THE IMPACT OF INFORMATION TECHNOLOGY ON INNOVATION AND ORGANIZATIONAL PRODUCTIVITY: A CASE STUDY OF GAMBIAN FIRMS

BİLGİ TEKNOLOJİSİNİN YENİLİK VE ORGANİZASYON VERİMLİLİĞİ ÜZERİNE ETKİSİ: GAMBİA FİRMALARI ÜZERİNE BİR VAKA ÇALIŞMASI

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Abstract: ***While endeavoring to magnify the productivity factor, various strategies and methods have been implemented by organizational managers. In our modern era, Information Technology has emerged as the most cutting-edge tool to materialize such aim. This piece of writing elaborates the need for applying Information Technology in operation in order to increase organizational productivity via the enhancement of innovation capabilities with reference to Gambian firms as a case study. The research investigates the relationship between Information Technology investment, firm innovation ability and organizational productivity of Gambian companies. Moreover, it explores whether Information Technology is having an impact on the operations of the companies. Thus, the research uses quantitative research method to determine the relationship and measure the productivity level based on technological innovativeness. According to findings, there's a positive relationship between Information Technology investment, technological innovativeness and productivity of Gambian firms. The findings suggested that Gambian firms should consider greater investments in Information Technology for a great improvement of the productivity factor.***

Keywords: ***Information technology, innovation, information systems, productivity, case study, technology and innovation management.***

Öz: ***Verimlilik faktörünü büyütmeye çalışırken, organizasyon yöneticileri tarafından çeşitli stratejiler ve yöntemler uygulanmaktadır. Modern çağımızda, Bilgi Teknolojileri bu amacı gerçekleştirmek için en ileri araç olarak ortaya çıkmıştır. Bu yazı, bir vaka çalışması olarak Gambiya firmalarına atıfta bulunarak inovasyon yeteneklerinin geliştirilmesi yoluyla organizasyonel üretkenliği artırmak için Bilgi Teknolojisini operasyonda uygulama ihtiyacını incelemektedir. Araştırma, Gambiya şirketlerinin Bilgi Teknolojisi yatırımı, firma inovasyon yeteneği ve organizasyonel üretkenliği arasındaki ilişkiyi araştırıyor. Ayrıca, Bilgi Teknolojilerinin, şirketlerin operasyonları üzerinde bir etkisi olup olmadığını araştırmaktadır. Bu nedenle araştırma, teknolojik yenilikçiliğe dayalı ilişkiyi belirlemek ve verimlilik düzeyini ölçmek için nicel araştırma yöntemini kullanır. Bulgulara göre, Gambiya'nın Bilgi Teknolojisi yatırımı, teknolojik yenilikçiliği ve verimliliği arasında pozitif bir ilişki var.***

Anahtar Kelimeler: ***Bilgi teknolojisi, yenilik, bilgi sistemleri, üretkenlik, vaka çalışması, teknoloji ve yenilik yönetimi.***

INTRODUCTION

Ever since, companies have been continuously searching for the best strategies and the most cutting-edge tools that boost company performance in order to gain competitive advantage in the most intensive global market. The strategies vary from managerial, financial and geographical strategies.

In our modern era, Information Technology, is unarguably the most sophisticated of all tools driving the competitiveness of the global market. On spot service delivery, high sense of innovativeness and quality of the final service or product delivered determine the competitiveness of the firm, and Information Technology has what it takes to foster such abilities.

The Gambia is surely part of the whole picture of the global market. Despite the size, the country proves to be an active strategic trade channel. Therefore, various means must be adopted to define strategies of making such place a leading global market. The strategies and means include intellectual, business and even those of political dimension. Based on the perception of that necessity to create means and develop strategies, this attempt is made from the academic and intellectual scope as an effort to formulate such strategies and define the most appropriate means.

The introduction part shall explain the background of the study, the aim of conducting it, its research problem, research questions and significance. Moreover, it should clearly define the key variables constructing the research topic and finally determine the scope it covers.

1. INFORMATION TECHNOLOGY

Information Technology is defined as a set of hardware, software and networks. It has the unique ability to collet, process and store information for current or future use (Turulja and Bajgorić, 2020: 1021).

Information Technology, as an efficient an effective tool in business operation has recently become indispensable in all facets of organizational management. It is embedded with a power to change and enable optimization of current tasks, in addition to assisting governments and non-government organizations to deliver service to its people accordingly. On an individual level it’s strongly determining how modern or smart an individual is (Ravichandran, 2018: 32).

In terms of our modern global business environment, it has evolved to an extent that it has imposed itself as the survival factor of firms in today's most competitive markets. It defines a firm's business model, shape out its modernity dimension and most importantly provide firms with powerful market strategy to discover and exploit opportunities.

Having perceived the huge potentials Information Technology brings to organizations it has propelled managers to look for the best ways to integrate it with business processes with the objective of raising the productivity factor. According to Kariuki (2015: 221), over 50% of investment funds worldwide are directed towards developing more Information Technology infrastructure. The great focus on IT investment is rationally due to the understanding of IT’s capability in breaking boundaries in terms of reaching customers, promoting agility in processing and

efficiently delivering quality (Sigilai, 2020: 248). With Information Technology possessing such distinctive features it is paramount to align it with main organizational strategies as well as enabling it to accommodate business processes accordingly.

1.1. Innovation

Innovation is originally a Latin word. It technically means the creation of something new or the addition of value to something already existing (Yusuf, 2021: 477). Wikhamn (2019: 106) believes that the term "innovation' if mentioned within the business scope, it typically refers to the presentation of something new with the aim of gaining higher profitability and greater customer base through having satisfied customers. An innovation can be in a form of new product, service or even a concept purely derived from a scientific research or technical analysis. However, it should satisfy a need, provide a solution for a relevant issue or even develop a perception towards a certain phenomenon.

From a business perspective, innovation can be divided into four types as per the OECD Oslo manual. They are organizational innovation, process innovation, product innovation and lastly marketing innovation. As per the manual, Organizational innovation is the organization's implementation of new practices and methods in workplace, surrounding environment and in external relations. Process innovation is the implementation of new strategies intending to reduce cost of production, but without compromising the quality of the provisioned service. While Product innovation is the development of products with different features to meet consumer's variable needs. Alternatively, marketing innovation is adoption of new marketing techniques and strategies for greater effect on consumer's purchase behavior.

The innovation's multi dimensions makes it a cutting-edge strategy. If efficiently utilized, it can provide firms with unique solutions while working on winning competitive advantage in the competitive global market as it enables firms to alter the competition rules. Its re-structures the industry in a manner that favours the innovator, thus overcoming rivals in the market and building a broader customer base (Chege et. al. 2020: 351, Kijkasiwat and Phuensane, 2020: 97).

1.2. Productivity

Productivity has been technically defined as the amount of output (final product or service) that is generated from a specific amount of input (Haseeb, 2019: 154). As per the business expertise, increment in an organization's productivity is perceived when the output increases while inputs remain static. It can also be noticed when the output remains static, but inputs are minimized (Lafuente González et. al., 2019: 61).

According to Ghorbanzad and Beig (2012: 1198), increment in productivity is consistently related to social and organizational gains. For instance, reduction in cost of operation for both private and public utility is a practical examples of productivity outcomes.

It has been mentioned earlier that increment in a country's productivity by 1% yearly means a multiplication in the standard of living of that country for every 70

years. Due to productivity's strong association with financial gains, firm managers have constantly searched for the most efficient strategies to increase its level.

1.3. Background of the Research

Productivity, as a determinant and a reflection of a country or community's standard of living makes it something of great value and importance. According to scientific statistics, a 1% increment in a country's productivity is substantially a multiplication in the standard of living for that country in every 70 years (Roos, 2017: 889) Having realized the strong correlation between productivity and financial gains as stated above, firms' managers always search for meaningful strategies to increase it.

On the other hand, consumer's constant demand for diversity drives organizations towards innovating with the objective of satisfying variable needs of customers. Satisfying customers will certainly have the organization maintain its status in the competitive global market. Succeeding in innovating on a constant basis forms a customer that attaches great value to an organization, thus neglecting any other rival in the same industry when making a choice out of multiple options. Failing to innovate means loss of market share, thus inflicting serious repercussions on the organization's business (Daragahi, 2017: 126).

In the same regard, Information Technology holds the potential to ensure growth in productivity through replacement of manual processes with automation, improvement of both product and service quality, reduction of operation costs and promotion of open information access (Akhavan et. al., 2021: 54). The use of Information Technology would minimize both time and distance barriers efficiently, reduce labour costs and delivers products and services with higher quality (Kariuki, 2015: 221; Ghorbanzad and Beig, 2012: 1198)

The ability to work smarter is a key factor in gaining productivity. In that regard, Information Technology provides the opportunity to enhance the smartness of an organization. It is recognized that increasing spending on Information Technology has become the most influential factor in recent productivity growth in business industries (Chen, 2019: 78). The more an organization spends on Information Technology acquisition the higher the gains are. The fact that Information Technology initiates human capital improvement, changes in organizational structure as well as improving organizational flexibility makes it necessary to be incorporated in today's business. While intangible aspects of the introduced product are noticeable advantages of Information Technology implementation. That includes quality, convenience, timeliness and variety.

On top of that, Information Technology provides firms with opportunities to have access to competencies achieved by other firms and the ability to develop their internal competencies to be able to introduce new products and facilitate knowledge flows inside and outside the firm (Martin and Nguyen-Thi, 2015: 1116).

To sum it up, several factors collectively contribute to the productivity and growth of an organization. These factors are multidimensional. It involves in depth hard and soft skills possession, financial ability and technical capabilities. However, in a modern era whereby Information Technology is integrally incorporated in every

human activity most notably in business activities, the necessity for a constant and thorough study on the impact of Information Technology on organizational productivity and innovation abilities needs to be conducted.

Although previous researches pertaining to the Gambia have explored the impacts of other several factors such as finance and human resource on productivity of Gambian firms, it is fair enough to state that little effort is done trying to investigate and explain the impact of Information Technology on firm's productivity level and innovativeness capability. Therefore, an empirical analytical study must be conducted to examine and measure the actual impact and determine to what extent Information Technology is promoting innovation abilities of Gambian firms for a realization of higher productivity.

The significance of a research is determined by its topic and its relevance to current affairs. The more the research generate findings and provide solution to current or expected global and national issues the greater its value. This research is significant in the sense that it tries to:

- Understand the Technology factor as an impactful operation tool in Gambian firms.
- Examine how technological innovation is crucial to organizational managers in Gambia's private sector.
- Provides firm managers with extra clue in their quest for a market strategy that has potential to boost productivity.
- Defines innovation types and concepts in business management with information Technology as the initiator.
- Shed light on Information Technology culture in the Gambian society, as well as its readiness and integration in life and daily business activities.

The main aim of the study is to explore the effects of Information Technology on innovation abilities of Gambian Firms, which in turn reflects on their organizational productivity based on empirical and analytical evidences.

2. LITERATURE REVIEW

The Literature review section is aimed at shedding light on previous studies in the same scope. It may be in the same context or a different one. Various researches have been conducted on the effect of Information Technology on firm productivity. The following lines shall exhibit those researches done and their respective results.

2.1. The Information Technology and Productivity Relation

Knowing that productivity creates a great value to both countries and individually owned organizations, it has grabbed the attentions of nowadays mangers. They are competing in finding the most effective tool to boost the productivity. As a result, most managers found Information Technology to be the most suitable tool, as it enhances human capacity with cutting-edge features.

According Kijek and Kijek (2019: 222) Information Technology has the unique potential to ensure growth in productivity in multiple ways. The first being through

automation of business processes, enhancement of both product and service quality, promotion of open information access and of course through the reduction of production costs. He extensively mentioned that Information Technology influences productivity through having the decision-making element within the organization being decentralized. Thus, empowering non-managers to make decisions and activate prompt changes in business processes.

Harnessing the virtue of Information Technology in the work environment would reduce both time and place limitations. It adds efficiency to processing and production activities, minimizes labor costs and delivers products and services with quality greater than expected (Hussen and Çokgezen, 2021: 8). Moreover, Information Technology enables organizations to continue business activities beyond the prescribed working hours. Thus, increasing economic growth. One would not argue that The Automated Teller Machine (ATM) is practically an example of how Information Technology diminishes time and geographical limitations immensely by extending service delivery hours. For that being the case, the relationship between IT and productivity is of a direct relation. The more the company spends on IT the higher the chances are to create a greater performance. Findings of Ghorbanzad and Beig (2012: 1198) has established the same fact. They indicated that the amount of organizational productivity realized associating to Information technology investment is positively a direct relation. Companies with huge Information Technology investment have the great potential to realize organizational productivity and vice versa.

Ghorbanzad and Beig (2012: 1198) have even indicated that European countries locating at the eastern part would gain production efficiency more than that of G7 countries by the virtue of Information Technology as an operation strategy and production mean. Based on empirical findings, results have identified digital investment to reflect higher return rates on organizations than physical investments. The high return rates are simply caused by the fact that Information Technology initiates human capital improvement, changes in organizational structure, reduce production costs as well as introducing organizational flexibility. In the same regard, the intangible aspects of the product being produced, or the service being rendered such as quality, convenience, timeliness and variety are noticeable advantages of implementing Information Technology in operation. On top of that, Information Technology enables firms to have the opportunity accessing competencies achieved by others. The open access to other competencies would encourage firms to develop their own internal competencies, facilitate the flow of knowledge within or outside the firm and introduce new products that can satisfy pending needs (Wannakrairoj and Velu, 2021: 109679).

Among the various ways Information Technology raises productivity level is by minimizing Information Technology expenses while business benefits remain static and vice versa. The minimizing of technology investment is either by integrating various technology infrastructure into one multifunctional or eliminating the less influential ones. However, mere Information Technology investment does not guarantee instant improvement of organizational performance. Instead, researchers have indicated that it may take up to three years to observe the real influence Information Technology has the organization's performance. For that being the case, in order to cut short, the interval between the investment and the observation of real

influence, a thorough analysis is necessary to strategically determine the most suitable Information Technology infrastructure that has the capacity to facilitates the realization of business objectives. A great Information Technology effect on firm productivity level is only materialized if work processes are modified in accordance Information Technology requirements (Nguyen et. al. 2021: 100804). Further, authors (Chege et. al. 2020: 351) added that Information Technology investment alone does not to improve productivity. Rather, it's a mediator to enhance human capital resource in the course of production.

At least, four basic elements have been highlighted as necessary if an organization seeks efficiency in productivity through Information Technology as mentioned by Ghorbanzad and Beig (2012: 1198). These are: Capable innovative human resources, Information Technology mechanisms, which is interpreted as knowing and implementing rules and regulations governing financial and improvement growth methods, Sophisticated Information Technology tools (Software, hardware and networks) and a clear-cut organizational structure. Authors (Fu, 2018: 319) asserted that Information Technology can only have the potential to adjust productivity level should it be anchored with a set of necessary organizational and labor competencies in order to turn the potentiality into reality. The necessary competencies include a strong technological and educational background, technically well prepared and well-trained staffs and a labor force that's well equipped with required technologies.

As a summary, the importance of information Technology as a production factor based on economic perspective can be embodied in its role of catalyzing operation and organizational change, in addition to restructuring the market composition and altering competition rules.

2.2. Productivity Paradox

Productivity paradox is defined as the believe of considering information Technology to have no influence on firm's productivity due to lack of evidences justifying the relativity (Hartmann et. al., 2021: 151). Kijek and Kijek, (2019: 222) were one of the first researchers to cast doubt on the impact of Information Technology on productivity.

Nonetheless, despite the believe of Information Technology's irrelevance to organizational productivity some would have, various scientific studies have proven veracity of the relationship between the two variables. For instance, Ghorbanzad and Beig (2012: 1198) have scientifically investigated Information Technology's impact on the productivity of Behnoush Company in Iran. As per their findings, the relationship is proven to be positive. In the same context, Kariuki (2015: 221)'s study results regarding Kenya's Population Service company (PS Kenya) were found to be in line with that of Ghorbanzadan Beig's results. Furthermore, Cidik (2019: 65) investigated the Information Technology and productivity factor, surveying 341 Spanish firms and yet again came out with a positive result, contradicting the negative notion.

However, Kijek and Kijek, (2019: 222) had put an effort explaining the source of the contradicting notion. He established that in order to gain productivity with the

support of Information Technology, the human capital should possess great IT skills to make differences post IT investment. In the same manner, Kijek and Kijek, (2019: 222) cited that the country's development pattern pertaining to technology does count a lot whenever an effort is being put to establish a relationship between the two variables. Results may vary from one country to another due to differences in their technology development pattern which in turn reflects on organizations technology readiness.

Based on the point of views mentioned above, one can assume that the source of the productivity paradox notion is simply methodological. Recently, meaningful scientific data is made available to be availed by researchers and more advanced methodologies have been developed for more accurate results when measuring a relativity between any social or scientific phenomenon. Thus, lifting the confounding notion towards the Information Technology and productivity relationship. The same explanation is been given by Polák (2017: 43).

2.3. Information Technology and Innovation

When technological innovation is mentioned, it simply refers to those innovations enabled or optimized by Information Technology. It is the type of innovation that cannot be either done or optimized manually. Alternatively, Authors (Hanelt et. al., 2021: 11) simplified the term by defining it as the adaption of new information CEO in business.

Information Technology is obviously the driving force of today's globalization, undertaking the basis of global innovation and change. Information Technology renders organizations various innovation mechanisms to restructure organizational setup, re-engineer business processes and develop a very new product with the support of software packages and well sophisticated network systems (Chae et. al., 2018: 532).

The Twenty First century is characterized by augmented consumer demand that must be met. The unlimited and variable demands drive entrepreneurs to develop strategies of enhancing innovation capabilities. Succeeding in developing a high sense of innovativeness means creating a large customer base which will adjust productivity gains. Consequently, business entities adapted technology as a mean of increasing their ability to create products of various unique features that can satisfy the needs. Having successfully relied on IT so far, managers commonly hold the view that IT is enormously impacting new product ideas and that consumers accept technologically influenced products, describing it as convenient (Mauerhoefer et. Al., 2017: 726; Martin and Nguyen-Thi, 2015: 1116). The underlying factor behind acceptance of technologically influenced products is that Information Technology itself enables organizations to initiate fascinating innovations through merging latest CEO with both society and business. If successfully merged, IT can capacitate the extraction of new knowledge embedded in societies which serves as promoter of innovation (Ravichandran, 2018: 32).

Even-though researchers hold different point of views when it comes to classifying innovation types, the "change" aspect is always present at the core of

classification perspectives despite differences. For instance, Ghorbanzad and Beig (2012: 1198) classified innovation into four different types as follows:

- Product innovation: Meaning change in the type, shape or model of offered products?
- Process innovation: Which is change in production method by adopting new mechanisms.
- Position innovation: Which is related to the context in which products and services are produced or delivered.
- Paradigm innovation: Known as change in what an organization does and how it is done.

Similarly, authors (Chege et. al. 2020: 351) believes that technological innovativeness in relation to business can be classified into Process innovation, administrative innovation and interactive innovation. Process innovation focuses on the development of new ideas in functional tasks and administrative innovation seeks CEO ways of supporting proper administration of departments. Be it human resource or finance or marketing. The interactive innovation is the development of strategies and methods that integrates core business processes such as Enterprise Resource Planning (ERP), Supply Chain Management (SCM) and Customer Relationship Management (CRM).

After having demonstrated innovation types, practical market examples are given to broaden the understanding of how Information Technology helps in initiating various business innovation. For instance, almost a decade, Apple brand has been able to upgrade and optimize the iPhone product at least once a year with unique features. The most notable aspect being the Camera; the most appealing feature to costumers. In terms of process innovation, Arrow Electronics, a leading American global electronic component distributor have succeeded in establishing a WAN (Wide Area Network) that enables One-Hop connectivity between its central CEO in New York and other subsidiaries all over the World. The One-Hop connectivity would eliminate delay between the request of relevant company data and transferring it. Concerning paradigm innovation, Toyota's shift to "Build-to-order" method of production, which is mainly based on actual demand is a genuine example. Unlike the traditional production method that is characterized by expected demand, the build-to-order enables Toyota to produce based on actual demand. The actual demand is identified in real time with the support of Oracle E-business software (Chae et. al., 2018: 532).

Nonetheless, in order for a business entity to increase its sense of innovativeness, Hanelt and researchers, (2021: 11) pointed out four influential covariates as determinants of effective innovativeness: Strategic Information Technology investment, in-depth understanding of E-business strategies, adoption of standardized and systemized business practices and broad knowledge of customers.

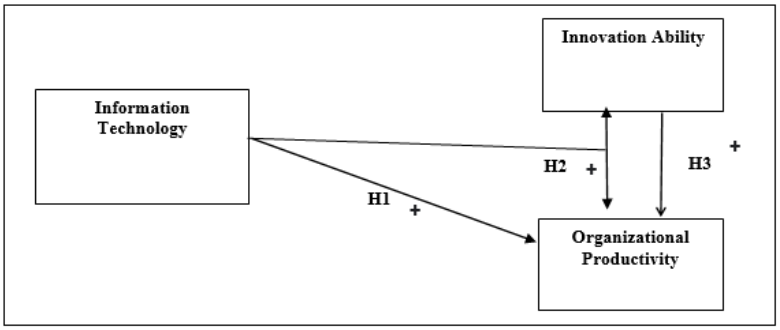
As a summary, technology fosters an organization's sense of innovativeness by enabling companies to initiate changes in processing, production and marketing. Such changes would have been difficult to be initiated without the technology as a tool. With certainty, its ostensibly right to state that current Social Media platforms have

given marketing units so much flexibility and opportunity to expose products and services to the largest possible number of customers, just to give an example.

3. RESEARCH METHODOLOGY

The theoretical framework demonstrates the structure of the research. Information Technology, Innovation and organizational productivity are the main variables constructing this research topic. Based on Figure 1, Information Technology is considered as the independent Variable impacting other dependent Variables. Organizational productivity is the dependent variable as it reflects the level of Information technology implementation. Innovation, as a moderator, is the other dependent variable that bridges and facilitates the productivity optimization as seen in the framework below.

Figure 1: Conceptual Framework of Technological innovation – Productivity Model



Hypotheses are generally an assumption about a population parameter. Precisely, a statement relating to a population and a prediction of what the researcher expects the outcome of his or her research to be. The Hypothesis may be true and vice versa. It should be testable, CEO can base an argument upon it. Based on hypotheses, the data analysis is performed. Concerning the topic in hand, the following hypotheses were proposed:

- H1: There is a positive relationship between firm Information Technology investment and organizational productivity.
- H2: Information Technology and firm innovativeness have a positive impact on both productivity of Gambian firms.
- H3: Information Technology investment has positive impact on firm innovativeness.

Research is commonly known as something undertaken with the objective of finding things out in a well systematic way in order to increase one's knowledge. While Research methodology is simply the theory about how a research will be done (Sekaran and Bougie, 2019: 159). In this section we shall elaborate on the approach we have taken to conduct this research in order to come up with tangible findings in relation to the impact of technological innovativeness on the productivity of Gambian firms.

3.1. Research Design

The aim of the study is to identify and measure the actual impact of Technological innovativeness on organizational productivity of Gambian private companies, and to test the veracity of the already proposed hypotheses. Therefore, the quantitative method research design which is explanatory in CEO was applied to prove the causal relationship between the three variables statistically. The quantitative results also allow the researcher to generalize results derived from the sample population and make a conclusion.

3.2. Data Collection Model

Data was collected through filling out the research questionnaire by either IT Managers, CEO Managers of Gambian firms. Both the Online link of the questionnaire and hardcopies were used to get responses, depending on the convenience of the participant.

Prior to the collection of data, all participants were informed about the study and their consent was sought. Participants were also notified that participation is voluntary and that all participants have the right to withdraw from the study at any stage in time during the data collection period. All participants are free to take as much time as they want while answering the questions.

3.3. Instrument

As known in the scientific research scope, a standardized questionnaire was used as an instrument. Questionnaires demonstrated efficiency in social science studies as a method of extracting information. It enables the researcher to make comments on the population being studied and derive a scientific evident based on quantitative method.

Therefore, a questionnaire was developed from the following English sources:

1. Information Technology's influence on productivity,
2. Impact of information Technology innovation on firm Performance in Kenya,
3. Impact of information Technology on innovation in determining firm performance (Naidoo and Hoque, 2018: 649)

These questionnaires were selected and modified with the help of the research supervisor to eliminate points irrelevant to my area of study. Finally, the questionnaire is of analytical dimension as it aims at exploring and explaining the relations between variables highlighted in the topic. The questionnaire type is close ended. The respondent's choices were predetermined, ranging from "Strongly Agree" to "Strongly Disagree".

3.4. Participants

In this research, Gambian private companies functioning in various sectors were chosen to collect data from. More precisely, companies within the Greater and Brikama Local Government Areas (Naidoo and Hoque, 2018: 649). The total number of companies surveyed in this study is 40 company. The companies vary in according to domain of work and type of services provide. Domains of work and service

provision ranges between Housing and Real estate, Insurance, Oil and petroleum, Printing and advertising, E-commerce, Banking and Finance, Automotive, Information Technology consultancy… etc.

3.5. The Research Questionnaire

The questionnaire consists of three main sections as follows:

- Section (A): Evaluates investment in Information Technology through assessing quick adoption of Information Technology, staff training, alignment of business strategies with Information Technology strategy and related covariates.
- Section (B): Measures the general impact of Information Technology on organizational productivity through evaluating Information Technology elements that affects productivity including facilitation of operation efficiency, extraction of market information, improvement of labor productivity through automation, ability to serve new market segment, prompt and higher level of customer responsiveness and quick customer service.
- Section ©: Measures the Impact of Information Technology on innovation concepts by studying factors related to Information Technology's influence on productivity such as implementation of automation, development of software and devices, control of quality, modelling of business processes… etc.

The "5-point Likert Scale" is used to identify the participant's level of agreement with the statements established in the survey, ranging from strongly agree, agree, neutral to strongly disagree. Appendix 1 at the end of the research paper demonstrates the full research questionnaire.

3.6. Data Analysis

The data that is collected from participants was coded and entered to the IBM Statistical Package for Social Sciences SPSS, V -23 for statistical analysis. The collected data was checked for its completeness and errors before data entry and analysis. Upon scrutinizing the data, 43 responses were received. Of the responses, 3 were disqualified, as they were not matching with the inclusion criteria. Therefore, conducting the study on 40 companies only.

The data is analyzed using descriptive statistics and inferential statistical methods. Descriptive statistics in terms of frequencies and percentages was generated from the information provided by variables. This method of data analysis provides a better understanding of the research. Descriptive analysis aims to represent a given reality in terms of a numerical value. Moreover, The Pearson Correlation Analysis and Multiple Regression Analysis will be used to establish the impact and relation among variables. Correlation Analysis measure the relation between an independent and dependent variable without identifying the impacting variable. While multiple regression analysis is used to measure the relation between three or more variables with reference to the variable causing the impact.

Eight items were constructed to measure the Information Technology investment Variable as seen in table 1. The Alpha value of the Validity and Reliability Analysis is .857 which is acceptable. Suggesting that the items have high internal consistency. A reliability coefficient of .70 or even higher is deemed acceptable in most researches within the Social Sciences scope.

Table 1: Cronbach's Alpha for Total IT investment

Reliability Statistics

Cronbach's Alpha	N of Items
.857	8

Meanwhile, fourteen items were constructed to measure the Information Technology impact on productivity Variable. Table 2 shows the Alpha value of the Validity and Reliability Analysis is .899 which is acceptable too. Suggesting a greater internal consistency between the items.

Table 2: Cronbach's Alpha for Total IT impact on productivity

Reliability Statistics

Cronbach's Alpha	N of Items
.899	14

Finally, sixteen items were constructed to measure the Information Technology innovativeness Variable. Table 3 shows the Alpha value of the Validity and Reliability Analysis is .913 which is acceptable too. Suggesting a greater internal consistency between the items.

Table 3: Cronbach's Alpha for Total IT innovativeness

Reliability Statistics

Cronbach's Alpha	N of Items
.913	16

3.7. Factor Analysis

Factor Analysis is a tool for inter-dependency analysis. It usually indicates that all variables considered in the research are equal in status. The factor level is measured by the KMO and Bartlett's test, which measures the sampling adequacy. Usually, a KMO value of (0.50) is adequate for a reliable factor in Social Sciences. High values that are close to (1.0) suggests that Factor Analysis are useful with the data.

According to results derived from collected data, The KMO value for all three variables are above (0.5) as shown in table 4. It suggests that the sampling is adequate, and the results derived from analysis are dependable. The Rotated Component Matrix, sometimes referred to as Factor Load, determines the level of influence of each item in the factor analysis, as well as indicating whether the item is valid to measure the variable and vice versa. The higher the Factor Load is the stronger the influence of the item is in relation to the Variable it measures. Appendix 2 provides a broader understanding of the factor reality concerning Gambian Private companies. Knowing that (0.4) is the least acceptable Factor Load for a valid item.

Table 4: KMO values of variables

KMO and Bartlett's Test		
Information Technology investment		**Item 1 - 8**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.739
Bartlett's Test of Sphericity	Approx. Chi-Square	135.442
	df	28
	Sig.	.000
Information Technology impact on productivity		**Item 9 – 22**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	338.244
	df	91
	Sig.	.000
Information Technology impact on firm innovativeness		**Item 23 – 38**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.801
Bartlett's Test of Sphericity	Approx. Chi-Square	405.477
	df	120
	Sig.	.000

3.8. Pearson Correlation Analysis

In order to establish a relation between any two or more variables, it must be statistically tested using a standardized scientific method. Therefore, in this research, the Pearson Correlation Analysis test was used to study the relationship among the three variables in the research topic (IT investment, IT innovativeness and IT impact on productivity). In Pearson correlation tests, values close to (1) always indicate a strong correlation.

Upon investigating the relationship between the variables, the results derived have shown a positive relationship. As per the Information Technology investment and firm productivity correlation analysis, the Pearson value is (.840) at a significance level of (0.01) This means Gambian firms are more productive with Information Technology. Also, the correlation test between IT investment and firm innovativeness is (.828) at a significance level of (0.01) too, indicating that Information Technology is a significant component in Gambian firms sense of innovativeness. Firm innovativeness with the support of Information Technology also showed a positive relation with firm productivity level with a correlation score of (.840) at a significance level of (0.01). These analysis shows in table 5.

Table 5: Correlations

Correlations			
Variables			Total Information Technology innovativeness
Total information Technology investment	Pearson Correlation	1	.828**
	Sig. (2-tailed)		.000
	N	40	40
Correlations			
Variables			Total Information Technology impact on productivity
Total Information Technology investment	Pearson Correlation	1	.840**
	Sig. (2-tailed)		.000
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			
Correlations			
Variables			Total Information Technology impact on productivity
Total Information Technology innovativeness	Pearson Correlation	1	.830**
	Sig. (2-tailed)		.000
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

The findings validate Hypothesis (1) which stated that there is a positive relation between Information Technology investment and organizational productivity of Gambian firms. However, despite being correlated, the correlation test doesn't indicate the direction of the relation as the Regression Analysis does. Therefore, it is necessary to conduct Regression analysis to determine which of the variables affect the other as stated in the research hypotheses.

3.9. Regression Analysis

As stated above, Regression Analysis enables the researcher to define the direction of the impact after identifying the relationship between established variables. It is conducted by determining one independent variable and one or more dependent variables. The independent variable is known as the predictor. While the dependent variable is the predicted one.

In the event two or more independent variables (predictors) are used against one dependent variable, the Multiple Regression Analysis technique must be utilized. In our case study, both single and multiple regression techniques are implemented. The findings of Regression Analysis have proven our assumptions to be true.

Hypothesis (2) has predicted that Information Technology investment has a positive impact on both organizational productivity and innovativeness of Gambian

firms. The more firms adjust investment and implementation of the Information Technology factor the higher the innovation abilities are as well corporate gains.

In the regression analysis, the "R" and "R-Square" scores as per the model summary are (.874) and (.763) respectively, indicating a strong correlation coefficient as figures are close to value (1). Information Technology investment and firm innovativeness as a set predict 71% of firm productivity. In terms of significance of as per the ANOVA results, the test is statistically significant at the level of (.000) indicating a significant amount of variance Information Technology investment and firm innovativeness has on productivity. Meanwhile the coefficient table shows that both Information Technology investment and firm innovativeness as predictors are significant as the scores are below (.05). Table 6 provides a more detailed explanation of the regression test and the amount of correlation and impact technology investment and technological innovativeness as independent variables are having on the level of corporate productivity.

Table 6: Impact of IT investment and innovativeness on firm performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.874[a]	.763	.750	3.819	.763	59.576	2	37	.000

a. Predictors: (Constant), Total Information Technology innovativeness, Total Information Technology investment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1738.154	2	869.077	59.576	.000[b]
	Residual	539.746	37	14.588		
	Total	2277.900	39			

a. Dependent Variable: Total Information Technology impact on productivity
b. Predictors: (Constant), Total Information Technology innovativeness, Total Information Technology investment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.023	2.274		2.648	.012
	Total Information Technology investment	.709	.209	.484	3.389	.002
	Total Information Technology innovativeness	.347	.116	.429	3.005	.005

a. Dependent Variable: Total Information Technology impact on productivity

Meanwhile Hypothesis (3) predicted that Information Technology investment increases innovation abilities of the firms. As per the Information Technology and innovation regression test, technology is main factor enabling firm with huge innovation potentials. Both "R" and "R-Square" have the score of (.828) and (.686) respectively. As per the "R-Square", Information Technology can predict up to 69% of the innovativeness of firms with a significance level of (.000) as indicated by the ANOVA. Therefore, validating the hypothesis. Table 11 demonstrates the technology and innovation regression test.

Table 7: Impact of IT investment and innovativeness investments

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828[a]	.686	.678	5.362

a. Predictors: (Constant), Total Information Technology investment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2390.175	1	2390.175	83.129	.000[b]
	Residual	1092.600	38	28.753		
	Total	3482.775	39			

a. Dependent Variable: Total Information Technology innovativeness

b. Predictors: (Constant), Total Information Technology investment

Coefficients[a]

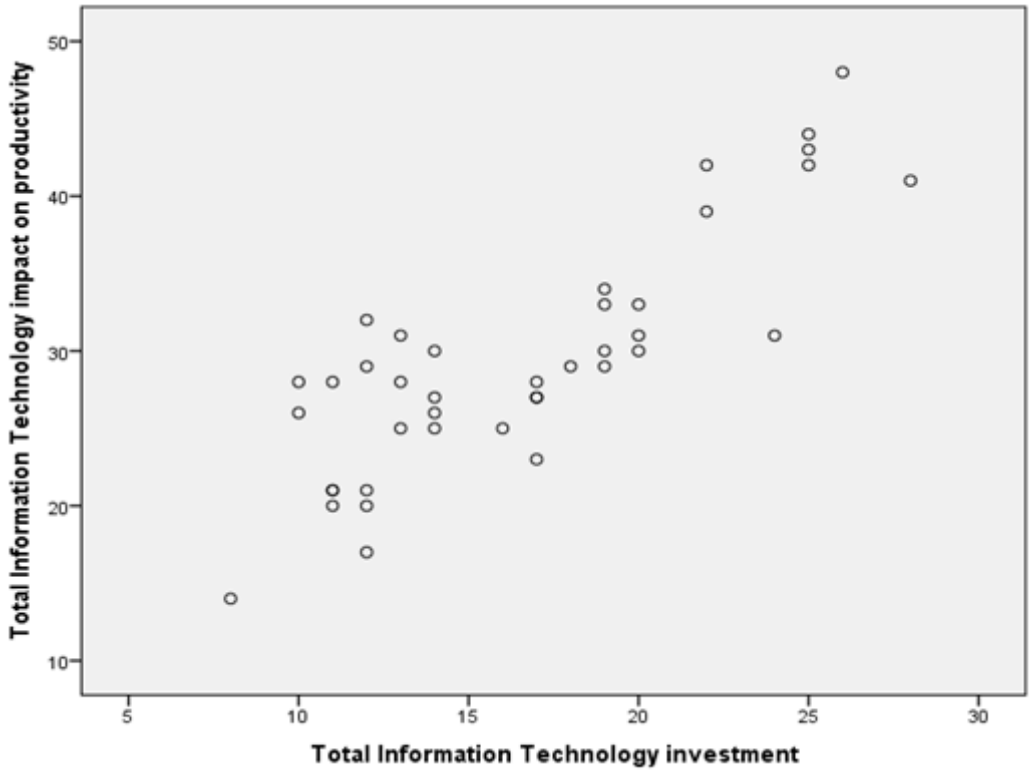
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.845	2.852		3.101	.004
	Total Information Technology investment	1.500	.165	.828	9.118	.000

a. Dependent Variable: Total Information Technology innovativeness

4. FINDINGS

The research has come out with crucial findings. Firstly, it is found that there is a positive relation between Gambian firms Information Technology investment and organizational productivity. The Information Technology factor is one of the determinants of the organizational growth of firms. Secondly, the Regression analysis results showed how Information Technology is impacting on organizational innovativeness and productivity. The more companies invest on Information Technology, the higher the chances are for a greater innovation ability and organizational growth as shown in below Scree Plot.

Figure 2: Scree Plot for IT investment and Productivity direct relation



Nevertheless, it is also found that almost half of Gambian private companies are not facilitating operation through automation of business processes. Companies have also demonstrated inefficiency in the development of applications that can boost performance by making service accessible to both workers and employees remotely. Usage of powerful analytical tools such as Artificial intelligence isn't well considered in business development. Concerning the establishment of Service-oriented architecture, the attention given to it by companies is below the requirement. The main reason for such shortcomings could be of financial incapability as the market is largely dominated by SMEs which barely gain financial support from financial institutions or government.

CONCLUSIONS AND RECOMMENDATIONS

Although findings indicated a positive impact of Information Technology on productivity of Gambian firms, necessary improvements must be initiated to boost the productivity level and enable more innovation, most notably in areas of automation and artificial intelligence. Any business entity that propels to creating a strong base of loyal customers should put continuous innovation at the forefront of its business strategies. Be it process or product innovation. Continuous innovation doesn't only serve as a yardstick for creating customer satisfaction and loyalty; rather it sets a standard for the firm to meet the demands of customers constantly.

Today's market is shaped by information Technology and gaining competitive advantage over competitors is determined by customer satisfaction, timeliness of

service and convenience as well as quality of final product. Information Technology categorically enables the realization of such business features. For that being the case, Gambian firms are ought to set strategies that would make Information Technology more impactful in their functioning.

Recommendations are based on the results found. Therefore, two recommendations are given according to findings of the research. One of which is business in its dimension, and the other being Academic.

From a business point of view, Gambian firms should strive for a more effective implementation of powerful analytical tools and skills in business. This includes the hiring of experienced data analytics, the acquisition of Decision Supporting Systems (DSS) and use of Artificial Intelligence (AI). For Instance, Artificial Intelligence can predict customer choices and behaviors towards a product or brand based on previous purchases. The other important area which requires improvement is automation. Automation is a technology that helps in processing with minimal human assistance. A lot of services can be delivered more efficiently by eliminating the human factor. As per my understanding, the service sector is the most needed sector to engage in automation projects as it is the sector with higher contribution to the country's GDP. The last of necessary improvement areas for organizations the research findings indicated is the development of Service-Oriented Architecture (SOA). Service Oriented Architecture creates a unified communication system of various systems within one organization. For instance, a company may have a Customer Relationship Management system, Financial Management System, Human Resource Management System and Enterprise Resource Management System. The Service Oriented Architecture integrates between multiple system through a unified communication language. It allows the organization to have one holistic system instead of various systems each requiring a system manager expert. Moreover, it gives companies flexibility in operations and allows response to business need faster.

From an academic view, it is necessary to suggest that a more thorough research should be done pertaining to Information Technology's role in the Gambian market. Similar studies can be conducted to investigate and measure the impact of Information Technology on the service delivery within the Government sector. Knowing that the Gambian market is largely dominated by SMEs with inadequate financial capacity, a study on strategies of enabling the Information Technology factor of SMEs through financial support can be investigated too. Causes of poor preparation of Information Technology students and its solutions should also be an interesting field of research.

The Gambian government also has a substantial role to play in electrifying the inculcation of Information Technology culture in the country. The government can play as third-party facilitator of such transformation. For instance, the government should assume 25% of Information Technology infrastructure buying cost. Of each technology product a company purchases, the Government should bear 25% of its buying price. This encourages technology flow in the country as traders in the field will have more courage to import technology related products. Companies too will have more purchasing ability despite falling short financially.

REFERENCES

Akhavan, A., Zebarjady, M., & Esfahani, A. S. (2021). The Effect of Organizational Culture and Information-Communication Technology on Productivity, Services Quality, Customer Satisfaction, and Change Management through Knowledge Management. *The Journal of Tolooebehdasht*, 43-59

Chae, H. C., Koh, C. E., & Park, K. O. (2018). Information technology capability and firm performance: Role of industry. *Information & Management*, 55(5), 525-546.

Chege, S. M., Wang, D., & Suntu, S. L. (2020). Impact of information technology innovation on firm performance in Kenya. *Information Technology for Development*, 26(2), 316-345.

Chen, C. M., Cheng, W. J., Peng, S. K., Riezman, R., & Wang, P. (2019). *Trade Wars, Technology and Productivity* (No. w26468). National Bureau of Economic Research, 77-82.

Cidik, M. (2019). Construction productivity and digitalization: *An IT productivity paradox perspective*. In 35th Annual ARCOM Conference, 61-67.

Daragahi, G. A. (2017). The impact of innovation on customer satisfaction: A study of the cosmetics producer in Tehran. *International Review*, (1-2), 121-132.

Fu, X., Mohnen, P., & Zanello, G. (2018). Innovation and productivity in formal and informal firms in Ghana. *Technological Forecasting and Social Change*, 131, 315-325.

Ghorbanzad, Y., & Beig, M. (2012). The impact of information technology on productivity using structural equations technique in Iran Behnoush Company. *Management Science Letters*, 2(4), 1195-1202.

Hanelt, A., Firk, S., Hildebrandt, B., & Kolbe, L. M. (2021). Digital M&A, digital innovation, and firm performance: an empirical investigation. *European Journal of Information Systems*, 30(1), 3-26.

Hartmann, M., Waubke, R., & Gebhardt, L. (2021). Productivity Paradox in Digital Innovation for SMEs. *In Digitalization* (pp. 145-152). Springer, Cham.

Haseeb, M., Hussain, H. I., Ślusarczyk, B., & Jermsittiparsert, K. (2019). Industry 4.0: A solution towards technology challenges of sustainable business performance. *Social Sciences*, 8(5), 154.

Hussen, M. S., & Çokgezen, M. (2021). Relationship between innovation, regional institutions and firm performance: Micro-evidence from Africa. *African Journal of Science, Technology, Innovation and Development*, 1-17.

Kariuki, A. K. (2015). *Impact of information technology on organizational performance: case of population services Kenya* (Doctoral dissertation, University of Nairobi).

Kijek, T., & Kijek, A. (2019). Is innovation the key to solving the productivity paradox? *Journal of Innovation & Knowledge*, 4(4), 219-225.

Kijkasiwat, P., & Phuensane, P. (2020). Innovation and firm performance: The moderating and mediating roles of firm size and small and medium enterprise finance. *Journal of Risk and Financial Management*, 13(5), 97.

Lafuente González, E. M., Acs, Z., Sanders, M., & Szerb, L. (2019). The global technology frontier: productivity growth and the relevance of Kirznerian and Schumpeterian entrepreneurship. *Small Business Economics*, 67-79

Martin, L., & Nguyen-Thi, T. U. (2015). The relationship between innovation and productivity based on R&D and ICT use. *Revue économique*, 66(6), 1105-1130.

Mauerhoefer, T., Strese, S., & Brettel, M. (2017). The impact of information technology on new product development performance. *Journal of Product Innovation Management*, 34(6), 719-738.

Naidoo, I. P., & Hoque, M. (2018). Impact of information technology on innovation in determining firm performance. *African Journal of Science, Technology, Innovation and Development*, 10(6), 643-653.

Nguyen, V. K., Natoli, R., & Divisekera, S. (2021). Innovation and productivity in tourism small and medium enterprises: A longitudinal study. *Tourism Management Perspectives*, 38, 100804.

Polák, P. (2017). The productivity paradox: A meta-analysis. *Information Economics and Policy*, 38, 38-54.

Ravichandran, T. (2018). Exploring the relationships between IT competence, innovation capacity and organizational agility. *The Journal of Strategic Information Systems*, 27(1), 22-42.

Roos, G. (Ed.). (2017*). Technology-Driven Productivity Improvements and the Future of Work: Emerging Research and Opportunities: Emerging Research and Opportunities*. IGI Global, 887-993

Sekaran, U., & Bougie, R. (2019). *Research methods for business: A skill building approach*. john wiley & sons, 156-167

Sigilai, M. J. (2020). *Impact Of Information Technology on Output Growth of Manufacturing Firms in Kenya* (Doctoral dissertation, University of Nairobi), 236-254

Turulja, L., & Bajgorić, N. (2020). Knowledge acquisition, knowledge application, and innovation towards the ability to adapt to change. *In Disruptive technology: Concepts, methodologies, tools, and applications* (pp. 1019-1036). IGI Global.

Wannakrairoj, W., & Velu, C. (2021). Productivity growth and business model innovation. *Economics Letters*, 199, 109679.

Wikhamn, W. (2019). Innovation, sustainable HRM and customer satisfaction. *International Journal of Hospitality Management*, 76, 102-110.

Yusuf, A. (2021). The Influence of Product Innovation and Brand Image on Customer Purchase Decision on Oppo Smartphone Products in South Tangerang City. *Budapest International Research and Critics Institute-Journal* (BIRCI-Journal), 2(1), 472-481.