EFFECT OF ICT ON PRODUCT INNOVATION AND BUSINESS PERFORMANCE IN SMALL AND MEDIUM MANUFACTURING INDUSTRIES. CASE OF SELECTED INDUSTRIAL REGIONS IN TANZANIA

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A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF MARKETING, ENTERPRENEURSHIP AND MANAGEMENT

THE OPEN UNIVERSITY OF TANZANIA

2023

CERTIFICATION

I the undersigned certify that they have read and hereby recommend for acceptance by The Open University of Tanzania, a thesis entitled, '***Effect of ICT to Product Innovation and Business Performance in Small and Medium Manufacturing Industries in Tanzania".*** In fulfilment of the requirements for award of the degree of Doctor of Philosophy (Business Management) of The Open University of Tanzania.

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DECLARATION

I, **Wilson Benjamin Kiunsi**, declare that, the work presented in this thesis is original. It has never been presented to any other University or Institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby submitted in fulfilment for the degree of Doctor of Philosophy in Social Work of The Open University of Tanzania.

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Signature

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Date

DEDICATION

This thesis is dedicated to my Late Father Benjamin Ramadhan Kiunsi and my Late Mother Rhoda Jima Kiunsi.

ACKNOWLEDGEMENTS

I thank God Almighty for my creation, my breath of life, health and energy to pursue education to this level in line with His word in (Proverbs 4:13 “take hold of my instructions, do not let them go. Guard them for they are the key to life”), and enabled me to undertake research and write this thesis to share new knowledge with the rest of humanity. God was my fortress and provider of all financial support during this endeavor. I am grateful to my supervisors, Professor Elifas Tozo Bisanda and Dr. John Makunza for their support, understanding, patience and guidance through the whole process of conceptualizing the topic of this research to completion of this thesis. I also thank Dr. Gwahula Raphael, my study discussants Dr Hamisi Kalegele, Dr Buzaga Chachage, Prof JanErik Jaenson and Dr. Lilian Macha of Open University of Tanzania for their constructive criticisms during the doctoral presentations. My sincere thanks are also due to my employer, the Mbeya University of Science and Technology, for their support during my studies.

I am grateful to my daughters Sanae, Sandra a.k.a Shekinah, and Shammah and my beloved wife Jane Kyando Kiunsi for their prayers and moral support. I am appreciative of prayers and moral encouragement from my sisters and friends, Madam Lusubilo Mwaisunga and Madam Vickpaj Masasi who did not stop praying for me during my thesis writing process. I also thank Mwalimu William Sabaya, retired teacher and lecturer, formerly Director of the Tanzania Institute of Education, Founder and first Chief Executive of the Tanzania Commission for Universities and first administrator of the Tanzania Academy of Sciences for editing this work.

ABSTRACT

The objective of this study was to determine the effect of ICT on product innovation and business performance in Small and Medium Manufacturing Industries (SMMIs) in selected industrial regions in Tanzania. Tanzania lacks studies related to ICT and product innovation. Primary data used in the study was collected through a structured questionnaire administered to senior personnel of each SMMIs in Dar es Salaam, Mwanza, Arusha, and Morogoro Regions. To enable the testing of the hypothesis of this study, Structural Equation Modelling (SEM) was used. Purposive sampling was used to research on specific attributes in the main population of SMMIs. Returned questionnaires and correctly filled formed a sample size of 474 SMMIs for the model used by IBM Amos version 26. The study found out that there is a significant improvement of using ICT on Product innovation and business performance in SMMIs in Tanzania. Also, it showed weaker improvement between ICT and business performance as mediated through product innovation. Furthermore, this study showed the Technology Acceptance Model (TAM) and Dynamic Capability (DC) theories in that the performance of SMMIs can be achieved through the combination and simultaneous application of ICT and Product Innovation capabilities. The study concluded that SMMIs require ICT and product innovation for better performance. Implying to policy makers that should strengthen the link between ICT use and innovations in general, with due enhancement of the business environment among SMMIs. This study recommends that SMMIs should integrate the use ICT and product innovation to improve their performance.

Keywords: *ICT, product innovation, business performance, TAM, DC SMMIs*

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LIST OF ABBREVIATIONS AND ACRONYMS

AI	Artificial Intelligence
AGFI	Adjusted Goodness Fit Index
AMOS	Analysis of Moment Structures
AVE	Average Variance Extract
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CEO	Chief Executive Officer
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMfg	Cloud Manufacturing
CPS	Cyber-Physical System
CR	Composite Reliability
CT	Cloud Technology
CTI	Confederation of Tanzania Industries
DAS	District Administrative Secretary
DC	Dynamic Capability
DIC	Dynamic Innovation Capability
DOI	Diffusion of Innovation
EC	European Community
EPD	Electronic Data Processing
GDP	Growth Domestic Product
GFI	Goodness-of-fit Index

HCI	Human Computer Interaction
I4.0	Industry fourth revolution
IBM	International Business Machines
IC	Innovation Capability
ICT	Information and Communication Technology
ILO	International Labor Organization
IoT	Internet of Things
IT	Information Technology
KET	Key Enabling Technologies
MITM	Ministry of Industry, Trade and Marketing
MLE	Maximum Likehood Estimate
MSMEs	Micro, Small and Medium Enterprises
MSV	Maximum Shared Variance
NBS	National Bureau of Statistics
PEOU	Perceived Easier Of Use
PU	Perceived Useful
RAS	Regional Administrative Secretary
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SCOR	Supply Chain Operations References
SEM	Structural Equation Modeling
SIDO	Small Industries Development Organization
SMEs	Small and Medium Enterprises

SMMIs	Small and Medium Manufacturing Industries
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TAM3	Technology Acceptance Model 3
TAN-TRADE	Tanzania Trade Development Authority
TCCIA	Tanzania Chamber of Commerce, Industries and Agriculture
TOE	Technology, Organization, Environment
TPSF	Tanzania Private Sector Foundation
URT	United Republic of Tanzania
VCA	Value Chain Analysis
VET	Vocation Education Training
VIF	Variance Inflation Factor
VRM	Value Reference Model
VT	Visualization Technology

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Business performance of SMEs in the global economy has been a significant contributor to the economies of nations, and therefore periodic studies of the enterprises is vital for their improved positions and sustainability in the world economy. SMEs are a source of employment, contributor to technological development of businesses, and catalyst of competitive advantage in world industrial and business performance.

Based on related empirical studies, SMEs contribute significantly to over 55% of the gross domestic products of various countries, over 65% of all employment in developed countries, about 70% of their GDPs, and about 95% of all employment in middle-income countries, according to (Zafar and Mustafa, 2017). Despite their contribution to economic growth, SMEs' performance in developing nations is often viewed as subpar in comparison to that of their counterparts in affluent nations. SMEs make up over 60% of the GDP and 60% of all jobs in developing nations, as cited by (Zafar and Mustafa 2017).

The application and impact of ICT in SMEs is recognized by many firms for the sustained growth of the enterprises. This observation has led to attention and desire by researchers to study the different aspects of ICT and their contribution towards the the growth of industries and business performance in different economies. Even so,

the number of relating studies in developing countries are few (Mwantimwa, 2019) and (Cirera et al., 2016).

Yang et al. (2013) found that manufacturing industries that use ICT are more inventive and successful than manufacturing industries that do not. This was based on comparing the use or non-use of ICT by manufacturing businesses. According to the cited study, the innovative use of ICT and complementary human resources, design, production, sales, and marketing functions were prioritised by the successful industries. Therefore, it may be claimed that how ICT is applied depends on the individual users. ICT can be used in conjunction with other technologies to improve industry business performance and product innovation.

Tanzanian SMEs are increasingly using ICT, according to Msuya et al. (2017) and Hamad (2017). For instance, a study conducted on 405 SMEs in Tanzania by Msuya et al. (2017) found that the use of ICT in SME operations went from zero in 2004 to 80.1% in the form of computer technology and 56.6% in the form of internet technology by 2017.

Recently several researchers and authors have shown increased interest in the application of Technology Adoption Model (TAM) in Technological studies, particularly in relation to ICT. For instance, a study by Liao et al. (2018) employed the TAM to explore the use of modern technologies including ICT to evaluate technical performance in the manufacturing of books in Taiwan. The purpose of using TAM was to explain and predict the contribution of ICT and the relating

factors. Davis (1989) suggested that TAM was designed to explore the causal relationship between variables of knowledge and facilities in establishments.

Researchers have voiced numerous critiques of TAM despite its growing adoption. According to Oluwole (2016), TAM's biggest problem is a lack of organisational capacity. Khan and Woosley (2011) assert that, a lot of validation studies were carried out in academic settings with students serving as respondents rather than in commercial settings where industrial workers would have made better respondents. The claim made by Ajibade (2018) is that there is always a chance that outside variables could affect how widely new technologies are adopted and used to increase industrial productivity.

In addition to other factors, this study considered TAM variables as independent variables in the business environment. The Dynamic Capability (DC) theory's applicability to manufacturing firms was taken into consideration by the researcher as evidence of the need to include a factor outside of TAM The DC theory alludes that, a company must be able to integrate, coordinate, develop, and configure all forms of capabilities, regardless of where they came from, in order to successfully navigate changing business environments (Narcizo et al., 2017). This study attempted to analyse the impact of product innovation capability on business performance in the manufacturing sector industries based on this idea.

In addition to ICT, product innovation is another determinant of performance in SMEs. Different studies indicate that product innovation can be a basis of sustainable growth and prosperity in a knowledge-based and technology driven society and

serves as a determining factor for improved competitiveness in the manufacturing sector. International businesses, organizational management, marketing systems and business strategies altogether consider product innovation as an important factor in organizational performance enhancement (Shin and Lee, 2016). Rosli and Sidek (2013) are of the view that product innovation is one of the key catalysts of organizational performance worldwide. Furthermore, product innovation is considered an engine of transformation and economic growth which, on its part depends on the effective use of the organization's manpower capability and related resources.

In addition to the critical role that ICT and product innovation play in enhancing the performance of SMMIs, there is also the concern and possibility that ICT and product innovation can complement each other. To explore the ICT capabilities, particularly in product innovation, this study applied the DC theory. As business competition and customer preferences increase, it is–recommended that product innovation should be an option for a firm to remain competitive in the market. DC of SMMI maximizes the efficiency of product innovation in the business environment. Abrol and Abrol (2017) argue that business performance and overall growth of firms is a consequence of innovation and periodic adjustments. Studies such as by Cuevas-Vargas et al., (2016) regard ICT as an innovation enabler, and therefore the TAM and DC theories do complement each other as in this study.

SMMIs are challenged by digitalization of manufacturing processes which are referred to as Industry 4.0 (I4.0) allowing for real time data interchange and

flexibility, productivity, speed, and quality of products (Thoben et al.., 2017). Even if SMMIs were to depend on efficiency in manufacturing of products with added value and therefore expected to profit from investments into I4.0 related process innovation. The adoption and implementation of I4.0 technologies in SMMIs is lagging compared to the situation in large manufacturing companies (Stentoft et al.., 2019).

Shiraz (2017), is of the argument that the characteristics of SMEs are what distinguish them from large organizations. The extent to which SMEs differ is in their flexibility, lower overhead costs, and innovations. Large organizations have higher market power, managerial capabilities, and the capital investment seem to stand as some of the disadvantages of SMEs (Al Mamun et al., 2018). Authors argue that SME have higher flexibility because they have lower bureaucracy in decision making, lower over cost because they have lower number of employees, not expensive invested facilities

Most SMEs in Tanzania are smaller in size and organizational structure Anderson (2017) and are low in financial resources, have poor capabilities for effective impact in the business environments. These observations are well supported by Ebitu (2016), who doubts the ability of SMEs to compete with large industries particularly in the areas of marketing of products and services. In relation to business performance and the impact of the external environment, various studies, such as by Nyamanza, (2016) has shown that growth in employment, sales turn over and capital investment stand out as common indicators for business performance. In the

Tanzanian context, business performance depends on SMEs' abilities to continuously and sustainably innovate competitive products for acceptability in the markets, which, on its part depends on the level of product innovations, marketing capability, and other factors external to the business environment (Nyamanza 2019).

Buli (2017) suggests that a business external environment can affect the performance of an SME in different settings and plays a critical role in shaping the managerial perspectives of an organization, which in turn determines the growth of the SME (Sahoo & Yadav, 2017). Generally, therefore, external factors can influence an enterprise internal organization and the extent to which its objectives can be met. This is because SMEs do not have control over the factors in their external and changing environments. External environmental factors include unfavorable legal issues, institutional framework, laws, and bureaucracy, all of which stand as rivals to the growth of businesses. A study conducted by Oyedijo et al., (2012) concluded that similar external factors hinder the growth of Nigerian SMEs. Nyamanza (2020) on his part suggests that the same factors might are due to affect the manufacturing SMEs in Tanzania.

TCCIA (2023) reports that more than 95% of businesses in Tanzania are SMEs, together they contribute about 35% to the country’s GDP and 40% of total employment. SMMIs contributes to 14.3% of all SMEs in Tanzania (Andreoni, 2017). This implies that SMMIs have a significant share among the SMEs and as such their economic contribution is important. In their studies Buli, (2017) and Gamba (2019) suggested that a periodic investigation to be done on manufacturing

sector to determine their growth and parameters affecting their performance. This study opted to investigate SMMIS as a part of manufacturing sector.

Timmer et al., (2015) propose that differentiated products have a vital role in increasing the market efficiency of firms. Other authors further suggest that the manufacturing sector is eligible and responsible for the differentiated products of firms. Efforts have been in place to help SMMIs to capture emerging business opportunities and grow, these include the formation of institutions like SIDO, TAN-TRADE, TBS, and TPSF (Mazana, 2015). The roles of all these institutions include providing for the establishment of new industries, identifying the types of technology needed, providing business information, conducting training and organizing meetings through ICT, etc. MTMT provides support to SMMIs through external stakeholders such as the ILO (ibid). Furthermore, the ICT policy released in 2016, (URT (2016), directed that the technology should be used in industries to promote increases in production. Regardless of these initiatives, the performances of SMMIs have not been satisfactory enough to change the situations (Mwang'onda, 2018).

In this sense, SMMIs need to re-think their business strategies, particularly the use of ICT strategically to improve product innovation levels and so to raise business performance levels. Literature suggests that wherever ICT was used as a product innovation facilitator, it improved the organization's competitiveness and business performance level, but that kind of suggestion might not be applicable in the Tanzanian environment unless due research was done. Tanzania is one of the economically growing countries in Africa and has many economic opportunities

under the SMMIs which create more employment opportunities for the residents, (URT, 2017).

Innovation has a significant contribution to the growth of manufacturing industries. However, the extent and impact vary from one place to another due to different business operation environments. To the best of the researcher's knowledge, little, if anything, is known about the relationship between ICT, product innovation, and business performance in Tanzania. Therefore, this study aimed to examine the effect of ICT on product innovation and business performance in Small and Medium Manufacturing Industries in Tanzania

1.2 Statement of the Research Problem

The world is heading towards 4I.0 affecting the manufacturing sector performance, ICT and product innovation is the considered as the backbone of such revolution. In other hand, the government of Tanzania is embarking on an industrialization drive towards a middle-income economy by 2025 through job creation and economic growth. Industrial operation and development depend greatly on the utilization of ICT and product innovation to compete at local and international markets (Lugina, et al.., 2022). Therefore, for efficient management of ICT and product innovation and their impacts on SMMIs in Tanzania is deemed necessary for periodic studies to be conducted in determining their effects.

Despite the inherited advantages of integrating ICT in innovation in SMMIs, still, most of the empirical studies relating to ICT have been based on large manufacturing

industries in developed countries Aguilera et al.., (2015). Large manufacturing industries have more than 250 employees and Tanzanian Shillings 136,377,908,578/36 equivalent to 50 million euros sales turnover (BMWi, 2014) and (EC, 2017) while in Tanzania SMMIs have less than 99 the number of employees with Investment capital in machinery less than 800,000,000/- Tanzanian Shillings equivalent to 293,302.64 euros (URT 2013). Higher turn-over sales from large manufacturing industries suggests different ICT effect on product innovation particularly on I4.0 compared to Tanzanian SMMIs environments. Furthermore, Cuevas-Vargas et al., (2016) and Kijek and Kijek (2018) indicate that most of the empirical studies available relate to ICT and innovation and other innovations for business performance. Only a few studies exist that have examined the relationship between ICT, Innovation, and business performance, these being the variables of one system and need to be studied.

Studies on the application of ICT in developing countries are few. It is not clear to what extent ICT has been used to enhance product innovation and business performance particularly in SMMIs. On reviewing existing empirical evidence on the impact of innovation on business performance in SMMIs in Tanzania, Jaensson (2017), Ndesaulwa, and Kikula (2016) found that Tanzania lacked such evidence. Mwantimwa (2019) and Cirera et al., (2016) revealed that studies relating to ICT use and product innovation in SMMIs in Tanzania were few. Based on the facts, it was researcher's motivation to determine the effect of ICT, product innovation, and business performance as a unit system in SMMIs in selected industrial regions in Tanzania.

1.3 Research Objectives

1.3.1 General Objective

The general objective of this research was to determine the effect of ICT application on product innovation and business performance in SMMIs in selected industrial regions in Tanzania

1.3.2 Specific Objectives

The specific objectives of this study were:

i. To determine the relationship between ICT application and product innovation in selected industrial regions in Tanzania;
ii. To assess the relationship between ICT application and business performance in selected industrial regions in Tanzania;
iii. To determine the mediating effect of product innovation on the influence of ICT application on business performance in selected industrial regions in Tanzania.

1.3.3 Statement of Hypotheses

The following research hypotheses were developed: -

H1: ICT has improved product innovation in selected industrial regions in Tanzania

H3: ICT has improved business performance in selected industrial regions in Tanzania

HI:H2: Mediated effect of product innovation has improved ICT application on business performance in selected industrial regions in Tanzania

1.4 Scope of the Study

This study was targeted at four geographical regions of the URT, namely Dar es Salaam, Mwanza, Arusha, and Morogoro. The rationale for selecting these regions is that they all have the highest number of manufacturing industries when compared with the other regions of the republic. The referred regions have 991 or 50.9% of all the manufacturing industries in Tanzania as reported in government documents URT (2018). This study adopted the purposive survey research design approach.

1.5 Relevance of the Research

1.5.1 Theoretical Contributions

This study intended to contribute towards increased understanding of Technology Adoption Model (TAM) and Dynamic capability (DC). TAM has been referred to in studies relating to ICT application. Davis (1987) opines that the process of adoption of ICT depends on how its usefulness is perceived, adopted and applied. Regardless of successful use of TAM, the approach was criticized to have serious weaknesses relating to its validity since some studies associated with the concept of TAM were conducted in academic environments where students were used as respondents to research tools.

1.5.2 Policy Implication

The ICT policy of Tanzania URT (2016), provides that ICT should be applied in improving the performance of the manufacturing and other industries. It presses and emphasizes on the role of innovation in improving the quality and market acceptability of industrial products from Tanzania. So, results of this study are expected to show how the application of ICT has a significant contribution to the relationship between business performance and as mediated by product innovation.

1.5.3 Managerial Implication

The findings of this study provide several practical implications and areas for futuristic actions. First and foremost, the findings of this study, suggest that industry managers and all role players in the manufacturing sector with a focus on SMMIs need to consider serious application of relevant ICT hard and software for improved performance, quality, and market competitiveness of manufactured goods. One of the main goals of the ICT policy, 2016 of the URT is to provide for more room to use modern technologies in enhancing the performance of SMMIs and indeed all industries in the URT.

1.6 Organization of the Thesis

This work is organized into six chapter. Chapter one provides the introduction and background to the study. It outlines the Statement of the Research Problem and Research Objectives and concludes with indications of the scope of the study and its relevance to contemporary issues in the manufacturing sector of the country's economy.

Chapter two presents the highlights of the reviewed literature covering the global perspectives to the local situation in the United Republic of Tanzania, URT. Specifically, the chapter provides the definitions of key words and concepts as used in the study, the theoretical bases of the study, empirical studies, research gaps, and ends with a conceptual framework of the research.

Chapter three outlines the research methodology applied in this study. The chapter covers the research philosophy, research strategies, study area, study population, sampling techniques, sources of data, data collection tools and methods, data analysis, and ethical issues observed.

Chapter four: presents the findings of the study in the form of descriptive and inferential statistics. In the inferential statistics, the chapter presents the exploratory factor analysis, confirmatory factor analysis, data reliability and validity. It ends with the path analysis of structural equation modeling and mediation analysis.

Chapter five dwells on the discussion of the research results obtained from data analysis obtained from Chapter 4. It includes the interpretation of the path analysis and mediation analysis of the tested hypothesis applicable to this study. The chapter also provides the significance of the hypothesis to the theoretical contribution, policy, and managerial implications of the study results.

Chapter six concludes the study and provides recommendations as well as the limitation of the study and hence recommends areas for further research and

implications of the study to policymakers, industrial managers, and the whole of the manufacturing sector of the URT.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter presents an overview of different studies conducted globally and relating to SMEs, SMMIs, ICT, Product Innovation, and Business performance. It provides the conceptual definition of SMEs, SMMIs, ICT, Product Innovation, and Business performance. The chapter also presents the theoretical and empirical analysis of relevant studies on ICTs, Product Innovation, and Business performance and existing intra-relationships, from across the globe, Africa, and Tanzania. Furthermore, the chapter presents the identified gap in knowledge relating to the study and the theoretical framework pertaining. The chapter concludes with a summary of the different aspects and discernments relevant to this study.

2.2 Conceptual Definitions

2.2.1 Small and Medium Enterprises (SMEs)

Nyamanza (2020) argues that SMEs differ in definition depending on country setting, level of development, and purpose and the goal of the specific study. Authors such as Oladimeji et al., (2017) assert that policies, the role of SMEs in the economy, and other national programs make SMEs critical to a nation's economic development. The reason behind this is that SMEs, for example, in the United States of America, Asian countries such as India, and in Tanzania will be largest, large, and small respectively (Anderson, 2017). However, the most common measurement of an SME lies in the size of capital investment, the number of employees, total assets, production capability, and sales turn over (Nyamanza, 2020).

SMEs comprise two main parts; service industries and manufacturing industries. Service industries offer intangible products while manufacturing industries offer tangible products. In this study, the Manufacturing SMEs are regarded as the same as Small and Medium Manufacturing Industries (SMMIs) (Nyamanza, 2020).

2.2.2 Small and Medium Manufacturing Industries (SMMIs)

Since SMMIs are part of SMEs, the definition of SMMIs was adopted and modified to fit the Tanzanian definition URT (2013), which is a combination of the number of employees and investment capital in an enterprise. This study defines SMMIs as industries that process and transform raw materials to semi or finished products for an exchange value in the market. For instance, in Tanzania the number of employees in a Small Manufacturing Industry range from 5-49 with Investment capital in machinery 5-200 million Tanzanian Shillings and in Medium Manufacturing Industries, the number of employees ranges between 50-99 with Investment capital in machinery ranging between 200 – 800 million Tanzanian Shillings (URT, 2013).

In the event where as Manufacturing Industry fits any of the above two categories, then the investment level was considered as the deciding and categorizing factor. In Germany, BMWi, (2014) defines Small and Medium Manufacturing Industries with employees less than 50 and sales (in million Euros) about 50. The European Community, EC, (2017) define Small and Medium Manufacturing Industries as those with 250 Employees and 50 million Euros in sales.

2.2.3 Theoretical Analysis

Many studies have addressed the adoption of ICT in the manufacturing sector and came out with theories and/or models which examine the selected adoption. In addressing the ICT adoption issue, Korpelainen (2011) described four (4) most acceptable theories and/or models used. The TAM by Davis (1987) is considered as the most cited theory when scholars need to examine the adoption of ICT in an organization in which individuals must make decisions. The Theory of Reasoned Action (TRA) by Ajzen and Fishbein, (1980) is viewed by researchers as the second most used theory.

The theory provides the links/connections between beliefs, norms attitudes, intentions, and individualized behavior. The third most influential theory in the adoption of ICT at individualized level is the Theory of Planned Behavior (Ajzen, 1991). This theory focuses on self-regulated cognition. Rogers (2003) proposes the Diffusion of Innovation (DOI) model, which is attentive to social systems or organizations. Finally, Oliveira and Martins (2011) propose Technology, Organization, Environment (TOE) framework in some studies relating to ICT in the context of organizations. Comparatively, the TOE framework is consistent with DOI, for it has strong theoretical and empirical foundations which enable it to be used in different contexts.

2.2.4 Technology Adoption Model (TAM)

This study, adopted TAM. Apart from being the most cited theory/model on ICT adoption studies. Ajibade (2018), suggests that when the user is exposed to a new

technology such as ICT, adoption of technology depends on how its usefulness is perceived and how easy it is to use. Sometimes, perception does not reflect the reality of technology adoption, because it can be influenced by other factors such as experience, attitude, etc. In an environment where SMMIs are characterized with lower skills, lower education, etc. it is difficult to conclude that ICT adoption alone can be useful in promoting business competition where rules and regulations are imposed in the markets (Ajibade, 2018).

The theoretical foundation of the TAM was preliminarily designed by Davis (1987), who presented a base for the study on the reason behind accepting or rejecting ICT and how to improve users' acceptance of choice of new or modified design features of products. There has been a gradual increase and modification of TAM based on the proposed and empirical tests. The modifications have gone through TAM2, TAM3, or extended TAM for ICT. Briefly, developments have involved TAM2 which explored the determinants of Perceived Usefulness (PU) (combination of TAM2 and PEOU determinants, lead to an integrated TAM (Venkatesh & Bala, 2008).

The combination of TAM2 and PEOU determinants, lead to an integrated TAM (Venkatesh & Bala, 2008). The extended TAM for ICT determines the influence of PEOU, PU, customer behaviors, and attitude. The study by Ingham et al., (2015) showed that attitude was a strong direct predictor of ICT acceptance. The authors' study revealed that TAM with attitude had an additional 9% variance in ICT intention. This result is also confirmed by Lim and Ting (2014) who argued that

most studies on TAM, PEOU, and PU have been shown to have a positive influence on behavior.

In his studies, Davis, (1987) resolved that the reasons why technology users accept or reject new ways of doing things is based on PU and PEOU. The author asserts that originally TAM defined PU as the degree which allows users of technology to believe that accepted technology would be able to increase the performance of the organization. In addition, authors opine that in the original context of TAM, PEOU was defined as technology use and would be free of efforts while using statement by Davis (1987) that PEOU had a direct causal effect on PU, which is supported by Rauniar et al., (2014). In manufacturing industries, it can be elaborated that if PEOU can generally have influence PU two machines being in parallel and performing the same function, then the user will always use a machine that is easier to operate.

Moreover, some studies have criticized TAM. This includes Bashange (2015) and Zahid et al.., (2013). For instance, Bashange (2015) argues that most of the literature on TAM tended to regard the innovation as a dependent variable, instead of determining the factors that influence behavior. This criticism was primarily given by Zahid et al. (2013) who proposed that TAM does not consider other characteristics such as gender, age, and education as external factors that may influence the acceptance of technology. Equally, it could be argued that it is challenging to measure behavior, as sometimes hidden personality traits many times motivate behavior. Ajibade (2018) provides an argument that technology potential users sometimes do not accept or are prepared to use new technologies basing on the

perceptions that the technology is useful or easy to use. This suggests that there is a possibility of external factors influencing technology acceptance.

In linking ICT and TAM, it is important to consider the application of ICT in the operation of firms. In their study conducted in Tanzania, Msuya et al., (2017) explain that ICTs in SMMIs play a greater role in gaining access to new business markets, supply new products and services, changing business processes, increase business performance, and provide ability to employ and remain on top in business competitive environments

In relating between the ICT items and TAM3, first, all ICT items used in the study were adopted from (Msuya et al., 2017) and (Hamad (2017). This shows that ICT items proved to be useful and compromising to (PU) and this was a pre-requisite condition for TAM3. Regarding PEOU, Purwoko et al.., (2018) suggest that there is a strong correlation between PU and PEOU. In addition, customer behavior and attitudes affect the sales of products, realization of profits, employees' satisfaction, and market shares, as summarized in Table 2.3. Rahmat et al.., (2018) suggest that there is a strong link between customer behavior and attitude and liking and or disliking of products and purchase payment systems.

In view of their investigating ICT adoption among firms as a multidimensional construct. Wahab, et al., (2020) revealed that different studies have presented different findings and still inconsistent results support the existing relationship between ICT adoption and business performance. Some studies have come out with

results that ICT adoption in a business firm has no significant effect on business performance (Cardona et al., 2013) while other studies oppose the findings (Wahab, et al., 2020). Generally, literature attempts to suggest that there was a significant effect between ICT adoption in revenues, market efficiency, and opportunity (employment) when the ICT adoption role was high, and reduced the transaction cost.

For instance, a study conducted by Wahab et al., (2020) revealed that ICT adoption such as for improving service operations, reducing transaction costs, promoting good customer care, expanding business opportunities, enhancing competitors' information, all led to business performance improvement. These results show that a higher level of ICT adoption will lead to higher business performance of firms. The firms will develop and implement their strategic plans more effectively (Wahab et al., 2020).

In a survey study to determine the trend of ICT adoption in business processes as from 2004 to 2017 Msuya et al., (2017) showed that there was increased use of ICT in Marketing products and services, all accounting activities, business transactions, customers' and suppliers' communication, product design and innovation. Literature provides that an insight of ICT adoption varies from one study to another depending on the firm examined.

Regardless of the extensive use of TAM in ICT, a major criticism by Chuttur (2009) is that TAM has attained its saturation stage in using it for ICT. The authors suggest

that there is a need to identify weakness and take advantage of existing strengths. Also, Khan and Woosley (2011) point out a serious weakness of TAM that most of its validation studies were conducted in academic environments of which students were respondents and not in business environments. Another criticism with TAM is that it has been tested in deficiency areas (Priyanka and Kumar 2013). The authors, suggested that TAM lack definite conditions such as predictive power and ICT settings which provide results of practical value. Oluwole (2016) claims that the greatest challenge to TAM is the lack of organizational DC.

Based on the development and criticisms on TAM, this study adopted the use of TAM3 which is the extended TAM for ICT. The reason behind the choice was based on the reviewed literature that TAM is influenced by PEOU and PU. But TAM3 includes the influencers and yet it determines the effectives of customers' behaviors and attitude on products revealing business performance indicators. All indicators for business performance used in the study indicated in Table 2.3 relate to customers behavior of purchasing items and attitudes. For instance, customers' decisions on purchasing products affect the volumes of sales and associated profits.

Also, customers' purchasing power relates to satisfaction with products and services during business transaction. In addition, customers influence employees' satisfaction; for instance, higher sales and profit lead to possibilities of higher salaries and other employees' incentives which serve as employee's satisfaction indicators. Finally, market share, is associated with the extent to which products sales

position in market compare with competitors' sales of same product in the same market. So, the higher the sales the higher the possibility of higher market shares.

Studies by Rahmat et al.., (2018) reveal that customer behavior and attitudes affect the liking and disliking of purchased products and payment preferences. Therefore, its effect can be measured through sales of products, profit earned and market share (Nafula 2017), (Likar et al., 2014), (Nawaz et al., 2014), and (Hassan et al., 2013). Other authors suggest that there is a strong correlation between sales and incentives to employees and purchasers of products. Higher Incentives lead to higher employees' satisfactions. So, the use of ICT by linking it to TAM3, is intended to determine its effectiveness towards business performance as shown in Table 2.3.

Strong et al. (2014) investigated technology use and preferences of Caribbean extension officers. Their study used four constructs, including technology usefulness, ease of use of technology, current use of technology, and technology intentions. Strong et al.., (2014) considered PU and PEOU as two essential components of TAM that helped determine extension staff's planned ICT usage. This study, considered technological usefulness termed as (ICT use) as an external variable to TAM. In fact, it used PU as one of essential component in TAM theory. The goal of this study was to use TAM particularly on usefulness of ICT as a part of theoretical framework to investigate its contribution and effects to business performance as mediated to product innovation in SMMIs in Tanzania. The study included perceived useful of ICT in the and TAM theory. This study adopted ICT use attributes/indicators as external variables of TAM presented by (Msuya et al., (2017)

as All accounting activities, Business transactions and Customers' and suppliers' communication. Furthermore. Also, Hamad (2017) presented other attributes/indicators as Product design, Software development and Marketing products and services.

2.2.5 Information and Communication Technology (ICT)

ICT has affected and continues to affect every part of human life. Changes in ICT include speed, memory size, software, application, etc. therefore, there is no common and globally agreed definition of ICT. For instance, Ratheeswari (2018) defined ICT as a collection of technologies that provide access to and storing and transferring a large amount of information from one source to another at high high speed. Data transfer technologies include wireless networks, the internet, mobile phones, etc. Yusuf, (2013) defines ICT as the science which uses technologies for gathering data, storing it, processing and transmitting information through the telecommunication media for wider use.

Chandler and Munday (2012) defined ICT as the study, development, and application and management of information by using computers, computer networks, telephones, and other technologies for the dissemination of information. The discrepancy in definitions relating to ICT may be attributed to time, understanding, exposure, and application of technologies pertaining. It is likely that all definitions have the commonality of information gathering and transfer regardless of the un-described type of technology. However, this study adopted the definition by

Chandler and Munday (2012), particularly on the application of communication technologies and software development.

This study considered the essence of use, computer network works, and telephones as vital in industry and business management and promotion. For example, it requires the application of computers, computer network works and/or telephones to perform marketing of products and services, accounting activities, business transactions, customers' and suppliers' communication and innovation. The application of ICT tools as described by Chandler and Munday (2012) offers promotion for quality, speed and efficiency of all operations and service provision.

2.2.5.1 Description of ICT Items perceived useful in the study

Davis (1986) defined perceived usefulness as the degree to which a person believes that using a particular system would enhance their business performance. Wahab, et al.., (2020) point out that ICT in the supply chain management of companies helps to provide automation tracking of activities better. Also, helps to improve collaboration, reducing cost, and provides better communication in Purchasing, Manufacturing, Inventory Management, Demand Planning, Warehousing, Transportation, and Customer Service. which eventually helps the business performance of the firms.

The following items were perceived useful in improving the performance of SMMIs this study: -

ICT for marketing products and services: To target the right market and deliver expected quality products to customers, SMMIs must have suitable market strategies.

Information collected through ICT such as emails should be appropriately designated by SMMIs internal managements. Sağtaş, (2022) ICT renders customers responsive and promotive of product brand acknowledgement. Marketing products and services through ICT, saves time and cost but also raises SMMIs business income. For instance, through emails, customers initiate their preferences on product and/or services. Bilgin (2018) asserted that ICT is critical contributor of product marketing promotion such as through social media (whatsApp, Facebook, histogram, search engine optimization (i.e., google, yahoo), website marketing (tailor made website, online marketing). Wearesocial (2020) confirms the successful use of social media such as instrumental ICT tool to market professionals to group of customers where they can serve as potential promotors of SMMIs.

ICT for accounting activities: Taiwo and Edwin (2016) refer to the ways a firm can record and provide reports about its financial information. It recalls to the acceptable methods/principles or procedures and financial standards and then follows up firms in recording and providing reports about business transactions and relating events. The use of ICT and other advanced technologies have increasingly been adopted in accounting practice over manual practices. Francis (2013) affirms that ICT has introduced tremendous changes to firms which relates the ICT accounting system and business performance. ICT has assisted to enhance and speed accounting decisions and plans to be made and companies have remained relevant and competitive in the market.

It is important to acknowledge that ICT has improved the accounting functions in industries where it has been mainstreamed. ICT has increased the timelines of report preparation and operation analysis which are important roles of institutional management (Ali et al.., 2013). Reports can be used by internal management or external stakeholders, including investors, tax authorities and creditors (Taiwo & Edwin, 2016). ICT promotes Electronic Data Processing (EPD) that transforms raw data to meaningful information for use by management. EPD facilitates planning, recording, and updating of data, managing auditing functions and reporting business transaction in good time through ICT. In accounting reports receipts, payment vouchers, invoicing and written cheque are facilitated. The impact of ICT on the accounting functions of an establishment includes high speed transactions reduction of costs, higher reliability, and enablement of backup systems.

Presently, accountants use different types of application software to perform their daily accounting operations (Savitri, 2019). But ICT has improved business performance and enhanced reliability of accounting information (Ganyam & Ivunu 2019). ICT application on accounting activities involve both computer application software and hardware which enable speedy recording of accounting information (Knapp, 2019). ICT adoption by firms enables the speedy acquisition and implementation of daily accounting activities using applicable accounting software.

Xu, (2020) informs about the most used accounting application software that are user friendly in enabling the speedy performance of accounting tasks with accuracy. Phyu and Vongurai, (2020) concluded that manual accounting systems or the traditional

method is replaced with computerized accounting system. The lack of skills and experience, incomplete records have been done away with by the application of ICT in the accounting functions of establishments (Capusneanu et al., 2020). The lack of modern skills for computer applications in accounting functions is the main reason why SMEs prefer using traditional method to accounting systems (Kumar, 2020). Students in middle and higher-level institutions should ensure that they study computer applications in all areas of human engagements if they are to assure their employability including in SMMIs.

Shaffer et al., (2020) propose strategies to learn how to use specialized accounting software, and gain wide understanding of the counting, finance, and commercial segments within the framework of international accounting standards. This includes understanding of Generalized Accounting Software, i.e., Peachtree, Tally and Quickbooks. However, in the view of Tychalas and Kartza (2020) and Arcega et al., (2015) using ICT in accounting activities involves a big range of jobs which demand periodic retraining for efficient and effective performance.

ICT for business transactions: Kang et al.., (2021) share their experiences that ICT is regarded as a unique technological innovation that has radically changed business operations and consumer interactions in both developing and developed countries including in such areas as retail sales. Advanced software enables customer audience engagement, contacting customers through zoom, increasing sales, efficiency and productivity. The use of the internet, through smartphones and tablets, is also

transforming the selling and buying behavior for goods and services and therefore capturing all available business opportunities.

ICT promotes business transactions through e-commerce. The main factors involved in such transactions are ICT enabled (Myovella, et al.., 2020), which on its part depends on internet access and institutional computing capacity. Klaus (2017) considered broadband internet subscriptions, mobile broadband subscription, and internet band as key enablers. Sarkar, et al.., (2020) indicates that fixed telephone and mobile phone (smartphone) also can facilitate online transactions and preserve privacy and security and should not therefore be ignored.

ICT and e-commerce cannot be separated since e-commerce operations depends solely on ICT. Srivastava and Singh (2013) defined e-commerce as the application of ICT to support all activities and transactions involved in business. The concept of e-commerce works better on business, and it normally covers all the related ICT applications, but limited to ICT (Kumar, et al.., 2014). The four main types of transactions that can be facilitated by ICT in business, include, Business to business (B2B), Customer to business (C2B), Business to customers (B2C) and finally Customers to Customers (C2C).

Business transaction involves financial transaction between or among parties and includes the exchange of money, and payments for goods and/or services. The business transaction of a firm affects its financial position. TCRA, (2020) shows

that through the use ICT such as Mobile Money Services, the following business transactions are ongoing in Tanzania:

i) Borrowing money from a bank (i.e., Simbanking – CRDB)

ii) Purchasing goods from a vendor (i.e. eBay, Amazon etc)

iii) Paying rent and bills for other utilities (through Mpesa, Tigo pesa, AirTel money).

iv) Tax Payment through (Simbanking, Mpesa, Tigo pesa, Airtel money – transactions with Tanzania Revenue Authority)

ICT Enablement of Communication between Customers and Suppliers

Even if products may be satisfactory, customers may still go around to find better bargains for products. Thus, customer relationship management is vital and should be improved to enhance interpersonal communication between customers and suppliers of goods and services through call centers or website communication.

Effective communication is considered a strong bond and unifying thread connecting all relevant stakeholders in business to accomplish and retain competitive advantage regardless of the nature of the operating environments.

Increasingly, manufacturing firms are taking on board suppliers into product innovation and business performance agenda to overcome challenges of global competition, while maximizing customer satisfaction with higher product innovation, quality of goods and lower prices (Cirera et al., 2016). Therefore, confirmed modes of communication between customers and suppliers in relation to product innovation

and business performance is critical for improved performance of all kinds of businesses.

Yeniyurt et al., (2014) states that communication in business should be founded on openness and honest sharing of information to ensure a better fostering of efficient and more effective collaborative relationships between industry and suppliers of raw materials on the one hand, and distributors of finished products on the other. This can only happen through effective and good communication channels that allow all the involved parties to share issues that lead to strong partnership engagements (Claub, 2012). In addition, Kaynak and Sert (2012) adds that instituting good communication channels between industries and suppliers helps to bridge the gaps with partners and improve satisfaction and lasting relationships.

This researcher insists that good exchange interaction between customers and goods and service suppliers have a significant relationship with product quality. It can therefore be concluded that information sharing (communication) leads to improved business performance. A study epitomized by Omoruyi and Nwele (2020), shows that communication had a significant relationship with suppliers. However, such results may not always be so in all areas, and therefore more research is needed to fill identified gaps in relevant knowledge.

ICT use in product design and innovation: One of the major effects of the Covid-19 pandemic, was the rate of change in manufacturing industries on a global scale. Continuing mega-trends in human functions, particularly those involving the

application of ICT fundamentally change the circumstances/conditions in which SMMIs operate to develop and provide new products Edelhauser (2014). Manufacturing industries are therefore increasingly developing new products for competitive advantage the existing and emerging markets. Substantial increases in the application ICT have expanded its effectiveness. Regardless of its cost the intensity of Computer Aided Designs and Computer Aided Manufacturing (CAD-CAM) are rising in all types of manufacturing industries.

CAD is the ICT tool used for design of new products. CAD requires specialized staff depending on the area in the design tasks (Mitreva & Taskov, 2014). CAD is a technology that helps in the manufacturing industries. It requires higher efficiency, accuracy, and effectiveness. Edelhauser (2014), presents an argument that CAD-CAM technologies are more concerned with the application of computer software and hardware in different design and manufacturing sections/departments. Both functions- the design process (CAD) and manufacturing (CAM) are done with higher efficiency, accuracy and effectiveness for competitive advantages marketing the resulting products.

Apart from the fact that CAD technology is characteristic of the third phase in industrial revolution (Mao, 2015) and (Dzikite 2015). Documents that used CAD for design in mass production and customization to boost production in manufacturing firms is on an increasing high demand**.** Suneel & Moulali (2016) affirms that CAD helps industrial designers in performing simulations from product conception to parametrical design (sketches), creation (sample product), testing (function ability,

durability of product) prototyping (actual product and more testing), modification (adjustments i.e., size, weight etc.), analysis (engineering perspective) and design optimization.

Application of ICT in software development: The modernization of manufacturing industries needs systems that enable and manage technologies and understanding for improved effectiveness in business (Oliveira et al.., 2020). ICT for software development is directly connected to I.4.0 because it springs together all the techniques and provides solutions for technological modernization of manufacturing industries (Mineo et al.., 2016). Industry solutions as presented by Openshaw et al.., (2014), Keeley, (2013) opinion include IT integration, data analysis and management, cloud-based technology, IT security management and taxation models.

Software development should comprise an organized activity, which can define, develop (writing code for programming), test (to determine efficiency and effectiveness) and maintain the system (Lamounier, 2014). Wazlawick (2013) and Pressman et al.., (2016) categorize seven (7) phases of software development as software design, software requirements gathering, software requirement analysis, software design, software implementation, software testing and software deployment.

Therefore, the effect of ICT can be measured through, sales of products, profits realized, and market shares actualized (Nafula,2017), (Likar et al., 2014), (Nawaz et al., 2014), and (Hassan et al., 2013). These authors suggest that there is a strong correlation between sales and staff and customer incentives in business. Higher

incentives lead to higher employees' satisfactions. So, the use of ICT in linking to TAM3, intended to determine its effectiveness towards business performance as shown in Table 2.3. Based on this relationship, it can be deduced that ICT items used, namely, were PEOU, PU and customer behavior and attitude qualify for TAM3 to be used in the study.

2.2.6 Product Innovation

The success of any business organization can be traced back to successful products and this is based on the organization's capability to search the wants and needs of customers and make quick decisions to produce goods that fulfill customer expectations and demands (Zinga et al.., 2013). Product innovation can be described as the blood of the business organization. Until recently, there has been no reliable definition of product innovation that has global acceptance.

The features that define product innovation vary and involve knowledge, skills, resource capability, and technologies level of SMMIs. For instance, Ibidunni et al.., (2014) define product innovation as the development and functioning of a new application of a product to the business world. Gunawan (2015) is of the position that product innovation refers to a new product that may involve improvement in internal features, materials, and software development. Further, it may also include components that are user friendly, etc. It involves the specific market or environment where product innovation is recognized as new (Zinga et al.., 2013).

However, Aarushi et al., (2020) defined product innovation as the introduction of new products and distinctive services with improvements in their major features and

applications. The authors further defined product innovation as that which has been extensively enhanced through current technology, tools and resources, assimilated programs, customer satisfaction in mind and market acceptability.

Based on the range of definition given by the authors, this study adopted the definition given by Aarushi et al., (2020) and Gunawan (2015) as important and practical. The Authors considered product innovation as newness, modification of products and services. This study considers that the referred new product should be easy to use and has no ill effect on the environment. The product innovation in this study was used to assist in determining a mediated relationship between ICT and its contribution to business performance of SMMIs.

2.2.7 Business Performance

The variable of business performance is the most important factor for the understanding of a firm's success and the other factors pertaining. Collis and Hussey (2014) point out that for good business performance, reliable and valid measures are necessary. Ngugi and Karina, (2013) define business Performance as the metrics of how a certain objective or target is met. Business performance can also be considered as the evaluation results which indicate efficiency, productivity, regulatory conformity, and waste reduction. Since there is no single definition that can adequately explain business performance of SMMIs the researcher considers this to mean the level of success in production and sale of goods and services and the matching market competitiveness and growing market shares.

Even so, in some cases, the definition of business performance can be regarded as country specific and embracing geographical boundaries, etc. This study also considers business performance as the measurable achievement of specific goals defined and met by SMMIs, within a given time frame as set by a firm. The term business performance is a multidimensional construct which has different names, including success, growth, and competitiveness. Business stakeholders normally evaluate an organization's ability based on its business performance (Rosli and Sidek, 2013). This implies that business performance is comparable to a mirror image. The extent to which a firms' goal is accomplished automatically defines the firm's business performance.

Depending on the organization, different methods can be used by different organizations to measure their business performance. However, over years most of the existing literature shows that those different methods do measure a firm's performance. Shin and Lee (2016) categorize the performance factors in industrries as financial and non-financial measurements, the later of which focus on product quality and market competitiveness.

2.2.7.1 Business Performance Frameworks

In the analysis of business performance relating to manufacturing industries, Zheng, et al., (2020) provides different frameworks and reference models as made by previous scholars. These models are frequently used to assess and compare performances and uncover the best practices (Weilkiens et al, 2016). Porter and

Kramer, (2011) provide the Value Chain Analysis (VCA) model which includes operations/activities undertaken by companies to deliver quality products or services. Porter and Kramer, (2011) outline two categories of performance relating activities as primary activities and support activities. Primary activities include inbound logistics, operations, outbound logistics, sales, and marketing services. These activities add value to the products and services provided. Meanwhile support activities which include infrastructure, technological development, procurement, and human resource management improve the practicality of the primary activities.

Based on the general objective of this research, specifically to determine the effect of ICT on product innovation and business performance of SMMIs in Tanzania the VCA was adopted. All the three (3) variables of the study are part of the VCA. For instance, the use ICT in support of activities determines the effectiveness of technology development, and the effectiveness of manufacturing machines as infrastructures which determine product quality, specifications, and functionality of the innovated products. Finally, the primary activities of the manufacturing organizations are basically product generation, sales and marketing. These activities relate to each other in complementation. For instance, good marketing determines the level of sales and the sale of products form part of business performance measurement.

Financial business performance measurement: Regardless of consensus among researcher's business performance measurement is a multidimensional construct, while financial business performance measurements is considered as the most

important factor which fulfils the economic goal of a firm. The primary objective of any firm is to generate profit and hence holds stakeholders with the highest esteem. It is important to understand that scholars employ different methods to evaluate financial business performance measurements. Likar et al., (2014) and Nawaz et al., (2014), dealt with financial business performance measurements, and reveal that the most common method used in evaluation is either accounting-based measures, i.e., sales growth, profitability, Return On Equity (ROE), return on assets (ROA), return on sales (ROS) or stock market measures. Regardless of its limitations, profit maximization remains to be the most prominent determinant of performance of firms Kothari and Garg (2014). Several researchers prefer to use growth as the key measure of performance, while others combine performance with profitability (Likar et al., 2014).

Other researchers combine ROS, ROA, ROE, and ROI because these factors complement each other. It is thought that the use of a single ratio might not provide enough information about a firm, and this could trigger stakeholders i.e., investors to make judgment about the overall financial business performance of the firm which may not always be right. For example, ROA allows stakeholders to evaluate the effectiveness and efficiency of organizational management and its employees in making profits by pegging on asserts. However, to the contrary, ROS allows stakeholders to evaluate effectiveness and efficiency of an organizational management and employees by pegging on effective use of available assets (Likar et al., 2014).

Hassan et al., (2013) suggest that Accounting based measures in SMMIs are useful because they provide actual objective measures of firms. Accounting measurements reflect the history of a firm in terms of income statements which show what took place in a specified year, and explain the balance sheets statement which in turn justify the state of the organization's assets and their effective use.

Non-financial business performance measurements: Zarzycka and Krasodomska (2022), argue that non-financial business performance measurements must be done by evaluating the business performance of a firm for two main reasons. First, several stakeholders are involved in the business and have their unique goals and expectations from the business. Secondly, the strategic area targeted for assessment might not be financial. For that matter, scholars have developed different approaches to measure non-financial indicators that include customer satisfaction, customer retention, market shares, operational effectiveness, productivity levels, branding, reputation, and total quality (Hassan et al., 2013).

On new product performance measures, Hassan et al., (2013) advises on the use of two non-financial performance indicators namely customer and opportunity criteria. Customer criteria refer to satisfaction of customers and products attraction to new customers and creation of new markets and opportunities. The second dimension of opportunity criteria refers to creative by-products. These include providing opportunity for creating new products that require new skills and experiences.

Through the reviewed literature it is suggested that on measuring business performance of firms, both financial and non-financial measurements should be considered as important. The authors suggested that measuring financial indicators as a sole determinant is not necessarily wrong but it should also justify the decision on the choice and objective intended irrespective of non-financial indicators. It can therefore be generalized that the measurement of an organization's performance be done through agreed indicators.

Objective and subjective business performance measurements: Valmohammadi, (2017) define objective business performance measures as the exact values of an organization's real or actual performance while subjective measures are generally the opinions or perceptions of stakeholders relating to an organization's performance. For instance, objective measures are absolute values used for auditing financial data such as profit, sales, asset values, etc., and subjective measures are used to measure observations by management and employees' perceptions about organizational performance. Sofiyabadi, et al.., (2015) reveal that, objective measurements can be justified while subjective measurement cannot be justified. This study adopted subjective measurements because they enable opinion ranking between 1 and 5.

2.2.7.2 Dynamic Capability (DC)

The theory of DC involves the development of the resource-based theory (Wang & Ahamed, 2007). Literature on strategic management has debated DC theory as a measure to face and challenge a rapid dynamic change in technology and business environment (Teece, 2014). DC theory is defined as the ability of the firm to

integrate (coordinate), build, and reconfigure all types of competence regardless of their source, to face and overcome the rapid changes of business environment (Teece, 2014). Further, the author suggests that DCs consist of three major parts; sensing available opportunities and possible threats, seizing, or capturing opportunities, maximizing the resource utilization that leads to organization performance. Therefore, organizations must evaluate their ability to capture large business opportunities and take due advantage.

To study Innovation Capability, the DC theoretical framework was selected for two major reasons. First and fore-most DC is a theory of firms' internal capabilities concerning what is intended. Second, DC thinking is very strongly related to innovation concepts, for it emphasizes the researchers on DC to continual innovation (Aas & Breunig, 2017). Regardless, innovation is a vital concept to DC, the relationship that exists between DC and Innovation Capability which is not clearly explained, and sometimes overlaps in application (Aas & Breunig, 2017).

Several numbers of researchers support the argument of the presence of a strong relationship between DC and Innovation Capability (Aas & Breunig, 2017), (Dixon et al., 2014), (Narcizo et al., 2017), (Lee et al., 2016), but they consider the existence of the relationship in different ways. In the first perspective, DCs support and explain innovation (Teece, 2014) and presents the argument that DCs is a collection of capabilities and competencies which support the creation of new product and processes as the way to respond to changing market conditions. This relationship was confirmed in exploratory empirical studies by (Lee et al., 2016).

The second perspective provides an opinion on Innovation Capability as the main component of DC and Innovation Capability viewed as normal capability by Michailova & Zhan (2015) and refigured through DCs. In this case, innovation Capability is explained as the process of improving a product in an industry.

In the third perspective, Innovation Capability is well-thought-out to be a DC. Dixon et al., (2014) consider IC as DC which integrates with, modifies, and encompasses other DCs. In this scenario, Innovation Capability is theorized to be a higher order of capability able to integrate and configure main resources to achieve desired innovations (Michailova & Zhan 2015).

In this study, the researcher considered that product innovation-related resources were complementary to a firm's dynamic product innovation capability. In this aspect product innovation-related resources are not the same and are comprised of both tangible (i.e., buildings, machinery) and intangible (i.e., patents, licenses, trademarks, and intellectual resources). Resources are of different value, leading to different success levels. Sok et al., (2015) defined product innovation capability as a collection of interrelated routines under proper conditions and arrangements that can perform product innovation-related in the firm; including radical or increment product innovation of the current product quality based on the efficiency of the production process.

Saunila (2019) defined innovation capability as the ability of a firm to continuously transform creative knowledge and ideas into new products, process, and systems to

benefit the firm and its stakeholders. Based on the definition, Vallejo, and Arias-Perez (2017) concluded that innovation capability is a pillar to small firms that intends to compete with larger firms that have more resources. Research findings show that innovation capabilities in small firms have two paths to study; first what are the determinants of innovation capability and second is what the consequences of innovation capability are. Furthermore, Hsu (2013) point forward that it is significantly important to keep greater managerial importance to the intangible resource as well for the provision of a better stand for a firm to grow and gain competitive advantage.

It is considered that competitive success particularly in innovation, might be some elements of luck; however, for the industry to achieve and maintain its top position, probably luck alone is not enough (Bamiatz & Kirchmaier 2014). It is literally proper to propose that it is also important to have the ability to develop new products, in the efforts to attain business growth. Therefore, this study considers that product innovation enables industries to compete in the market by introducing new products and so to satisfy customer demands. To successfully do so properly industries must have a high level of both product innovation capability and ICT simultaneously to pursue desired performance. This suggests that a high level of product innovation capability and ICT cannot replace the essence of intellectual human resources. Similarly, a high level of intellectual human resources cannot replace product innovation capability and ICT.

In the light of Vallejo and Arias-Perez (2017) despite many literature reviews in innovation, still limited evidence is available on empirical literature about product innovation capabilities in SMEs, particularly in SMMIS. Saunila (2019) classifies innovation capability into the process and product innovation. Some classify innovation capability in terms of incremental and radical innovation.

Some studies have considered innovation capability as an overall capacity of the firm to design and produce new products. There is a need to provide practical evidence on availability and product innovation capabilities by utilizing innovation research like this. Therefore, this study aimed to explore the understanding of the existing characteristics of product innovation capability research in SMMIs. It can be theorized that product innovation capability is potential to creating novel and valuable products or knowledge.

In their reference model Vallejo and Arias-Perez (2017) shown that to achieve the desired outcomes of product innovation, an organization should have a definite capacity to innovate. They went on to explain that capacity to innovate includes innovation culture, environment understandability, and internal processes which refers to processing technologies. This study uses product innovation to measure SMMIs business performance. New products stand to be good indicators of a firm's capability to familiarize themselves with changes in market dynamics.

Therefore, this study considered that product innovation enables industries to compete in the market by introducing new products and so to satisfy customer

demands. To successfully do so properly industries must have a high level of both product innovation capability and ICT simultaneously to pursue desired performance. Firms always remain competitive to make sure they remain competitive in the market and modern technology. This study adopts a prior study by Kim-Soon et al., (2017), who presented product innovation attributes/indicators of an industry as follows: -Developing new products with technical specifications and functionalities differing from the current ones, developing products that are user friendly and Increasing manufacturing quality products. Furthermore, authors outlined producing products that have no ill effects on the environment, developing new products with components and materials differing from the traditional ones and finally decreasing manufacturing costs.

2.2.7.3 Integrating TAM and DC theories

Challenges on TAM presented by Chuttur (2009) clamed saturation stage in using TAM for ICT. And Khan and Woosley (2011) conducted studies at academic environments. Priyanka and Kumar (2013) challenges TAM as having been tested in deficiency areas lacking definite conditions for ICT settings in which TAM can be applied for offering results of practical value. Oluwole (2016) concludes by arguing that most of challenges of TAM were lacking the organization DC. This study attempted to integrate TAM3 theory and DC theory in determining their effects on business performance. Product Innovation Capabilities was considered because literature identified it as a component in DC and considered as a catalyst for the performance of firms (Teece, 2014) and (Lee et al., 2016).

2.3 Empirical Analysis of Relevant Studies

2.3.1 General Studies

Specific objective One: ICT and product innovation

The incorporation of ICT new systems has enabled businesses to perform better and execute business planning and production programs while stimulating product innovation. The suitable use of ICT enables manufacturing organizations in small businesses to improve management activities in substantial way. For dynamic manufacturing companies, with highly challenging environments, the requirement for advanced ICT use is important to offer high quality products performance, efficient services to customers in the rapidly changing of knowledge economy (Kuratko & Audretsch, 2013). ICT usage involves all stakeholders from supply of raw materials, product design, manufacturing process, finished products and delivery to customers by using different infrastructures and applications to remove any possible gap that could exist (Kathleen & Wilburn, 2018).

The Table 2.1, shows that there are theoretical and empirical evidences that has been because of ICT towards innovations. For instance, Arvanitis and Loukis (2015) provided evidence of application of ICT in the operation of hospitals and had a positive impact to product innovations. Scholars such as Cuevas-Vargas et al., (2016), Ferreras-Mendez and Arege (2014) have shown that ICT has a significant impact on product innovation.

The results by Ranatunga et al.., (2020) show that ICT had direct impact on business performance. However, Santoleri (2013) results show that being a basic ICT user is

negatively associated with product innovation in Chilean. This comparison draws a concern on when best can ICT provide positive or negative results? Should the use of ICT guarantee successful product innovation? Which grounds assure firms to innovate for successful business progress? On this ground, further research is required to establish the facts regarding the theory.

Specific objective Two: ICT and business performance

In the modern industries, ICT is the reason for determinant technological change of digital revolution in both developing and developed countries. Literature suggests that ICT infrastructure and associated capabilities are the pillars of business competitiveness and business performance of manufacturing organizations in small businesses. Studies in ICT and business performance had different results as well. On this grounds studies presented in Table 2.1 show that regardless these literature reviews most of which were from developed and developing countries, results were not the same. Studies by Ferreras-Mendez and Arege (2014) which took place in Italy and Spain, showed that ICT had a direct effect on business performance. Such studies are like those of Cuevas-Vargas at el.., (2016) which took place in Mexico.

Specific objective Three: The mediating effect of product innovation on the influence of ICT application on business performance

Regardless of negative comments by Kijek and Kijek (2018) on the lack of clearer evidence based on studies on the mediated effect of ICT on businesses performance in firms, still studies by Ferreras-Mendez and Arege (2014) which took place in Italy and Spain showed that ICT had a mediated effect to business performance. Similar

studies done by Ranatunga, et al.., (2020) show ICT direct and mediated impact to business performance. This suggest that variables that mediate ICT and business performance are important in determining the relationships. In the study conducted by Cuevas-Vargas et al., (2016) innovation was used; while Ranatunga et al.., (2020) used bounded rationality on ICT usage. Either in this study mediated effect of ICT usage was determined by product innovation and business performance on the grounds of various studies reviewed.

For instance, Arvanitis and Loukis (2015) provided evidence that application of ICT in hospitals had a positive impact to product innovations, moreover, ICT had a similar impact to business performance. The said study shows direct and mediated effect on business performance. In their study Kim-Soon et al., (2017) concluded that, the relationship between product innovation and business performance of firms is continuing to be a matter for debate. Besides, the nature of studies is still important for modern economies. The results on the relationships were contradicting. For instance, Saunila and Ukko (2014) and Saunila (2013) found out that product innovation had a relationship with firm performance, while Saunila (2014); found out that product innovation had a negative influence on business performance.

Currently, most of the literature available relating to ICT, product innovation and business performance has been from large manufacturing industries from developed countries. Most of the kinds of literature have shown a positive and significant relationship between ICT and product innovation, or ICT and business performance

or ICT have shown an indirect significant relationship when mediated through product innovation. This has led to the conclusion that ICT and product innovation have always been regarded by researchers as means for firms to remain competitive in business. But due to business dynamics in the firms, the relationship has not been significantly supported all the times and in all places. Therefore, the studies on ICT and product innovation and factors affecting it towards business performance remain to be significant important to scholars, policymakers, etc.

This study presents few empirical studies listed in Table 2.1 which analyses the effect of ICT on product innovation and business performance. Most of the empirical studies reviewed from this study were from developed countries which in context were different from Tanzania context.

In the process of acknowledging the role played by firms and the limited empirical studies to support the effect of ICT towards product innovation and business performance, the studies were imperative. This research work intended to add to the body of knowledge on business performance in SMMIs by examining the effect and contribution of ICT. If ICT must be successfully used to improve product innovation and business performance in SMMIs, then its effect must be examined, highlighted, and analyzed. This forms the basis of theory developments, implications to managers and policymakers. Currently, there is a lack of studies that have been carried out to examine and provide empirical evidence on the effect of ICT, Product innovation, and business performance as a unit system for effective SMMIs in Tanzania.

In considering research methodology, the reviewed literature suggests that the methods used determine the nature and accuracy of results. The empirical literature shows that a quantitative approach was used that included descriptive and inferential. Both approaches had different results especially in comparing data. All of them had different sample sizes. Literature suggests that sample size affects results.

On the SEM approach, Goodhue et al.., (2006) present their argument that sample size should not be the criteria for applying PLS-SEM because it does not have statistical power when the sample size is small and so it is recommended that Smart PLS is a powerful method to use when the sample is smaller and does not qualify to be carried out by CB-SEM. Blunch, (2017) argue that Amos which is Covariance Based Structural Equation Modeling (CB-SEM) gives attention to evaluating the goodness of fit on minimizing the discrepancy between the observed and estimated covariance matrix. Its application is based on testing of Confirmation of the theory used in the study. It requires a larger sample size. Authors further suggest that model complexity and measurement determine the sample size.

Studies on business performance of SMEs in the global economy have been significant; various studies have been done to determine the actual factors that lead to industrial best practices. For instance, ICT knowledge and use have been considered as the power to gain a competitive advantage over other business competitors. Rosli and Sidek (2013) argue that product innovation has become a fundamental catalyst for organizations to perform across the world. However,

different results have been achieved on the application of two constructs in the business world. The previous literature review presented in Table 2.1 shows studies conducted by other scholars and the knowledge gap which this study intends to fill.

Table 2.1: Previous general studies and identified knowledge gaps

Author	Findings	Methods and sample size	Gap	Focus of the current study
Terziovski (2010)	The research findings indicated that there is no relationship between innovation and SME performance	Multiple Regression analysis and Sample size 600	The study concentrated on SMEs Manufacturing in Austria	This study was done in Tanzania and used SEM and the sample size was 474 SMMIs
Ar & Baki, (2011)	The study revealed a positive significance of product and process innovation in firm performance	The study used descriptive SEM analysis with SPSS version 10 and Amos version 4	The study considered product and process innovation in SMEs in Turkey	The study was done in SMMI in Tanzania and used descriptive SEM analysis with SPSS version 26 and SEM Amos version 26 and the sample size was 474 SMMIs
Rosli and Sidek (2013)	The research findings showed that product and process had n influence to Manufacturing SMEs	Hierarchical Regression Analysis with sample size 284	The study was done in SMEs Manufacturing in Malaysia	The study used descriptive SEM analysis with SPSS version 26 and SEM - Amos version 26 and the sample size was 474 SMMIs
Ferreras-Mendez and Arege (2014)	The research showed that ICT had a direct and mediated effect to business performance	SEM with sample size 186	Study was conducted in Spain and Italian firms	The study was carried out in Tanzania with 22 manufacturing SMEs and the sample size was 474 SMMIs
Cuevas-Vargas at el.., (2016)	The results indicate that ICT had direct effect on firm business performance and shows that ICT had mediated effect on firm business performance as mediated by innovation	EQS 6.1 Software – SEM with sample of 228	The study was done in Mexico	The study used descriptive SEM analysis with SPSS version 26 and SEM - Amos version 26 and the sample size was 474 SMMIs
Aziz & Samad, (2016)	Research results revealed that innovation had an influence to Food Manufacturing SMEs competitive advantage	SEM – CFA with Amos version 21 with sample size 359	The study was carried out in Turkey with only one food manufacturing SMEs alone	The study was carried out in Tanzania with 22 manufacturing SMEs and the sample size was 474 SMMIs
Akben-Selcuk (2016)	Research results showed that innovation influenced competitiveness	Regression analysis with sample size of 359 respondents	The study was conducted in Turkey	The study was carried out in Tanzania with 22 manufacturing SMEs and the sample size was 474 SMMIs

2.3.1.1 Studies in African Countries

In the flow of ideas about the effect of ICTs and product innovation in manufacturing SMEs in Africa, this study presents a few empirical studies as listed in Table 2.2 which show the analyses of ICT and product innovation, product innovation and business performance, and ICT and business performance and finally ICT to business performance as mediated in product innovation on different firms. Studies in ICT and product innovation in Africa are used to compare events in developed countries. The literature shows similar outcome as indicated in Table 2.1, section 2.3.1.1.

The application of ICT and its effect has been shown to have positive impacts and sometimes contradicting effects. For instance, studies by Cirera et al., (2016) have shown that ICT had a positive impact on product innovation and productivity. However, in Kenya, Nafula (2017) indicated that product Innovation was weaker yet competitive than process, organization, and market innovation. Other previous studies in Africa indicated in Table 2.2, show the difference in methodologies and results when relating ICT, product innovation, and business performance.

Table 2.2: Summary of previous studies in africa to identify knowledge gaps

Author	Findings	Methods and sample size	Gap	Focus of the current study
Njogu (2014)	The study revealed that industrial processes, product, and Marketing had an influence on financial performance in Kenyan industries	Regression analysis with sample size of 180	The study determined the effect of product, process, and marketing innovation on financial industrial performance	The study was done to determine the effect of product innovation on financial and non-financial performance in SMMIs; the sample size was474 SMMIs
Mensah & Acquah (2015)	The research findings showed that product innovation had no influence on firm performance	PLS SEM with sample size 243 in Ghana	The study was done in Ghana and considered the effect of innovation on SMEs performance	The study was done in Tanzania by considering the mediated effect of ICT on business performance as mediated by product innovation and the sample size comprised 474 SMMIs
Cirera et al., (2016)	Results show that ICT, Product innovation had significant relations with productivity	Regression and Meta-analysis sample size 2938	Used secondary data for SMEs in manufacturing and Service. This research was done in Ghana, Uganda, DRC, Kenya, Zambia, and Tanzania	The study was carried out in Tanzania using primary data for SMMIs. The methodology used was SEM
Abdilahi, at. Al., (2017)	Research results indicated that product Innovation had a positive effect on business performance	Descriptive and Regression Analysis	The study was conducted in Somalia	The study was done in Tanzania based on SEM analysis
Nafula (2017)	The research showed that process, product, marketing, and organizational management had positive impact to firm competitive	Multiple Linear regression analysis with sample size of 284	The study was done in Kenya on the effect of innovations on competitiveness	The study was carried out in Tanzania with 22 manufacturing SMEs and sample size of 474 SMMIs
Cirera et al.., (2016)	Results show that ICT, Product innovation have significant relations with industrial productivity	Regression and Meta-analysis sample size 2938	Used secondary data for SMEs in manufacturing and Service. Research was done in Ghana, Uganda, DRC, Kenya, Zambia, and Tanzania	The study was carried out in Tanzania alone using primary data for SMMIs. Methodology used was SEM

A study by Akinwale (2018) conducted in South Africa, found that technology, technical staff size, funds allocation on Research and Development had positive significance to improve financial performance, unlike product innovation. Furthermore, research conducted in Hargeisa Somaliland, Abdillah et al.., (2016) showed that product, organization, and marketing innovation have a positive impact on firm performance. The study by Algeria Abderrezzak et al., (2016), found out that the capacity of innovation depended on the human skills and financial capacity of SMEs. In the view of empirical studies in Africa, it is shown that there was a lack of studies that show the role of ICT in the product innovation that leads to business performance improvement in SMEs.

In reviewing research methodologies, most of the studies conducted used a quantitative approach. For that matter, regression analysis was used (Njogu, 2014, Cirera et al., 2016), PLS-SEM (Mensah & Acquah (2015), Descriptive and Regression Analysis Abdilahi, et al., (2017) just to mention some were also used. In comparing Regression analysis and SMART PLS-SEM, researchers found that to determine and perform analysis simultaneously among and between variables, SMART PLS-SEM can do better. It can perform better estimates when it comes to determining indirect and mediated effects when the testing theory of bootstrapping techniques and Sobel test than regression analysis methods. While descriptive analysis is a method able to summarize the data, present their frequency, percentage, central tendency, plot, or provides a graph where necessary. There is no change of one variable that necessitates the change to the dependent variable.

2.3.1.2 Studies in Tanzania

The study by Msuya et al., (2017) revealed that there is an increase in ICT use in SMEs in Tanzania, particularly in process innovation and business performance. Hamad (2017) found that the use of computers, mobile phones, and the internet was perceived as adequate ICT tools to boost business performance. It also revealed that the size of a firm was the key determinant of the firm to become innovative (ibid). Furthermore, Ngonyani' (2014) research showed that there was a positive effect of innovation on organizational performance. Despite those empirical studies conducted in Tanzania, the scarcity of studies that included ICT, Product Innovation, and Business performance in an integrated model was lacking as evidenced by (Jaensson, 2017) and (Ndesaulwa & Kikula, 2016).

2.3.1.3 Research Gap identified

Theoretical gap: This study adopted TAM3 and DC. Most of the current studies are in reflection of the combination of TAM and DC theories in relation to SMMIs. Mensah & Acquah (2015 and Cuevas-Vargas et al., (2016). Either some studies such as by Ngonyani (2014) and Abderrezzak et al., (2016) provide implementation of TAM3 and DC independently. So, there was a lack of understanding in integrating TAM3 and DC in implementation on ICT, Product innovation, and business performance on SMMIs particularly in Tanzania.

Methodological gap: Most of the studies conducted used Linear Regression Modeling and Descriptive analysis (Nafula 2017) and (Abdilahi, et al.., (2017). Such approaches are unable to determine the relationships that could exist among Latent

variables. Also, there was a limited sample size, observed indicators, and latent variables. Other studies used PLS-SEM, Blunch, (2017) suggested that PLS-SEM was used to predict outcomes, while CB-SEM used to confirm that research data fits in the model. Furthermore, authors suggest that PLS-SEM was used for data that was not normally distributed, small sample size and constructs less than three while CB-SEM was used where data was normally distributed, with atleast three constructs and a large and small sample size.

Contextual gap: The light of a study by Ndesaulwa and Kikula (2016) showed that Tanzania lacks empirical evidence on the relationship between innovation and business performance. Most of the studies conducted are from large manufacturing industries from developed countries i.e., Cuevas-Vargas et al., (2016) in Mexico and others from Table 2.1. Either, few studies are from Africa. Studies from Africa include Mensah & Acquah (2015) which was done in Ghana, Nafula (2017) in Kenya, Abderrezzak et al., (2016) in Algeria. Akinwale (2018) others are in Table 2.2. Quite a few were from Tanzania including Msuya et al., (2017). Based on the previous studies presented most of them are from other countries, which can influenced by national policies, on number of employees, sales turn over, investments etc which cannot real reflect Tanzania business environments. This leads to a clear lack of sufficient contextual evidence that would provide new knowledge and understanding of ICT role and effect to Product innovation, and improved business performance in Tanzanian context.

Empirical gap:

Using Desktop and Library research methodology in Tanzania, Desaulwa and, Kikula (2016) found out that empirical studies that assess the impact of Innovation on SMEs performance in Africa were lacking. This implied that such limitation was practically missing in Tanzania. Also, in the study conducted by Mwantimwa (2019) using SPSS IBM 22 to generate descriptive and inferential statistics results, author found out that in Tanzania there were barriers to innovation practice while using ICT. Such barriers included lack of innovation attitude, lack of innovation education etc. Such results led to insufficient impacts of ICT and product innovation in Tanzania. in addition to previous results, in their research Cirera et al., (2016) which took place in Ghana, Uganda, DRC, Kenya, Zambia, and Tanzania, using Regression and Meta-analysis methodologies authors results showed that Results show that ICT, Product innovation had significant relations with productivity with insufficient empirical studies which reflected actual practice in Tanzania relating ICT, product innovation and business performance in Tanzania.

Finally, using Factorial and cluster analyses, the multiple discriminant analysis methodology, Billon et al., (2017), in Europe Union showed the existence of ICT use. Research and development (R&D) expenditure in the business sector, gross domestic product per capita, the number of researchers. However, such results were lacked comparison practice in Africa including Tanzania due to insufficient information that reflecting ICT, product innovation practice that could boost business growth. Such previous studies provide vivid evidence that Tanzania lack empirical studies that relate ICT, product innovation and business performance in SMMIs

2.3.2 Theoretical Framework

This section identifies the independent, dependent, and mediator variables needed for this study. Blunch, (2017) argue that a theoretical framework must identify and explain the relationship between variables in solving a problem in a scientific study. Through the literature reviewed, the dependent variable is considered as the leading sign of the researcher, and the main factor focused on in the investigation for business performance.

Dependent variable: The main objective of this study was to examine business performance in SMMIs in Tanzania. Business performance is the main variable in the research. A total of five (5) business performance indicators were used as shown in Table 2.3. These indicators were measured as appropriate because they are based on subjective performance. For each item the respondents were asked for views on business performance of the SMMI on a 5-point scale ranging from "1 = Strongly disagree" and “5 = Strongly agree”.

Independent Variable: ICT use was the independent variable in this study and had six (6) indicators shown in Table 2.3. For each item the respondents were asked about the ICT use in the SMMI for the last three years on a 5-point scale ranging from "1 = Strongly disagree" and "5 = Strongly agree". ICT use had a direct effect on business performance and had indirectly affected business performance via product innovation.

Mediating Variable: Product Innovation in SMMI was the mediating ICT use and business variable performance variable referred to in Figure 2.1. As indicated in Table 2.3, there were five (5) indicators for the product innovation variable.

Table 2.3: Study variables

	Variable	Indicators	Theory	Authors
Independent Variable	ICT Use	Marketing products and services	TAM3	Msuya et al., (2017) and Hamad (2017)
		All accounting activities		
		Business transactions		
		Customers' and suppliers' communication		
		Product design		
		Software development		
Mediating Variable	Product Innovation	New products with technical specifications and functionalities	DC	Cuevas-Vargas at al., (2016) and Hsu (2013) Kim-Soon et al., (2017)
		Products are user friendly to customers		
		Quality products.		
		Products have no impacts to environmental		
		New products with components and materials		
		Decreases cost of products.		
		New products with technical specifications and functionalities		
Dependent Variable	Business Performance	Increased Sales		Nafula (2017), Likar et al., (2014), Nawaz et al., (2014) and Hassan et al., 2013.
		Increased Profit		
		Increased Customers' satisfaction on products and services		
		Increased Employee's satisfaction		
		Increased Market share		

2.3.3 Conceptual Framework

A conceptual framework is defined as a network or set of connections or planes linked together to form a certain strategic way forward in a scientific study Kanire (2020). The network formed is produced from the grounded theory from the reviewed literature. Therefore, the variables that were used in this study were developed from a theoretical background which later formed the conceptual framework. The conceptual framework was vital for this study because it served as

the basis for understanding the causal or correlational model of integrated ideas, events, concepts and observations, interpretations, and other related experiences learned from the study. It can generally be considered that a conceptual framework is the connectivity of thoughts of a phenomenon and how those thoughts relate to each other so that they can bring to light new meaning in human activity.

Based on the fore-mentioned definitions, the conceptual framework for this study was developed and shows how the dependent variable was related to independent variables and mediated variables in the application of ICT, Product innovation, and business performance relationship.

In relating the independent variable (ICT use) to this study, Hamad (2017) reveal that the use of ICT tools such as computers, mobile phones, and the internet was perceived to boost business performance. The extent of effective of ICT tools various depending on experience, attitude, skills, and education Ajibade (2018). In linking ICT adoption and TAM3 (TAM for ICT), the move was based on the purpose of this study, namely. To determine and assess the effectiveness of post adoption of ICT on business performance in manufacturing industries. The study focused on testing ICT items which were also used in other studies and considered easier to assess and useful for improved performance of firms.

For instance, Msuya et al., (2017) used ICTs to access to new business markets, supply new products and services, changing business process in the firms, the results were better for business performance. Such results do not necessarily reflect or apply to all situations. For instance, Wahab, et al., (2020) argued that different studies have

presented different findings and still inconsistent results support the existing effectiveness between ICT adoption and business performance. Some studies have come out with results that ICT adoption in a business firm has no significant effect on business performance (Cardona et al., 2013) while other studies oppose the findings Wahab, et al., 2020). Reviewed literature provides that an insight of ICT adoption varies from one study to another. In complementing Product innovation as a mediating variable and part of the DC theory, researchers such as (Aas & Breunig, 2017), (Dixon et al., 2014) and (Narcizo et al., 2017), support the argument that there is a strong and significant relationship between (DC) of firms and innovation capability. Teece (2014) affirms that the capabilities and competence on product innovation do respond to market dynamic conditions. These augment by researchers create a base of if product innovation is part of DC (Lee et al., 2016).

The relationships illustrated in Figure 2.1 were based on empirical literature and theoretical review. It was further hypothesized that ICT use had a significant relationship with product innovation, business performance, and business performance mediated to product innovation in SMMIs.

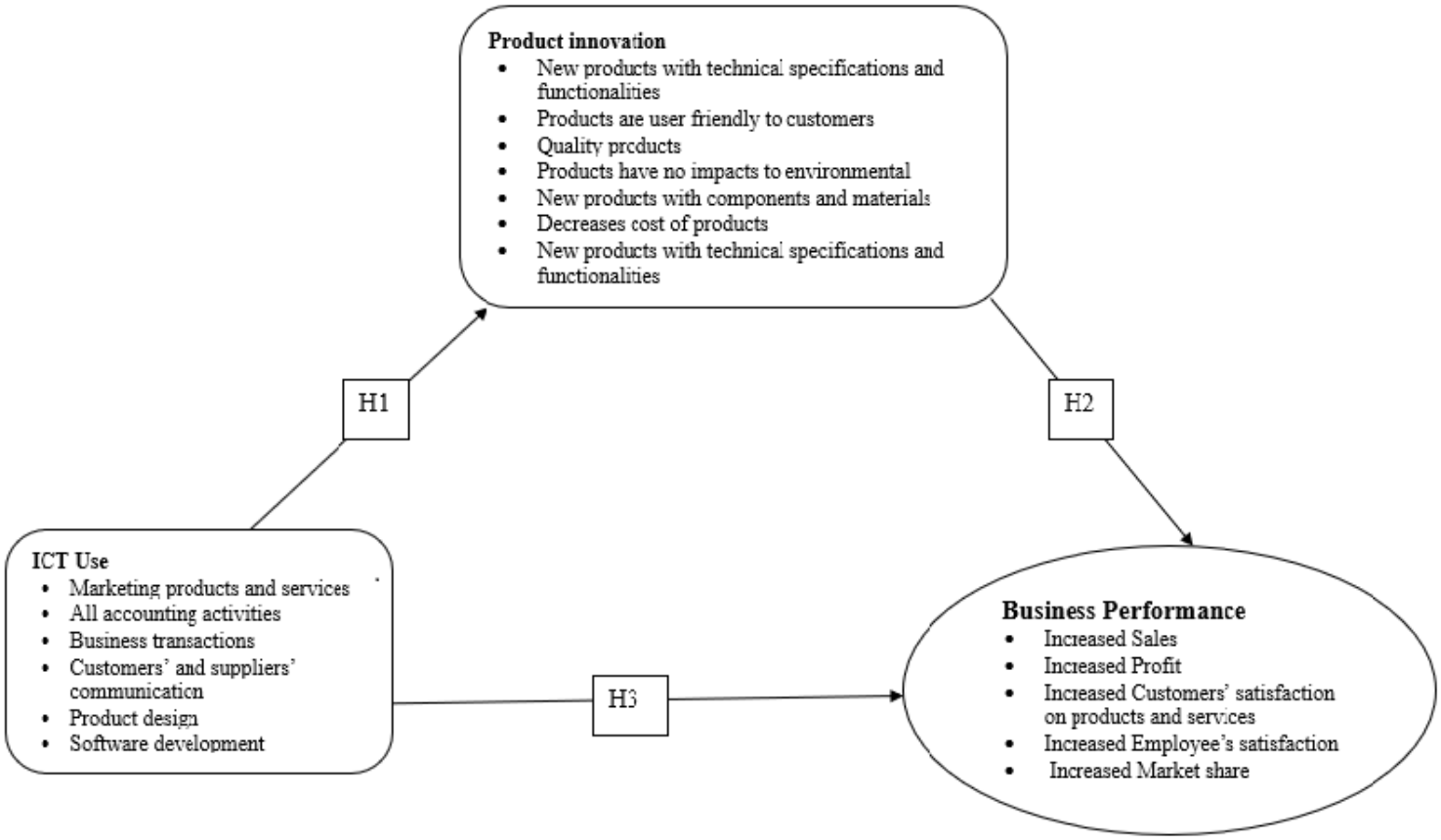

Figure 2.1: Conceptual framework

The Conceptual framework in Figure 2.1 consists of three (3) sets of variables: independent variable, mediated variables, and dependent variables. Indicators for each variable are shown in Table 2.3. The conceptual framework of this study was developed based on the literature review, theories (TAM3 and DC), and proposed relationship of ICT, product innovation, and business performance. Also, based on the conceptual framework in Figure 2.1 of this study hypotheses were developed and presented in section 1.3.3.

2.3.4 Chapter two Summary

The above review of existing literature indicates that there are only a few studies related to ICT application in promoting the performance of SMMIs, to promote product innovation, and business performance Cuevas-Vargas et al, (2016), Cirera et al.., (2016). There have been different approaches in research methodologies; study areas, and sample sizes of SMEs (Nafula 2017) and (Mensah & Acquah, 2015). Even so there is a lack of specific indicators for ICT use, Product Innovation, and business performance in operating SMMIs. Based on the analyses made, researchers conducted do not reflect the current situation as it exists in Tanzania today as ICT and its use in innovation are changing rapidly. In addition, it was difficult to generalize the findings so far realized to the Tanzanian business environment. This leads to the conclusion that Tanzania lacks empirical studies that relate ICT application in product innovation, and business performance. This calls for and justifies this study.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Overview

Kothari & Garg (2014) defined the research methodology as the systematic way of solving defined research problem. From this standpoint, the solution of the current research applied different methodological approaches. Based on the study objectives, an appropriate research methodology was chosen to address each. The underlying principle guiding each method selected was justified by way of the research philosophy, research design, study area, study population, and sample size and selection. This section also shows how the research tools were developed, adopted, and validated. It also indicates the study variables, their operationalization, ethical consideration, data collection data analysis.

3.2 Research Philosophy

Research philosophy or research paradigm is defined as the system of beliefs and assumptions leading to the development and or acquisition of new knowledge (Scotland, 2012). The positivist philosophy assumes that a study could bring or unearth new knowledge and/or expose an understanding of new realities supported by existing theories and empirical evidence (Bryman 2008).

Positivism holds that the use of the scientific method is liable to establish and confirm truth and/or objective reality of a phenomenon. It is regarded as the only source and foundation of true and valid knowledge. It believes that methods, scientific techniques, and procedures used in natural or social sciences offer valid

and dependable frameworks for detailed investigation of the natural or social world. Positivism encompasses positive progressiveness of social sciences (Habib, 2020). The fundamental objective of positivism is to portray the ability of a scientific study to solve practical problems and determine the possibility of the existence of causal relationships between variables through statistical analyses.

Believers in positivism assert that through ontological assumptions, investing in a phenomenon through the scientific approach, deductive analysis and reasoning leads to common agreement of objective truths (Plack, 2005). Epistemological assumptions provide that true knowledge is an outcome of sensory experiences obtained through comparative analysis or experimentation. To obtain objective and accurate data, there is the need to separate the subject and object from the influence of the researcher's personal experiences and emotions. Positivism works better in the social science category of research that intends to dig for deeper understanding of social dimensions and leadership/management behavior by using decision making data.

Considering positivism, on the ontological standpoint, it is believed that there exists one social reality which stands external to other researchers. Epistemology stand keeps on believing that the only observable/recognizable and measurable phenomena can be considered as knowledge (Collis & Hussey, 2014). So, positivism maintains an objective place as of great importance in the application of quantitative methods to deductively test a hypothesis to address the main objective of the study. The main role of the researcher is to provide information for the development of a law resulting

from tested theories (Bryman, 2008). Positivism has five principles which Bryman, (2008) presented as phenomenalism (or sensible knowledge), deductivism (that theories can be used to generate a hypothesis and new laws), inductivism (to include gathered facts that form laws and new knowledge), and objectivism (confirming that science must be free).

To produce new knowledge and understand the reality of the effect of ICT on product Innovation and Business Performance variables, theories and empirical evidence used were developed by using a review of past literature. Since this study was quantitative in nature, post-positivist philosophy was used to guide an understanding of reality and knowledge development. Existing literature suggests that positivist philosophy was properly applied to quantitative data and statistical analysis (Rehman &Alharthi, 2016). Prior to the justification of adopting the positivist philosophy for this study is presented in Table 3.1 below.

Table 3.1: Implication of positivist philosophy

	Positivism
Observer	Independent
Interest in humans	Irrelevant
Explanation	Quantitative data Must prove causality
Research progresses	hypothesis testing and deduction
Concepts	Must be definable and measurable
Unit of analysis	Should be reduced
Generalization	Based on statistical probability
Sampling requirements	Requires a large sample

Source: Collis and Hussey, (2014); Moufty, (2014)

Creswell, (2014) argues that a post-positivist study approach supports methodological pluralism. It is based on the assumed facts that the methodology to be used in a study should be selected based on the nature of the questions and problems to be addressed. Researchers argue that regardless of their faithfulness and adherence to the scientific research method, still research results are neither perfectly objective, nor unquestionably certain.

The post-positivists also assume that independent thinking researchers can be evaluated through scientific methods. However, it is critically recognized that through observations methodology, errors may still be involved leading to theory modifications (Creswell, 2014). For instance, two researchers may observe the same phenomena and yet understand it differently, depending on their beliefs, emotions, and experiences. So, objectivity of phenomena can certainly be achieved using multiple measurements to gain clearer understanding of a phenomenon. Creswell, (2014) insists that it is vital to understand that post-positivism and positivism per se have common issues to share. However post-positivism research approaches/practices in social sciences prefer post-positivism because the theories used in social science research and actual practice are inseparable.

Post-positivism has intervened as a reaction of academic researchers in overcoming the limitation of positivist philosophy. Researchers discovered that positivism lacks the full coverage of social science research since it is limited to observation and empirical analytical evidence. As a respond to mainstream social science and business performance and researches based on empirical quantitative approach,

researchers have come up with the suggestion of combining positivism and interpretivism paradigms and termed it post-positivism

Post-positivism attempts to balance positivist and interpretivist approaches to social science research. Creswell, (2014) argues that post-positivism recognizes and accepts the thought or results received through scientific models and which are not different from daily practice. In addition, in studies where consumer behaviors exist, the post-positivism paradigm of epispemology is regarded as more important. Post-positivism assumes that all observations have errors and are likely to fail, and that all used theories are revisable. For that matter it is difficult to achieve a steady goal about a phenomenon under study (Creswell, 2014).

In the conclusion of this study on the effect of ICT on product innovation and business performance, practical examples from real life were added to prove the practicability of the research results. In this study the results were compared to a practical life and it was revealed that there was a growth of ICT application and associated good performance in product innovation and business performance (TCRA, 2020).

In the development of hypotheses, TAM3 and DC theories were applied with associated variables. Furthermore, hypothesis testing for validation was performed through empirical data from field research. Therefore, the application of post-positivism philosophy particularly in this study was justified for the use of theories and application of quantitative data and tools to test the significance of the effect of

ICT on product Innovation and Business Performance in Small and Medium Industries in Tanzania.

3.3 Research Approach

Creswell (2014) defined research approach as the specific method used in data collection and analysis. The author argues further that, quantitative research approach involves the use and analysis of numerical data suitable for hypothesis development and resting. The current study collected data using standardized tools to test hypotheses developed on the use of ICT in product innovation and testing business performance in SMMIs in Tanzania. It was, therefore, necessary to use the quantitative approach in the process of data collection and involved analysis of numerical data.

This concurs with Daniel (2016) who advocates that quantitative approach relies on the collection and analysis of numerical data in predicting the significance of influences among variables of interest to a study. The study predicted significant influence of ICT use, product innovation, and business performance in SMMIs in Tanzania. This means that quantitative research could explain the phenomena pertaining to the effect of ICT on product innovation and business performance in SMMIs through mathematical analysis of collected data. Thus, quantitative approach was applied in this study as it enabled the collection of statistical data needed to determine the effect of ICT on product innovation and business performance in SMMIs.

3.4 Research Design and Strategies

Research design is the general plan used in linking conceptual research problems in empirical research (Rahi 2017). The author asserts that research design is the sum of all the activities required to be affected in conducting research and presenting the results in an agreeable manner. The activities included all the types of data required and data collection methodologies, data analysis, and reporting of the findings. To this effect, explanatory research design was adopted for this study.

Beside the above definition, Rahi, (2017) and Apuke (2017), inform that Exploratory research design should be used to examine and identify any possibility of causal relationship among variables that are relevant to the selected study problem. This study comprised of three variables, namely ICT, product innovation, and business performance. These variables in the current study were used to predict the causal relationships, if any. The approach was valid as it was well supported by Aliyu et al., (2014). These authors assert that explanatory research design can be used to determine the causal relationship among defined variables (Apuke, 2017).

In the review of literature such as those of Saunders et al.., (2016), this research work used descriptive quantitative research design together with survey questionnaires which were related to the post-positivist philosophy and deductive approach. In his research work Creswell (2014) suggested that if closed-end questions were used as in questionnaires during data collection, and data subjected to statistical analysis to determine the output information, that study is quantitative in nature. Based on this argument, this study was sorely of a quantitative nature because closed-ended

questions and applied statistical data analysis to obtain the required information were applied.

Quantitative studies usually examine the existing relationships between independent and dependent variables normally expressed by numerical values and analyzed through differential statistical tools and procedures (Saunders et al., 2016). As argued by Kumar, (2014) in the case of testing theories whose variables have numerical data presentations, to establish the predicted generalizations, quantitative research should be used, Creswell (2014) acertain that quantitative methods often use standardized methods for data collection and analysis techniques; and therefore, yield benefits including non-interactive, lower time consuming, valuable, objective, unbiased, and accurate data. In addition to that, Kothari and Garg (2014) assert that data collected through quantitative methods can be analyzed through statistical techniques. Therefore, this approach deemed it necessary to use and analyze the effect of ICT on product innovation and business performance in Small and Medium Industries. The approach was able to determine the relationship between the referred variables in this study.

3.4.1 Survey Population

A survey population is defined by Kothari and Garg (2014) as a collection of grouped items that exist in a certain organization from which a sample is required for detailed study. The main characteristic of a sample is that it should represent the main population intended for the study. Kumar (2014) proposes that a survey population should be the set of items or units to which a survey is focused. In the

context of this study, the survey population was the conglomerate of manufacturing industries in Tanzania. A pre-survey of SMMIs indicated that the exact number of SMMIs in Tanzania is unknown. However, the Annual Survey of Industrial Production URT (2018) indicates that there were 1931 production industries in Tanzania in 2018.

The study population for this research was the operating SMMIs in selected regions in Tanzania which were 991 refer Table 3.2. It was the prime intention of this study to examine the extent of the effect of ICT use on product innovation and business performance in Tanzania SMMIs. The study results could provide a clear direction on what should be done to promote improved performance of every SMMI in the country band so improve the national productivity and market shares of the products at national and international levels. Citing URT (2018), the study population was 991 (50.9%) of all the manufacturing industries in Tanzania

3.4.2 Survey Area

Survey area research can be defined as the geographic location, political bound area, or social-cultural area where the intended research is planned for actualization (Kothari & Garg, 2014). This means that an area of research is limited to geographic areas and locations from which data is to be collected from and based on opinions, and perceptions of selected respondents.

This study was conducted in four (4) geographical regions in Tanzania as listed in Table 3.2. According to URT (2018), the selected regions had the highest number of

industries compared to other regions. The regions have 991 (50.9%) of all the manufacturing industries in Tanzania. The location of the areas (Regions) can be seen in the map in figure 10. Ndesaulwa and Kikula (2016) argue that Tanzania lacks empirical studies on product innovation and business performance, hence the need for this study.

Table 3.2: Selected regions for research

S/No	Regions	Number of Industries	% of total industries in Tanzania
1.	Dar Es salaam	530	27.4
2.	Morogoro	238	12.3
3.	Arusha	139	7.2
4.	Mwanza	84	4.0
Total		991	50.9

Source: URT (2018)

3.4.3 Sampling Desing

Setiowati et al., (2015) acknowledge that not all firms have to adopt ICT at the level of high technology. SMMIs might adopt ICT at different paces. Small manufacturing firms have the least benefits from the adoption of ICT because they lack financial capabilities, they cannot meet the high running costs pertaining, they lack enough ICT knowledge, etc. Basing on the theoretical and practical matters in this study, a simple random sampling technique was adopted to select the sample size of 950 respondents from the SMMIs. The simple random sampling technique was utilized because it avoided biasness since each member of the population had the equal chance of being included in the final sample. Based on this argument, it was difficult to identify which of the existing SMMIs had ICT facilities and do use ICT. Later purposive sampling was used to research on specific attributes in the main population

of industries. The study selected only those SMMIs that used ICT daily and where product innovation activities are undertaken and consequent impact on business performance determined periodically.

3.4.3.1 Sampling Frame

Kothari and Garg (2014) define a sampling frame as a list of items or objects from which a sample to be studied is drawn. Based on this definition, the sampling frame for this study was based on the manufacturing industries listed in Table 3.3.

Table 3.3: Sampling frame of manufacturing industries

S/No	**Type of Industries**
1.	Food products
2.	Furniture
3.	Beverages
4.	Fabricated Metal products
5.	Plastics and Rubber products
6.	Paper and Paper products
7.	Leather and related products
8.	Machinery and equipment
9.	Textile
10.	Publishing, Printing and Records Media
11.	Electrical equipment
12.	Printing and reproduction of recorded media
13.	Motor vehicles, trailers, and semi-trailers

Source: Annual Survey of Industrial Production, URT (2018)

3.4.3.2 Sampling Procedures

Scholars such as Esuh et al., (2011) argued that the choice of a sampling procedure in scientific research depends on the nature of the study and the theoretical and practical issues pertaining. Kothari & Carg (2014) assert that sampling techniques include systematic sampling, random sampling, cluster sampling, purposive

sampling, etc. This study adopted purposive sampling. Purposive sampling is a non-probability approach that enables a researcher to study cultural and behavioral norms of a chosen population. The technique can be both quantitative and qualitative in nature (Kothari-and Carg, 2014). This study adopted quantitative approach based on the similarity of the characteristics listed in Table 3.1. Scholars are of the common view that in order to get better results and useful information, a survey technique is considered a more appropriate research strategy (Musabila, 2012). This survey technique was preferred because it saves time and costs by enabling the sampling of a small size for sizeable data which in turn represents the main population of the study. The survey technique involves the collection of data from a large sample size, using a structured questionnaire.

This method is deemed better for descriptive and causal analysis of the sample that describes well the population. Furthermore, the survey technique is an important strategy particularly in this study because SMMIs are many and are geographically scattered in the selected parts of Tanzania and may vary in many ways. So, examining ICT, product innovation, and business performance variables required this technique with a scientific approach. The survey techniques provide data that is flexible, comparable, and analysable. Finally, this technique gave the option of repeating the same research in different contexts to confirm its reliability. Even so the technique did not provide a deep enough meaning and understanding of the phenomena which the researcher set off to pursue.

To avoid the inconsistency of data collected in this study over time, a cross-sectional survey was used by distributing structured questionnaires for data collection (Kothari & Carg, 2014). The cross-sectional survey approach was well supported by Scholars such as Bhattacherjee, (2012) and Igwenagu, (2016) who argue that a survey enables the collection of data on practices and situations through questionnaires and measurements of dependent and independent variables at the same time.

3.4.3.3 Sample Size

Kline (2013) suggests that SEM works better on a big sample size of research. If the sample size is not big enough, this may lead to errors in some estimates such as standard errors, and therefore lead to poor estimates of model values. However, Barrett (2007) does not agree on what is meant by the term big sample size. The author suggests that as a rule of the thumb, a sample size should not be less than 200. This argument is critically opposed by Iacobucci (2010) who asserts that a sample size of 200 is not a satisfactory criterion.

The author argues that if the reliability test is good, that is greater than 0.7 and if each factor has at least 3 or 4 indicators, then the sample size can be between 50 and 100. Other scholars such as Bentler and Chou (1987) are of the view that sample size should depend on several variables. The use of the ratio of cases per parameter was suggested by Jackson (2003). The author furthermore suggested the ratio of 20 to be used as the number of cases per parameter. In his study Kline (2013) found out that the approach by Jackson (2003) as the most frequent method supported and used to determine the sample size in many studies. Finally, Namweli and Magali (2018),

proposes that sample size should be proportional to the main population (N) and sampling error (e). The authors postulate the formula to be used as the Slovan formula of

$$n = \frac{N}{1 + Ne^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Equation 1}$$

Based on the discussion above, this study opted to adopt the Slovan formula. The reason behind this choice was that most of the current researchers such as Namweli and Magali (2018) have used this formula too. Comparing the sample size obtained from equation 1, it was greater than the proposed sample size by Barrett (2007) Jackson (2003), and Kline (2013). So based on Kline (2013) who suggested that SEM works better on a big sample size of data, this approach justified the sample size. On such a ground, and given that the main population (N) was 991, SMMIs from five (5) Regions as in Table 3.2 and Sampling Error (e), was estimated to be (5%). Therefore, at the population of 991 and 95% confidence level the sample size using the Slovin formula was estimated to be at least 285 SMMIs, this being the minimum sample size (n) for the study.

3.5 Variables and Measurement Procedures

All data collected was generated from the use of a research questionnaires which was adopted from previous studies and modified to fit the needs of this study. The measurement scales used in the study to collect the data was adopted and modified including the research variables which comprised ICT use (6 items), Product Innovation (7 items), and business performance (5 items). Items from each variable were adopted and modified from different sources. For instance, the ICT use variable

items were adopted and modified from Setiowat et al.., (2015) and Msuya et al., (2017), product innovation variable items were adopted from (Cuevas-Vargas et al., 2016), (Hsu, 2013), and (Kim-Soon et al., 2017). The business performance variable items were adopted from (Nafula 2017), (Likar et al., 2014), (Nawaz et al., 2014), and (Hassan et al., 2013).

In measuring the variables, two methods were used; the first one was objective (quantified data) and subjective (judgmental perception). Yildiz and Karakas (2012) suggests that there is a high correlation between subjective and objective measurements. However, considering the objective measurement criteria, particularly in financial issues of business, firms lack relevant objective data and respondents were sometimes reluctant to provide the needed data. Given that view, this study decided to use subjective measurements.

To establish a balanced ground for analysis, all questions for each of the three (3) variables were measured using the 5-point Likert scale; where strongly disagree was scaled=1, Disagree was scaled=2, Somehow Disagree was scaled =3, Agree was scaled=4 and strongly agree was scaled=5). Finally, to obtain the respondents' characteristics, such as title, age, level of education, age in the firm, type of ownership, number of employees, and type of manufacturing industry were all determined.

Based on the underlined relationship that indicators of this study were the manifestation of latent variables, the reflective measurement model was used

(Blunch, 2017). Reflective measurement models are the models by which observed items of individual latent variables are from or relate to the same theme i.e., ICT and product innovation all relate to business performance indicators. The arrows of each latent variable point to the observed measurement items.

3.6 Methods of Data Collection

3.6.1 Questionnaire Survey

This study was founded in the use of collected primary data. Primary data used in the study was collected through a structured questionnaire (Appendix I and 2) administered to senior personnel of each SMMIs in Dar es Salaam, Mwanza, Arusha, and Morogoro Regions. Saunders et al., (2016) emphasizes that questionnaires are the highly recognized and standardized research tools in social sciences and the most favorable data collection method in surveys.

The reason is that questionnaires guide the respondents to answer the same type of questions throughout the data collection process. Furthermore, the authors consider the method as fitting even if it takes a longer time to collect data from the big population from different areas. As mentioned earlier questionnaire method and tool was adopted and framed in two languages, English and Kiswahili. The two languages were used to promote comprehension of the research questions by all the respondents who were free to choose the language in which he /she was familiar with. Framing a questionnaire in different languages is a practical approach and it is well supported and used in different studies; such as (Kanire, 2020) and (Sanga, 2020).

Sanga (2020) used the approach while researching on the Role of Local Government Authorities in Promoting Small and Medium Tourism Enterprises at Mto wa Mbu, Monduli District in Tanzania, and Kanire (2020) used it while studying the Influence of Customer Relationship Marketing on Customer Retention in the Tanzania Telecommunication Industry; A Case of the Vodacom Tanzania Limited Company.

To make the data collection process friendly, a list of available SMMIs in each region was requested and obtained from the relevant City Directors/SIDO Directors. The Researcher and four (4) Research assistants distributed the questionnaires to the selected SMMIs. Since the introduction letter was endorsed by City Directors, this implies that Chief Executive Officers (CEO) were targeted. CEOs were targeted because of having more the whole picture of a firm while directors and managers were favoured because of having more information on the firm's details (Ometlic, 2016). But it was possible for CEOs to delegate mandate to other staff such as Managers, Directors, and Owner Manager to make sure the questionnaires were quickly filled and returned the process of distributing them was done manually for each respondent. The average time used for filling a questionnaire was around 23 minutes. Both sections were filled correctly and where there was an unclear item the research assistants gave the needed help promptly.

A previous study conducted by Mugenda (2011) proposed that research finding indicated that only 35.7% of questionnaire distributed to the organizations were filled which allowed for valid analysis and report writing. This observation reason prompted the researcher in this study to distribute a total of 991 questionnaires with

the projection of getting more than 285 responses considered enough for data analysis based on the SEM.

3.6.2 Questionnaire Pretesting and Pilot study results

For this research to be conducted, it was deemed right that a pilot test of the questionnaire be conducted to confirm validity, reliability, format, and scales of questionnaires (Creswell, 2014). The pilot study was conducted in Dar es Salaam, Morogoro, Arusha, and Mwanza regions because these regions were the main research areas for this study. The main objective of the pilot study was to ensure that the readability, clarity, and understanding of questions enabled respondents to provide answers that reflect the research purpose (Blunch, 2017).

It is important to understand that those questionnaire items were adopted from literature and were reliable and valid to measure the required constructs in the phenomena. The pilot study helped to promote understanding of the differences in perception from SMMIs respondents as these would help in investigating the applicability of the study. From the feedback and suggestions from the pilot test, minor changes from respondents were obtained, including wording and questions layout, hence face validity was confirmed**.** In addition, the researcher analyzed the data to investigate any possible potential threats in questionnaire items and decisions to be made on whether to delete or edit items. The following are some examples of items that needed editing: -

i) There was a typing error on writing "*production innovation*" which was changed to *product innovation*

ii) The words "*Our firm design new aesthetics"* was misplaced in the questionnaire; it was deemed right that the sentence was removed.

iii) Study variables on product innovation was edited from

a) "*New products with technical specifications and functionalities totally differing from the current ones"* to "new products with technical specifications and functionalities"

b) "*Newness for current products leading to improved ease of use for customers*" to "Products are user friendly to customers"

c) "*Manufacturing quality in components and materials of current products*" to "Quality products"

d) "*Develops new products with components and materials totally differing from the current ones"* to "new products with components and materials"

e) "*Decreases manufacturing cost in components and materials of current products*" to "Decreases cost of products".

f) "*New products with technical specifications and functionalities totally differing from the current ones"* to "new products with technical specifications and functionalities"

g) "*Software innovation*" to "software development".

During the pilot study; data reliability used Cronbach's Alpha test. The results indicated in Table 3.4 show that Cronbach's Alpha test was 0.9. The results were above the recommended value of 0.7 (Kanire 2020).

Table 3.4: Reliability Statistics for pilot study

Cronbach's Alpha	N of Items
0.900	17

Source field research (2020)

In checking the item as indicated in Table 3.5, the results show that all items were between 0.890 and 0 .900. Therefore, none of the items had negatively affected the overall reliability of 0.7 if at all could be deleted.

Table 3.5: Item-Total Statistics for Pilot study

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ICT1	57.4110	98.079	.650	.892
ICT2	57.2740	96.368	.725	.889
ICT3	57.3014	97.213	.691	.890
ICT4	57.1918	102.324	.428	.899
ICT5	57.0548	101.108	.532	.896
ICT6	57.0822	98.854	.502	.897
PI_1	57.3151	99.497	.570	.894
PI_2	57.2603	97.529	.675	.891
PI_3	57.2603	100.167	.554	.895
PI_4	57.1644	95.695	.679	.890
PI_5	57.1918	99.657	.548	.895
PI_6	57.2740	96.118	.615	.893
BP1	57.2192	104.368	.471	.898
BP2	57.2466	103.911	.474	.897
BP3	57.2466	101.272	.565	.895
BP4	57.1233	103.804	.417	.899
BP5	57.0959	102.366	.405	.900

Source field research (2020)

3.6.3 Questionnaire Survey Structure

The questionnaire survey used in this study was divided into four (4) main sections. The introductory letter to respondent, was meant to explain the purpose of the

research, and humble request to respondents to fill the questionnaire. This part did not require the respondent to fill anything but his/her moral agreement to fill the blank spaces in the questionnaire. The first part which was Section A required the respondent to provide his/her profile in terms of Region, Gender, Age (years), and education level. Furthermore, the respondent was required to fill in his/her position (designation) in the business, his/her position (designation) in the business, length of service in manufacturing industries (years), industrial sector, average capital invested in this industry (TZS) and finally several employees in his/her industry.

Section "B" consisted of industrial activities. In this part, the ICT use was identified as an independent variable to be used. The variable was associated with six (6) items used to explain or identify it. The items were: -

i) Our industry uses ICT for marketing products and services
ii) Our industry uses ICT for all accounting activities
iii) Our industry uses ICT for business transactions
iv) Our industry uses ICT for customers' and suppliers' communication
v) Our industry uses ICT for product design
vi) Our industry uses ICT for software development

In addition, in this section, the respondents were expected to rank his/her answers based on the Likert scale which ranged from strongly disagree, disagree, Neutral, agree to strongly agree. It was important to use this subjective approach because it is a friendly approach and respondents take less time to provide answers.

Section "B", covered Product Innovation activities in the industries. Product innovation was considered as a mediated variable. This means it worked as partial mediation between ICT use and Business performance. Product innovation variable comprised of six (6) items

i) Our industry develops new products with technical specifications and functionalities
ii) Our industry develops products which are user friendly to customers
iii) Our industry increases quality of products.
iv) Our industry's products have no impact on environmental
v) Our industry develops new products with components and materials
vi) Our industry decreases costs of products.

In the same way as section "B", the respondent was expected to rank his/her answers based on the Likert scale which ranged from strongly disagree, disagree, Neutral, agree to strongly agree. It was important to use a subjective approach because it is a friendly approach and respondents take less time to provide answers.

Finally, there was section "C" which comprised the business performance variable. It acted as the dependent variable of the study. It was projected to be linked to ICT use as the independent variable and product innovation as a mediated variable. The business performance variable comprised five (5) items namely: -

i) Our industry has increased sales
ii) Our industry has increased profit
iii) Our industry has increased customers satisfaction with products and services

iv) Our industry has increase employees' satisfaction

v) our industry has increased market share

In the same way as sections "B" and "C", the respondent was expected to rank his/her answers based on the Likert scale which ranged from strongly disagree, disagree, Neutral, agree to strongly agree. It was important to use a subjective approach because it is a friendly approach and respondents take less time to provide answers.

To ensure consistent and clear understanding of the respondents, the questionnaires were prepared in English and Kiswahili languages.

3.6.4 The response rate of data collected

In a study conducted by Mugenda (2011) on survey response level, it was revealed in this study that there was an average response rate by the organization above 50% and so the returned questionnaires were analyzed and results reported. Preliminary data collection obtained from this study is shown in Table 4.1 indicating that a total of 950 questionnaires were distributed in four (4) regions and 498 questionnaires were returned which constituted a response rate of 52%. A response rate of 52% obtained from this study is above that recommended by Mugenda (2011) who considered a minimum response rate of 50 as fitting. Therefore, data analysis and reporting continued.

Table 4.1: Response rate

S/No	Regions	Number of Industries	% of industries based on selected Regions	Distributed questionnaires	Number of Questionnaires Returned	Response Rate
1.	D'Salaam	530	53	508	218	43
2.	Morogoro	238	24	228	143	63
3.	Arusha	139	14	133	75	56
4.	Mwanza	84	8	81	62	77
Total		991	100	950	498	52

Source: Research field (2020)

3.7 Data Processing and Analysis

3.7.1 Descriptive Analysis

Data processing and analysis was done using quantitative approaches. As such the quantitative data were entered and descriptively analyzed by using IBM SPSS version 26. Frequency and percentage are important tools to describe the general profile and characteristics of responds status. With that argument frequency and percentages were used to describe and analyze the general data provided by the respondents. The descriptive analyses provided enough explanations and the required understanding of the SMMIs categorical variables in the study. Descriptive analysis was used to obtain an understanding of the data; outliers, missing data, normality, and homogeneity of data. Furthermore, inferential statistics were used as an approach to test linearity and multicollinearity among independent variables in the study using SPSS IBM version 26.

3.7.2 Multivariate Data Analysis

In the effort to enable the testing of the hypothesis and analyse the statistical significance of predictor variable in this study, namely, business performance,

Structural Equation Modelling (SEM) was used. SEM is considered the second generation for multivariate analysis techniques. Scholars view it as integration, generalization, and extensive familiar techniques with Analysis of Variance (ANOVA), factors analysis, and multiple regression analysis (Hoyle, 2012).

SEM enables the researchers to find the solution to a set of interrelated study questions in a comprehensive analysis and systematic way by modeling the relationships among the tested multiple independent, mediated, and dependent variables simultaneously. In addition, Hoyle, (2012) argues that SEM enables researchers to estimate the relationships among unobserved variables and relationships between unobserved and observed variables.

The author pointed out that SEM provides features for researchers to concurrently include both categorical observed and continuous and latent variables (Hoyle, 2012). Furthermore, the CFA and SEM were analyzed using AMOS software version 26. Hoyle, (2012) affirms that AMOS software can recover loadings, estimated parameters, and path coefficients more precisely than another SEM software. In addition, Amos opines that the software produces unbiased parameter estimates.

Considering the arguments from different authors on SEM capabilities and the main features of a conceptual model of this study, it seemed right for the researcher of this study to opt for SEM as the proper statistical technique to test the proposed hypothetical model. However, before the fore mentioned data processing and analysis was done, all questionnaires filled by respondents were checked for missing

data and outliers. This procedure was done to maximize the accuracy of questionnaires before data analysis is conducted.

Also, mediation analysis was performed to determine the mediating effect of product innovation on the relationship between ICT as the independent variable and business performance as the dependent variable. Existing literature reveals that there are many different types of mediation analyses. However, this study adopted conditions for mediation analysis as recommended by Baron and Kenny (1986). The reason for this adoption was that most the studies have adopted it and follow the same guideline; which included mediating between independent and dependent variables, the relation between the mediator and independent variable, and dependent and mediation variables. All correlations between variables should be significant. In the case of total mediation, the relationship between independent and dependent variables should be reduced to zero, given the independent and mediator variables.

This study performed mediation analysis under the SEM framework by using the imputation estimation approach in Amos Version 26 to analyze mediated effects, direct effects, and total effect in multiple indicators, this approach was used as was done by (Chen and Yu-Cheng, 2017).

3.7.3 Management of Missing Data and Outliers

Both conventional statistical and software methods have received special attention from different researchers in determining and measuring missing data in specified

models. Researchers concede that missing data creates problems for estimating parameters of a model.

In the process of handling missing data, the methods used are very important to observe. Any inappropriate method of handling missing data would eventually result in bias in estimating parameters, testing statistics, standard errors, and inefficient use of data and hence the conclusion of the study (Kline, 2013). Dealing with missing data can be categorized into four (4) parts: (i) Available case methods (ii) single imputation methods, (iii) model-based imputation method, and (iv) MLE.

Available Case Method: The Available Case Method in the application involves pair-wise deletion. Both are considered as most fundamental techniques for deleting with missing data. Likewise, deletion can involve all cases in the data set with missing elements which lead to loss of credibility of sample size. In dealing with Pair deletion, this approach excludes cases in the data set when their corresponding variables are used in analysis. This approach leads to an inconsistent number of cases applied to different analyses in the same study. In addition, those results will be in out-of-bounds covariance or correlations (Kline, 2013). Based on this argument both approaches on data deletion can lead to biased estimates and result in many unearthed issues.

Single Imputation Methods: In considering the Single Imputation Methods, this approach includes meaning substitution and regression-based substitution which replaces each missing value with one calculated value. The methods used are

unconditional mean and regression-based imputation. However, the main challenge of all single imputation methods is that they tend to underestimate error variance (Kline, 2013 and Zhang, 2014), and therefore are not suitable for dealing with missing data when SEM is used for analysis.

Model-Based Imputation Methods: The Model-Based Imputation Methods and ML estimation for incomplete data are more complicated than the mentioned methods. Kline, (2013) and Zhang, (2014), argue that model-based imputation methods normally generate more than one calculated value for each missing value, which is termed multiple imputations. Schlomer et al, (2010) alluded that this method is a complex and computer-intensive method and difficult to combine its data sets after multiple data sets have been generated.

Maximum Like hood Estimator (MLE): Finally, for the case of the Maximum Likelihood Estimator (MLE), which is the last method according to Kline (2013), this method provides acceptable estimates of standard errors and regression coefficients (Schlomer et al, 2010). In addition, it provides the determinant results and is available in SEM computer tools for use (Zhang 2014). For example, computer software such as AMOS can detect the missing values and use MLE for incomplete data to determine the referred values (Zhang, 2014) and (Byrne, 2013). ML provides values that are less biased than what other classical techniques. Likewise, pair-wise deletion methods can do the same the data is in the form of non-random missing data (Kline, 2013). This concludes that ML gives the impression that

it is the best method for handling missing data in most SEM applications when data is not missing randomly.

Before reaching a conclusion on which method of data missing handling can be appropriate, it was important to consider missing data patterns and the magnitude of values affecting the skewness of the concerned variables. For that matter, the pattern of missing data and the missing item value was needed for redress. Kline, (2013), Zhang, (2014 and Byrne, (2013) divide the pattern of missing data into three (3) categories, namely, (i) Missing Completely at Random (MCAR), (ii) Missing at Random (MAR) (iii) Not Missing at Random (NMAR).

MCAR was used for conventional methods by Schlomer et al.., (2010) while MAR was used for MLE (Allison, 2003). MLE provides better estimates of regression coefficient and standard errors for MCAR and MAR Schlomer et al.., (2010). it is commonly considered that less than 5% missing data of sample size has the least impact, and deleting such values is always recommended Kline, (2013). However, in a study conducted by Schlomer et al.., (2010), the results indicated that the use of MLE can be accepted even if the missing values can be based on 20% of the sample size.

On a similar notch of comparing the complete and missing data using AMOS Byrne (2013) found similar results on estimated parameters and goodness of fit from the samples of complete data and 25% missing values. This suggested that MLE provides better results for MAR and MCAR regardless of the high percentage of

missing data. Based on the arguments presented this study and adopted from Schumacker and Lomax (2004) it is opined that when missing values were less than 5%, they could be deleted case-wise since it does not in the overall affect the sample size.

Tabachnick and Fidell (2007) defined outliers as a variable in cases that have extremes in observed values compared to the other values. As such one extreme variable is referred to as univariate outlier and a combination of more variables with extreme values is termed as multivariate outliers. The existence of outliers tend to provide bias to coefficients and the likeliness of getting inaccurate results. So, researchers such as Taruwinga (2011) suggest that outliers should be removed before analyzing issues relating to commerce. Regardless, there are numerous methods used to detect and remove outliers. This study adopted Box drop and Mahalanobis Distance which could consequently be removed using the Winsorization method (Kwak and Kim, 2017).

3.7.4 Assumptions of Multivariate Analysis

Before performing SEM, various diagnostic tests were carried out to discern the underlying statistical assumptions for Multiple Regressions analyses. The tests carried out were: -,

3.7.4.1 Normality Testing

The normality test was done to determine whether the sample data had been drawn from a normally distributed population. The normality of the data was tested using

the skewness and kurtosis test. Kim, (2013) reveals that, Skewness and Kurtosis test are used for a sample size that is greater than 300, in which case the skewness should be less than 2 and kurtosis less than 4. If that condition is met then the sample tested is normally distributed and for that purpose, it does not violate the assumptions of normality.

3.7.4.2 Linearity Testing

The Linearity test was also conducted to determine the correlation between variables in the study. The test was done using the correlation coefficient matrix where the coefficient was significant if ($p>0.05$). The results showed the trend and strength of correlation (Zhang, 2014).

3.7.4.3 Homogeneity Testing

Homogeneity of variance normally refers to the assumption that the dependent variable provides equal variances to the set values for an independent variable (Zhang, 2014). Levene's test was used to test for homogeneity of variance. The test was done using SPSS IBM version 26 to test whether $p< 0.05$ to reject the hypothesis or $p > 0.05$ then the test of the sample data was insignificant, and the null hypothesis was accepted such that the variance was equal and the assumption of homogeneity was well fulfilled (Blunch, 2017).

3.7.4.4 Multicollinearity Testing

A multicollinearity test was conducted on the assumption that the independent variables are not correlated. Collinearity always occurs when there is a strong

correlation between two or more independent variables. Whenever the collinearity is detected, it normally reduces the predictive power of individual independent variables. Collinearity was tested using VIF and the IBM SPSS Version 26 regression procedure. If VIF < 10 it indicates that there does not exist any problem with multicollinearity. (Nafula, 2017).

3.7.5 Exploratory Factor Analysis

To reduce the number of variables of a particular study into a smaller set of variables, EFA should be used as a multivariate statistical procedure. The procedure creates the underlying dimensions between latent construct and measured variables that allow the theory to be formed and refined. Moreover, EFA examines the construct validity. In the central focus of the study conducted by Bryrne (2016), the author explained the essence of EFA in the study as decreasing the number of variables, hence detecting unidimensionality of theoretical variables, and determining the relationship between variables and evaluates the construct validity in the view of scale or instruments. Furthermore, EFA assists in solving the challenges raised by multicollinearity hence developing theoretical constructs which finally prove or disproves the proposed theory.

This study opted to use EFA in making sure that all constructs are significantly aligned with their pre-determined indicators. The reason behind the adoption is that previously the researcher in this study hypothesized that ICT, Product Innovation, and business performance variables from empirical evidence and theoretical constructs measurements were based on reviewed literature without supporting data.

In this situation, Sanga (2020) cites Thomson (2004) who concluded that where a sample data does not fit the theory, it will always result in a poor fit. This suggests that it is difficult to perform CFA without EFA being done. So EFA was done to make sure that observed and latent variables are well linked before continuing the study. To explore the data IBM SPSS Version 26 was used.

3.7.5.1 Validity and Reliability

In field data collection, validity and reliability of data are concepts that are concurrently closely associated. The concepts provide important facets for the study because they assure the consistency and stability of the research findings. Checking the validity and reliability in this study, assisted the researcher to obtain genuine results that led to valid and dependable conclusions, recommendations, and recommended future areas for further research. The study by Saunders et al.., (2016) suggest that to draw a valid conclusion of any research report, it is vital to put into consideration all the aspects of validity and reliability in the research. Taking that into account, this study, considered the whole research project in determining the validity and reliability of data. The aspects examined and closely monitored included those presented in the following sections.

3.7.6 Validity

Validity in social science research refers to the testing of instruments such as questionnaires, to determine whether they measure what was intended. Validity measures the extent, to which a research instrument was successful in measuring the intended factor in a meaningful manner (Heale & Twycross, 2018). Other researchers

also suggest that validity of research tools is the first step in field data collection. Content validity is the check on the variables, study objectives, and hypothesis and the second part focus on what is commonly referred to as face validity of research tools.

3.7.6.1 Content Validity

A pilot study was conducted to ensure the content validity of the research tools used, namely questionnaires and interview schedules. The piloting was intended to avoid the possibility of interviewees misunderstanding the questions posed in the tools, selected experts in SMMIs and a sample of industry respondents were spotted to fill in the samples of questionnaires. This process helped to test the relevance, clarity, and meanings of the questions posed. In so doing the process identified the problems which were immediately attended to and corrected before the actual research starts. The piloting ensured that the tools would produce the same results if applied to another research environment to determine the same or similar results. This would be proof of reliability based on the Cronbach alpha of a minimum satisfactory value of 0.7 (Blunch, (2017).

To confirm content validity of research tools, engineers, technicians, supervisors, and management experts from different SMMIs were approached and requested to provide a critical examination of the questionnaires and to comment on the proposed structure and appropriateness of the questions, and provide all the necessary improvement before the tools were finalized for field use in collecting the needed data. (Saunders et al., 2012). Major and minor corrections were made as per Section

3.6.2 in this report. The pilot study exercise involved the distribution of 100 questionnaires whence 83 were returned.

During the check-up of the filling of the pilot questionnaires, it was found that only 73 had recommended corrections. Saunders et al., (2016) suggest that a minimum of 30 returned tools was satisfactory. In such results the reliability test of the pilot study was 0.900. Therefore, the questionnaires returned with improvements fitted for statistical analysis. The questionnaires were confirmed to be a valid measurement instruments for the research.

3.7.6.2 Face validity

Kumar (2014) informs that face validity assures that each question in the questionnaire or item in the scale of variables has a logical link with the research objectives and proposed hypothesis. It was necessary to ensure face validity because it is quick and friendly in the data collection process. In order to ensure face validity, the process involved thinking about what is measured in the questionnaire constructs and its sense in the process of asking questions to respondents. Furthermore, face validity was used to encourage and guide respondents to visualize that the measurement procedure was friendly and it reflected their thinking on the performance of the firm in its daily activities.

In the context of applying face validity in this study, the questions developed conformed with the research objectives and hypotheses of the study. The research instruments reflected and covered all matters pertaining as earlier indicated in the

constructs. In addition, the structured questionnaires used as research instruments were specific and understandable to respondents, and enabled the participants in the study to provide their opinions freely. This approach facilitated face validity and ensured that the data obtained reflected the real situation in the firms. It was also important to incorporate both content and face validity tests at the same time.

3.7.6.3 Construct Validity

The items or indicators for measuring constructs were determined based on the measurement scales of empirical literature review applicable to this research topic. To meet the construct validity requirements, the pretesting of questionnaires as study instruments was organized with a few respondents from Dar es Salaam, Morogoro, Arusha, and Mwanza regions, these areas being the main research areas for this study. Blunch, (2017) defined convergent validity as the degree to which the scale of the indicators correlates in the same direction with other measures of the same construct. Construct validity was determined in terms of convergence validity. To verify the exact measure of construct validity, the convergence validity was based on the Master Validity tool as proposed by Gaskin & Lim, (2016).

3.7.6.4 Assessment of Nomological Validity

Nomological validity test was undertaken by relating measurements to the theoretical model which led to more deductions, interpretations, and conclusive tests of hypothesis. To test for nomological validity, all standardized coefficients had values greater than 0.2 and as allowed for analysis and reporting by Fonell and Larcker,

(1981). Table 4.20, shows all the measurements model relating to ICT, Product innovation (PI), and business performance (BP).

3.7.6.5 Criterion validity

To provide evidence on the scoring of the constructs; criterion validity was used as in past literature by Byrne (2013, who explained that criterion validity is a kind of validity that puts forth evidence of correlation between of identical constructs that theoretically should be related to each other. In providing the evidence of criterion validity, the two methods were used; namely predictive or concurrent validity.

Based on the above argument, this study opted to use predictive validity of the constructs measured by using regression and discriminant analysis. Concurrent validity was made through instruments (questionnaires) which were adopted after they were verified with the support of theoretical and empirical literature.

Thus, in concluding the criterion validity issue was addressed, the researcher rechecked the adopted questionnaire instruments for fitting research constructs and hypotheses. The observed items for dependent, independent, and mediated variables were well reflected in the theoretical and empirical literature. This led to precise instruments fitting the relationships between ICT use, product innovation, and business performance variables of this study. Table 3.6 presents the summary of construct's validity

Table 3.6: Construct's validity summary

Validity	Definition	Assessments
Content validity	The degree to which the measurement instruments (questionnaire) items were relevant and able to represent the target constructs	Relevant theories were employed on items and experts provided their opinions. Refer Section 3.6.2 in this report
Face validity	The degree to which the measurement instruments (questionnaire) items analytically reflected what is intended to be measured	Theory, empirical review, and expert opinions of assessment of items was employed. Refer Section 3.6.2 in this report
Predictive validity	The degree to which a measure of an item or variable predicts the outcome.	Mult regression and discriminant analysis used to assess predictive validity. See Table 4.21, and Table 4.17
Concurrent validity	The degree to which measure and relates to the second measure	Assessment was done through Covariance correlation matrix analysis. see Figure 4.7 and Table 4.16
Convergent validity	The degree to which different measures of the same constructs strongly correlate to each other	Assessment was done through correlation analysis and CFA using Master Validity tool. Refer Table 4.17
Discriminant validity	The degree to which measures of different constructs diverge from each other or correlate with each other	Assessment done through correlation analysis, CFA and AVE using Master Validity tool. Refer Table 4.17
Nomological validity	The degree to which measures relate to each other in the network of constructs based on the theoretical review	Assessment was done through correlation analysis, mult-regression analysis, and path analysis using SEM. Please refer Table 4.21

3.7.7 Reliability

Ab-Hamid et al., (2017) defined reliability as the degree or an extent to which constructs measures have zero error and provides important results qualifying for analysis and reporting. In another approach of definition, Bryne (2013) describes reliability as the degree or an extent to which a study measure is free from any possible error and repeated by another researcher using the same methodology yields consistent results as done by the previous researcher.

Regardless of fore-given definition; this study considers that it is difficult to obtain results that can be free from error. The researcher of this study attempts to argue that there might be unseen factors surrounding the sample area or responses which might lead to a slight difference from previous researchers. Therefore, this study considered that reliability can be defined as the degree to which research results obtained from the sample, represents populations, and might have minimum errors and yet acceptable to a certain extent and not signify major difference from previous or future researchers if they used or are going to use the same data collection method and the same data analysis procedures.

To provide reasonable reliability in this research, Cronbach's alpha analysis was performed to test the reliability of dependent, independent, and mediating variables. The results obtained from this study as were promising since Cronbach's coefficient was ranging from 0.882 to 0.893 as indicated in Table 3.7. Referring to Lee et al. (2016) presented that if Cronbanch's coefficient is ranging from 0.7 to 0.90 then the results are very reliable. This confirms the results of this study as very strong.

Table 3.7: Reliability of variables

Variables	Number of items	Cronbach’s alpha
ICT use	6	0.882
Product Innovation	7	0.883
Business performance	5	0.893

Source: Research Field (2020)

3.7.8 Validity and Reliability Concern in EFA

Performing EFA was an important step in the data analysis process to determine whether many variables of the sample population could be reduced to a possible

smaller number of factors influencing variables and analyzing the factors which would form common factors. So EFA was important in the study because it had multiple variables which required the formation of a common factor that could lead to a meaningful interpretation.

Kaise-Meyer-Olkin (KMO) and Barlett's Test of Sphericity were analyzed to determine the strength of the intercorrelation between items. Table 4.9 shows the value for KMO obtained was 0.925 and Barlett's Test of Sphericity was significant at 0.000. Both values were above the cutting point which is for KMO 0.7 and Barlett's Test of Sphericity which is less than 0.005. Based on Blunch, (2017), the results show that all criteria were met for intercorrelation between the items and appropriateness of factor analysis was superb, therefore verifying for the existence of validity and reliability

Using Blunch, (2017) recommendation on Kaiser's criteria on defining Eigenvalue as a test that measures the extent of variances of the observed variables a factor explains. Authors explain that the Eigenvalue helps to decide on which factors should be left or kept. Blunch, (2017) presents that a factor in which eigenvalue is greater than 1 is considered more important than that with less than 1 eigenvalue. Figure 4.3 shows that there were only three common factors whose eigenvalue was greater than 1. This evidence provided more validity and reliability to the sample collected.

EFA was applied to determine validity and reliability. Based on retaining the loading factor above 0.4 between constructs, Thompson (2004) suggested that it assures the validity and reliability in the study. Field (2006) work suggests that since EFA works better when the sample size is larger. This assists in diminishing errors during the data analysis process. All three tests performed using EFA were qualified to justify the validity and reliability of the data set in the study, the summary of it is presented in Table 3.8.

Table 3.8: Summary of Validities and Reliabilities through EFA

Reliability and validity	Criteria	Method used
Variables	Continuous	All variables were continuous using Likert scale for each item ranging from 1 to 5
Sample size	At least 285	The sample size used in this study was 474
	KMO p value	KMO p value was greater than 0.5. this proved that the sample size was adequacy refer, Table 4.9
	Heterogeneous	Differences in gender, age, working experiences, firm age, geographical location were used, Table 4.6
	Homogeneous	All respondents were employees of SMMIs in Tanzania, Table 4.6
Retaining factor	Eigen value greater than 1	All three (3) retained factors had Eigen values greater than 1, Figure 4.3
Retaining items (indicators) and noe-use of Multi collinearity	VIF should be less than 10	Maximum VIF value was 2.708 and minimum value was 1.684. this verifies that there no threat of multicollinearity, Table 4.5
Common method Bias	Maximum Total Variance percentage is 50%.	Total Variance percentage was 48.474%., Table 4.8

3.8 Confirmatory factor analysis

Kanire (2020), recommends that CFA should be applied to determine the loading of measures, covariance, and error variances. CFA was considered critical as the measurement EFA could not be performed.

3.8.1 Criteria of Evaluation in CFA Model fit

During the model refinement process, focusing to get the optimum fit, the following criteria as suggested by Byrne (2013) was used. The authors suggest that Standardized Regression Weight (SRW) should be greater than 0.5, and Modification indexes (MI) should be less than 11. When the MI value is high, that means that there are higher covariances between measurement errors in the same construct.

In the process of estimation values in the measurement model, the goodness of fits was used to check whether the estimates fit the proposed model and if any modification was required for better fitness. Based on the literature review fit indices as indicated in Table 3.9 were used for goodness fit measures was used.

Table 3.9: Fit indices used in the study

Fit indices	Type of Fit Index	Description	Cutting off point
AGFI	Parsimony Fit	It was used to avoid complex models and prefers models with a minimum number of free paths	Closer to 1 is good fit ≥0.80 Acceptable fit
CFI	Incremental Fit	It compares how the estimated model fits the null model	Closer to 1 is good fit 0.9 < CFI Acceptable fit
RMR	Absolute Fit	Measures the square root difference of residuals between a sample correlation and hypothesized correlation	RMR< 0.0 Acceptable fit
RMSEA	Absolute fit	Estimates the parameter values of the sample how well will fit the main population covariance.	RMSEA< 0.08 Acceptable fit

Source: (Kline, 2016; Blunch, 2017 and Byrne (2013)

The Correlation coefficients presented in Table 3.10 show the strength and direction of an association between the variables in the study. A Pearson Correlation is

usually used to measure the linearity association between two normally distributed variables.

Table 3.10: Conventional approach to interpreting a Correlation Coefficient

Absolute Correlation coefficient values	Interpretation
0.00 - 0.19	Negligible Correlation
0.20 - 0.39	Weak Correlation
0.40 - 0.69	Moderate Correlation
0.70 - 0.89	Strong Correlation
0.90 - 1.00	Very strong Correlation

Source: Schober, at al., (2018)

Other conditions which were important to be considered before removing the item were proposed by Blunch, (2017) and are if the item had less than 0.4-factor loading, modification index (MI) higher than 11, or higher measurement error. To reach a required baseline measurement model, a fit that fits all three variables (ICT, Product Innovation, and Business performance) measurement model was developed and CFA was run independently using MLE in IBM AMOS 26 to estimate its fitness.

3.8.2 Validity and Reliability Concern in CFA

The purpose of the assessing measurement model was to determine the relationship among constructs and their matching constructs. This was done by assessing their convergent and discriminant validity by using the Master Validity tool as proposed by Gaskin & Lim, (2016). The assessment of convergence validity dealt with individual item reliability along with internal consistency. During the assessment, the evaluation was done by observing how closely the items were to a single construct correlated to one another (Zhang, 2014). While discriminant validity was done by

observing the degree to which the research constructs differed from each other Blunch, (2017) and Kline, (2013). The authors concluded that adequate results on convergency and divergency validity, internal consistency, and item reliability qualifies for structural equation modeling.

3.8.2.1 Convergence Validity

During the assessment of the measurement model, convergence validity was the first to be determined. The evaluation of Inter-item correlations of constructs was considered a strong measurement of convergence validity. In Table 4.17, CV was found to be greater than 0.5.

3.8.2.2 Average Variance Extracted (AVE)

Blunch, (2017) recommend that AVE should be 0.5 or above for convergence validity to be analyzed, see Table 4.17. Though AVE is not the measurement for Convergence validity, it was considered reasonable for the strength of the statistical analysis.

3.8.2.3 Discriminant Validity

For the fulfilment of the measurement model, the discriminant validity was important to be evaluated. Discriminant validity was determined to understand what constructs diverged from others. Discriminant validity can be expressed in another way as a proof of construct validity, as extents to which one constructs differs from the other. Kline (2013) suggests that a model has been acceptable discriminant validity only when the AVE of a construct must be larger than maximum shared variance (MSV)

of other corresponding constructs in the study. A discriminant value from Table 4.17 shows that it was less than Convergence Validity and above 0.5 which is recommended.

In the process of model identification, several indicators are important to each factor. Researchers such as Bagozzi and Yi, (2012) and Kline (2013) argue that a minimum of three indicators per factor can be important because less than that would lead to failure to converge hence an unstable model. A single indicator per factor may lead to failure in measurement error account while testing the hypothesis. In this study, all three constructs had more than three indicators, refer to Figure 4.7.

The results validity analysis in Table 4.17 indicates that all variables in Composite Reliability (CR) were greater than 0.60 as the recommended value. The results on AVE values were greater than 0.4. Both values were recommended in the study by Fornell and Larcker (1981) as an indicator of good internal consistency of the study at a p-value < 0.001

To overcome some of the weaknesses which EFA had, CFA was important to be brought on board. Any weakness which EFA had, includes loading of measures, covariance and error variances which were not estimated Kanire (2020). For that matter researchers such as Kanire (2020) recommend that CFA should be performed to overcome the shortfalls. A measurement model was developed to determine the measurement errors and correlation between the latent variables in the study.

3.8.2.4 Composite Reliability (CR)

This study used CR to assess the existing internal consistency of the study variables. The internal consistency of a study normally should reflect the extent to which the instruments and questions should in a satisfactory way measure the behavior of what it tests. Fornell and Larcker, (1981) recommend that internal consistency should be obtained, by calculating CR. Schober, et al., (2018) suggested that, CR should be greater than 0.5 to be acceptable, and when it is greater than 0.6 it is more acceptable. Kanire (2020) suggests that CR is well thought out to be superior to Cronbach's alpha test (a measure of consistency) because CR is not influenced by the number of items. From Table 4.21 the constructs that had a coefficient value of at least, 0.7 were more acceptable and qualified for further analysis and reporting (Kanire, 2020).

3.8.2.5 Item Reliability (|IR)

Assessment of item reliability was done, by assessing the loadings factor for each item. The loadings factor indicated the correlation of the needed items with their corresponding constructs. The higher the item correlation was, the lower the random errors for individual constructs. Therefore, the procedure was also done to identify and eliminate any item that could affect the reliability of the corresponding construct level of random error. Blunch, (2017) recommend that the loading factor above 0.5 was very significant. Based on this recommendation by the author; to maximize the ability of the measurement model to fulfil the better, 0.5 was considered as the minimum value. The results are indicated in Table 4.21.

Summary of validity and reliability at CFA as presented in Table 3.11

Table 3.11: Summary of validity and reliability at CFA

Validity and Reliability component	Technique used	Cut-off points	Study model validation
Discriminant validity	CFA used in SEM	CFI>0.90, AGFI>0.8, RMSEA<0.08, RMR<0.08 and AVE> MSV	CFI=0.930, AGF=0.890, RMSEA=0.07, RMR=0.031 Table 4.16 and MSV=0.571 minimum; Table 4.17
Convergence validity	CFA used in SEM	CFI>0.90, AGFI>0.8, RMSEA<0.08, RMR<0.08 and AVE>0.5	CFI=0.930, AGF=0.890, RMSEA=0.07, RMR=0.031 Table 4.16 and AVE=0.600 minimum Table 4.17
Reliability and internal consistency	Composite Reliability (CR)	All CR p-value>0.6 or 0.7	CR=0.887 minimum, CR > =0.871, Table 4.17
Content validity	Literature Review, academic Seminars, and industrial expert opinion	Higher degree of agreement from mentioned sources	Research instruments reviewed, academician and expert were considered then plot study done, section 3.7.2
Nomological validity	SEM	Standardized path coefficients determined	All standardized coefficients of study variables had significant values greater than 0.2, Table 4.21
Predictive validity	SEM	Variance indicated in the 0.4 range and above	All unobserved variables of the study achieved, Table 4.8

Source: Research Field, (2020)

3.8.3 Ethical Issues

Akaranga and Makau (2016) assert that the research process, requires participation, coordination, and cooperation of different stakeholders of different disciplines and standards that an issue of ethics should be well considered. This should include accountability, trust mutual understanding, respect, and fairness, therefore, the researchers should completely observe and follow all the guidelines which demand a researcher to comply. Authors insist that researchers should comply with research

ethics guidelines for authorship, patenting policies, copyright, data sharing policies, and confidentiality rules.

The term ethics refers to a branch of philosophy that specifically deals with the peoples' conduct and guide standards of peoples' behavior and relating to each other (Ongong'a, 2013). It is referred to as the extent to which a behavior should be accepted or rejected. Researchers as professionals are bound to research ethics which required them to work under well-defined rules and guidelines which help them to exercise certain norms of conduct.

Research ethics require researchers to protect the subject dignity and disseminate or publish information that is researched (Fouka & Manttzorou, 2011). Akaranga and Makau (2016) suggest that research should adhere to the ethics of research by being cautiously ready to reveal the findings of work by maintaining intellectual rights without harming any other person or organization. Mugenda (2011) points out that in maintaining academic freedom, the researcher must have an open mind to share the findings of his work without fear or any possible intimidation and being able to protect his/her intellectual rights.

To make sure that research ethics protocol was adhered to, permission letters from the Open University of Tanzania for data collection were obtained. Then letters were presented to Regional Administrative Officers (RASs) of all four (4) regions, namely Dar es Salaam, Morogoro, Arusha, and Mwanza regions then- forwarded to District Administrative Officers (DASs), City Directors and finally permission were granted and introduction letter for collection of data from different SMMIs were obtained.

This study was bound to observe research ethics by avoiding fabrication and falsification. For instance, terms, fabrication, and falsification. Kour, (2014) defined fabrication as a process of creating or faking data or research findings that already exist in recording or text format while falsification (fraud) and defined it as the intentional changing of materials, processes, equipment, findings or deliberately omit data for sake of cheating the audience or other scholars.

Such practice violates research ethics that leads the research to be untrustworthy to research stakeholders and undermines his or her academic integrity. In this research, no materials, processes, equipment, findings were fabricated to come out of this stage. Reflecting on this study, it can be described that from an early stage of the research proposal all fabrication and falsification of any nature was acknowledged that it could mislead scholars and other stakeholders. This allowed this study to continue with data collection and analysis and final report writing.

This research has brought a major concern in academic higher learning particularly in research works like this study. Mugenda (2011) and Kour (2014), point out that plagiarism is the practice or active behavior in the research process whereby a researcher must ensure or prove that the written work is original and any text, results and whatever information used in the study or publication is acknowledged from the source or authors. Based on the development of ICT globally, the plagiarism issue has been calling for as important to be worked out by Saunder et al., (2012). It is therefore, advised that to overcome the challenge it is important to cite or quote the

author(s) of the information. In that regard, all literature review that was sourced was acknowledged and due reference indicated.

In many cases, literature was paraphrased to avoid direct copying and pasting but rather provide a better meaning which could reflect the study at hand. In addition, where necessary researchers' opinions were presented as the original thinker of the concept or opinion or findings, conclusions, and recommendations. Also, this study was checked through plagiarism software if it did not exceed the allowable plagiarism limits and passed.

In the effort to adhere to research ethics, Mugenda (2011) describes anonymity as the ability to keep secrets by not disclosing the identity of the respondents. This study practically responded to this ethic. During a research process, respondent anonymity was ensured by promising all respondents that the researcher would protect all information given, and in case it needs to be revealed then consent from respondents would be sought. This was done to avoid any possibility of physical or psychological harm to respondents by avoiding embarrassing questions that could upset respondents. To avoid deception in the research participates were told the truth of what they were supposed to respond to. No compromised truth was told to them. This was deliberately done by providing structured questionnaires and minimum explanations were given to avoid the researcher to influence and provide biased answers by respondents.

Kour (2014), referred to non-maleficence as the potential risks that participants may face based on research findings. The authors insist that the study should not constitute any possible physiological, social, emotional, or economic harm to participants. This happens if the respondents are forced to provide answers which could lead to negative consequences on their part. This study was risk-free and had no harmful questions as part of the questionnaires.

During the plot study, the research tools were first viewed by academic and industrial professionals, and where the errors were detected, they were corrected before the research process began. In addition, the questionnaires were translated into Kiswahili language to provide a clearer meaning to each respondent. Finally, the aim of the study was given in a brief before filling the questionnaires began and it was insisted later that this research was meant for academic purposes and not otherwise. This process avoided the possibility of non-maleficence to respondents.

The issue of voluntary and informed consent which requires the respondents to understand the task, voluntarily, clearly, and manifested way and intelligently provide his or consent to respond to the questionnaires. In the process of voluntary participation, the respondents were not asked to provide their names or personal contacts.

CHAPTER FOUR

FINDINGS OF THE STUDY

4.1 Introduction

This chapter presents the research findings of this study. It presents both the preliminary data, data analysis and the consequent major findings.

4.2 Preliminary Data Analysis

Data screening and cleaning was undertaken before the actual analysis was done. All challenges relating to the collected data were viewed from two approaches. The first approach dealt with determining and removing missing and outlier values. The second was about examining whether the sample collected could fit for further analysis. This included issues like normalizing, linearity, etc. (Zhang, 2014, Saunders et al, 2016)

4.3 Data Screening Process

Before data entry started, all questionnaires were screened, to determine if there were any missing values. Descriptive analysis was undertaken to determine the accuracy of each item entered. This process was done by determining whether the answers provided by the respondents were within the range required in the original questionnaires.

4.3.1 Management of Missing Data and Outliers

Reviewed literature suggests that missing data is a critical problem in data analysis and can influence the extent to which the results might not match the aims and objectives of the study (Blunch, 2017).

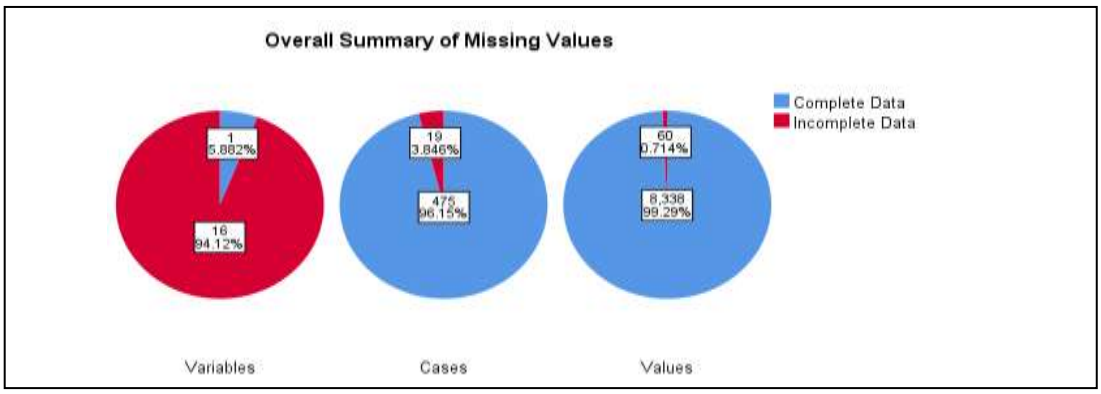

Figure 4.1: Overall summary of missing values

Source: Field Research (2020)

Figure 4.1 presents the results as an overall summary of the missing data of the study variables, cases and is displayed in three pie charts. The variables pie charts show that 1(5.88%) variable had missing data out of a total of 7. The case pie chart shows that 19(3.836%) had at least one missing data and the data pie chart show that 0.71% of the values (variables x cases) are missing.

Also, the patterns that the charts show in Figure 4.2 present the missing values in patterns based on a group of cases with the same pattern of missing and available data. Based on Missing data Value Analysis with the results of missing data less than 5%, and pattern significance at $p = 0.641$, then $p>0.05$, and MCAR; the result justified the conventional method to be used being the method used in deleting all missing cases, Schumacker and Lomax (2004).

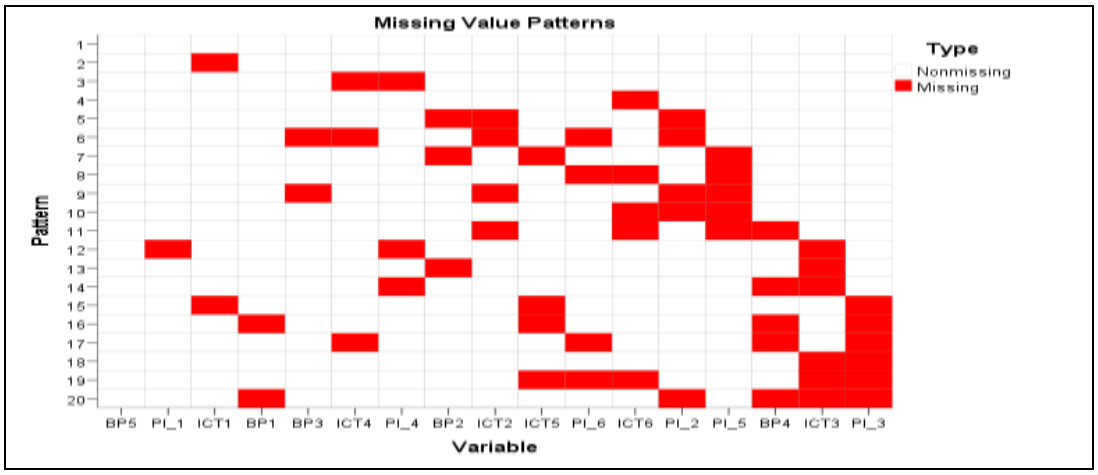

Figure 4.2: Missing Values Patterns

Source: Field Research (2020)

Blunch, (2017) propose that outliers should be detected and if found they should be removed so as to avoid affecting the model in this study. This study used Box plot to detect outliers. Kwak and Kim (2017) argue that the Box drop technique can be used to detect outliers in each data set. The authors assert that if data lies outside the lower or upper limit of the defined data in the data set; then that number is deemed to outliers. The results shown in Appendix 1.1 indicate that there was no value entered for analysis that was above (5) or below (1).

This means that there were no outliers in the sample of data collected. For confirmatory that data had no outliers, the Mahalanobis distance test was used. The test was done through SPSS version 26. Mahalanobis Distance detected 51 values as outliers see Appendix 1.2. However, during observation, all values were between 1 and 5. Liao, et al., (2016) suggest that based on the Winzorization method which requires any outlier exceeding the maximum, allowed value should be replaced by maximum allowed value i.e. (5) and any number less than the required minimum

number should be replaced by minimum value i.e. (1). In this argument no case was removed, hence the sample size remained unaffected. These results enabled the researcher to go on to the next stage.

4.4 Assumptions of Multivariate Analysis

The presentation of major results of the descriptive analysis in the current study included Normality, Linearity, Homogeneity, and Multicollinearity tests

4.4.1 Normality Testing

Assessment of multivariate normality as the second step for data screening was conducted in this study. Moufty (2014) argues that data is normally distributed expresses the mean and variance. Path analysis was one of the parametric statistical tests used to find significance in the results if data is in normally distributed. In this research, skewness and kurtosis were applied to assess univariate normality. If both skewness and kurtosis measurements are 0, then the data set is normally distributed, otherwise if far away from 0; data is regarded as not normally distributed.

Table 4.2: Skewness and Kurtosis descriptive statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
ICT1	474	-1.312	.112	1.316	.224
ICT2	474	-.861	.112	.052	.224
ICT3	474	-1.210	.112	1.270	.224
ICT4	474	-1.321	.112	1.701	.224
ICT5	474	-1.187	.112	1.059	.224
ICT6	474	-1.361	.112	1.553	.224
PI_1	474	-1.291	.112	1.314	.224
PI_2	474	-1.212	.112	1.176	.224
PI_3	474	-1.116	.112	1.036	.224
PI_4	474	-0.784	.112	-0.075	.224
PI_5	474	-1.062	.112	0.584	.224
PI_6	474	-1.095	.112	0.711	.224
BP1	474	-1.498	.112	2.780	.224
BP2	474	-1.193	.112	1.452	.224
BP3	474	-1.202	.112	1.450	.224
BP4	474	-1.046	.112	.695	.224
BP5	474	-1.305	.112	1.515	.224

Source: Research Field (2020)

A broad perspective about the normal distribution of sample data was adopted by Kim, (2013) who argued that where a sample is normally distributed and if the sample size is greater than 300 then the skewness must be less than 2 and kurtosis less than 4. Table 4.2 shows that the skewness values were between (-1.498 and -.861); these values are less than 2 while the kurtosis values were (0.052 and 2.780) less than 4. Based on this observation, both values were within the range proposed by Kim, (2013). So, the sample data was normally distributed. Where the sample was normally distributed for the sample size >300 then skewness < 2 and kurtosis <4 by (Kim, 2013).

4.4.2 Linearity Testing

In the effort to ensure the linearity of data collected, a test was conducted using bivariate correlation analysis. The results show that all independent variables were

significant at p<0.01, as in Table 4.3 and was therefore, accepted as recommended by Blunch, (2017).

Table 4.3: Correlation Matrix

		ICT1	ICT2	ICT3	ICT4	ICT5	ICT6
ICT1	Pearson Correlation	1	.604**	.736**	.556**	.593**	.542**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
ICT2	Pearson Correlation	.604**	1	.550**	.380**	.427**	.466**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
ICT3	Pearson Correlation	.736**	.550**	1	.613**	.588**	.575**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
ICT4	Pearson Correlation	.556**	.380**	.613**	1	.571**	.562**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
ICT5	Pearson Correlation	.593**	.427**	.588**	.571**	1	.617**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
ICT6	Pearson Correlation	.542**	.466**	.575**	.562**	.617**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
**. Correlation is significant at the 0.01 level (2-tailed). N=474							

Source: Field Research (2020)

4.4.3 Homogeneous Testing

In the effort to examine the possibility of existing homogeneity assumption; which was intended to check whether the dependent variable sample data provided equal variance to the set values for an independent variable (Blunch, 2017). Levene's test was done using SPSS IBM version 26. The results indicated (as in in Table 4.4) that p> 0.005. These results indicate that the test of the sample data was insignificant, and therefore the null hypothesis was accepted such that the variance was equal and the assumption of homogeneity was fulfilled (Zhang, 2014).

Table 4.4: Test of homogeneity of variance

		Levene Statistic	df1	df2	Sig.
BP1	Based on Mean	.001	1	472	.977
	Based on Median	.018	1	472	.893
	Based on Median and with adjusted df	.018	1	436.729	.893
	Based on trimmed mean	.123	1	472	.726
BP2	Based on Mean	.187	1	472	.666
	Based on Median	.036	1	472	.849
	Based on Median and with adjusted df	.036	1	423.761	.849
	Based on trimmed mean	.389	1	472	.533
BP3	Based on Mean	.532	1	472	.466
	Based on Median	.124	1	472	.725
	Based on Median and with adjusted df	.124	1	447.404	.725
	Based on trimmed mean	1.020	1	472	.313
BP4	Based on Mean	.576	1	472	.448
	Based on Median	.260	1	472	.611
	Based on Median and with adjusted df	.260	1	414.610	.611
	Based on trimmed mean	.304	1	472	.582
BP5	Based on Mean	.024	1	472	.876
	Based on Median	.038	1	472	.845
	Based on Median and with adjusted df	.038	1	416.332	.845
	Based on trimmed mean	.092	1	472	.761

Source: Field Research (2020)

4.4.4 Multicollinearity Testing

Before performing regression analysis, a multicollinearity test was conducted as recommended by (Zhang, 2014). A diagnosis test was done to determine the possible state of multicollinearity of independent variables. Table 4.5 indicates the results of the diagnosis. Multicollinearity always occurs when there is a strong correlation between two or more independent variables. Whenever the collinearity exists it normally reduces the predictive power of individual independent variables. Collinearity was tested using VIF using the IBM SPSS Version 26 regression procedure. The results show that VIF was < 10 indicating that there was no multicollinearity problem. (Nafula, 2017).

Table 4.5: Multicollinearity statistics

(Constant)	Tolerance	VIF
ICT1	.370	2.704
ICT2	.594	1.684
ICT3	.369	2.708
ICT4	.524	1.907
ICT5	.489	2.044
ICT6	.509	1.965

Source Research Field (2020)

4.4.5 Respondents Profile of the Sample Distribution

The following section describes the nature and characteristics of respondents in this study. The respondents' characteristics were presented using descriptive analysis which included region, gender, age, education level, service length, industrial sector, capital investment, number of employees, and designation. The respondents' profiles, in summary, is presented in Table 4.6.

Table 4.6: Respondents' profile of the sample distribution

Variable	Item	Frequency	Percent
	Dar es Salaam	217	45.8
	Morogoro	108	22.8
	Arusha	90	19.0
	Mwanza	59	12.4
Region	Total	474	100.0
	Male	312	65.8
Gender	Female	162	34.2
	Total	474	100.0
	18-35 years	145	30.6
	36-45 years	228	48.1
	46-54 years	90	19.0
	above 55 years	11	2.3
Age	Total	474	100.0
	Primary	39	8.2
	Secondary	83	17.5
	Certificate	96	20.3
	Diploma	111	23.4
	Bachelor Degree	141	29.7
	Other	4	0.8
Education level	Total	474	100.0
	below 5 years	181	38.2
	between 6-10 years	191	40.3
	between 11 - 15 years	83	17.5
	above 15 years	19	4.0
Service length	Total	474	100.0

Source: Field Research (2020)

Respondents' distribution by Regions: In this study Dar es Salaam, Morogoro, Arusha, and Mwanza regions were the source of the needed data. Data relating to all the four regions is indicated in Table 4.6. Out of 474 respondents contacted, (217)45.8% were from Dar es Salaam, (108)22.8% were from Morogoro, (90)19% from Arusha, and (59)12.4% from Mwanza. The number of respondents from Dar es Salaam was slightly higher since the region has more industries than the other regions in the sample selected. The respondents in each region showed unique characteristics commensurate with the status of industrialization and number of industries in the region.

Respondents' distribution by Gender: In this research, males and female respondents were involved. All the respondents were analysed for gender as in Table 4.6. The study had a total of 474 respondents where (312)65.8% were male and (162)34.2% were female. Regardless the fact that males were more than females, this research provides the proportional representation of gender as shown by percentage. This provided an equal opportunity for each gender to provide views relating to this study.

Respondents' distribution by Age: The research finding as in Table 4.6 show that the respondents' distribution was also grouped by age. Among the 474 respondents, (228)48.1% were aged between 36-45 years, (145)30.6% were aged between 18-35 years, (90)19% were aged between 46-54 years and (11)2.3% were above 55 years. So, most of the respondents were aged between 36-45 years indicating that this was the prevalent age cohort for employment in Tanzania industries.

Respondents' distribution by Education level: The research results as indicated in Table 4.6 show that the respondents were also classified subject to their education level. Among the 474 respondents, (141)29.7% were holders of Bachelor Degrees, (111)23.4% were holders of Diplomas, (96)20.3% were holders of certificates, (83)17.5% had secondary school education background, (39)8.2% had primary school education and (4)0.8% had other informal qualifications. This study intended to see the educational background of the respondents and considered this factor as an important determinant of reasoning and understanding of the various issues relating to industries and the study at hand. These result patterns denote that most of the respondents had adequate education which has contributed in giving reliable and reliable and valid data to this current study. Having majority of the respondents were educated, it suggests that what was answered was known to them. This contributes in enhance the validity and reliability of findings.

Respondents' distribution by Duration of employment in industry: The researcher intended to understand how long the respondents had been in the manufacturing industry. The results of the study as in Table 4.6 indicate that (191)40.3% of all 474 respondents had been in the manufacturing industry for between 6-10 years, (181)38.2% below 5 years, (83)17.5% between 11 - 15 years, and (19)4% had above 15 years' experience working in the manufacturing sector hence a rich source of data for the study.

4.4.6 General Characteristics of Industries

The following section describes the general characteristics of the industries targeted for this study and include industrial sector, capital investment, number of employees, and their designations. These general characteristics are presented in Table 4.7.

Table 4.7: General Characteristics of Industries

Variable	Item	Frequency	Percent
Industrial Sector	Textiles and Apparels	53	11.2
	Timber, Wood Products and Furniture	74	15.6
	Food, Beverage and Tobacco	75	15.8
	Chemicals and fertilizers	13	2.7
	Metal and Metal Products	42	8.9
	Plastics and Rubber Products	32	6.8
	Leather Products and Footwear	37	7.8
	Paper, Paper Products and Printing, Publishing & Packaging	47	9.9
	Electrical Equipment	10	2.1
	Machinery and Equipment	30	6.3
	Textiles	24	5.1
	Other….	37	7.8
	Total	474	100.0
Capital investment	Less than Tzs 5 million	155	32.7
	Between Tzs 5-200 million	265	55.9
	Between Tzs 200-800 million	54	11.4
	Total	474	100.0
Number of employees	Less than 5 employees	160	33.8
	Between 5 and 49 employees	255	53.8
	Above 50 employees	59	12.4
	Total	474	100.0
Designation	Owner Manager	214	45.1
	CEO	68	14.3
	Director	94	19.8
	Manager	98	20.7
	Total	474	100.0

Source: Research Field (2020)

Respondents' distribution by Industrial Sector: Table 4.7 shows that SMMIs aimed at different products. The research results show that out of 474 grouped industries (49)9.9% were involved with Paper, Paper Products, and Printing, Publishing & Packaging, (37)7.8% were based in Leather Products and Footwear, and (32)6.8% were of Plastic and Rubber Products. The results also show that (30)6.3% were based in Machinery and Equipment, (75)15.1% were of Textiles,

(10)2.1% were of Electrical Equipment and (37)7.8% were other involved in other products. From the respondents, it is clear that there was an equal proportion of representation of SMMIs in the process of data collection. This helped to capture data relating to views of SMMIs.

Respondents' distribution by Capital investment: Table 4.7 shows the levels of capital investment in the different SMMIs. Out of 474 respondents from industries in the study, (265)55.9% indicated that their industry had an investment of between TZS 5-200 million, (155)32.7% had invested less than Tzs 5 million, and (54)11.4% invested Between Tzs 200-800 million. This means that majority of SMMIs had an investment of between TZS 5-200 million which were involved in the economy. This group was in the middle of SMMIs investors, likely to be more objective and helpful in providing data relevant for the study.

Respondents' distribution by Number of employees: The researcher investigated the number of employees in each SMMI. The results shown in Table 4.7 indicate that out of the 474 respondents, (255)53.8% had between 5 and 49 employees, (160)33.8% had less than 5 employees and (59)12.4% had between 50 and 99 employees. This implies that majority of SMMIs had small number of employees between 5 and 49, this gave an advantage to employees to be connected together and share the common vision of the organization creating a team work result. This verifies that data integrity of this study was highly results of all employees' effort.

Respondents Distribution by Designation: Table 4.7 shows the designation of each respondent in the study. Out of the 474 respondents in the research, the results indicate that (214)45.1% were Owner-Managers, (98)20.7% were Managers, (94)19.8% were Directors, and (68)14.3% were CEO of SMMIs. From the findings, it is clear that most of the respondents were Owners of SMMIS. Which means all data provided were likely to be genuine and reliable for data analysis in this study.

4.5 Exploratory Factor Analysis

The next step in the data analysis process involved the determination of whether many variables of the sample population could be reduced to a possible smaller number that would be represented as factors. At this stage, EFA was done using SPSS IBM 26. EFA of this work was conducted with the support of varimax rotation; which assessed the underlying structure for the seventeen (17) items in the survey questionnaire. To select which indicators should remain to form the critical factors, this study adopted what Kanire (2020) used. The author used four (4) criteria namely, Eigenvalues, scree test (use of scree plot), conceptual theoretical based on assumptions, and finally factors that should have a minimum of three (3) indicators. This study used the combination of criteria as recommended by Yong & Pearce (2013). The approach helps to eliminate or reduce the possible weakness that could not be observed using one criterion.

4.5.1 Total Variance Explained

First, Principal Axis Factoring was used through the combination of the orthogonal rotation method and Varimax rotation. Blunch, (2017) argue that whenever this

method is applied, it provided the sum of variances for each factor matrix loading and identifies distinctive factors. This approach of data analysis is recommended by (Fabrigar & Wegener, 2011). Results in Table 4.8 show that only three components had Eigenvalue greater than1 accumulating a 66.188% of Rotation Sums of Squared Loadings. This result provides a clearer picture of the study that it had three constructs for analysis.

Table 4.8: Total variance explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.736	51.387	51.387	3.960	23.295	23.295
2	1.345	7.912	59.299	3.685	21.677	44.972
3	1.171	6.889	66.188	3.607	21.216	66.188
4	.793	4.663	70.851			
5	.714	4.200	75.051			
6	.664	3.904	78.956			
7	.526	3.095	82.050			
8	.479	2.820	84.870			
9	.450	2.650	87.520			
10	.411	2.418	89.938			
11	.358	2.104	92.041			
12	.315	1.851	93.893			
13	.263	1.546	95.438			
14	.241	1.418	96.857			
15	.208	1.221	98.078			
16	.184	1.085	99.163			
17	.142	.837	100.000			
Extraction Method: Principal Component Analysis.						

Source: Field Research (2020)

Mustafa (2020) suggests that the accepted total variance explained in factor analysis for variables to be valid should not be less than 60%. This means that useful data can show up the expected factors in a model.

4.5.2 Kaise-Meyer-Olkin (KMO) and Barlett's Test of Sphericity

Second, Kaise-Meyer-Olkin (KMO) and Barlett's Test of Sphericity were analyzed to determine the strength of the intercorrelation between items. Table 4.9 shows the value for KMO obtained was 0.925 and Barlett's Test of Sphericity was significant at 0.000. Both values were above the cutting point which is for KMO 0.7 and Barlett's Test of Sphericity which is less than 0.005. Blunch, (2017) suggest that if that criterion is met, it means that intercorrelation and appropriateness between the items of factor analysis was proper.

Based on the above suggests; it can be viewed that since the minimum sample size required to 285 the actual sample size was 474. This verifies that the study minimized possible errors to a big extent. The verification can be proved by sample adequacy which was done through EFA whereby Kaise-Meyer-Olkin (KMO) was used to determine the quantitative value of sample adequacy. The KMO is used to test for sampling adequacy before factor extraction while performing EFA. In testing KMO, Blunch, (2017) suggested that 0.5 should be considered as the bare minimum, possible values between 0.5 and 0.7 should be considered as mediocre, possible values between 0.7 and 0.8 should be considered as good and above 0.9 were considered as superb.

Table 4.9: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.925
Bartlett's Test of Sphericity	Approx. Chi-Square	5400.535
	Df	136
	Sig.	.000

Source: Field Research (2020)

On the issue of Bartlett's Test of Sphericity, Kline, (2016) points out that the test helps to determine whether the null hypothesis of the original correlation matrix is identical or not. In deciding if the test is significant, the matrix is considered if it is not an identity matrix, and therefore there are possibilities of other relationships between variables that must be included in the analysis. So based on the results presented in Table 4.9 that Bartlett's Test of Sphericity was highly significant ($p<0.001$). This means that there were some other relationships between the variables present in the correlation matrix found during EFA. Therefore, the results in Table 4.9 which shows $p<0.001$ among other values prove that there are correlations of observed data matrix that were appropriate for EFA.

4.5.3 Scree Plot

The Eigenvalue normally measures the extent of variances of the observed variables as a factor. Therefore, Eigenvalue helps to decide on which factors should be left or kept. Blunch, (2017) presents that a factor in which eigenvalue is greater than 1 is considered more important than those with less than 1 eigenvalue as shown in Figure 4.3. From the Figure 4.3 results show that three (3) factors had eigenvalue greater than 1.

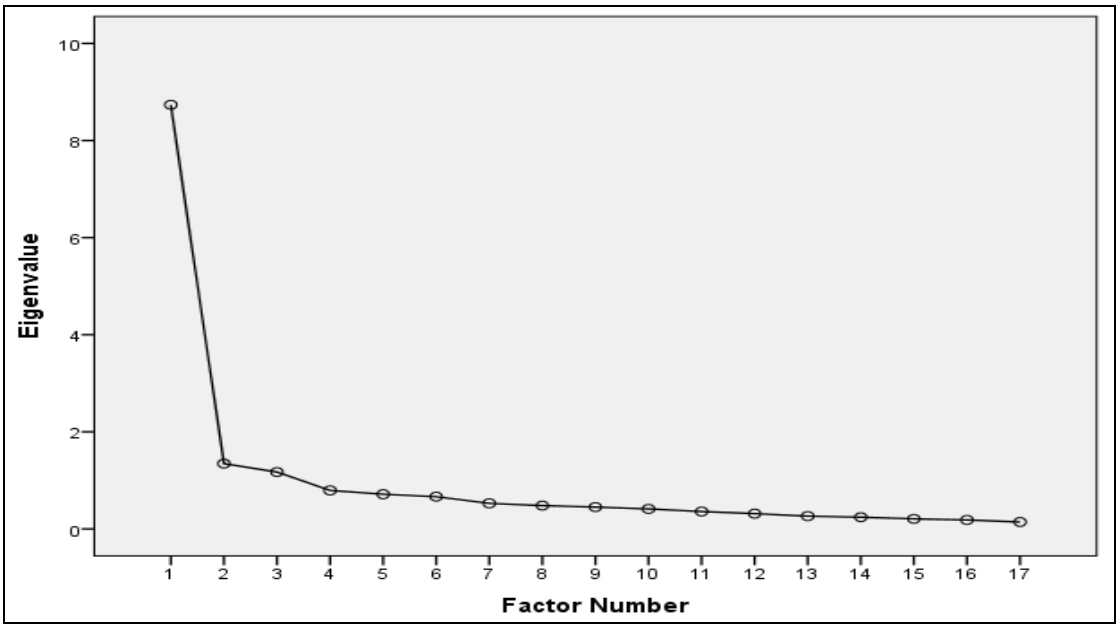

Figure 4.3: Figure 4: Scree Plot

Source: Field Research (2020)

4.5.4 Communalities Analysis

Communality analysis of variables was performed. The term commonality can be defined as the extent to which an item correlates with all available items in a study. Blunch, (2017) argues that a higher communality score shows a better fit in a study. For instance, if the communality value for a variable is between 0.0 and 0.4 it is low as the item. Item will be removed because it will struggle to load significantly on any other factor. From Table 4.10 item number PI_4 (Our industry's products have no impact on the environment) from the Product innovation variable was removed in the next step because it had a value of 0.311 which was less than 0.4

Table 4.10: Communalities

	Initial	Extraction
ICT1	.680	.692
ICT2	.442	.406
ICT3	.647	.701
ICT4	.520	.509
ICT5	.587	.556
ICT6	.541	.541
PI_1	.693	.660
PI_2	.704	.675
PI_3	.631	.667
PI_4	.311	.299
PI_5	.581	.618
PI_6	.553	.546
BP1	.748	.682
BP2	.748	.702
BP3	.689	.743
BP4	.603	.557
BP5	.540	.495
Extraction Method: Principal Axis Factoring.		

Source: Field Research (2020)

Finally, factor loadings were examined to determine the nature of factor structure. Blunch, (2017) defined factor loadings as the correlation coefficients between the variable and factor. The authors further present that the factor loadings which is greater than 0.5 is much recommended and should be retained for it will practically contribute to factor. In this study, all items were above 0.5 and therefore no item was removed. Please refer to Table 4.11.

Table 4.11: Rotated component matrix

Item	Item statement	Components		
		1	2	3
ICT1	Our industry uses ICT for marketing products and services	.675		
ICT2	Our industry uses ICT for all accounting activities	.523		
ICT3	Our industry uses ICT for business transactions	.724		
ICT4	Our industry uses ICT for customers' and suppliers' communication	.619		
ICT5	Our industry uses ICT for product design	.638		
ICT6	Our industry uses ICT for software development of	.644		
PI_1	new products with technical specifications and functionalities			.679
PI_2	products are user friendly to customers			.696
PI_3	Our industry increases quality products.			.717
PI_4	Our industry's products have no bad impact on the environmental			.517
PI_5	new products with components and materials			.687
PI_6	Decreases cost of products.			.606
BP1	Our industry has increased sales		.699	
BP2	Our industry has increased profits		.732	
BP3	Our industry has increased customers' satisfaction on products and services		.761	
BP4	Our industry has increased employees' satisfaction		.664	
BP5	Our industry has increased its market share		.574	

Extraction Method: Principal Axis Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Source: Field Research (2020)

4.5.5 Common Method Bias (CMB)

This study assumed using long questionnaire instruments and used cross-sectional study composed of different backgrounds to collect data from all four regions as a sample which could have caused CMB or Common method variance (CMV) Podsakoff (2012). Since the questionnaires needed considerable cognitive effort to bring out accurate responses Ardura and Artola (2020), there could have been a possibility of respondents feeling fatigued, and therefore less willing to provide precise answers. Authors propose other potential reasons for CMB. However, these

are not limited to scale items complexity, but less ability of the respondents to understand the questionnaires including item ambiguity, etc.

When there is suspicion of foresaid threads of responds accuracy, Fuller et al., (2016) suggested that Harman's single-factor test be used as a statistical tool to detect CMB. Based on the technique, researchers should introduce all the scale items or indicators to EFA and perform analysis on an un-rotated factor solution to find the number of components whose eigenvalue is greater than one that would explain the aggregate variance. The assumption made in this approach is that, if CMB exists, then only one component would account for greater than 50% of the existing covariance between the indicators and the conditioned constructs (Podsakoff et al., 2003).

However, the researcher in this study was aware that the use of Harman's single-factor test was not an exemption of possible weaknesses. Critically the test was not accurate enough to reveal all the levels of CMB (Craighead, et al.., 2011). While analyzing CMB, using EFA, the results indicate in Table 4.12, show that the total variance percentage was 48.474%. This result was less than 50%, and according to Podsakoff et al., (2003), these results mean that there was no potential threat to CMB.

Table 4.12: Total variance explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.736	51.387	51.387	8.240	48.473	48.473
2	1.345	7.912	59.299			
3	1.171	6.889	66.188			
4	.793	4.663	70.851			
5	.714	4.200	75.051			
6	.664	3.904	78.956			
7	.526	3.095	82.050			
8	.479	2.820	84.870			
9	.450	2.650	87.520			
10	.411	2.418	89.938			
11	.358	2.104	92.041			
12	.315	1.851	93.893			
13	.263	1.546	95.438			
14	.241	1.418	96.857			
15	.208	1.221	98.078			
16	.184	1.085	99.163			
17	.142	.837	100.000			

Extraction Method: Principal Axis Factoring.

Source: Field Research (2020)

Also, the method proposed by Ardura and Artola (2020) was based on the effect of CMB towards discriminant validity of latent variables which was used by examining the correlation matrix between all the constructs of the study. When applied, the afore-mentioned techniques, authors interpreted that the existence of corrections between constructs in the model being greater than 0.9 then there is a possibility of CMB. In conducting discriminant validity analysis using the Master Validity tool as proposed by Gaskin & Lim, (2016), the maximum share variance (MSV) shows that all values were less than 0.9 hence causing no potential threat for CMB, please refer Table 4.17.

4.6 Confirmatory Factor Analysis

Kanire (2020) outlines that Exploratory Factor Analysis had a weakness; that is the loading of measures, covariance, and error variances were not estimated. For that matter, researchers such as Hooper et al. (2008) suggested that confirmatory factor analysis should be performed to determine the loading of measures, covariance, and error variances. A measurement model was developed to determine measurement errors and correlation between latent variables in the study.

Before testing for SEM, CFA was important to test the measurement theory. The testing was done to verify how the theoretical specification of variables matches the actual data (Zhang, 2014). SEM usually combines CFA and multiple regression analysis for specifically selected capability to represent latent variables in multiple dependence relationships and at the time account for any ensuing measurement error. All estimates in SEM were done using IBM AMOS Version 26 based on the MLE approach. MLE was chosen because it is flexible in violating normality, and produces reliable estimations compared to other techniques (Zhang, 2014).

4.6.1 Measurement Model for ICT use

The first step was to run an ICT use construct using IBM Amos 26 for the purpose to determine the confirmation of indicators used ICT1, ICT2, ICT3, ICT4, ICT5, and ICT6. As can be seen from Figure 4.4, the results show that all indicator factor loading was greater than 0.5. The above requires a cutting-off point as proposed in Table 3.9. The results also illustrated in the same figure indicate that the model fits well as supported the cutting of points shown in Table 4.13.

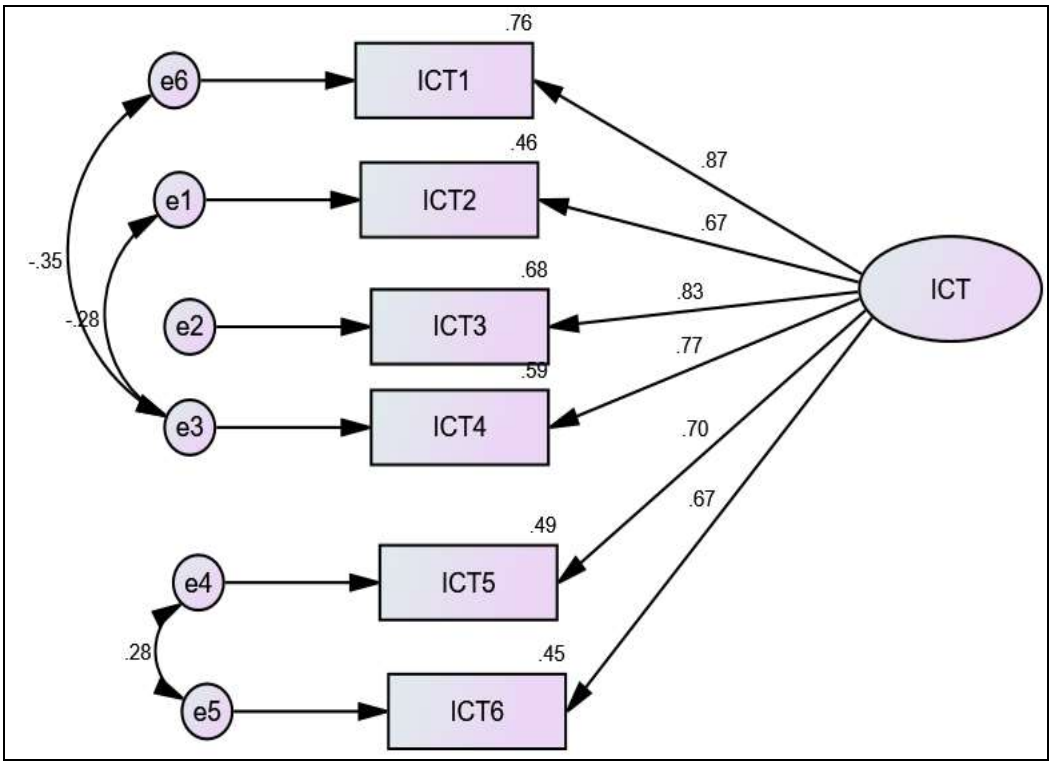

Figure 4.4: CFA for ICT

Source: Field Research (2020)

Table 4.13: Goodness of fit for ICT

Fit indices	AGFI	CFI	RMR	RMSEA
Default Model	0.954	0.990	0.019	0.07

Source: Research Field (2020)

Bearing in mind the importance of model fit indices, Table 4.13 describes the results of measurement model of the study by estimating model fit for ICT. Firstly, AGFI suggest that the model is almost a good fit level (0.954) which is greater than 0.8 (Kline, 2016; Blunch, 2017), also CFI verifies the model is perfect fit (0.999) which greater than (0.90). Moreover, the RMR is close to fit (0.019) which is less than (0.06) Kiani et al. (2020) and finally RMSEA was found to be (0.000) which was less (0.008) proposing the model to be fit (Byrne, 2013).

4.6.2 Measurement Model for Product Innovation

The second Measurement Model test was to run the Product Innovation construct using IBM Amos 26 to confirm the applicability of the observed variables. The observed variables as indicated in Figure 4.5 were; PI_1, PI_2, PI_3, PI_4, PI_5, and PI_6. In the process of running the model, the observed variable PI_2 was dropped because it had a loading factor less than 0.4 which recommended for analysis (Byrne, 2013). Also, e7 and e10 and e10 and e12 were covaried to enhance the model fit. The model fit results for the PI are presented in Table 4.14.

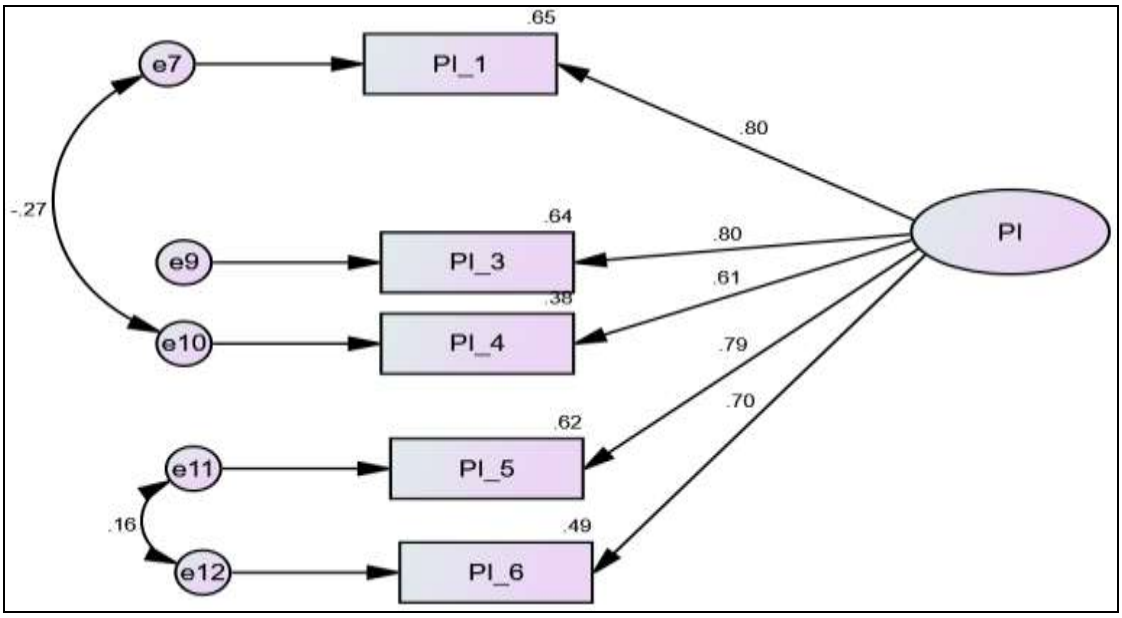

Figure 4.5: CFA for PI

Source: Field Research (2020)

Table 4.14: Goodness of Fit for PI

Fit indices	AGFI	CFI	RMR	RMSEA
Default Model	0.999	1.000	0.003	.000

Source: Field Research (2020)

In the consideration of essence of model fit indices, Table 4.14 designates the results of measurement model of the study by estimating model fit for PI. Initially, AGFI suggest that the model is almost a good fit level (0.999) which is greater than 0.8 (Kline, 2016; Blunch, 2017), also CFI verifies the model is perfect fit (1.00) which greater than (0.95). Furthermore, the RMR is close to fit (0.003) which is less than (0.06) Kiani et al. (2020) and lastly RMSEA was found to be (0.000) which was less (0.008) proposing the model to be fit Byrne (2013).

4.6.3 Measurement model for Business Performance

Finally, CFI was run again using IBM Amos 26 to test the observed variables and confirm the relationship between the variables in the business performance measurement model. The observed variables were BP_1, BP_2, BP_3, BP_4, and BP_5. The output results as shown in Figure 4.6 shows that the loading factor of each observed variable was above 0.5 and no variable was dropped. However, for a better fit of the model e13 and e14 were covaried and e16 and e17 were as well covaried. In addition to that construct model presented in Table 4.15 reveal that fitted the model.

Finally, CFI was run again using IBM Amos 26 to test the observed variables and to confirm the relationships in the business performance measurement model. The observed variables were BP_1, BP_2, BP_3, BP_4, and BP_5. The results as shown in Figure 4.6 indicate that the loading factor of each observed variable was above 0.5 and no variable was dropped. However, for a better fit of the model e13 and e14 were covaried and e16 and e17 were also covaried. In addition, the construct model presented in Table 4.15 reveal that all fitted the model.

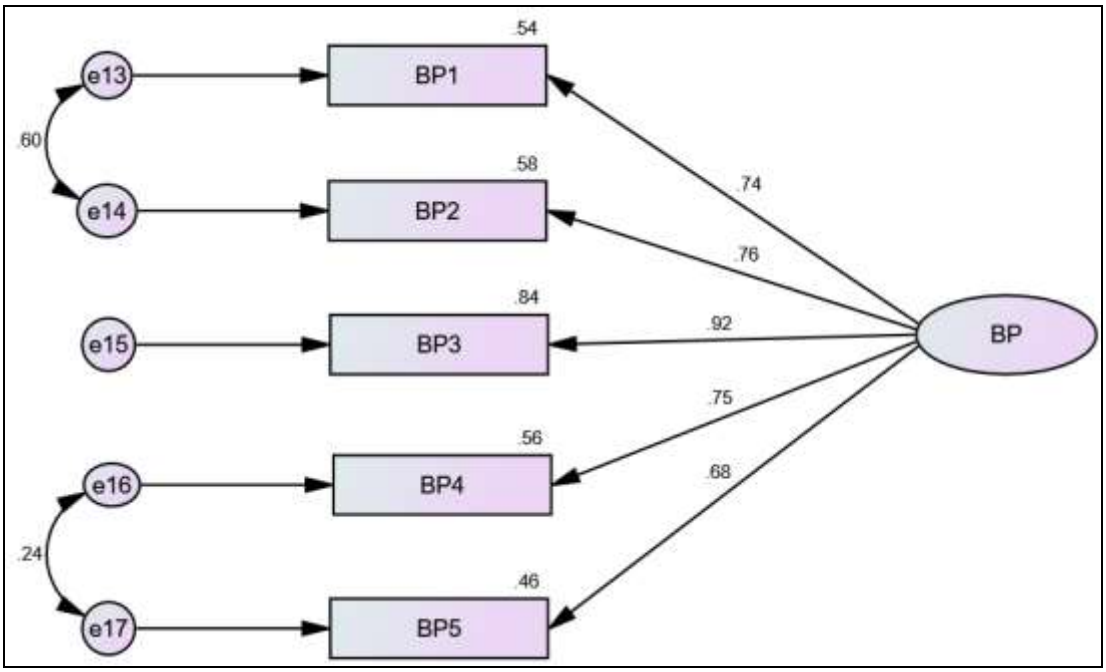

Figure 4.6: CFA for BP

Source: Field Research (2020)

Table 4.15: Goodness of fit for BP

Fit indices	AGFI	CFI	RMR	RMSEA
Default Model	0.985	0.997	0.005	0.020

Source: Field Research (2020)

While it is important in this study to measure model fit indices, Table 4.15 reports the results of measurement model by estimating model fit for Business Performance. Primarily, AGFI suggest that the model is almost a good fit level (0.985) which is greater than 0.8 (Kline, 2016; Blunch, 2017), also CFI verifies the model is perfect fit (0.997) which greater than (0.95). likewise, the RMR is close to fit (0.005) which is less than (0.06) Kiani et al. (2020) and finally RMSEA was found to be (0.020) which was less (0.08) proposing the model to be fit Byrne (2013).

4.6.4 Measurement Baseline Model

To reach the baseline measurement model that requires that it fit all three individual measurement models formed earlier were combined, and then run to determine the goodness of fit through CFA, using MLE through IBM SPSS AMOS 26. To reach a model that fits the data, the minimum requirement of Goodness of fit was met as proposed by Kline, (2016), Byrne (2013) and Blunch, (2017) in Table 3.9. In the process of running Figure 4.7. The results for the goodness of fit cut-off points are indicated in Table 4.16.

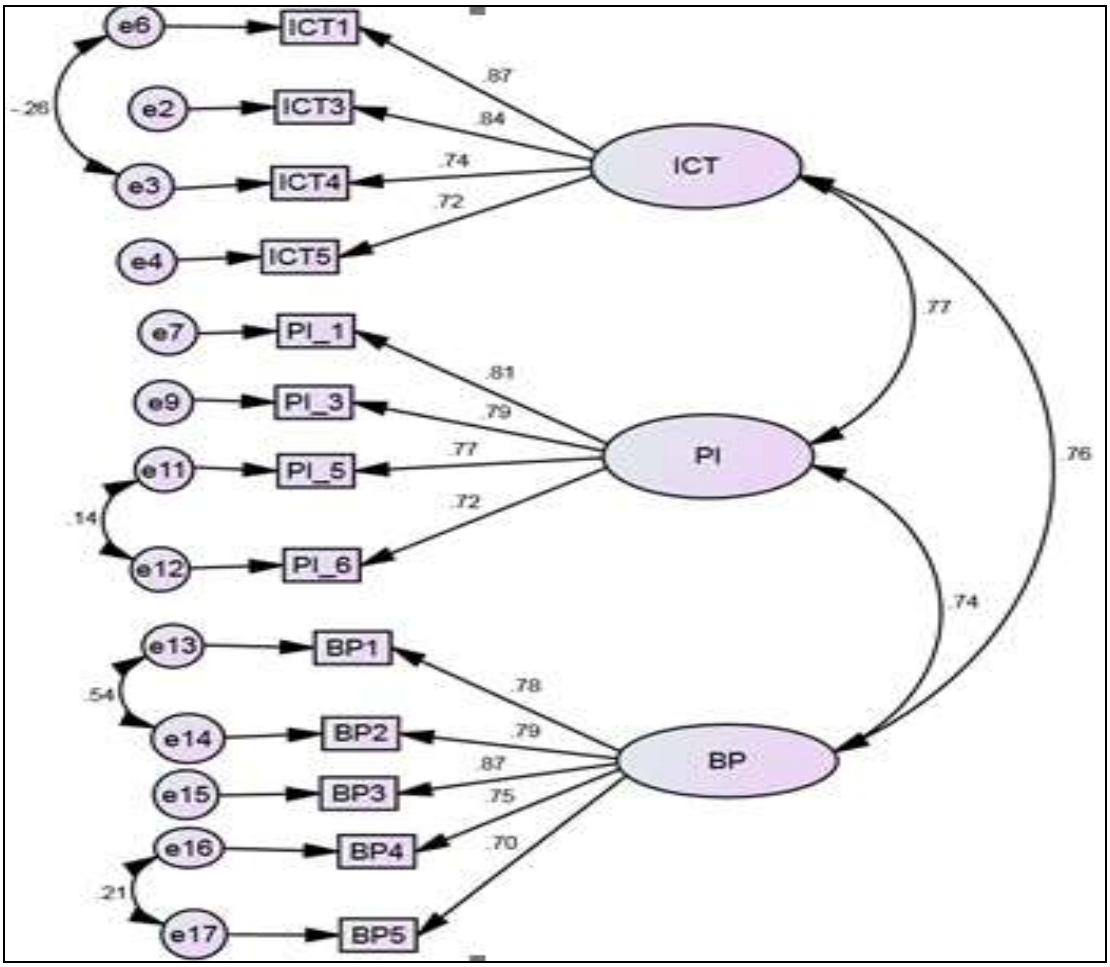

Figure 4.7: Grouped CFA for ICT, PI and BP

Source: Field Research (2020)

Table 4.16: Grouped CFA Goodness of Fit for ICT, PI, and BP

Fit indices	AGFI	CFI	RMR	RMSEA
Default Model	0.890	0.930	0.031	0.070

Source: Field Research (2020)

Results in Table 4.16 shows the measurement model of the study by estimating model fit. Originally, AGFI suggest that the model is a good fit level (0.890) which is greater than 0.8 (Kline, 2016; Blunch, 2017), also CFI verifies the model is perfect fit (0.930) which greater than (0.90). moreover, the RMR is close to fit (0.03) which is less than (0.06) Kiani et al. (2020) and finally RMSEA was found to be (0.070) which was less (0.008) proposing the model to be fit Byrne (2013). Based on Figure 4.8 the following ICT items contribute to product innovation and business performance. Suct items are: - Marketing products and services (ICT1), Business transactions (ICT3), Customers' and suppliers' communication (ICT4) and Product design (ICT5).

Concurrently, the model was tested for convergence and divergence validity. Blunch, (2017), refer to convergence validity as the extent to which the theoretical concepts under study are related to the reality of the existing phenomena. Furthermore, the authors describe discriminant validity as the extent to which theoretical concepts which are not related do not reflect the existing phenomena. To determine the values for convergency, divergency, and Composite Reliability (CR), Master Validity Tool was used. Referring to Gaski and Lim (2016); Convergence validity was estimated by the AVE method for each construct in the study.

If AVE was greater than 0.5 then the construct variables were convergent. While Discriminant validity was determined by calculating the MSV which was done through squaring correlation between constructs, if MSV was less than AVE this confirmation is not discriminant of validity. Finally, CR was done as the test of internal consistency in the study, particularly in CFA. This was estimated to relate to the total amount of true score variance of a construct over total scale score variance. The final model for validity measures is presented in Table 4.17.

Table 4.17: Model Validity measures

	CR	AVE	MSV	MaxR(H)	BP	ICT	PI
BP	0.887	0.611	0.571	0.897	0.782		
ICT	0.871	0.628	0.596	0.884	0.756***	0.793	
PI	0.857	0.600	0.596	0.860	0.741***	0.772***	0.775

Significance of Correlations: *** $p < 0.001$
Source: Field Research (2020)

Based on the recommendation given by Gaskin & Lim, (2016) a factor loading less than 0.5 is insignificant and the goodness of fits cut-off points four (4) items as presented in Table 4.18 were removed because they did not fit to the Grouped Measurement model, see Figure 4.7. The whole process conducted in this study verifies that good results were achieved.

Table 4.18: Removed Items from ICT and Product innovation variables

Factor	Item	Item statement
ICT: Information and Communication Technology	ICT2	ICT use for all accounting activities
	ICT6	ICT use for software development
PI: Product Innovation	PI_2	improved ease of use for customers
PI: Product Innovation	PI_4	industry's products have no impact on the environmental

Source: Field Research (2020)

4.6.5 Structural Equation Modeling

The structural model of this study provided for the relationship between ICT and Product Innovation, Product innovation and business performance and finally, ICT and business performance, all of which were analyzed. The testing process of the hypothesis was done through a structural model using AMOS version 26 as the suitable software for the analysis. Various coefficients and scores obtained from the analysis were used to define the relationships with the proposed hypotheses. The hypothesis which was tested in this study indicated the direction, strength, and significance level of the path coefficient. In the path analysis of the model, showing the relationship between ICT use, Product innovation, and business performance the following model was developed as shown in Figure 4.8, with the cut-off points indicated in Table 4.19.

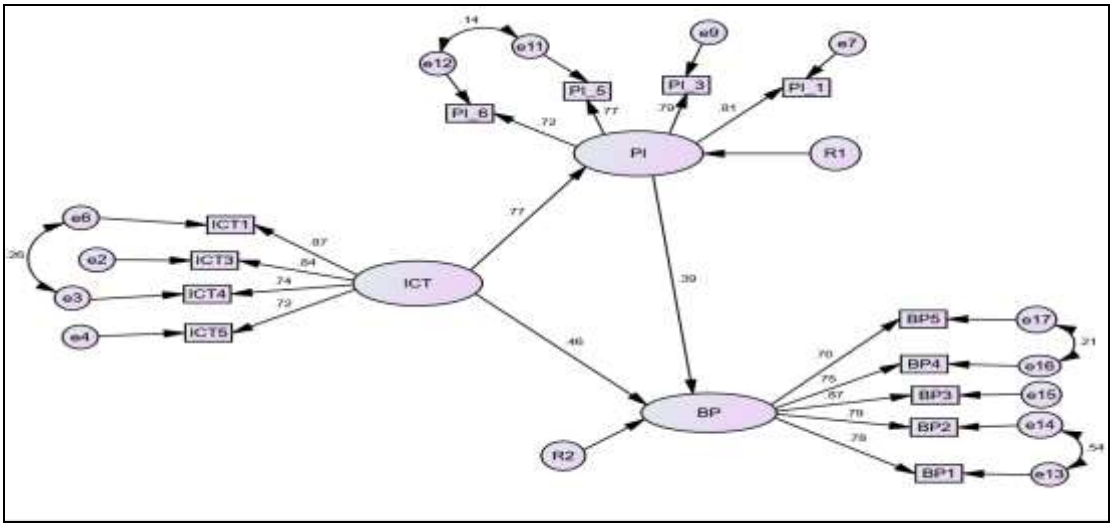

Figure 4.9: Path Analysis for ICT, Product Innovation and Business Performance

Source: Field Research (2020)

Table 4.19: Goodness of fit for path analysis

Fit indices	AGFI	CFI	RMR	RMSEA
Default Model	0.930	0. 980	0.0310	0.070

Source: Field Research (2020)

Bearing in mind the essence of model fit indices, Table 4.19 presents the results of measurement model of the study by estimating model fit. Firstly, AGFI suggest that the model is almost a good fit level (0.930) which is greater than 0.8 (Kline, 2016) and (Blunch, 2017), also CFI verifies the model is perfect fit (0.980) which greater than (0.95). Moreover, the RMR is close to fit (0.0310) which is less than 0.06 (Kiani et al. 2020) and lastly RMSEA was found to be (0.007) which was less (0.008) proposing the model to be fit (Byrne 2013).

4.6.5.1 Regression Weights Model

From the baseline model in the previous section, regression weights of the model were determined and presented in Table 4.20. This part was vital in establishing the relationships between variables extracted from Regression Weights Model which for any relationship provides that CR > 1.96 and should be significant at $p < 0.05$ indicating a positive and significant relationship.

Table 4.20: Regression weights default model

			Estimate	S.E.	C.R.	P	Label
PI	<---	ICT	.702	.046	15.227	***	par_15
BP	<---	ICT	.333	.053	6.285	***	par_16
BP	<---	PI	.313	.058	5.368	***	par_17
BP1	<---	BP	1.012	.065	15.510	***	par_1
BP2	<---	BP	.964	.061	15.700	***	par_2
BP3	<---	BP	1.095	.065	16.965	***	par_3
BP4	<---	BP	1.008	.059	16.950	***	par_4
BP5	<---	BP	1.000				
ICT5	<---	ICT	.738	.042	17.608	***	par_6
ICT3	<---	ICT	.827	.038	21.634	***	par_7
ICT1	<---	ICT	1.000				
ICT4	<---	ICT	.714	.043	16.619	***	par_8
PI_6	<---	PI	.872	.055	15.988	***	par_11
PI_5	<---	PI	.970	.055	17.515	***	par_12
PI_3	<---	PI	.847	.046	18.293	***	par_13
PI_1	<---	PI	1.000				

*** <0.001

4.6.5.2 Standardized Regression Weights Model

In determining the relationships between the variables in this study, Standardized Regression weights were analyzed. For analyzing the relationship between variables, SRW recommends being at least 0.2 which allows for data analysis and reporting. The results in Table 4.21 indicate the SRW of this study.

Table 4.21: Standardized Regression Weights Default Model

			Estimate
PI	<---	ICT	.772
BP	<---	ICT	.455
BP	<---	PI	.389
BP1	<---	BP	.783
BP2	<---	BP	.793
BP3	<---	BP	.871
BP4	<---	BP	.748
BP5	<---	BP	.704
ICT5	<---	ICT	.719
ICT3	<---	ICT	.835
ICT1	<---	ICT	.868
ICT4	<---	ICT	.739
PI_6	<---	PI	.721
PI_5	<---	PI	.774
PI_3	<---	PI	.794
PI_1	<---	PI	.808

Source: Research Field (2020)

So, to support the hypothesis, this study used the approach as recommended by Matonya et al.., (2019), which was set $p \leq 0.05$ and Critical Ratio (CR) ≥ 1.96. If this condition was not met the null hypothesis was rejected. In the process of testing and evaluating the strength and significant level of hypothesis, standardized path coefficients, CR, and the level of significant (p) were applied. The results are presented in diagram in Figure 4.8 and goodness of fit in Table 4.19, Regression weights of default model presented in Table 4.19 and Standardized Regression Weights in Table 4.21. For instance, from Table 4.19 all values are presented to satisfy the cutting-off point as proposed by different authors. After establishing the estimated model fit that shows good fit indices, the coefficient and hypothesis testing were analyzed based on the model.

The following hypotheses were tested and results presented: --

H1: ICT has significant relationship with product innovation in SMMIs in selected industrial regions in Tanzania

This hypothesis was examined with the path analysis of ICT and PI, which formed the relationship. The results in Table 4.20 indicate that ICT has a significant relationship with product innovation in the SMMIs in Tanzania. In addition, Table 4.21 indicates that the path coefficient was 0.772 based on Table 4.20 and the results were significant at 0.001, 15.227 > 1.96, which indicate that the relationship was strong correlation correlated (Mukaka, 2012).

H2: Product innovation has significant relationship with business performance in SMMIs in selected industrial regions in Tanzania

The (H2) hypothesis was examined by using the path analysis between PI and BP which formed the referred relationship. The results in Table 4.20 indicate that PI has a significant relationship with business performance in the SMMIs in Tanzania. Table 4.21 indicates that the path coefficient between PI and Business performance was 0.389, and based on the same Table 4.20, the results were significant at 0.001, and in CR. It was found out that 5.368 > 1.96, which indicate that the relationship was a moderately positive correlation (Mukaka, 2012).

H3: ICT has significant relationship with business performance in SMMIs in selected industrial regions in Tanzania

This hypothesis was examined using the path analysis with ICT and BP as key to the relationship. The results in Table 4.20 indicate that ICT has a significant relationship with business performance in the SMMIs in Tanzania. Table 4.21 indicates further that the path coefficient between ICT and Business performance was 0.455, and based on the same Table 4.20, the results were significant at 0.001, and in CR, it was found out that 6.285 > 1.96, which indicate that the relationship was a moderately positive correlation correlated (Mukaka, 2012).

HI: H2 Mediated effect of product innovation has improved ICT application on business performance in SMMIs in selected industrial regions in Tanzania

Before undertaking the analysis for mediation; it was important to establish that the conditions for mediation analysis were met. This study adopted Baron and Kenny's (1986) conditions. Several kinds of the literature suggest Baron and Kenny's (1986) conditions to be popular and widely accepted. So, in line with Baron and Kenny (1986) assertions, Table 4.22 presents the comparison between the conditions and results obtained from Table 4.20 and Table 4.21.

Table 4. 22: Comparison of Mediation Conditions and Correlation results

Baron and Kenny's (1986) conditions	Results from Table 4.22	Remarks
There should be a confirmed relationship between the independent and dependent variables	ICT significantly correlates with business performance	Accepted
There should be a confirmed relationship between the independent and mediator variables	ICT significantly correlates with product innovation	Accepted
There should be a confirmed relationship between the mediator and dependent variables amidst independent variables	Product innovation significantly correlates with business performance	Accepted

***P<0.001

So based on the results from Table 4.22 it is evident that all three conditions were met as proposed by Boron and Kenny (1986). This argument propels the ground of

mediation effect. A study conducted by Field (2018), suggests that mediation is likely to occur if the relationship between the predictor and outcome is affected by the mediator, whereas full mediation occurs when the mediator is removed. The results presented in Table 4.23, indicate the direct, mediated, and total effects of ICT and product innovation on business performance in Tanzania. Table 4.23 shows that the direct effect of ICT use on business performance is 0.455, while the mediated effect on business performance is 0.292.

Table 4.23: Path model and total effect

Variable	Direct effect on business performance	Mediated effect on business performance	Total effect on business performance
ICT use	0.455	0.292	0.747
Product Innovation	0.389	0	0.389

Source: Research field (2020)

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

In this chapter the study presents the main findings of the study. The discussion presented is solely based on the survey research, and exploratory research design. The main objective of this chapter is to summarize the findings and compare them with the current and previous research findings of the other related or similar studies. This approach helped the researcher to establish the effect of ICT and Product innovation, ICT and Business performance, and ICT and Business performance as mediated by product innovation. The established findings were based on study-specific objectives, hypotheses, and conceptual framework of the study.

5.2 Effect of ICT on Product Innovation in SMMIs in selected industrial regions in Tanzania

The research hypothesis was that ICT has a significant relationship with product innovation in SMMIs. The research results show a standardized regression weight of 0.718 which is a strong positive relationship between ICT and product innovation. This means that ICT has a strong positive relationship and a significant effect on product innovation in in selected industrial regions in Tanzania.

This means that ICT use in marketing industrial products and services (ICT1), business transactions (ICT3), customers' and suppliers' communication (ICT4), and product design (ICT5) indicated that their path towards product innovation are significant and fitting for discussion as demonstrated in Chapter four. Furthermore,

ICT item Business transaction ICT3(0.835) has more effect to product innovation and business performance in SMMIs in selected regions in Tanzania refer Figure 4.8 and Table3.21. However, product innovation items such as new products with technical specifications and functionalities differing from the current ones (PI_1), products are user friendly to customers (PI_2), increases quality products. (PI_3), new products with components and materials differing from the current ones, and (PI_5) all contribute towards decreases in the cost of products. (PI_6).

Chin (1998) postulated that, in any hypothesis, whenever the standardized path coefficient (γ) is greater than 0.2, then the results qualify for discussion. In this particular study, the standardized path coefficient of 0.772 was above the recommended cut-off point, therefore, it qualified for meaningful discussion. Furthermore, the analysis of the significant effect of ICT on Product Innovation was done using CR values and the results are shown in Table 4.17. The results indicated a CR of 15.205 and $p < 0.001$. In such a situation, Hox and Bechger (2014) consider that CR is significant. The author argues further that for the relationship to be significant the CR should be greater than 1.96 and p-values should be less than 0.05. From such an argument the relationship between ICT and Product innovation was significant.

The relationship was well-thought-out to be significant because the CR was greater than 1.96 and the p-value less than 0.05. The result of this study shows that ICT affects product innovation. This result concurs with the findings by Ueki and Tsuja

(2019), who found that ICT had a strong positive correlation with product innovation in Thailand, and Vietnam.

In Africa; the results of this research concur with the study by Abderrezzak et al.., (2016) and Cirera et al.., (2016) whose results showed that ICT influenced product innovation in firms. The results of this study also support the Technology Adoption Model theory that is dominated by the perceived Easy to Use and Perceived Useful variable. In a study by Olumide (2016) the authors showed examples of TAM variables including ICT experience, intention to use and perceive Ease to use for internet self-efficacy, and objective usability. However, these results appear to contradict with Santoleri (2013) whose results show that being a basic ICT user is negatively associated with product innovation in Chilean country.

It can therefore be suggested in this study that the ability to drive product innovation varies depending on the type of ICT tools, firm process, the current knowledge, ICT consulting firms, and product innovation capabilities, etc. it can also, be suggested that the use of ICT did not affect product innovation, due to the sample selected made little use of ICT in product innovation or did not deploy ICT use extensively, lack of competencies and financial constraints or lower technology industries usually apply incremental product innovation, which do not require major adjustments of the production processes

Although ICT use is a positive contributor to the product innovation, it is deemed right that sometimes it is not always the case. Therefore, it was important to identify more concertedly which items should represent business performance indicators.

Table 5.1: Effect of ICT to different departments

Department	Item	Items tested	SRW	Comments
Accounting	ICT2	ICT for all accounting activities	-	Dropped
Customer care	ICT4	ICT for customers' and suppliers' communication	.739	Accepted
Design	ICT5	ICT for product design	.719	Accepted
	ICT6	ICT for software development	-	Dropped
Manufacturing	PI_1	Develops new products with technical specifications and functionalities	.808	Accepted
	PI_2	Develops newness for current products leading to improved ease of use for customers	-	Dropped
	PI_3	Increases manufacturing quality in components and materials	.717	Accepted
	PI_4	Products have no impacts to environmental	-	Dropped
	PI_5	Develops new products with components and materials	.774	Accepted
	PI_6	Decreases manufacturing cost in components and materials of current products.	.721	Accepted
Marketing	ICT1	ICT for marketing products and services	.838	Accepted
Sales	ICT3	ICT for business transactions	.835	Accepted
	BP1	Increased sales	.783	Accepted
	BP2	Increased profit	.793	Accepted
	BP3	Increased customers' satisfaction on products and services	.871	Accepted
	BP4	Increases employee's satisfaction	.748	Accepted
	BP5	Increased market share	.719	Accepted

Source: Field Research (2020)

In determining the application of ICT across difference departments, the study in Table 5.1 revealed that 4 (66.66%) suggest that there is a growing application of ICT in manufacturing industries. However, Accounting and Design departments should

increase the use of ICT particularly for design activities. Improvements in these department will increase business performance.

5.3 Effect of Product Innovation on Business Performance in SMMIs in SMMIs in selected industrial regions in Tanzania

Based on hypothesis H2: the results obtained in Table 4.20 and Table 4.21, show that Product Innovation has a significant effect on business performance in SMMIs. To test this, the Path analysis test was done by considering product innovation as an independent variable against business performance as the dependent variable. Standardized Regression weight results, shown in Table 4.20 indicate that product innovation was significant to business performance in SMMIs.

Therefore, it was accepted in this study that product innovation has a significant effect on business performance in SMMIs. Hence more efforts by SMMIs in increasing product innovation will result in a significant increase in business performance. The results concur with the Study by Abdi and Ali (2013) who indicated that innovation had a significant role in determining the business performance of firms in Somalia. Innovation helps firms to attain a competitive advantage as the environment changes. The results also concurred with Rosli & Sidek (2013) and Oke, et al.., (2013). However, these results are contradictory with those of Mensah and Acquah (2015) and Nafula (2017) studies who found that product innovation has a no-significant effect on the business performance of firms.

Poor performance of firms might have been attributed to poor physical infrastructures, inferior products versus competitors, poor technology, lack of skills, etc. It is also possible that the lack of access or links to international marketing information and related constraints, financial constraints might have been the reasons for the detected poor performance. Finally, it is also possible that the lack of license and adequate technology from the business owners who are mainly foreigners, poor or lack of research and development strategies might have caused poor performance of manufacturing firms.

5.4 Effect of ICT and Business Performance in SMMIs in SMM in selected industrial regions in Tanzania

By testing hypothesis H3 on ICT statistical significance on business performance in SMMI, the Path analysis test was carried out by considering ICT as an independent variable against business performance, the latter being the dependent variable. The results as shown in Table 4.20 and Table 4.21 reveal that ICT was a significant contributor to business performance in SMMIs.

Therefore, it was accepted in this study that conclusively ICT has a significant effect on business performance in SMMIs, particularly on increased sales (BP1), profit (BP2), customers' satisfaction on products and services (BP3), employee's satisfaction (BP4) and market share (BP5). The results of this study are comparable with those of Msuya et al., (2017), Hamad (2017) Cirera et al.., (2016), Cuevas-Vargas et al.., (2016) Ferreras-Mendez and Arege (2014). Such results are in line

with TCRA (2020) which reports the rise in the number of mobile phones subscribers and internet users compared to previous years.

However, in the study on the effects of ICT on business performance on manufacturing industries cautioned that ICT per se is not the only main factor of performance of firms. Other factors should be considered, this includes cost of ICT facilities, economical use, investment in research and development. Forementioned factors can propel the successful use of ICT on business performance in SMMIs in developing countries like Tanzania.

However, these results were contrary to those conducted by Ejemeyovwi and Osabuohien (2018) who indicated that the use of ICT particularly Mobile technology in relations to growth of ECOWAS was negatively correlated. Furthermore, results of this study contradict with ICT performance in developing countries like the USA. For instance, Gartner (Consultancy Company in the USA) reported that less than 70% of ICT projects did not meet their targeted business goals (Saran, 2012) and the research by (Jacobs, 2012) indicated that 74.1% of ICT projects exceeding their budget expenditure. Contradiction of different studies confirm that ICT does not give improved business performance until the firms and their workers have acquired the right technologies, proper strategic planning, and education/training and in emerging competencies.

It can otherwise be expressed that the role of ICT depends on an organization's capturing ICT growth opportunities. In this situation, the effect of ICT on the

performance of a firm can be mediated. In such opinion it can be concluded that ICT benefits will not be exploited without proper changes in a firm's business model and increases in a firm's human capital along with modern ICT knowledge and skills.

5.5 Mediating effect of product innovation on the influence of ICT application on business performance in SMMIs in selected industrial regions in Tanzania

As can be seen in Table 4.23, the third hypothesis was tested whether ICT has a direct effect on business performance as mediated by product innovation in SMMIs. The hypothesis aimed to test, the indirect effect of ICT on business performance in SMMIs. Results indicate that ICT has a significant direct effect on Business performance by 0.455.

ICT use, when mediated by Product Innovation, has mediated effect of 0.292. So, the use of ICT when applied innovatively through product improvement has a positive impact on business performance. These results comparable with those of Cuevas-Vargas et al.., (2016) and Ferreras-Mendez and Arege (2014).

The assessment of the direct and mediated effect of ICT use on business performance of SMMIs shows that direct effect prevails over mediated effects. This indicates that ICT can increase performance by increasing product innovation practice in SMMIs This study coincides with those of Coccobell, et al., (2012) who argued that widespread ICT is essential for economic activity for two major reasons; first, ICT directly increases firm productivity and boosts up economic growth. Second, it

generates complementary innovations such as product innovation that advances the quality and market acceptability of products.

Based on the practical experience of this study, the results show that the use of ICT does not only improve business performance but also helps to support and reinforce product innovation capabilities hence increasing business performance. A study by Fernandez-Mesa (2014) supports the current study that ICT has mediated effect on firm performance as mediated through learning and therefore proposing that SMMIs should pay attention to mediating factors, especially on product innovation to attained additional benefits of ICT. Fernández-Mesa (2014) asserts that research results contradict with these results as such mediated effect of ICT were higher than direct effect of ICT in business performance. The reason behind is that ICT performance goes higher when mediated through learning (internal or external) unlike using it directly to effect dependent performance.

This study puts forward major responsibilities to managers such that they should not concentrate on considering the direct application of ICT, but rather find some other ways to improve ICT use to strengthen business performance. Also, the mediated effect of ICT on business performance in the manufacturing industries has been comparable with the study conducted by Biag (2013) in the United States of America. The research results indicated that ICT was used as an enabler of product innovation which assisted in the growth of business performance. However, this study did not provide clearer evidence on the mediated effect of ICT on businesses performance in firms, contrary to Kijek and Kijek (2018) who argued that there is no

clear evidence of gain in business performance using ICT in firms. The authors insisted that most studies refer to the direct relationships between ICT and business performance, ignoring the mediated effects caused by ICT application.

Perhaps the most important issue in this study was that the study was done during the onset of Covid-19 pandemic. Therefore, there was a possibility of a change of direct or mediated effect of the disease condition on the study results. So, the researcher thought it logical to compare the finding of this study with other similar studies to see if there was any major impact of the pandemic on the trend of the collected data.

This study established that the operation of industries with due application of ICT during the period of the pandemic was significantly related to business performance. This result appears to suggest that due to peoples' movement restrictions and the imposed lockdown due to covid 19 in some countries, the use of ICT led to increases in the sales of products and the sales transactions continued between firms and customers through e-commerce.

This study was done during the covid-19 pandemic, and therefore some factors influenced some of the research activities. For instance, the poor performance of product innovation led to poor business performance. Although Tanzania was not affected by regional lockdowns, due precautions on the disease were high. This might have been the reason industrial product innovation by SMMIs was not seriously affected and continued to do well.

5.6 Theoretical Contribution

This study borrowed experience from the Technology Acceptance Model, TAM. Even so, Khan and Woosley (2011) argued and warned that TAM lacked enough validation because most of the studies it guided were conducted in academic environments where students were the main respondents. This study provides more validated grounds as the study was conducted in SMMIs where the main respondents were businessmen and businesswomen and the results were significantly good. The results suggest that TAM might work better in academic settings than in business environments where competition is higher and products based. In the criticism raised by Bashange (2015) TAM is critically challenged in this study because it acts as an independent variable to product innovation and business performance and the results were still significant.

For instance, Oluwole (2016) and Chuttur (2009) claimed that the greatest challenge to TAM is in its lack of organizational dynamics. The claims are well supported by Ajibade (2018) who argue that TAM requires external factors that might influence the acceptance of technology. In addressing these criticisms, this research attempted to link TAM with product innovation capabilities and external factor and organizational dynamics, and the results show that jointly they provided better results on business performance on SMMIs.

Priyanka and Kumar (2013) criticized TAM that it lacks a definite area, defined conditions, predictive power, and ICT settings. In response to the criticism, this study was conducted on SMMIs purposely where ICT was used for manufacturing

purposes. Items to test TAM were equal and common to the business environment in Tanzania. The study was the cross-sectional in approach, meaning that all variables tested were collected at the same time. This provided an equal business environment for all the responses. Regarding the predictive power and ICT setting, this study estimated the minimum sample size to be 285. However, the sample was expanded to 474. Based on SEM through IBM, Amos version 26, the sample size and sample data matrix fitted the structural model. This suggested that SEM is the better method to test for TAM as applied to this study.

Drawing on the TAM and DC theories, the intervening relationships between ICT use and product innovation in achieving SMMIs business performance were examined. As SMMIs were considered as entities with scarce resource capability, this study drew on a combination of both theories in enabling the industries to achieve higher business performance. The findings of this study indicate that to achieve sustainable growth, SMMIs, must acquire a high level of ICT utilization and product innovation capabilities in combination.

A high level of ICT use in the daily operations of SMMIs cannot substitute a low level of product innovation capabilities in the same SMMIs. Furthermore, in the relation to the combination of TAM and Product innovation capabilities particularly in the analysis of the total effect of ICT, the results show that SMMIs can achieve higher business performance unlike if the application of the selected theories were to act independently.

The study enriched the TAM and DC theories by providing the independent effect of ICT use and Product Innovation variables in business performances for SMMIs. It provided for and justified the mediated effect of ICT use as mediated by Product Innovation capabilities in the performance of the SMMIs business. Former studies on the application of TAM and DC theories were done in isolation for targeted objectives. This suggests that the use of TAM was not enough on its own to attain the full desired business goals. In the same way, the use of DC alone would not achieve the desired levels of industrial performance.

The theoretical development and empirical findings of this research provide that TAM has a potential value, but SMMIs must have DC to achieve the levels of desired performance. Based on the referred model of business performance as the dependent variable, it can be concluded that for higher success in business performance, focusing on TAM in the cost of DC, or focusing on DC in the cost TAM, would have been incomplete. The theories used in the current research and empirical findings are complementary to each other. They provide a clear indication that researchers need to integrate TAM and DC to fully capture the benefits of SMMIs growth.

This study also enriches the TAM and DC theories in that the performance of SMMIs can be achieved through the combination and simultaneous application of ICT and Product Innovation capabilities. The research findings confirm the proposition, theory, and empirical support for an understanding that most of SMMIs fail to achieve the desired performance due to the lack of either operating

independently. Considering markets dynamics and business competitions, SMMIs must acquire maximum levels of available resources and capabilities and utilize them efficiently to be successful in the competitive markets and achieve and enhance performance. Due to globalization, business competitions, most foreign firms which also face competition, seek overseas opportunities, by entering domestic markets through bilateral partnership or shareholding

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Introduction

The following section presents the main findings of the study as well as the conclusion and recommendations. It also presents proposed future research areas where interested scholars may dwell. Finally, the section presents the research implications of the study to policymakers, managerial staff in industries and theoreticians interested in this kind of study. This study concludes that ICT has improved product innovation and business performance in SMMIs in selected industrial regions in Tanzania. Also, ICT has improved Business Performance through Product Innovation Mediation in selected industrial regions in Tanzania. This study recommends the application of ICT to improve product innovation and business performance in selected industrial regions in Tanzania. The study also recommends the mediation of product innovation on the application of ICT on business performance in selected industrial regions in Tanzania.

6.2 Conclusion

This research investigated the effect of ICT on product innovation and business performance in selected industrial regions in Tanzania. This study provides the following conclusion: -

6.2.1 Effect of ICT on Product Innovation in SMMIs in selected industrial regions in Tanzania

The research hypothesis was that ICT has a significantly improves product innovation in SMMIs in selected industrial regions in Tanzania. The research results show a strong positive relationship between ICT and product innovation. This means that ICT has a strongly improved and a significant effect on product innovation in small manufacturing industries in selected industrial regions in Tanzania.

The results of this study also support the Technology Adoption Model theory that is dominated by the Perceived Useful variable. For instance, this study employed the TAM to investigate the use of ICT to evaluate technical performance in the SMMIs in selected industrial regions in Tanzania. The decision of using TAM was to explain and predict the contribution of ICT and the relating factors. Using TAM results showed that there was the causal relationship between variables of ICT and Product Innovation in selected industrial regions in Tanzania.

In determining the contribution of ICT across difference departments, the study suggest that there was a growing contribution of ICT in SMMIs. However, Accounting and Design departments should improve the use of ICT particularly for design activities. Improvements in these departments eventually will increase business performance.

6.2.2 Effect of Product Innovation on Business Performance in SMMIs in selected industrial regions in Tanzania

This study intended to show that Product Innovation has a significant improvement in business performance in SMMIs in selected industrial regions in Tanzania. Thus, it was accepted in this study that product innovation has a significant improve on business performance in SMMIs. Henceforth more efforts by SMMIs in improving product innovation will result in a significant increase in business performance. The study revealed that product innovation helped SMMIs to attain a projected business performance on sales, profit and customers' satisfaction on products and services. Also, product innovation helped SMMIs to accomplish employee's satisfaction and market share

6.2.3 Effect of ICT and Business Performance in SMMIs in selected industrial regions in Tanzania

By testing ICT significance on business performance in SMMIs in selected industrial regions in Tanzania the results indicated that ICT was a significant contributor to business performance in SMMIs. Consequently, it was accepted in this study that conclusively ICT has a significant effect on business performance in SMMIs, particularly on increased sales (BP1), profit (BP2), customers' satisfaction on products and services (BP3), employee's satisfaction (BP4) and market share (BP5).

Regardless of increased Business performance gained because of the application of ICT, most of such results are from developed countries and relate to large firms

contrary to the situations in developing countries like Tanzania. The study attempted to suggest that ICT improved business performance was due SMMIs and their workers have acquired the right technologies, proper strategic planning, good capturing ICT growth opportunities and education/training and in emerging competencies.

6.2.4 Mediating effect of product innovation on the influence of ICT application on business performance in selected industrial regions in Tanzania

The approach used in this study acknowledged the mediating effect of product innovation on the causal relationship between ICT use and business performance. Using SEM in a proposed conceptual framework showed that ICT use is a product innovation enabler establishing that ICT use has a direct effect on business performance in manufacturing industries.

Through this study, the researcher observed that there was mediated effect of ICT use that worked well through product innovation. For that matter, data analysis indicates a proper path by which ICT use contributes to product innovation and hence business performance of SMMIs in Tanzania. In addition to the direct and mediated results of ICT use on business performance, this study informs that other factors can boost up product innovation and business performance.

6.2.5 Theoretical Contributions

This study contributes towards increased understanding of Technology Adoption Model (TAM) and Dynamic capability (DC). TAM has been referred to in studies

relating to ICT application. Davis (1987) opines that the process of adoption of ICT depends on how its usefulness is perceived, adopted and applied. Regardless of successful use of TAM, the approach was criticized to have serious weaknesses relating to its validity since some studies associated with the concept of TAM were conducted in academic environments where students were used as respondents to research tools.

In the effort to overcome the two challenges indicated above, first, this study was done in business environments that sampled SMMIs and the respondents to the research tools were firm Managers, Engineers, and Technicians, and not students. In overcoming the organization's capability limits, this study adopted the DC theory. In this scenario, product innovation capability was considered as a higher order factor able to integrate and configure the main resources such as to achieve the desired innovations leading to good performance of the manufacturing firms.

Based on this thinking, the researcher considered that product innovation-related resources were complementary to each firm’s dynamic product innovation capability particularly in relation to tangible and intangible products. In integrating the two chosen theories it was discerned that there was a significant relationship between ICT and business performance as mediated by product innovations in SMMIs. The analysis showed that the application of TAM alone is not enough to effect better business performance, but integrating with DC, particularly product innovation capability, led to better results than in the case of the application of each individual factor standing alone.

6.3 Policy Implication

6.3.1 Policy Implication

The ICT policy of Tanzania URT (2016), provides that ICT should be applied in improving the performance of the manufacturing and other industries. It presses and emphasizes on the role of innovation in improving the quality and market acceptability of industrial products from Tanzania. So, results of this study have shown how the application of ICT has a contribution to the relationship between business performance and as mediated by product innovation in selected industrial regions in Tanzania.

The study provides recommendations for ICT policy makers such as MITM, SIDO, TCCIA to enable them to better understand current developments in the ICT industry and the extent to which ICT continues to effectively impact SMMIs to increase productivity. Furthermore, this also study helps policy makers to evaluate the current status of product innovations and business performance in SMMIs and so to improve existing policies beyond the last review of 2016.

6.3.2 Managerial Implication

The findings of this study provide several practical implications and areas for futuristic actions. First and foremost, the findings of this study, suggest that industry managers and all role players in the manufacturing sector with a focus on SMMIs need to consider serious application of relevant ICT hard and software for improved performance, quality, and market competitiveness of manufactured goods. One of the main goals of the ICT policy, 2016 of the URT is to provide for more room to use

modern technologies in enhancing the performance of SMMIs and indeed all industries in the URT.

This study has shown a significant relationship between the contribution of ICT and consequent effect on product innovation and business performance. This provides a practical appeal to SMMIs managers that ICT use should be continuously promoted and enhanced. CEOs of manufacturing and indeed process industries should invest more in the application of ICT, relevant staff training, and establish and publicly disclose that they now have product innovation and quality assurance environments.

Regardless of the successful part of ICT use and its associated effects, it should be noted that not all ICT users are successful in business. This study signals that ICT alone is not the only determinant of performance of ICT across the firms; it is a subject type of organization, technology, and business environment. From the study sometimes ICT effect need to be mediated. So, there is a need to train employees to enable them to realize some of the hidden benefits of ICT towards improved business performance. If ICT is not well instituted and controlled in the firm, particularly the use of the internet, the technology can lead to poor performance of the manufacturing sector of a country's economy.

For instance, UNECA, (2012) reports that ICT caused conflicts and violence among staff hence hindering the desired maximum performance of firms. Furthermore, Asongu and le Roux (2017) reports that ICT had an insignificant correlation to product innovation. ICT failure is not only found in developing countries alone,

Saran (2012) found out that 70% of failed ICT projects did not meet their targeted business goals in developed countries. This contradicting outcome of ICT use provides an alert to all managers and industry practitioners that the technology should not be taken for granted that it can and must lead to improved business performance.

This study recommends that other factors for improved business improvement should be considered in relation to SMMIs. The researcher suggests and recommends that SMMIs management, researchers, and academicians should periodically evaluate the status of ICT application and the extent to which it assists in improving the performance of businesses.

6.4 Recommendations

The effect of ICT investment and use on business performance in firms has become more evident when concurrently mediated by product innovation process. By developing and testing SEM under the observed variables and error measurements, this research provides new confirmation on ICT and product innovation as sources of improved business performance in SMMIs in selected industrial regions in Tanzania.

6.5 Limitations of the Study and Recommendations for Future Studies

This study focused on effect of ICT on product innovation and business performance in SMMIs in selected industrial regions in Tanzania.

First the purposive sampling survey approach for data collection was not adequate for generalizing from the findings. So, future studies are needed that use random sampling approach in addressing establishing the relationships between ICT use, product innovation, and business performance for SMMIs in Tanzania

Secondly, based on the conceptual model used, this study used SEM based on AMOS version 26 to test the relationships between independent, mediated, and dependable variables as a unit system in the study. With the use of SEM, it was only possible to test the relationship between two variables independently. So, future research is recommended for the use of SEM, with a higher response rate for testing the relationship between the variables.

Thirdly, since the validity of data that was collected has elapsed, there is a possibility to get more accurate data that will add value to the analysis. This study recommends that qualitative analysis be instituted to advance and provide better results. This study suggest that the use of a mixed research approach will help to provide a clearer understanding of the study phenomena.

Finally, this study focused on the mediating role of product innovation. There are other organizational dynamic capabilities in business environment variables and industrial focus that could lead to better results based on the proposed model relationship. In the cause of using other variables, the use of moderating or mediating approach can better test their effects.

6.6 Implications

6.6.1 Policy Implication

The results from this study reveal that for SMMIs to improve their business performance, they require ICT and product innovation for better performance. Policy makers particularly on ICT need to jointly promote ICT use with matching training employees. Promoting ICT without promoting the concept and skills of innovation particularly in product design, can fail to achieve set business goals. The policy should strengthen the link between ICT use and innovations in general, with due enhancement of the business environment between local SMMIs and the international role players in relating businesses.

Based on the results of this study, it is important to emphasize the essence of deliberate coordination of efforts to promote ICT use with product innovation practices in SMMIs in Tanzania. For instance, public policies to promote ICT use in SMMIs without considering the complementary concerns for product innovation, may not lead to the expected improvement in business performance.

In addition, since ICT use has mediated effect on the performance of SMMIs, firms that invest in employing and training more human resource stand better chances to increase ICT use and product innovation that eventually leads to improved business performance. ICT investment should go hand in hand with the DC of firms particularly in product innovation capabilities. These will be better off than those which concentrate on one factor alone for the promotion of productivity. This knowledge is important to policy makers because it enables them to have better

choices in planning combination of policy initiatives and performance measurement indicators of ICT use and product innovation capability of industries.

6.6.2 Managerial Implications

This study has management implications for SMMIs managers in developing countries, particularly in Tanzania. Managers should realize that SMMIs have a significant contribution to GDP amidst increasing competition in product quality. In responding to global business competition, SMMIs should seek to increase market sales, profits, and customer satisfaction on products and services given. Employee satisfaction and rising market shares can be better realized with modern ICT based facilities and operations.

Industries of all sizes should keep on using ICT for improved product innovation and they should make aggressive use of existing product innovation capabilities in their SMMIs. As indicated earlier, the total ICT effect on business performance in SMMIs was higher than the direct effects of ICT on product innovation. This study recommends that SMMIs should intensify open innovation through external linkages with other SMMIs including involvement and embraced advice from SIDO. SMMIs should also continue to innovate especially in the design and packaging of new products irrespective of the type of SMMI size and level of capital investment to survive in the business competition environment.

However, business owners or managers must also formulate new strategies to make their SMMIs and associated services and products more competitive and innovative.

Current SMMIs are bound to choose either to become product innovation-oriented, product imitation oriented, or both. SMMs can choose and plan how best to execute a product innovation path whereby ICT will lead the way to greater competitiveness of products and services. 21`1-+

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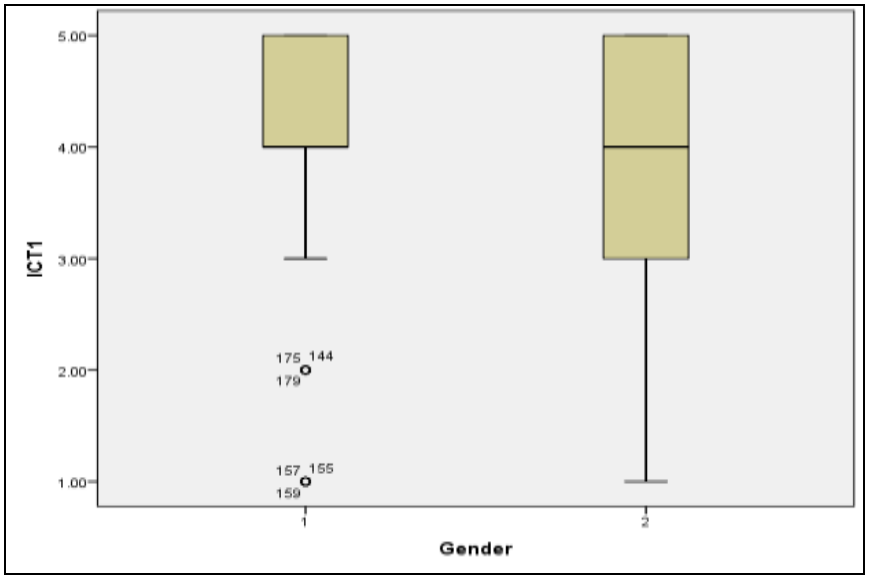
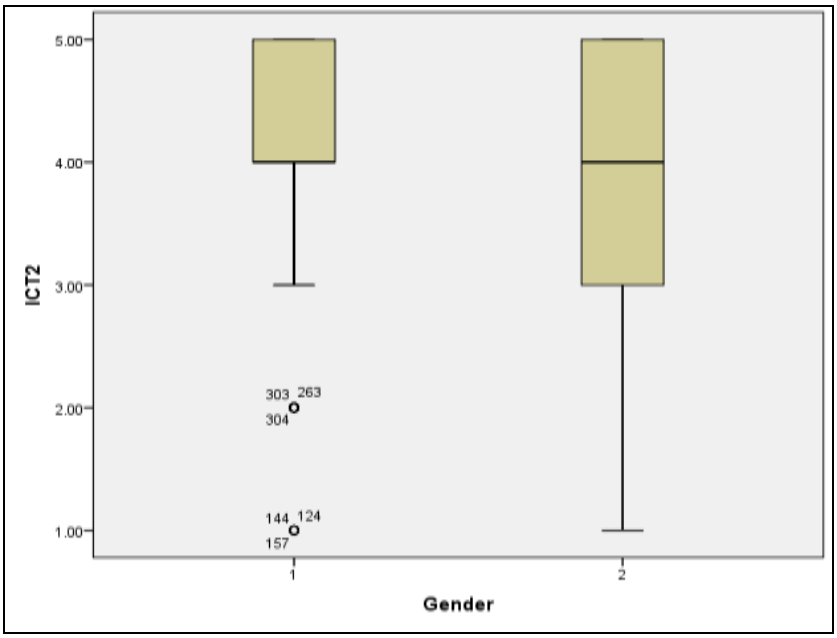
APPENDICES

Appendix 1: Box Drop

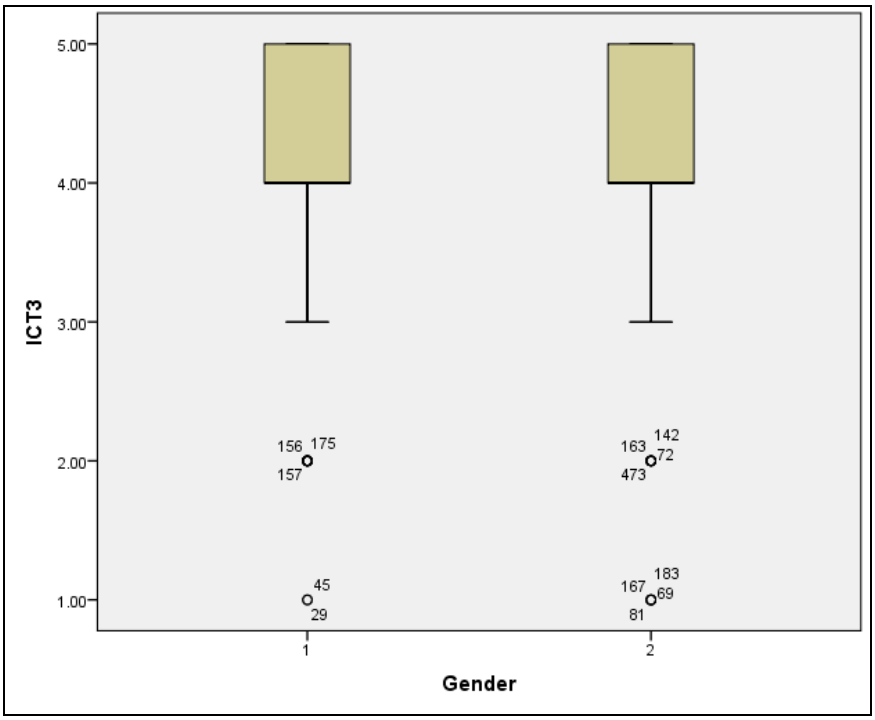
ICT 1



ICT2



ICT3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4.00
3.00
2.00
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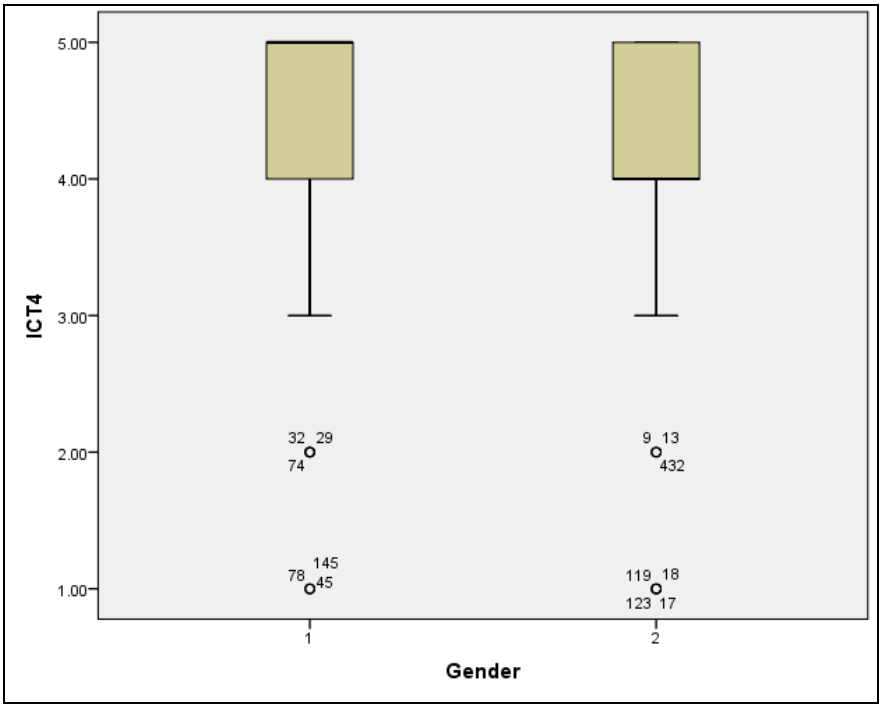
ICT3
156 175
157
45
29
163 142
72
473
167 183
69
81
1
2
Gender

ICT4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4.00
3.00
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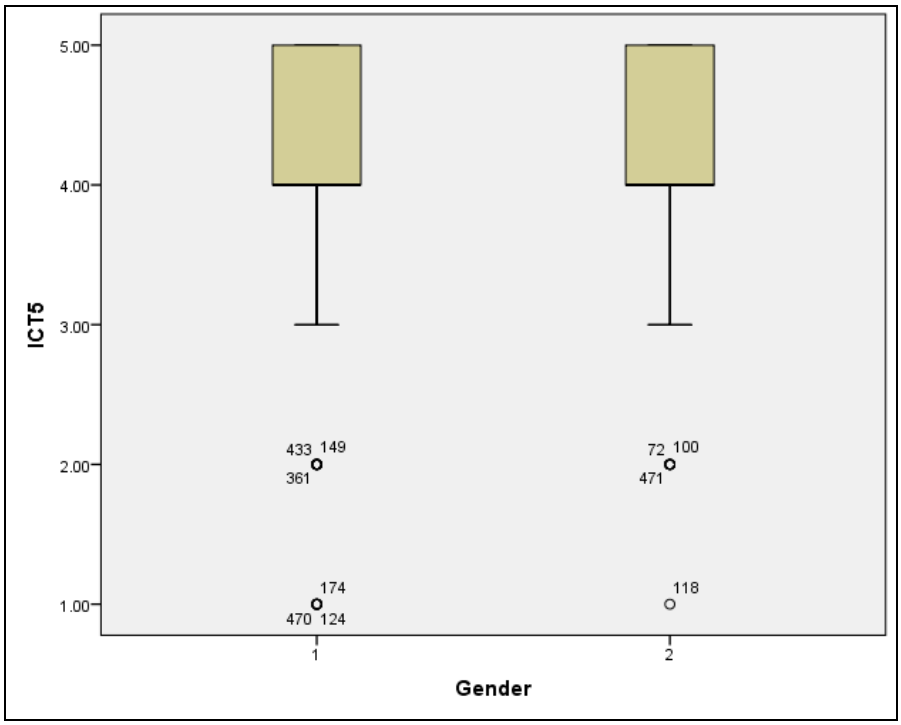
1.00
ICT4
32 29
74
78 145
45
9 13
432
119 18
123 17
1
2
Gender

ICT5


5.00
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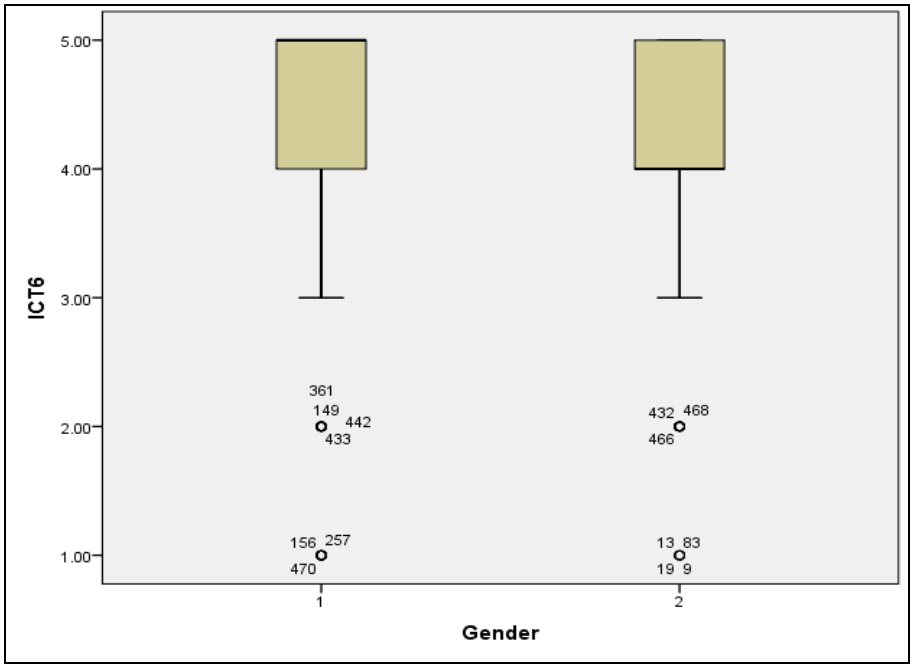
2.00
1.00
ICT5
433 149
361
72 100
471
174
470 124
118
1
2
Gender

ICT6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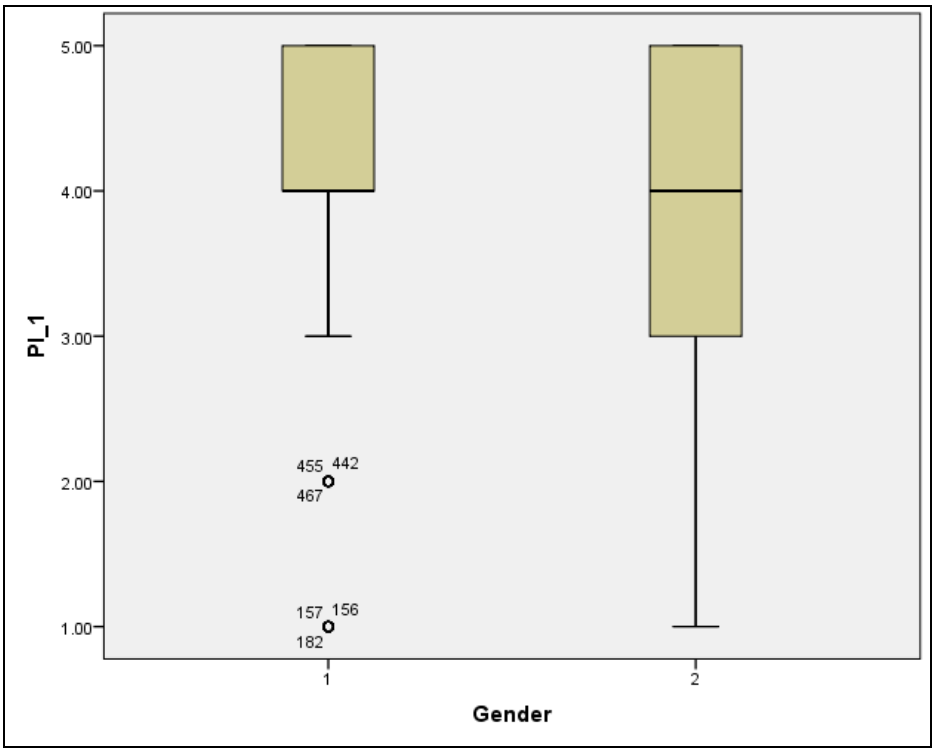
4.00
3.00
2.00
1.00
ICT6
361
149 442
433
432 468
466
156 257
470
13 83
19 9
1
2
Gender

PI_1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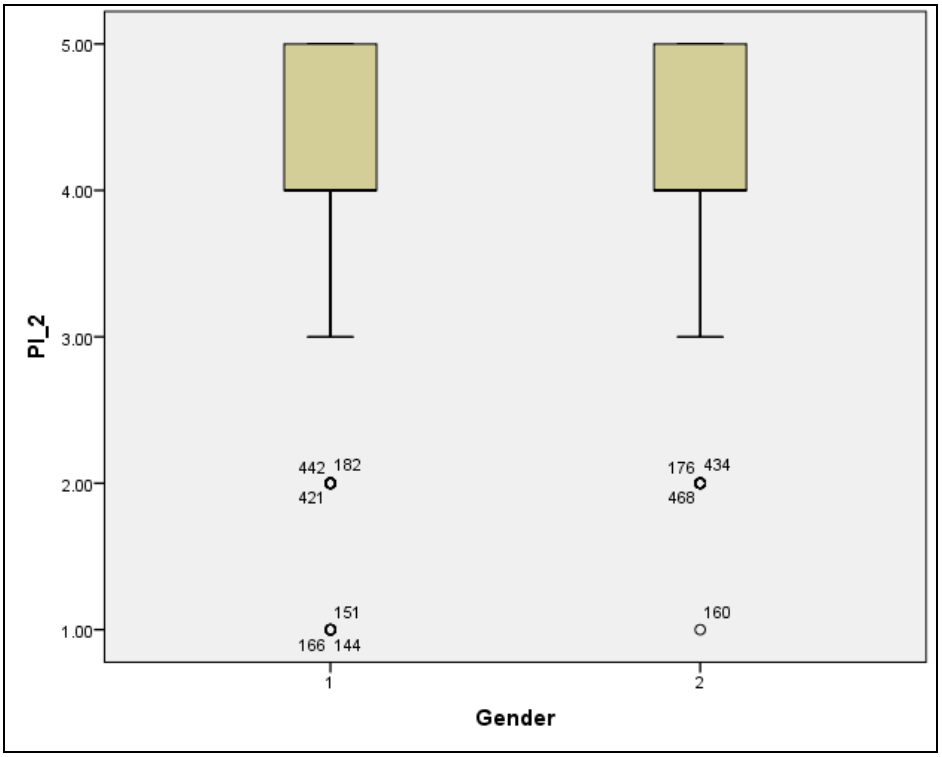
PI_1
455
442
467
157
156
182
1
2
Gender

PI_2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3.00
2.00
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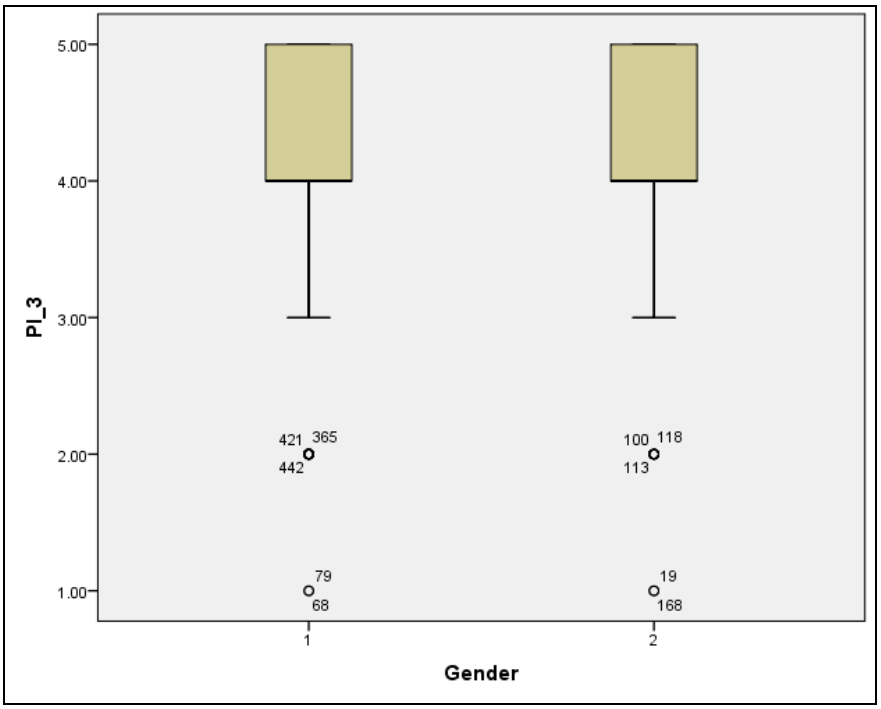
PI_2
442
182
421
176
434
468
151
166
144
160
1
2
Gender

PI_3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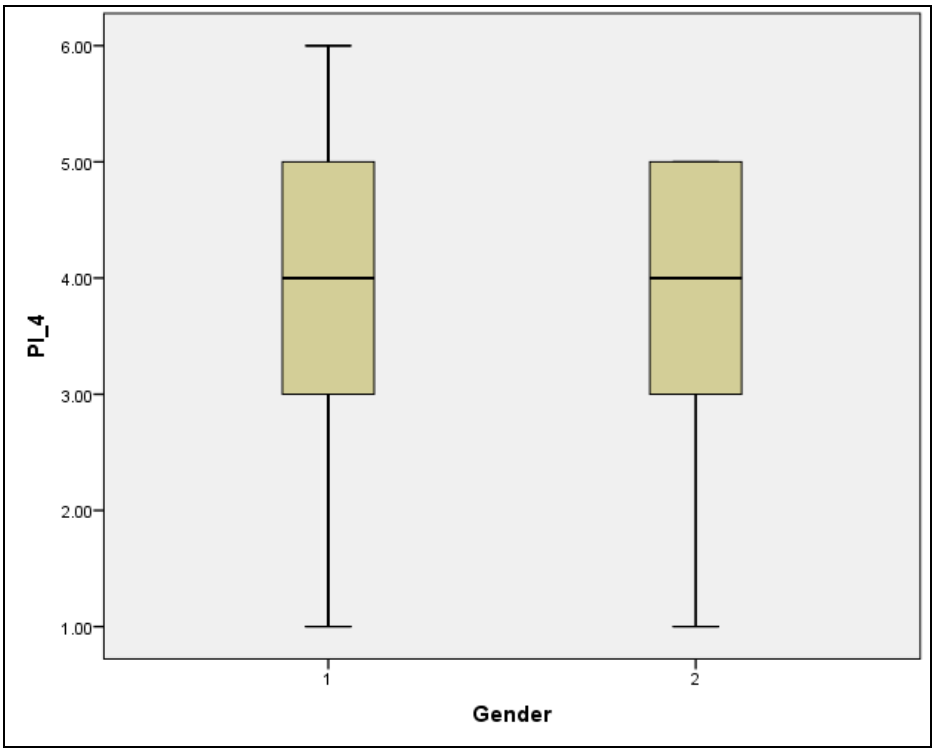
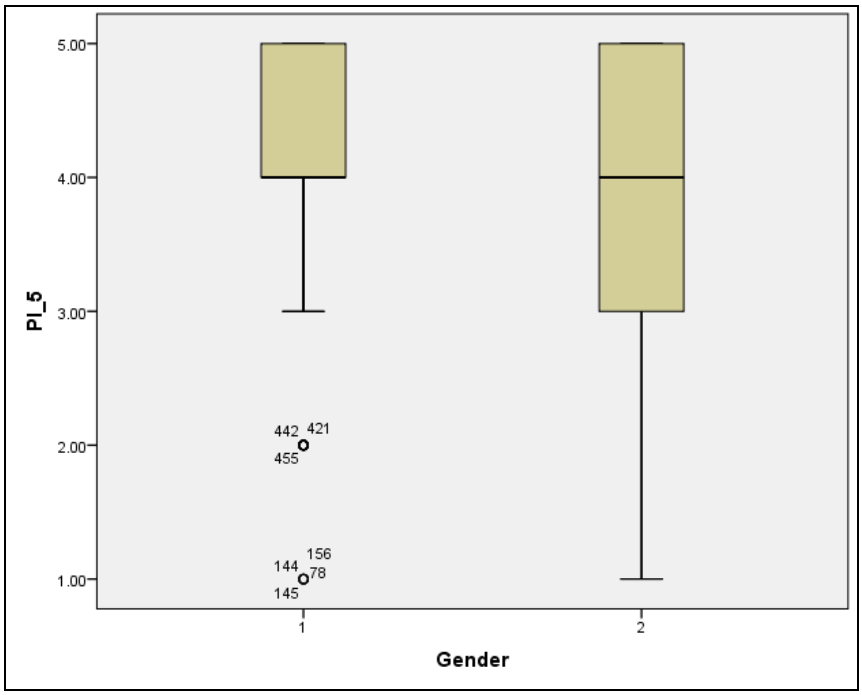
4.00
3.00
2.00
1.00
PI_3
421
365
442
79
68
100
118
113
19
168
1
2
Gender

PI_4


6.00
5.00
4.00
3.00
2.00
1.00
PI_4
1
2
Gender

PI_5


5.00
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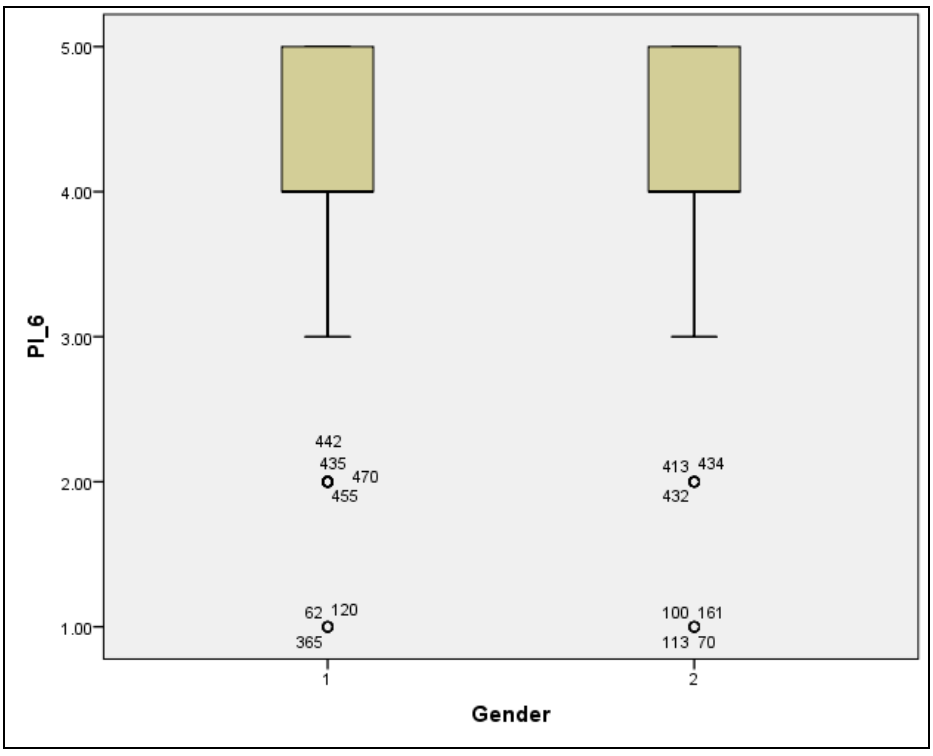
2.00
1.00
PI_5
442
421
455
156
144
78
145
1
2
Gender

PI_6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3.00
2.00
1.00
PI_6
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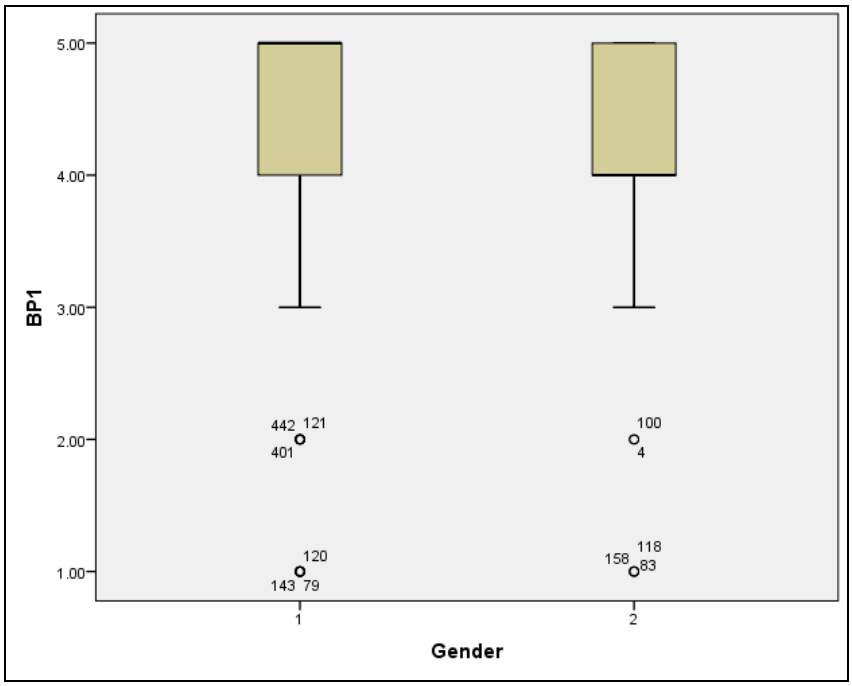
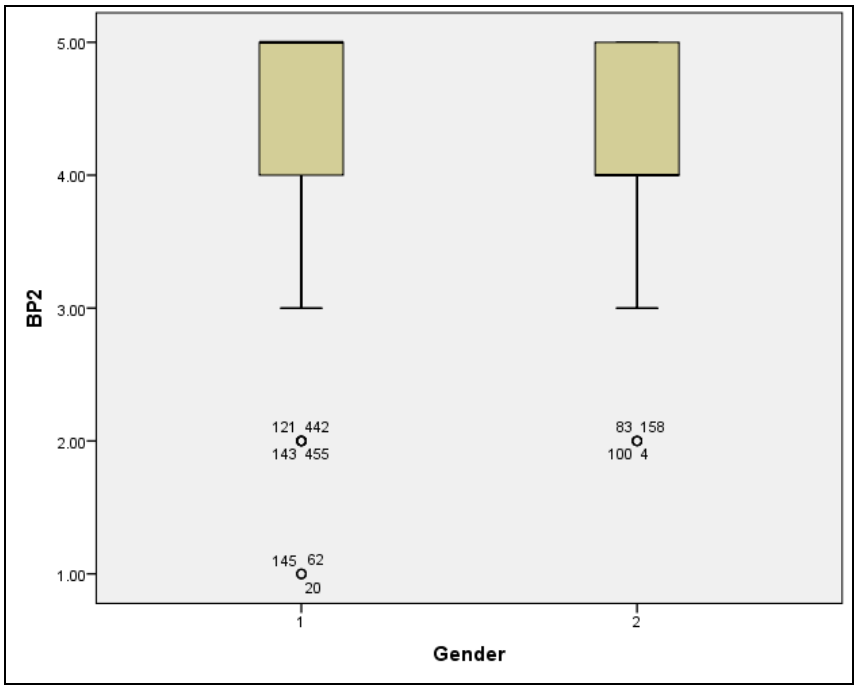
435
470
455
62
120
365
413
434
432
100
161
113
70
1
2
Gender

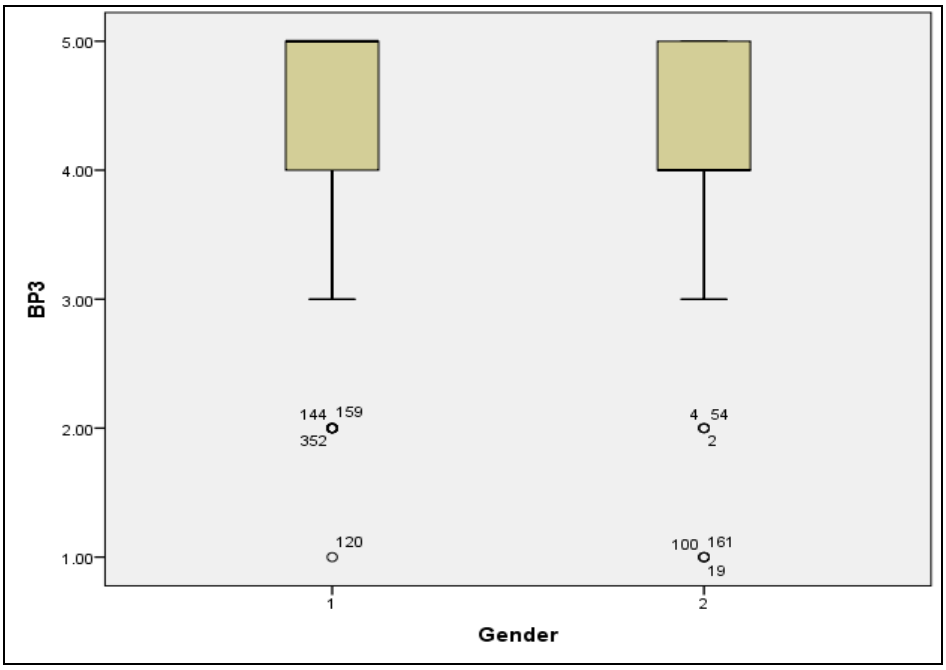
BP1


5.00
4.00
3.00
2.00
1.00
BP1
442 121
401
120
143 79
100
4
118
158 83
1
2
Gender

BP2


5.00
4.00
3.00
2.00
1.00
BP2
121 442
143 455
145 62
20
83 158
100 4
1
2
Gender

BP3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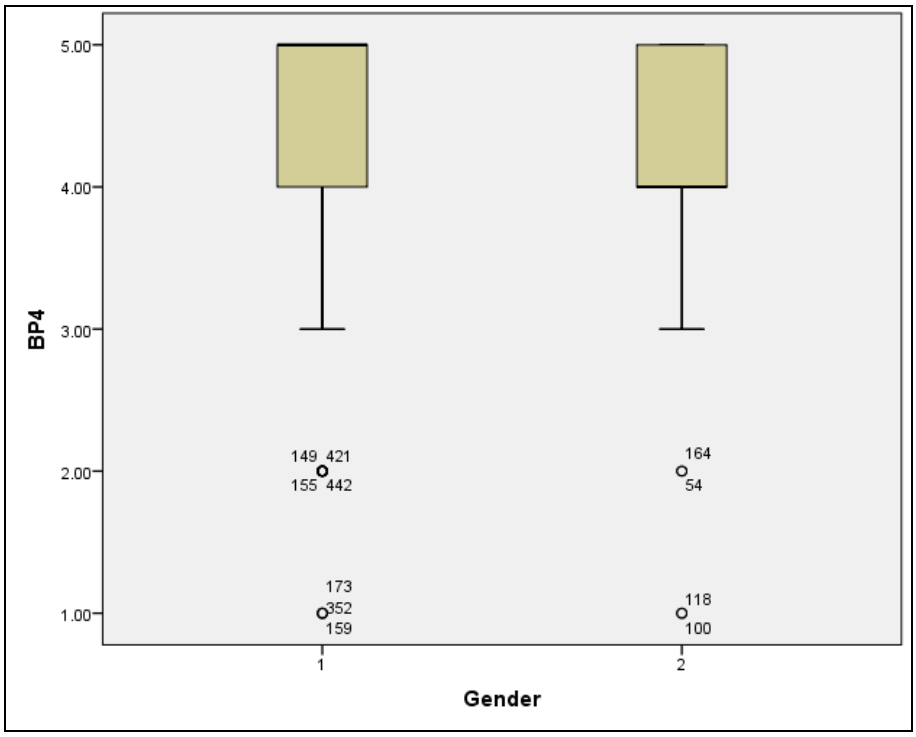
2.00
1.00
BP3
144 159
352
120
4 54
2
100 161
19
1
2
Gender

BP4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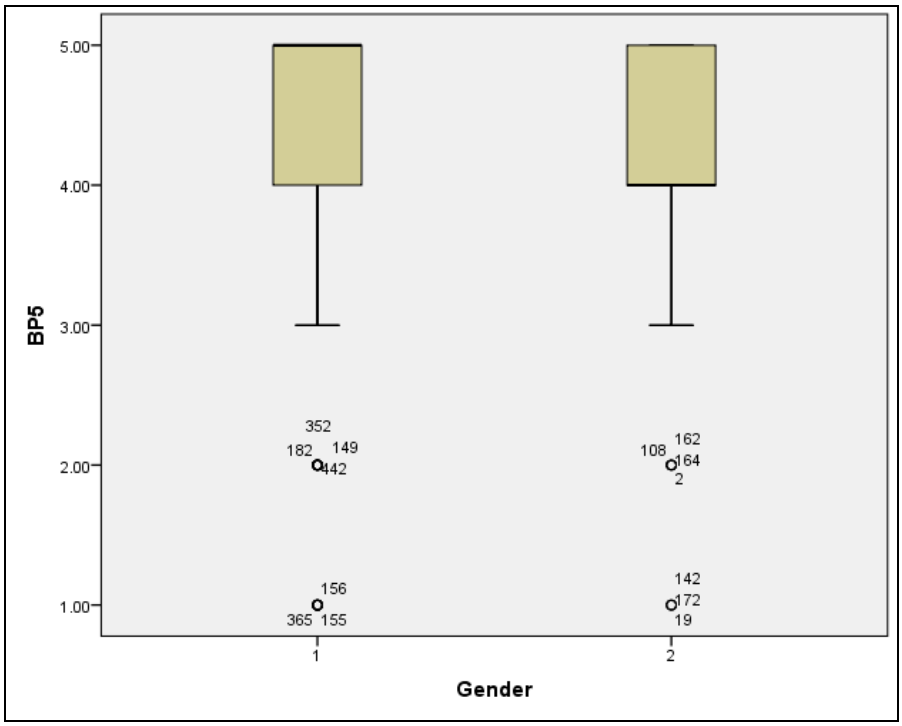
4.00
3.00
2.00
1.00
BP4
149 421
155 442
173
352
159
164
54
118
100
1
2
Gender

BP5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4.00
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2.00
1.00
BP5
352
182
149
142
156
365
155
162
108
164
2
142
172
19
1
2
Gender

Appendix II: Mahalanobis distance results

ICT1	ICT2	ICT3	ICT4	ICT5	ICT6	PI_1	PI_2	PI_3	PI_4	PI_5	PI_6	BP1	BP2	BP3	BP4	BP5	DV	MAH_1	pMAH_1	Pvalue
5	5	5	5	5	5	2	2	2	3	2	2	4	4	4	2	4	60	35.72991	0.005	1.00000
2	2	2	4	4	4	4	3	3	2	4	4	4	4	3	5	5	71	35.80321	0.0049	1.00000
3	3	3	4	4	4	4	4	4	3	2	5	4	3	5	3	2	96	35.80399	0.0049	1.00000
4	5	5	5	4	5	3	2	2	3	1	2	3	3	2	2	3	49	35.82617	0.0048	1.00000
3	3	3	3	3	3	4	4	1	3	1	3	4	4	4	4	3	40	35.98672	0.0046	1.00000
3	3	3	3	3	3	5	3	3	3	3	3	4	4	4	1	4	110	36.32843	0.0041	1.00000
5	5	5	5	5	5	2	2	2	3	2	2	2	2	3	3	4	61	36.91995	0.0035	1.00000
4	4	4	1	5	3	3	3	3	4	4	5	3	3	3	3	4	34	37.03106	0.0033	1.00000
3	3	4	2	5	1	3	3	3	3	3	4	3	3	3	3	3	36	37.14167	0.0032	1.00000
4	4	4	4	4	4	1	4	4	2	2	3	5	5	5	5	5	50	37.36981	0.003	1.00000
2	2	4	2	2	2	2	4	4	4	4	2	4	4	4	4	4	39	37.50777	0.0029	1.00000
4	4	4	5	5	4	1	3	3	3	3	2	4	4	3	4	5	58	38.32411	0.0022	1.00000
3	3	3	3	3	4	4	3	1	5	3	2	3	4	3	3	4	35	38.70439	0.002	1.00000
4	4	4	3	3	3	3	3	3	5	5	1	4	4	4	4	3	38	39.90915	0.0013	1.00000
3	2	4	5	5	5	3	3	4	2	1	3	4	4	4	2	2	52	40.19948	0.0012	1.00000
4	4	3	3	2	5	4	3	3	4	1	4	4	4	3	3	4	32	41.97837	0.0007	1.00000
2	2	3	3	4	2	4	4	4	2	3	1	1	1	2	3	4	48	43.9793	0.0003	1.00000
3	4	4	1	5	3	5	5	5	3	3	4	3	3	3	3	3	28	44.29303	0.0003	1.00000
3	3	3	3	5	5	3	3	3	3	3	3	4	3	4	5	1	114	44.48838	0.0003	1.00000
1	3	3	5	3	4	3	3	4	2	5	1	3	3	3	3	3	21	45.59188	0.0002	1.00000
3	3	3	3	2	5	3	1	3	3	4	5	3	3	3	3	3	20	45.68335	0.0002	1.00000
4	2	4	4	1	1	4	4	3	5	3	4	5	5	4	4	5	30	46.07014	0.0002	1.00000
5	1	3	4	5	3	3	1	3	5	3	3	3	3	3	3	3	18	46.45125	0.0001	1.00000
1	2	1	3	4	5	3	4	4	4	2	5	3	3	3	3	3	23	47.07159	0.0001	1.00000
4	3	1	5	3	3	3	4	3	3	3	3	4	3	3	3	3	27	47.34792	0.0001	1.00000
4	5	4	1	3	4	4	4	3	5	1	4	4	4	4	3	5	22	47.73519	0.0001	1.00000
3	5	4	5	3	3	5	3	5	5	3	4	5	5	5	5	3	31	48.10258	0.0001	1.00000
5	5	5	4	3	1	5	4	4	5	5	5	5	5	3	4	4	5	42	48.16398	0.0001	1.00000
3	3	4	3	4	3	4	1	4	5	5	5	5	5	5	5	5	24	49.97417	0	1.00000
1	1	4	4	1	1	2	4	4	4	4	2	4	4	4	4	4	17	54.2535	0	1.00000
1	1	2	3	5	4	1	2	4	5	3	3	3	3	4	5	1	33	54.25542	0	1.00000

ICT1	ICT2	ICT3	ICT4	ICT5	ICT6	PI_1	PI_2	PI_3	PI_4	PI_5	PI_6	BP1	BP2	BP3	BP4	BP5	DV	MAH_1	pMAH_1	Pvalue
5	5	5	5	3	4	5	5	5	2	4	3	5	5	2	1	2	75	54.36883	0	1.00000
5	5	5	5	2	2	3	5	3	2	2	3	4	4	3	5	3	25	55.3354	0	1.00000
4	3	1	5	3	3	3	4	3	5	3	1	3	3	3	3	3	14	55.92396	0	1.00000
3	1	3	4	5	2	1	2	4	5	3	3	1	2	4	5	3	37	57.13659	0	1.00000
2	4	4	4	4	2	2	2	5	4	2	2	5	5	3	3	3	29	60.471	0	1.00000
1	3	1	5	5	5	3	3	5	5	3	3	4	5	5	5	5	16	63.44142	0	1.00000
3	3	3	3	3	3	3	3	3	5	5	1	4	5	1	3	4	43	65.79272	0	1.00000
1	2	2	3	4	4	5	5	5	1	2	3	3	4	3	5	1	19	74.08304	0	1.00000
1	2	3	5	3	5	1	2	3	4	3	3	5	3	4	2	1	45	75.39438	0	1.00000
2	1	4	3	5	2	3	1	3	5	1	3	3	4	2	5	4	13	83.80086	0	1.00000
1	2	3	5	4	1	1	2	4	5	1	3	1	2	5	5	3	15	84.49684	0	1.00000
4	5	2	3	4	1	1	2	3	4	1	5	3	4	5	3	1	10	89.51862	0	1.00000
1	5	2	5	3	4	3	3	2	2	5	5	1	2	5	3	4	12	90.91613	0	1.00000
3	3	3	4	5	1	1	3	5	1	4	2	3	1	3	5	1	7	91.97962	0	1.00000
3	5	5	5	5	5	5	5	2	4	5	1	5	5	4	3	1	6	94.06383	0	1.00000
1	2	4	5	3	3	5	1	2	4	5	3	5	4	2	1	3	4	95.60649	0	1.00000
4	3	5	1	4	5	2	2	3	5	1	4	3	1	3	5	4	11	95.88455	0	1.00000
1	5	4	3	1	5	1	3	2	3	1	5	1	3	5	1	5	5	111.4271	0	1.00000
1	2	4	5	1	5	1	2	4	5	3	1	1	4	1	3	1	9	113.1326	0	1.00000
3	1	5	3	1	5	1	2	5	3	5	1	1	5	3	2	5	3	151.6117	0	1.00000
1	5	2	4	1	5	1	5	1	3	2	5	1	5	4	2	2	2	143.4935	0	1.00000
3	3	3	4	5	1	4	4	1	1	2	4	4	5	1	5	1	8	130.2881	0	1.00000
1	4	5	1	5	2	1	5	3	4	1	5	4	3	3	5	4	1	128.6079	0	1.00000

Appendix III: Questionnaire in English language

Questionnaire for survey

Dear Respondent,

My name is Wilson KIUNSI, a Doctoral student in the Faculty of Business Management at the Open University of Tanzania. Currently, I am undertaking a research on the effect ***of ICT on Product Innovation and Business Performance in Small and Medium Manufacturing Industries in Tanzania***", in fulfilment of the requirement for award of the Doctor of Philosophy (PhD) degree of the university. This research intends to investigate whether ICT use in Small and Medium Manufacturing Industries has any effect on product innovation and business performance in Tanzania.

As manager / Owner of the industry, you are humbly requested to share your experience by filling this questionnaire. You have been selected to be part of this survey because your industry uses ICT in its daily operations. I am aware that you are very busy; however, I would be extremely grateful if you would please reserve a few minutes to fill this questionnaire. The data collected in this study will be treated as confidential and disclosed to no one. The information obtained from your participation will help ICT and Small and Medium Manufacturing Industries policy makers to develop proper better strategies to assist industries to grow in the country Furthermore, results obtained from this study will help managers to use ICT innovatively for the better growth of their industries.

Thanking you in advance

Yours sincerely,

Wilson KIUNSI

PhD Candidate, (The Open University of Tanzania)

SECTION A: Background Information

To each question please **Tick (√)** the information that matches your view most closely or write your answer if needed. The information on the questionnaire will only be used for this study.

	Item		**Measures**	**TICK**
1.	Region	a.	Dar Es Salaam	
		b.	Morogoro	
		c.	Arusha	
		d.	Mwanza	
2.	Gender	e.	Male	
		f.	Female	
3.	Age (years)	a.	18-35	
		b.	36-45	
		c.	46-54	
		d.	Above 54	
4.	Education level	a.	Primary	
		b.	Secondary	
		c.	Certificate	
		d.	Diploma	
		e.	Bachelor's Degree	
		f.	Other, Please specify;	
5.	Your position (designation) in this business	a.	Owner manager	
		b.	CEO	
		c.	Director	
		d.	Manager	
6.	Your position (designation) in this business	a.	Owner manager	
		b.	CEO	
		c.	Director	
		d.	Manager	
7.	Length of service in manufacturing industries (years)	a.	Below 5	
		b.	6 -10	
		c.	11-15	
		d.	Above 15	
8.	Industrial sector	a.	Textiles and apparels	
		b.	Timber, Wood Products and Furniture	
		c.	Food, Beverage and Tobacco	
		d.	Chemicals and fertilisers	
		e.	Metal and Metal Products	
		f.	Plastic and Rubber Products	
		g.	Leather Products and Footwear	
		h.	Paper, Paper Products and Printing, Publishing & Packaging	
		i.	Electrical Equipment	
		j.	Machinery and Equipment	
		k.	Textile	
		l.	Other Please specify;	
9.	Average capital invested in this industry (TZS)	a.	Less than Tzs 5 million	
		b.	Between Tzs 5-200 million	
		c.	Between Tzs 200-800 million	

		d.	Do not know	
10.	Number of employees in this industry	a.	Less than 5 employees	
		b.	Between 5 and 49 employees	
		c.	Between 50 and 99 employees	

SECTION B: ICT Activities In The Industry

From the experiences you have with your industry for the last three (3) years, indicate to what extent you disagree or agree with the statements below by **ticking (√)** only one appropriate item for each given statement whether you; **strongly disagree, disagree, Neutral, Agree, or strongly agree**

	ICT activities in the industry	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly disagree**
11.	Our industry uses ICT for marketing products and services					
12.	Our industry uses ICT for all accounting activities					
13.	Our industry uses ICT for business transactions					
14.	Our industry uses ICT for customers' and suppliers' communication					
15.	Our industry uses ICT for product design					
16.	Our industry uses ICT for needed software development					

SECTION C: Product Innovation Activities

From the experiences you have with your industry, indicate to what extent you disagree or agree with the statements below by **ticking (√)** only one appropriate item for each given statement whether you; **strongly disagree, disagree, Neutral, Agree, or strongly agree**

	Product Innovation activities	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly disagree**
17.	Our industry develops new products with improved technical specifications and uasbility					
18.	Our industry develops products that are user friendly to customers					
19.	Our industry keeps improving in manufacturing quality products.					
20.	Our industry's products have no ill impacts to environmental					
21.	Our industry has developed new products with new components and materials					
22.	Our industry has decreased the cost of products.					

SECTION D: Business Performance Indicators

From the experiences you have with your industry for the last three (3) years, indicate to what extent you disagree or agree with the statements below by **ticking (√)** only one appropriate item for each given statement whether you; **strongly disagree, disagree, Neutral, Agree, or strongly agree**

	Business performance indicators	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly disagree**
23.	Our industry has increased its sales					
24.	Our industry has increased its profits					
25.	Our industry has increased customers' satisfaction on quality products and services					
26.	Our industry has raised employees' satisfaction					
27.	Our industry has increased its market share					

Thank you for your cooperation: Remained Blessed

Appendix IV: Questionnaire (Dodoso) in Kiswahili

Ndugu Wahojiwa

Jina langu ni Wilson Kiunsi, Mwanafunzi wa programu ya shahada ya Udaktari katika Kitivo cha Usimamizi wa Biashara, Chuo Kikuu Huria cha Tanzania. Kwa sasa ninafanya utafiti kuhusuo "***Matumizi na mchango wa TEHAMA katika Ubunifu wa Bidhaa na ufanikishaji wake wa biashara katika Viwanda Vidogo na vya Kati nchini Tanzania"*** kama takwa la kuhitimu Shahada ya Udaktari wa Falsafa (PhD). Utafiti huu unakusudia kuchunguza ikiwa utumiaji wa TEHAMA katika Viwanda Vidogo na vya Kati una tija kwenye ubunifu wa bidhaa na mafanikio katika biashara.

Kama Msimamizi/Mmiliki wa Kiwanda chako, kwa unyenyekevu nakuomba ushiriki wa uzoefu wako kwa kujaza dodoso hili. Umechaguliwa kuwa sehemu ya utafiti huu kwa sababu Kiwanda chako kinatumia TEHAMA katika shughuli zake. Ninajua kuwa una shughuli nyingi; walakini, ningefurahi sana ikiwa unaweza kutenga muda kidogo kujaza dodoso hili. Takwimu zitakazokusanywa, zitakuwa ni siri na hatapewa mtu yeyote. Taarifa inayopatikana kutokana na ushiriki wako itasaidia watengenezaji Sera ya TEHAMA na Viwanda vidogo na vya kati kuweka mikakati sahihi ya kusaidia viwanda kukua nchini. Kwa kuongezea, matokeo yatakayopatikana katika utafiti huu yatasaidia mameneja kutumia vizuri zaidi TEHAMA kiubunifu kwa ajili ya ukuaji wa Viwanda.

Natanguliza shukurani

Wako

Wilson KIUNSI

Mwanafunzi wa Udaktari wa Falsafa, (Chuo Kikuu Huria Tanzania)

SEHEMU YA 1: Taarifa Ya Awali

Kwa kila swali tafadhali weka **alama ya vema (√)** kwenye jibu linalolingana na maoni yako kwa karibu au andika jibu lako ikiwa inahitajika. Taarifa utoayo kwenye dodoso hili itatumika tu kwa ajili ya utafiti huu.

	Jambo		**Vipimo**	**Alama ya vema (√)**
1.	Mkoa wa	a.	Dar es Salaam	
		b.	Morogoro	
		c.	Arusha	
		d.	Mwanza	
2.	Jinsia	a.	Kiume	
		b.	Kike	
3.	Miaka yako ya umri	a.	18-35	
		b.	36 – 45	
		c.	46-54	
		d.	Zaidi ya 54	
4.	Kiwango cha elimu	a.	Msingi	
		b.	Sekondari	
		c.	Cheti	
		d.	Diploma	
		e.	Shahada	
		f.	nyingine….	
		Kama ingine tafadhali taja;		
5.	Muda wa utumishi katika kiwanda hiki	a.	Chini ya Miaka 5	
		b.	Kati ya Miaka 6 -10	
		c.	Kati ya Miaka 11-15	
		d.	Zaidi ya Miaka 15	
6.	Cheo chako katika kiwanda hiki	a.	Meneja Mmiliki	
		b.	Mkurugenzi Mtendaji	
		c.	Mkurugenzi	
		d.	Meneja	
7.	Umri wa kuanza kwa kiwanda hiki	a.	Chini ya miaka 5	
		b.	Kati ya miaka 5-10	
		c.	Kati ya miaka 11-15	
		d.	Zaidi ya miaka 15	
8.	Aina ya kiwanda	a.	Nguo na mavazi	
		b.	Mbao, Bidhaa za Mbao na fanicha (useremala)	
		c.	Chakula, Vinywaji na Tumbaku	
		d.	Kemikali na mbolea	
		e.	Chuma na Bidhaa za chuma	
		f.	Bidhaa za plastiki na Mpira	
		g.	Bidhaa za ngozi na viatu	
		h.	Karatasi, Bidhaa za karatasi na Uchapishaji, Uchapishaji na Ufungaji	
		i.	Vifaa vya umeme	
		j.	Mashine na Vifaa	
		k.	Nyingine....	

		Kama ingine tafadhali taja;		
9.	Wastani wa mtaji uliowekezwa katika kiwanda hiki (TZS)	a.	Chini ya Tzs million 5	
		b.	Kati ya Tz million 5-200	
		c.	Kati ya Tzs million 200-800	
		d.	sijui	
10.	Idadi ya wafanyakazi katika kiwanda hiki	a.	Chini ya wafanyakazi 5	
		b.	Kati ya wafanyakazi 5 na 49	
		c.	Kati ya wafanyakazi 50 na 99	

SEHEMU B: Matumizi ya TEHAMA Katika Kiwanda

Kutokana na uzoefu ambao umekuwa nao na Kiwanda chako kwa miaka 3 iliyopita, onyesha ni kwa kiasi gani haukubaliani au unakubaliana na taarifa hapa chini kwa kuweka **alama ya vema (√)** kwenye nafasi moja tu uonayo inafaa kwa kila ulizo ulilopewa: **1 = sikubali kabisa, 2 = sikubaliani, 3 = wastani, 4 = nakubaliana, 5 = nakubali kabisa**

	Matumizi ya TEHAMA katika kiwanda	**Sikubali kabisa**	**Sikubali**	**wastani**	**Nakubali**	**Nakubali kabisa**
11	Kiwanda chetu kinatumia TEHAMA kwa ajili ya uuzaji wa bidhaa na huduma					
12	Kiwanda chetu kinatumia TEHAMA kwa ajili ya uhasibu wote					
13	Kiwanda chetu kinatumia TEHAMA kwa ajili ya shughuli za kibiashara					
14	Kiwanda chetu kinatumia TEHAMA kwa ajili ya mawasiliano ya wateja na wauzaji					
15	Kiwanda chetu kinatumia TEHAMA kwa ajili ya muundo wa bidhaa					
16	Kiwanda chetu kinatumia TEHAMA kwa ajili ya mwendelezo wa mfumo laini					

SEHEMU YA C: Shughuli Za Ubunifu Wa Bidhaa

Kutokana na uzoefu ambao umekuwa nao na Kiwanda chako kwa miaka 3 iliyopita, onyesha ni kwa kiasi gani haukubaliani au unakubaliana na taarifa inayotolewa hapa chini kwa kuweka **alama ya vema (√)** kwenye nafasi moja tu uonayo inafaa kwa kila ulizo ulilopewa: **1 = sikubali kabisa, 2 = sikubaliani, 3 = wastani, 4 = nakubaliana, 5 = nakubali kabisa**

	Aina ya ubunifu wa bidhaa katika kiwanda	**Sikubali kabisa**	**Sikubali**	**wastani**	**Nakubali**	**Nakuba kabisa**
17.	Kiwanda chetu kinatengeneza/kinaendeleza bidhaa mpya kwa uanishaji wa kiufundi na utendaji					
18.	Kiwanda chetu kinaendeleza upya wa bidhaa za sasa na kuzifanya kuongoza katika soko na urahisi wa kutumiwa na wateja					
19.	Kiwanda chetu kimeongeza ubora wa vifaa/ bidhaa za kisasa					
20.	Bidhaa za kiwanda chetu hazina madhara kwa mazingira					
21.	Kiwanda chetu kinatengeneza bidhaa mpya kila mara					
22.	Kiwanda chetu kimepunguza gharama ya uzalishaji					

SEHEMU YA D: Viashiria vya Utendaji wa Biashara Katika Kiwanda

Kutokana na uzoefu ambao umekuwa nao na Kiwanda chako, onyesha ni kwa kiasi gani haukubaliani au unakubaliana na taarifa zifuatazo kwa kuweka **alama ya vema (√)** kwenye nafasi moja tu uonayo inafaa kwa kila ulizo ulilopewa: **1 = sikubali kabisa, 2 = sikubaliani, 3 = wastani, 4 = nakubaliana, 5 = nakubali kabisa**

	Viashiria vya utendaji wa biashara katika kiwanda	**Sikubali kabisa**	**Sikubali**	**wastani**	**Nakubali**	**Nakubali kabisa**
23.	Kiwanda chetu kimeongeza mauzo					
24.	Kiwanda chetu kimeongeza faida					
25.	Kiwanda chetu kimeongezeka kiwango cha kuridhika kwa wateja, kutokana na ubora wa bidhaa na huduma tunazotoa					
26.	Kiwanda chetu kimeongezeka kiwango cha kuridhika kwa wafanyakazi					
27.	Soko la bidhaa za Kiwanda chetu limepanuka					

Asante kwa ushirikiano wako: Ubaki Umebarikiwa

Appendix V: Map of Tanzania Showing Geographical Regions

Appendix VI: Research Clearance Testimonials

THE OPEN UNIVERSITY OF TANZANIA

DIRECTORATE OF POSTGRADUATE STUDIES

P.O. Box 23409
Dar es Salaam, Tanzania
http://www.openuniversity.ac.tz

Tel: 255-22-2668992/2668445
ext.2101
Fax: 255-22-2668759
E-mail: dpgs@out.ac.tz

REF: PG201701180

Regional Administrative Secretary,
Arusha Region,
P. O. Box 3050,
ARUSHA.

31th July, 2020

RE: RESEARCH CLEARANCE

The Open University of Tanzania was established by an Act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No.55 in the official Gazette. The Act was however replaced by the Open University of Tanzania Charter of 2005, which became operational on 1st January 2007. In line with the Charter, the Open University mission is to generate and apply knowledge through research.

To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Mr. Wilson Benjamin Kiunsi, Reg. No: PG201701180** pursuing **PhD.** We here by grant this clearance to conduct a research titled ***"Effect of ICT on Product Innovation and Business Performance in SMMIs in Tanzania"***. He will collect his data in your region from 10th August to 9th November 2020.

In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O. Box 23409, Dar es Salaam. Tel: 022-2-2668820.We lastly, thank you in advance for your assumed cooperation and facilitation of this research academic activity.

Yours Sincerely,

Prof. Hossea Rwegoshora
For: VICE CHANCELLOR
THE OPEN UNIVERSITY OF TANZANIA

THE OPEN UNIVERSITY OF TANZANIA

DIRECTORATE OF POSTGRADUATE STUDIES

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E-mail: dpgs@out.ac.tz

REF: PG201701180

Regional Administrative Secretary,
Dar es Salaam Region,
P. O. Box 5429,
DAR ES SALAAM.

31th July, 2020

RE: RESEARCH CLEARANCE

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Yours Sincerely,

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THE OPEN UNIVERSITY OF TANZANIA

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REF: PG201701180

Regional Administrative Secretary,
Morogoro Region,
P. O. Box 650,
MOROGORO.

31th July, 2020

RE: RESEARCH CLEARANCE

The Open University of Tanzania was established by an Act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No.55 in the official Gazette. The Act was however replaced by the Open University of Tanzania Charter of 2005, which became operational on 1st January 2007. In line with the Charter, the Open University mission is to generate and apply knowledge through research.

To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Mr. Wilson Benjamin Kiunsi, Reg No: PG201701180** pursuing **PhD.** We here by grant this clearance to conduct a research titled ***"Effect of ICT on Product Innovation and Business Performance in SMMIs in Tanzania "***. He will collect his data in your region from 10th August to 9th November 2020.

In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O. Box 23409, Dar es Salaam. Tel: 022-2-2668820.We lastly, thank you in advance for your assumed cooperation and facilitation of this research academic activity.

Yours Sincerely,

Prof. Hossea Rwegoshora
For: VICE CHANCELLOR
THE OPEN UNIVERSITY OF TANZANIA

THE OPEN UNIVERSITY OF TANZANIA

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Regional Administrative Secretary,
Mwanza Region,
P. O. Box 119,
Mwanza .

31th July, 2020

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