistical Package for Social Sciences (SPSS) and Microsoft Excel software were used in the analysis. Descriptive statistics such as means, standard deviation and frequency distribution analysed the data. Data was then presented through percentages and frequency tables. This ensured that the gathered information was clearly understood by describing the situation. The qualitative data was analysed using content analysis and findings discussed. Inferential statistics involved testing of correlation among the various variables. A relationship was determined as significant since the associated p value was less than 0.05. 95% confidence level and 5% significance level were used. This established to what degree the independent variable influences the dependent variable. Analysis of Variance (ANOVA) was also determined to ascertain the goodness of fit of the model. The equation that represented the algebraic expression of multiple regression model

RESEARCH RESULTS AND DISCUSSION

One hundred and eighty seven (187) questionnaires were distributed and self-administered to the population drawn from officers of the universities, comprising of the university administration and IGU management. All 187 questionnaires were correctly completed and returned resulting in a 100% response rate. (Kothari, 2007) categorized response rates, stating that 50% is acceptable, 60% is good, 70% is perfect, and 80% is excellent. Similarly, (Saunders, 2003) suggested that a 30 to 50% response rate is reasonable for statistical generalizations. (Babbie and Benaquisto, 2009) deemed 50% adequate, while (Bailey, 1987) set an adequate response rate at 75%. A response rate of 50% is adequate, 60% and above is good, while above 70% is very good (Mugenda, 2009). Therefore, a 100% response rate in this study was deemed excellent for subsequent data analysis.

Descriptive Analysis

The questions in the questionnaire were measured on a scale of 1-5, with 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree and 5 indicating Strongly Agree to the question asked. From the results, a mean of 1 indicated that the respondents strongly disagreed with the question asked. A mean of 2 indicated that the respondent disagreed with the question asked. A mean of 3 indicated that the respondent was neutral on the question asked. A mean of 4 indicated that the respondent were in agreement with the question asked and a mean of 5 indicated that the respondents were in strong agreement with the asked question. The standard deviation gave the variations of the response from the mean. The smaller the standard deviation the better quality of the results as it indicated that the responses were not far off from the mean response.

Influence Of Process Innovations On The Growth Of Public Universities In Kenya Through IGUs.

The data presented in Table 1 provided a comprehensive view of how process innovations influence the growth of public universities in Kenya through IGUs. The results indicated that the introduction of new strategic business processes, which included business reengineering, supply chain management, and lean production, was received positively by 51.9% of the respondents. In comparison, 18.7% remained neutral, and 10.2% disagreed. Approximately 9.1% strongly disagreed, showcasing a range of perspectives. The mean agreement level was 3.43, with a standard deviation of 1.116, suggesting moderate overall agreement.

The survey also found that the company or institution places a significant emphasis on continuous monitoring and evaluation of business processes and staff performance. A substantial 74.3% of respondents strongly agreed with this approach, while 10.7% agreed. Conversely, only a tiny percentage disagreed (2.7%), and an even smaller percentage strongly disagreed (8.6%). The mean agreement level was 3.76, indicating a high level of agreement, with a standard deviation of 0.984, signifying relatively consistent responses among participants.

Regarding the introduction of new and improved strategic decision-making and accountability methods, the majority (62.6%) of respondents agreed (either strongly or moderately), while 11.2% strongly agreed and 11.2% disagreed. A smaller proportion (6.4%) remained neutral. The mean agreement level was 3.57, with a standard deviation of 1.102, indicating a moderate level of agreement with the implemented decision-making and accountability methods. The company or institution focused on recruiting skilled staff to drive business activities efficiently, and this was generally well-received. Approximately 56.7% of respondents agreed (either strongly or moderately), with 14.4% strongly agreeing. In contrast, 10.2% disagreed, and 11.8% strongly disagreed. The mean agreement level was 3.6, implying a moderate to high level of agreement, with a standard deviation of 1.09, indicating a relatively consistent response among participants.

The company or institution emphasized staff engagement in capacity-building initiatives to equip them with relevant evolving business processes. This approach was well-accepted, as evidenced by 69.5% of respondents strongly agreeing and an additional 13.9% agreeing. A smaller percentage remained neutral (9.1%) or disagreed (3.2%). The mean agreement level was 3.86, signifying a high level of agreement, with a standard deviation of 0.852, suggesting consistent responses among participants.

Finally, the establishment of mutually beneficial and strategic external relations with other industry firms was perceived positively by a majority of respondents. A significant 65.2% strongly agreed, while 26.2% agreed. Only a few respondents disagreed (4.8%), and an even smaller percentage remained neutral (3.7%). The mean agreement level was 4.05, indicating a high level of agreement, with a standard deviation of 0.89, suggesting relatively consistent responses among participants. (Ferraris et al., 2018) conducted a study on the effects of strategic business processes on

organizational efficiency, which is consistent with the findings of this study. The study found that effective implementation of business reengineering, supply chain management, and lean production positively correlated with improved operational efficiency, aligning with the present study's findings on new strategic innovative business processes.

Table 1: Influence of Process Innovations on the growth of Public Universities in Kenya through IGUs.

Items	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	σ
The company/institution introduced new strategic business processes for propagating business efficiently. (Business reengineering, supply chain management, lean production etc	19 (10.2)	17 (9.1)	35 (18.7)	97 (51.9)	19 (10.2)	3.43	1.116
The company/institution continuously monitors and evaluates the business processes and staff performance to achieve and improve overall efficiency.	16 (8.6)	5 (2.7)	7 (3.7)	139 (74.3)	20 (10.7)	3.76	0.984
New and improved methods of strategic decision making and accountability were introduced? (Decentralization of decision making, Fluid interdepartmental relations)	16 (8.6)	21 (11.2)	12 (6.4)	117 (62.6)	21 (11.2)	3.57	1.102
The company/institution recruits skilled staff to drive business activities efficiently.	13 (7)	22 (11.8)	19 (10.2)	106 (56.7)	27 (14.4)	3.6	1.09
The company/institution engages staff in capacity building initiatives to equip them in relevant evolving business processes.	8 (4.3)	6 (3.2)	17 (9.1)	130 (69.5)	26 (13.9)	3.86	0.852
The company/institution has sought and created mutually beneficial and strategic external relations with other industry firms.	7 (3.7)	9 (4.8)	0	122 (65.2)	49 (26.2)	4.05	0.89

SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly

Influence Of Technological Innovations On The Growth Of Public Universities In Kenya Through IGUs.

Table 2 provides a detailed insight into how technological innovations influence the growth of public universities in Kenya through IGUs. Firstly, it was observed that a considerable majority, comprising 44.9% who agreed and 16% who strongly agreed, acknowledged that the company or institution prioritizes the application of innovative technology in running its business activities. This indicates a high level of emphasis on incorporating innovative technology, showcasing a forward-thinking approach. Conversely, only a minority of 15.5% disagreed with this prioritization. In terms of production technologies, the study revealed that 55.1% of respondents recognized a continuous advancement in the sophistication of applied production technologies aimed at enhancing product quality and achieving cost savings. This underscores a proactive stance towards technological advances to improve operational aspects. Only 1.1% strongly disagreed, reinforcing a general agreement regarding the advancement of production technologies.

Efficient communication networks through Information Technology were recognized as vital for supporting information sharing within business activities. The majority (57.2%) agreed with this notion, demonstrating the importance of seamless communication facilitated by information

technology infrastructures. A minimal 3.2% disagreed, further affirming the consensus on the role of information technology in fostering efficient communication networks. Additionally, the study highlighted the impact of advanced production systems and processes on product output and cost savings. A significant 70.1% of respondents agreed that the utilization of advanced production methodologies resulted in increased product output and cost savings, indicating the efficacy of technological advancements in optimizing operations. Only a tiny proportion (6.4%) disagreed, underlining the perceived positive impact on productivity and efficiency.

Furthermore, the study addressed the commercialization of research knowledge and skills within these academic institutions. An overwhelming 64.7% acknowledged the adoption and promotion of the commercialization of research knowledge and skills. This suggests a recognition of the importance of translating research into practical applications for broader societal benefit. Disagreement was minimal, reinforcing the acceptance of this approach. Lastly, the impact of commercialization on market share and market presence was explored. A notable 55.1% agreed that commercialization of research knowledge and products has indeed increased the company's/institution's market share and market presence. This finding emphasizes the strategic relevance of commercialization in expanding influence within the market. Only 5.3% disagreed, further indicating a prevailing consensus regarding its positive impact.

According to a recent study conducted by Landers and Marin in 2021, titled - Impact of Technology Integration on Organizational Growth, integrating innovative technology and continuously advancing production technologies can positively impact product quality and operational efficiency. The study emphasized the importance of prioritizing technological innovation integration in Public Universities to facilitate growth through IGUs.

Table 2: Influence of Technological Innovations on the growth of Public Universities in Kenya through IGUs.

Items	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	σ
The company/institution prioritizes application of innovative technology in running business activities.	0	29 (15.5)	44 (23.5)	84 (44.9)	30 (16)	3.61	0.934
The level of sophistication of applied production technologies is continuously advanced to improve product quality and cost savings.	2 (1.1)	25 (13.4)	21 (11.2)	103 (55.1)	36 (19.3	3.78	0.945
Efficient communication networks through Information Technology is supported to support information sharing within business activities.	1 (0.5)	6 (3.2)	36 (19.3)	107 (57.2)	37 (19.8)	3.93	0.751
The advanced production systems and processes applied have result in increased product output and cost savings.	0	25 (13.4)	12 (6.4)	131 (70.1)	19 (10.2)	3.77	0.807
Commercialization of research knowledge and skills has been adopted and is being promoted within the company/institution	0	4 (2.1)	36 (19.3)	121 (64.7)	26 (13.9)	3.9	0.64
Commercialization of research knowledge and products has increased the company's /institution's market share and market presence	0	10 (5.3)	38 (20.3)	103 (55.1)	36 (19.3	3.88	0.774

SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly

Growth Of Public Universities In Kenya Through IGUs.

The findings in Table 3 illuminate vital factors contributing to the growth of public universities in Kenya through IGUs. Notably, there is a strong confirmation and substantial market presence of product brands associated with public universities in Kenya, with 47.6% agreeing and 24.1 strongly agreeing. This underlines a significant market penetration and recognition of these brands. Additionally, a considerable agreement (55.6%) and a notable strong agreement (19.3%) emphasize that recruiting specialized professionals has enhanced business expertise and competence within these universities. This highlights the value of skilled human resources in driving growth and operational efficiency. Moreover, a consensus (72.7%) on the formalization of IGUs within management and business structures underscores the institutional efforts to engage effectively in the market. These findings collectively indicate the strategic initiatives and structural enhancements that Public Universities are undertaking to boost their growth and market engagement through IGUs.

(Alrowwad et al., 2020) conducted a study examining how organizational innovations affect organizational performance. The study explored the impact of innovations in different aspects of an organization, such as strategies, processes, and structures, on growth and overall performance. The findings of that study were in line with this study and highlight the crucial role of innovation in improving efficiency, competitiveness, and change within organizations.

Table 3: Growth of Public Universities in Kenya through IGUs.

Items	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	σ
Product brands associated with public university are present and consumed in the market	30 (16)	13 (7)	10 (5.3)	89 (47.6)	45 (24.1)	3.57	1.356
New recruitments of specialized professionals have increased business and operational expertise and competence within public university.	19 (10.2)	9 (4.8)	19 (10.2)	104 (55.6)	36 (19.3)	3.69	1.145
IGU have been formalized in both management and business structure to engage effectively in the market.	16 (8.6)	6 (3.2)	29 (15.5)	89 (47.6)	47 (25.1)	3.78	1.123
Increased income has been generated through commercial activities of IGUs and profits realized giving returns on investment	24 (12.8)	7 (3.7)	18 (9.6)	109 (58.3)	29 (15.5)	3.6	1.184
Public university have entered into working and business partnerships with other government agencies and private sector through the IGUs.	22 (11.8)	10 (5.3)	13 (7)	126 (67.4)	16 (8.6)	3.56	1.112
IGUs have acquired industry production machinery and efficient processes in the production of its products boosting production capacities	10 (10.7)	8 (4.3)	21 (11.2)	111 (59.4)	27 (14.4)	3.63	1.121

SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly

Inferential Analysis

Correlation Analysis

The correlation analysis presented in Table 4 explores the relationships between different types of innovations (Process Innovation, Technological Innovation and their impact on the growth of Public Universities in Kenya through IGUs. Correlation coefficients, denoted by Pearson Correlation, range from -1 to 1, indicating the strength and direction of the relationship. The significance levels (Sig. (2-tailed)) indicate the confidence in the observed correlations. Process Innovation demonstrates a moderately positive correlation (0.309**) with the growth of public universities in Kenya through IGUs. This suggests that as public universities implement new processes and procedures to improve effectiveness and efficiency.

The growth of these institutions through IGUs, consequently also increases significantly. Conversely, technological innovation showed a moderately strong negative correlation (-0.353**) with change in growth of public universities in Kenya through IGUs. This implied that too much emphasis on technological advancements might, counterintuitively, lag growth of public universities in Kenya through IGUs.

Table 4: Correlation Analysis

		Process Innovation	Technological Innovation	Growth of Public Universities
Process Innovation	Pearson Correlation			
	Sig. (2-tailed)			
	N			
Technological Innovation	Pearson Correlation	-.463**	1	
	Sig. (2-tailed)	.000		
	N	187	187	
Growth of Public Universities in Kenya through IGUs	Pearson Correlation	.309**	-.353**	1
	Sig. (2-tailed)	.000	.000	.000
	N	187	187	187

Regression Analysis

Table 5 provides the model summary for examining the influence of strategic innovations (Process and Technological Innovations) on the growth of public universities in Kenya through IGUs. The model indicated a strong relationship, with an R Square value of 0.663, signified that approximately 66.3% of the variation in the growth of public universities in Kenya through IGUs can be explained by the strategic innovations in the model. The Adjusted R Square, the measure that accounted for the number of predictors in the model, is 0.635. This adjusted value signified the proportion of variance in the growth of public universities in Kenya through IGUs that was explained by strategic innovations while considering the complexity of the model.

The Standard Error of the Estimate is 0.121, providing an average measure of the accuracy of the predictions made by the model. A lower value indicates a more accurate prediction of the growth of public universities in Kenya through IGUs based on the strategic innovations. The Durbin-Watson statistic, with a value of 2.211, helps to assess the presence of autocorrelation in the residuals. A value close to 2 suggests that there is no significant autocorrelation in the model residuals, indicating that the observations are likely independent of each other. Overall, the model summary indicated a strong relationship between the considered strategic innovations and the growth of public universities in Kenya through IGUs. It provided valuable awareness into the predictive capacity of these strategic innovations in influencing growth.

Table 5: Model Summary for influence of strategic innovations on growth of public universities in Kenya through IGUs

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.704[a]	.663	.635	.121	2.211

a. Predictors: (Constant), Process Innovation, Technological Innovation
b. Dependent Variable: Growth of Public Universities in Kenya through IGUs

Table 6 presents the results of the Analysis of Variance (ANOVA) for assessing the influence of strategic innovations (Technological, Process) on the growth of public universities in Kenya through IGUs. The ANOVA results indicate that the overall model is statistically significant with a very low p-value (Sig. = .000). This suggests that at least one of the predictors (strategic innovations) substantially affects Kenyan public universities' growth through IGUs.

In the regression model, the sum of squares for regression is 18.408, implying that the variation in the growth of public universities in Kenya through IGUs can be attributed to the strategic innovations considered in the model. The degree of freedom (df) for regression is 4, representing the number of predictors in the model (Process Innovation and Technological Innovation). The Mean Square for regression is 4.602. This indicated the average variation, explained by each predictor, in the growth of public universities in Kenya through IGUs. The F-statistic is 8.859, a ratio of the mean square for regression to the mean square of the residuals. A higher F-statistic suggested a stronger relationship between predictors and growth of public universities in Kenya through IGUs, as was the case in the study.

The ANOVA results confirmed the significance of the model and demonstrated that the predictors (strategic innovations) collectively had a notable influence on the growth of public universities in Kenya through IGUs.

Table 6: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	18.408	4	4.602	8.859	.000[b]
	Residual	94.549	182	.519		
	Total	112.957	186			

a. Dependent Variable: Growth of Public Universities through IGUs
b. Predictors: (Constant), Process Innovation, Technological Innovation

The Coefficients table (Table 7) provides crucial awareness into the relationship between Technological and Process innovations and the growth of public universities in Kenya through IGUs. The analysis of the model revealed the relationship between various types of innovation and the growth of public universities in Kenya through IGUs. Process innovation shows a statistically significant positive impact (Beta = 0.172, Sig. = 0.027), indicating that enhancements in processes significantly contribute to growth. Technological innovation exhibits a robust positive impact (Beta = 0.244, Sig. = 0.002), emphasizing its substantial influence on growth.

The analysis indicates that a unit increase in process innovation corresponds to a 0.172 unit increase in the growth of public universities in Kenya through IGUs. This underlines that by optimizing internal processes, substantial growth can be attained. Technological innovation demonstrated a more meaningful impact, where a single unit increase leads to a significant 0.244 unit expansion of growth. Emphasizing technological advancements can therefore be a powerful driver of growth for these universities

Technological Innovation was captured in the Audited Reports, with the acquisition of machinery and equipment that produced the products and services the IGUs presented in the market.

Recruitment of professional staff members was also capture in the secondary data. The staff mandate being to drive the set IGU commercial agenda. This ultimately led to introduction of products and services, acquisition and utilization of equipment and machinery towards production of products and services.

These products and services through marketing activities, earned revenues as shown in Table 7.

Table 7: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	4.355	.859		5.068	.000		
	Process Innovation	.207	.093	.172	2.224	.027	.769	1.301
	Technological Innovation	445	.143	.244	-3.121	.002	.755	1.325

a. Dependent Variable: Growth of Public Universities in Kenya through IGUs

Conclusion

In conclusion, the study provided valuable insights into the influence of strategic innovations on the growth of public universities in Kenya through IGUs. The diverse demographic representation within the sample underscored the importance of understanding varied perspectives, contributing to a comprehensive analysis. The emphasis on process and technological innovations highlighted their pivotal role in fostering substantial growth. Efficient integration of innovative technology, advancements in production technologies, and strategic application of Information Technology were identified as critical components in augmenting operational efficiency and product quality.

The coefficients table further emphasized the potent impact of process and technological innovations on growth, indicating the potential for substantial expansion by optimizing internal processes and leveraging technological advancements effectively.

Recommendations

Public universities in Kenya should focus on process innovation to streamline business operations within IGUs. Exercising efficient supply chains, lean production, can immensely contribute to growth of public universities in Kenya through IGUs. Regular evaluation and tweaking of processes should be continuous to be adaptable to altering dynamics.

Public universities in Kenya should adopt a balanced and strategic approach to technological innovation. While embracing cutting-edge technologies, public universities should ensure these technologies support the mission and objectives of IGUs. Training and upskilling staff to utilize these technologies should be a necessity, ensuring they incrementally contribute to growth and operational efficiency.

Areas for Further Studies

To avoid direct generalization of this study on to private universities, a similar study on private universities in Kenya is also highly advocated. This is because the study was limited to public universities in Kenya, and therefore the findings, conclusions and recommendations in the study cannot be applied directly on to private universities in Kenya without supporting empirical evidence.

As technological innovations have revolutionized various sectors, it is crucial to investigate their long-term implications. While these innovations have demonstrated a strong positive impact on the growth of public universities in Kenya through IGUs, assessing their sustainability in the future

is critical. Future studies could focus on examining the long-term effects of technological innovation on public universities in Kenya. Factors such as, usefulness of perpetual technology upgrades, integration of emerging technologies and technology obsolescence need to be evaluated. Such evaluations will be critical in ensuring that public universities in Kenya remain competitive and achieve sustainable growth over time while addressing potential negative impacts of technological innovation.

Finally, growth is a broad variable with multiple indicators. Therefore additional studies can be conducted to evaluate additional indicators of growth, over and above those highlighted in this study.

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