.

A Model Using ICT Adoption and Training to Improve the Research Productivity of Academics

by

Sujit Kumar Basak (20930065)

Submitted in fulfilment of the requirement of the Doctor of Technology degree in Information Technology in the Department of Information Technology, Faculty of Accounting and Informatics, Durban University of Technology, Durban, South Africa

December 2014

Supervisor:……………………………

Dr. Desmond Wesley Govender
PhD (Information Systems); Masters (Digital Communication and Media/Multimedia); Honours in Computer Science

Co-supervisor:……………………………

Dr. H. L. Garbharan,
DPA; MPA; Hons.; B. A.

DECLARATION

I, Sujit Kumar Basak declare that this dissertation is a representation of my own work both in conception and execution. This work has not been submitted in any form for another degree at any university or institution of higher learning. All information cited from published or unpublished works have been acknowledged.

______________________ ________________________

Student Name Date

Approved for final submission

Supervisor Date

Co-supervisor Date

Supervisors Permission to Submit For Examination

Student Name: Sujit Kumar Basak

Student No.: 20930065

Dissertation Title:
A Model Using ICT Adoption and Training to improve the Research Productivity of Academics

As the candidate's supervisors, we agree to the submission of this dissertation for examination.

The above student has satisfied the requirements of English Language competency.

…………………………………………………………….

Supervisor: Dr. Desmond Wesley Govender
PhD (Information Systems); Masters (Digital Communication and Media/Multimedia); Honours in Computer Science

……………………………………………………………

Co-supervisor: Dr. Hari Lall Garbharran
DPA; MPA; Hons.; B. A.

This work is

Dedicated

To My

Beloved

Father & Mother

Sudhir Chadra Basak

Maya Rani Basak

ACKNOWLEDGEMENTS

I would like to thank many individuals for their contribution to the completion of this dissertation.

Dr Desmond W. Govender and Dr Hari. L. Garbharran, I would not be where I am today if it were not for you. Thank you for your guidance and advice.

Prof Seraphin D. Eyono-Obono thank you for your contribution.

Mother, **Father, Brothers** and **Sister**, thank you for all of your help, support, and patience. ***Mother***, thank you very much because you always expected the best from me. ***Father***, thank you very much for putting pressure on me by making me your role model. ***Brothers***, ***Sister-in-law***, ***Sister*** *and* ***Brother-in-law***, thank you for your encouragement.

My friends **Prof. K. C. Raju** and **Mr. Micah Odhiambo Nyamita** thank you for your assistance and encourangement.

Family and **Friends**, I would like to thank everyone for their time, patience and encouragement. You are all greatly cherished and appreciated.

May almighty God bless you.

ABSTRACT

Research productivity is one of the core functions of a university and it plays a crucial role for a nation to develop and find its standing in our global world. This study examined the effect of ICT adoption and training on the research productivity of university academics. Much research has been done on using technology in research with a view to increase productivity. However, hardly any research could be found on the use of ICT combined with ICT training with a view to increase research productivity. This study addressed this gap in the literature. The study sought to design a model that can increase research productivity of academics while optimizing ICT adoption and training effects.

The study was conducted at four public universities in KwaZulu-Natal, South Africa, whilst the part of the study on ICT training was conducted at one of the four universities. This study was conducted both in the form of a survey of 103 university academics and in the form of experimental sessions, where the use of ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) with training was used for research, the use of ICT without training was used for research and, finally, a session where a manual system (without using research software/tools and training) was used for research.

The overall aim of the study was to investigate and design a model for the increase in research productivity of academics in universities after having adopted ICTs. The final results of the research revealed that the use of ICT tools (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) with training increases research productivity as compared to using ICT tools without training, and/or using a manual system (without using research software/tools and training). A statistically proven model is recommended with a view to increase research productivity of academics.

TABLE OF CONTENTS

TITLE PAGE		i
DECLARATIONA		ii
SUPERVISORS' PERMISSION TO SUBMIT FOR EXAMINATION		iii
DEDICATION		iv
ACKNOWLEDGEMENTS		v
ABSTRACT		vi
TABLE OF CONTENTS		vii
LIST OF FIGURES		xiii
LIST OF TABLES		xv
CHAPTER ONE		1
INTRODUCTION		1
1.1	Background of the Study	1
1.2	Research Problem	5
1.3	Research Aim, Objectives and Research Questions	7
1.4	Rationale	7
	1.4.1 Financial Incentives	8
	1.4.2 Non-financial Incentives	9
	1.4.3 Comparing Financial and Non-financial Incentives	9
1.5	Methodology	10
1.6	Thesis Outline	11
1.7	Summary	12
CHAPTER TWO		13
LITERATURE REVIEW		13
2.1	Introduction	13
2.2	Research and Research Productivity	14
2.3	General Research Productivity Factors	14
2.4	Impact of ICT on Research productivity	17
2.5	Joint Effect of Technology Adoption and of Technology Training on Work Performance (Productivity)	21
2.6	Research Productivity Tools	25
	2.6.1 Turnitin	25

2.6.2 Analysis of Moment Structure (AMOS) 26

2.6.3 NVivo 28

2.6.3.1 Literature Review 28

2.6.3.2 Qualitative Data Analysis (e.g., interview, audio, and video) 29

2.6.4 SPSS (Statistical Package for the Social Sciences) 30

2.6.5 EndNote 31

2.7 Summary 32

CHAPTER THREE 33

THEORETICAL FRAMEWORKS, THEORIES, AND MODELS 33

3.1 Supporting Theory 33

3.1.1 Employee Productivity Theories 33

3.1.1.1 General Productivity Theories 34

3.1.1.1.1 The Hawthrone Effect 34

3.1.1.1.2 Taylor's Productivity Theory 35

3.1.1.1.3 Maslow's Need Theory 35

3.1.1.1.4 Adlerfer's ERG Theory 37

3.1.1.2 Motivation Theories 38

3.1.1.2.1 Vroom's Expectancy Theory 38

3.1.1.2.2 Adams's Equity Theory 39

3.1.1.2.3 Geogopalau's Path Goal Theory 41

3.1.2 Vroom's Expectancy Theory Supporting This Study 42

3.1.1.3 Research Productivity Theories, and Models 42

3.1.1.3.1 Cumulative Advantage Theory 42

3.1.1.3.2 Economic Theory (Marginal Productivity Theory) 43

3.1.1.3.3 Bland's Model (BM) 44

3.1.1.3.3 Dundar and Lewis's Model 46

3.1.1.3.4 Blackburn and Lawrence's Model 47

3.1.1.3.5 Teodorescu's Model 47

3.1.3 Bland et al.'s (2005) Model Supporting This Study 49

3.1.1.4 ICT Adoption Theories, Frameworks, and Models 50

3.1.1.4.1 Theory of Reasoned Action 50

3.1.1.4.2 Theory of Planned Behaviour 52

3.1.1.4.3 Technology Acceptance Model 53

3.1.1.4.4 Technology, Organisation, and Environment Framework 55
3.1.1.4.5 The Diffusion of Innovation Theory 56
3.1.1.4.6 The Unified Theory of Acceptance and Use of Technology 57
3.1.4 Unified Theory of Acceptance and Use of Technology Framework Supporting This Study 59
3.1.1.5 Proposed Model 59
3.1.1.5.1 Impact of ICT Adoption on the Research Productivity by University Academics 60
3.1.1.5.2 (Stage 2) Using ICT with training; (Stage 3) Using ICT without training; and (Stage 4) Using a manual system on research productivity 61
3.1.1.5.3 A Proposed Model on ICT Adoption and Training for the Increase of Research Productivity 65
3.4 Summary 66

CHAPTER FOUR 67
RESEARCH DESIGN AND METHODOLOGY 67
4.2 Aims and Objectives of the Survey and Experiment 67
4.3 Scope and Research Methodology 68
4.3.1 Survey Population 68
4.3.2 Sampling 68
4.3.3 Data Collection 70
4.3.3.1 Questionnaire Design 71
4.3.4 Data Capturing and Variables Coding 72
4.3.5 Data Analysis (Survey Phase) 73
4.3.5.1 Data Reliability and Validity 73
4.3.5.2 Statistical Analysis 75
4.3.5.3 Descriptive Statistics 75
4.3.5.4 Inferential Statistics 77
4.3.5.5 Pearson Correlation Test 81
4.4 Research Strategy Using ICT with Training Experiment 82
4.4.1 Using ICT with Training Experiment Design 82

4.4.2 Using ICT with Training Experiment Evaluation 84
4.4.3 Questionnaire Design Using ICT with Training 84
4.5 Research Strategy Using ICT without Training 86
4.5.1 Using ICT without Training Experiment Design 86
4.5.2 Using ICT without Training Experiment Evaluation 87
4.5.3 Questionnaire Design Using ICT without Training 87
4.6 Research Strategy for Using a Manual System (without using research software/tools and training) 89
4.6.1 Using a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) Experiment Design 89
4.6.2 Using a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) Experiment Evaluation 90
4.6.3 Questionnaire Design for a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) 90
4.7 Summary 92

CHAPTER FIVE 93
ANALYSIS OF THE RESULTS 93
5.1 ICT Adoption Impact Analysis 93
5.1.1 Results of the Survey 93
5.1.1.1 Data Reliability and Validity 93
5.1.1.2 Descriptive Statistics 94
5.1.1.2.1 Demographics 94
5.1.1.2.1.1 Experience 94
5.1.1.2.1.2 Job Status 95
5.1.1.2.1.3 Internet Access 96
5.1.1.2.1.4 Summary of Demographics 98
5.1.1.2.2 Research Productivity or Output for the Year of 2011 101
5.1.1.2.3 ICT Adoption 103
5.1.1.2.4 Rotated Components Matrix for the ICT Adoption 104
5.1.1.2.5 Impact of ICT Adoption on Research Productivity 106
5.1.1.3 Inferential Statistics 106
5.1.1.3.1 Pearson’s Correlations Test 106

5.1.1.3.2 Hypothesis Testing (P-Values and Statistical Significance) 111
5.1.1.3.3 Summary of the Survey's Results 112
5.2 Results of the Experiment 112
5.2.1 Reliability and Validity 113
5.2.2 Correlations among Latent Variables with sq. rts. of AVEs 114
5.2.3 Structural Model (comparison of using ICT with training, using ICT without training and using a manual system (without using research software/tools and training)) 116
5.2.4 Case for Comparison and Evaluation of Three Categories 120
5.2.5 Proposed Model 122
5.2.6 Effect Size 122
5.2.7 Model Fit 124
5.2.8 P Values Correlations Using ICT with Training, Using ICT without Training, and Using a Manual System (without using research software/tools and training) 126
5.2.9 Mean and Standard Deviation for Research Productivity, ICT Adoption, and ICT Training 127
5.2.10 Graphs Using ICT Training 127
5.2.11 Model Graphs 134
5.2.12 Summary of the Experiment Results 135
5.3 Conclusion 136

CHAPTER SIX 137
CONCLUSIONS AND RECOMMENDATIONS 137
6.1 Introduction 137
6.2 Research Aim, Objectives, and Research Questions 137
6.3 Achievement of the Objectives 138
6.4 Summary of Findings 140
6.5 Limitations of the Study 141
6.6 Key Models' Contribution 142
6.7 Case for Comparison and Evaluation of Three Categories 145
6.8 A Proposed Model 147
6.9 Research Implications 148

6.10 Practical Implications 148
6.11 Recommendations Based on the Results of the Study 148
6.11.1 ICT Adoption on Research Productivity 149
6.11.2 Using ICT with Training Increases Research Productivity 149
6.11.3 Using ICT without Training Increases Research Productivity 149
6.11.4 Using a Manual System (without using research software/tools and training) Increases Research Productivity 149
6.12 Recommendations for Future Research 150
6.13 Final Word 150
REFERENCES 151
APPENDIX A: SURVEY QUESTIONNAIRE 178
APPEBDIX B: EXPERIMENTAL QUESTIONNAIRE 182
APPENDIX C: ICT ADOPTION 218
APPENDIX D: USING ICT WITHOUT TRAINING, USING A MANAUAL SYSTEM (WITHOUT USING RESEARCH SOFTWARE/TOOLS AND TRAINING) 226
APPENDIX E: GRAPHICAL REPRESENTATION 239
APPENDIX F: OSMOZ CONSULTING INVOICE 242
APPENDIX G: TRAINING SESSIONS PICTURES 243
APPENDIX H: EXERCISES 246

LIST OF FIGURES

Figure 2.1: Research Productivity Factors	16
Figure 2.2: Impact of ICT on the Research Productivity	20
Figure 3.1: Maslow's Hierarchy of Needs	36
Figure 3.2: The Concept of ERG Theory	37
Figure 3.3: Vroom's Model	38
Figure 3.4: Adam's Equity Thoery (1965)	40
Figure 3.5: Path-Goal Leadership Components	41
Figure 3.6: Bland Model	45
Figure 3.7: Teodorescu's Model	48
Figure 3.8: Theory of Reasoned Action	51
Figure 3.9: Theory of Planned Behaviour	52
Figure 3.10: TAM2-Technology Acceptance Model	54
Figure 3.11: Technology, Organisation, and Environment	55
Figure 3.12: Diffusion of Innovation Theory	56
Figure 3.13: Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)	58
Figure 3.14 (stage 1): Impact of ICT Adoption on Research Productivity by University Academics	60
Figure 3.15 (stage 2): Using ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) with Training on Research Productivity	62
Figure 3.16 (stage 3): Using ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) without Training on Research Productivity	63
Figure 3.17 (stage 4): Using a Manual System (without using research software/tools (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin)* and training) on Research Productivity	64
Figure 3.18: A Proposed Model on the ICT Adoption and ICT Training for the Increase of Research Productivity	65
Figure 5.1: Experience Distribution	95
Figure 5.2: Job Status Distribution	96
Figure 5.3: Internet Access Distribution	97
Figure 5.4: Demographics Distribution	100

Figure 5.5: Research Productivity or Output of 2011 from Four Universities 102
Figure 5.6: ICT Adoption on Research Productivity Distribution 104
Figure 5.7 (stage 1): Impact of ICT Adoption on the Research Productivity by University Academics 106
Figure 5.8 (stage 2): Using ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) with Training on Research Productivity 117
Figure 5.9 (stage 3): Using ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) without Training on Research Productivity 118
Figure 5.10 (stage 4): Using a Manual System (without using research software/tools (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) and Training) on Research Productivity 119
Figure 5.11: A Proposed Model on ICT Adoption and Training for the Increase of Research Productivity 122
Figure 5.12: Using *SPSS* Software with Training and Research Productivity 128
Figure 5.13: Using *AMOS* Software with Training and Research Productivity 129
Figure 5.14: Using *Turnitin* Software with Training and Research Productivity 130
Figure 5.15: Using *EndNote* Software with Training and Research Productivity 131
Figure 5.16: Using *NVivo* Software for Qualitative Data Analysis with Training and Research Productivity 132
Figure 5.17: Using *NVivo* Software for Literature Review with Training and Research Productivity 133
Figure 5.18: ICT Adoption and Research Productivity 134
Figure 5.19: ICT Training and Research Productivity 135
Figure 6.1 (stage 1): Impact of ICT Adoption on Research Productivity 142
Figure 6.2 (stage 2): Using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) with Training on Research Productivity 143
Figure 6.3 (stage 3): Using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) without Training on Research Productivity 144
Figure 6.4 (stage 4): Stage 4: Using a Manual System (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and Training) on Research Productivity 145
Figure 6.5: A Proposed Model on the ICT Adoption and Training to Increase Research Productivity (Source: Researcher) 147

LIST OF TABLES

Table 4.1	Sampling of the Academic Staff Members	69
Table 4.2	Sampling of the Academic Staff members Who Participated in the Study for the Experiment	70
Table 4.3	Case Processing Summary	75
Table 4.4	Reliability for the ICT Adoption Research Variable	75
Table 4.5	Coding of Background Data	76
Table 4.6	Coding of Research Productivity for the Year of 2011	77
Table 4.7	Coding of ICT Adoption Data	78
Table 4.8	Coding of Using ICT with Training	79
Table 4.9	Coding of Using ICT without Training	80
Table 4.10	Coding of Using a Manual System (without using research software/tools and training)	81
Table 5.1	Experience Frequency Distribution	95
Table 5.2	Job Status Frequency Distribution	96
Table 5.3	Internet Access Frequency Distribution	97
Table 5.4	Demographics	99
Table 5.5	Research Productivity or Output for the Year of 2011	101
Table 5.6	Percentages of the Research Productivity of 2011	102
Table 5.7	ICT Adoption on Research Productivity	103
Table 5.8	Rotated Components Matrix for the ICT Adoption	105
Table 5.9	Pearson's Correlation Analysis of the Likert Scale Research Variables	108
Table 5.10	Summary of the Results of the Chi-square Tests	111
Table 5.11	Composite Reliability Coefficients and Cronbach's Alpha Coefficeients	113
Table 5.12	Correlations among Latent Variables with sq. rts. of AVEs Using ICT with Training	115
Table 5.13	Correlations among Latent Variables with sq. rts. of AVEs Using ICT without Training	115
Table 5.14	Correlations among Latent Variables with sq. rts. of AVEs Using a Manual System (without using research software/tools and training)	115
Table 5.15	Comparison of SPSS with Three Categories	120
Table 5.16	Comparison of AMOS with Three Categories	120
Table 5.17	Comparison of Turnitin with Three Categories	120

Table 5.18	Comparison of EndNote with Three Categories	120
Table 5.19	Comparison of NVivo (for data analysis) with Three Categories	121
Table 5.20	Comparison of NVivo (for literature review) with Three Categories	121
Table 5.21	Effect Sizes for Total Effect Using ICT with Training	123
Table 5.22	Effect Sizes for Total Effect Using ICT without Training	123
Table 5.23	Effect Sizes for Total Effect Using a Manual System (without using research software/tools and training)	123
Table 5.24	Model Fit and Quality Indices for Using ICT with Training, ICT without Training, and Using a Manual System (without using research software/tools and training)	125
Table 5.25	P Values Correlations Using ICT with Training	126
Table 5.26	P Values Correlations Using ICT without Training	126
Table 5.27	P Values Correlations Using a Manual System (without using research software/tools and training)	126
Table 5.28	Mean and Standard Deviation of AMOS, EndNote, NVivo (for data analysis and for literature review), SPSS, Turnitin, and for the Research Productivity	127
Table 5.29	Mean and Standard Deviation of Research Productivity, ICT Adoption and ICT Training	127
Table 5.30	Comparison of SPSS with Three Categories	145
Table 5.31	Comparison of AMOS with Three Categories	146
Table 5.32	Comparison of Turnitin with Three Categories	146
Table 5.33	Comparison of EndNote with Three Categories	146
Table 5.34	Comparison of NVivo (for data analysis) with Three Categories	146
Table 5.35	Comparison of NVivo (for literature review) with Three Categories	147

"The last thing that we find in making a book is to know what we must put first." – Blaise Pascal

Chapter 1: Introduction

The history of universities dates back to the 13th century with the establishment of the University of Paris by the Roman Catholic Church and French monarch as one of the first and most significant universities (Altbach, 2008). Universities were initially created as a social entity to create, store, and transmit knowledge for various professions, including legal, medical and religious (Montesinos et al., 2008). Since then, they have evolved to become the cornerstone of what is now called 'higher education'.

It is well established that higher education has four objectives: first, to provide formal education and training for various careers; second, to offer outreach services to the community at large; third, to engage in research and prepare scholars to extend the frontiers of knowledge; and fourth, to educate the world towards an intelligent and responsible life (McGrath, 1949).

The present study focuses on the research mission of universities within the context of the widespread adoption of Information and Communication Technologies (ICTs) by the modern world. This chapter introduces the study by presenting background information on research and ICT adoption and ICT training in universities so as to elucidate the research question underlying the present study. The aim, objectives, research questions and rationale of the study are presented, followed by an outline of each of the remaining chapters of this thesis.

1.1 BACKGROUND OF THE STUDY

The following extract from Altbach (2008) highlights the role of university research:

> "Research is the other core function of universities, dating back to the establishment of the University of Berlin by Wilhelm von Humboldt in the early 19th century (Ben-David and Zloczower, 1962). It has come to be the central value of top-tier universities in all countries, and academic rewards and

institutional prestige for individual faculty members are bestowed largely on the basis of research productivity. Research is defined in different ways by various disciplines and can take many forms. Pure research–the discovery of new knowledge–is generally considered the gold standard in terms of recognition and prestige. Nobel prizes are won for pure research. Applied research–increasingly emphasized as universities seek to generate income from research output–applies scientific discoveries to problems, commercial products or related practical goals. Research in the humanities may deal with interpreting texts or gaining insights on literature. Historical research may work from original data or may reanalyse existing research. Research in many scientific fields requires significant funding for laboratories and equipment. In other disciplines, research may need only basic library or internet resources. Research can thus take many forms and have different purposes. The focus on discovery, interpretation and originality links the vast array of research themes, methodologies and orientations."

Viewed from the perspective of the thousand-year history of the university in western society, the research mission of universities and the systematic production of knowledge are relatively recent phenomena. Prior to World War II, government support of academic research in all nations continued to be justified primarily on historical grounds. Prevailing beliefs about the university as a bastion of independence vis-à-vis markets and governments discouraged closer connections between academic inquiry and industrial activities. This view of the educational mission of the university was directly challenged before the war by the British physicist Bernal in his book *The Social Function of Science* (1939), which provided evidence of the important role research intensity played in industrial development and called for a radical expansion of government support for academic research.

As further outlined in Vannevar Bush's highly cited post-war report in the US, *Science: The Endless Frontier* (1945), the evidence from the war years suggested that social benefits in the form of increased wealth, health, and national security automatically follow when governments make significant investments in basic university research, applied research, and technical innovation. This 'linear model' subsequently influenced post-war science policies in most of the Organisation for Economic Co-operation and Development (OECD) countries. As a consequence, government support for academic research in the OECD countries quickly achieved the order of magnitude that Bernal had called for before the war, and which many critics at the time had deemed naïve.

The research mission of higher education, mainly because of the four missions of teaching, community outreach, 'blowing the whistle' to the world, and research, distinguishes it from other levels of education. This is highlighted in the following extract from Soliman and Soliman (1997): "Currently research is regarded as more prestigious than teaching (Alfred and Weisman, 1987; Garvin, 1980; Trow, 1984) and valued more in all higher education institutions" (Fairweather, 1993).

Research is understood "as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings" (Australian Research Council, 2010:17), as defined by university research evaluation system, the Excellence in Research for Australia (ERA). Under this broad definition, research includes activities that meet the immediate needs of research clients, working to generate and improve knowledge and undertakings that bring about improvement in life with existing knowledge. Research activities or research inputs emphasise the process, or money and energy invested in research, and may include reading about research, acquisition of competitive research grants, working on a research project, reviewing research proposals, discussing research with colleagues, and networking with national and international researchers (Pratt et al., 1999; Ramsden, 1994).

Harris and Kaine (1994) concluded that research productivity is more a function of individual motivation than of resource support. Research performance is usually used interchangeably with research productivity (Inglis, 1999; Nederhof and Noyons, 1991; Tien, 2000; Wood, 1990) to refer to quantity and quality of research outputs (Zamarripa, 1994). Although different studies have defined and operationalised research productivity varyingly, the majority measured it in terms of research publications, research grants, and citation rates (Adkins and Budd, 2006; Australian Research Council, 2010; Inglis, 1999; Ito and Brotheridge, 2007; Ramsden, 1994; Zamarripa, 1994).

The potential of ICT adoption for growth and development for countries, business, leisure and sports is now widely acknowledged (World Bank, 2006; Carbonara, 2005; Beech et al., 2000; Charney and Leones, 1995; Crede and Manell, 1998). Such benefits are brought about by the capacity of ICTs to create new services, sources of revenue, markets and employment opportunities, as well as increased productivity and cost effectiveness (Crede and Manell, 1998). ICT adoption is changing the way in which organisations operate and/or compete, and new ventures are being created while existing businesses are being modified (Carbonara, 2005). Many organisations are using ICTs to engage in e-commerce, e-business, or, more broadly, e-organising. While there is substantial debate regarding the benefits and costs of such initiatives, organisations are increasingly looking to ICTs as a means to increase efficiency and effectiveness (Zorn, 2002). A typical example by Clark et al. (2002) implores managers to consider not only technology issues but also "integrated business solutions". These authors and many others accept ICT adoption and implementation as a rational process in which managers analyse organisational needs and problems, and carefully consider technological options within the frame of business strategy (Zorn, 2002).

Although the widespread adoption of ICTs reduces the competitive advantage enjoyed by early adopters, non-adopters are, however, still disadvantaged by their inability to join them. Adeya (2002), in a United Nations Economic Commission (ECA) report, states that ICTs cover Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and, other related information and communication activities. The adoption of ICT increases the productivity, and in this study, ICT adoption was analysed and based on a survey of 103 academic staff (selected departments based on the ratio, see chapter 4) of four universities in KwaZulu-Natal (KZN).

Once an organisation has adopted relevant ICTs suitable to its context, it is usually important for it to train its staff for the effective use of the new technologies, hence ICT training is highly effective, more efficient, and makes fewer mistakes (Training and Certification Works, 2011). ICT trained employees are more comfortable in the workplace as they are familiar with the functions of applications and use them to carry out tasks efficiently. ICT-trained employees do not seek help from telephone help desks or technical support departments and their work needs less revision because of their familiarity with the technology. Well-trained ICT employees can have access to the most up-to-date sources and information, rapidly and cheaply, whilst it helps them to work independently and to unlock their hidden potential (Shaywitz, 2008). ICT training is credited by existing literature for its potential to increase productivity, a fundamental reason being that ICT training increases the productivity. In this study, it will be shown that, using ICT training, researchers may increase research productivity with the use of specific software such as *EndNote, NVivo, AMOS, SPSS,* and *Turnitin*.

Baldwin and Sabourin (2002) raise an important caveat that must be kept in mind when interpreting the results from their studies, that simply purchasing advanced ICT does not necessarily lead to success. Firm performance critically depends on how these ICTs are implemented, the success of which requires overcoming financing problems associated with acquiring new and untried ICTs; a human resource strategy to develop the necessary worker skills, including proper training; and innovation through the development of best practices in quality control and engineering. The main reason for this is that ICT adoption does not increase the research productivity without proper ICT training. Hence, this study uses both ICT adoption and training to attempt to increase the research productivity of academics.

1.2 RESEARCH PROBLEM

A noticeable trend in the research world is that academic staff tends to increase their research productivity, however, universities still face low and skewed research productivity and the cause for this is unknown. Many institutions are losing financial support and, hence, existing research is under threat. The adoption of ICT and ICT training for academics remains a challenge. Therefore, this research investigated possible challenges and suggested solutions that could be used for the effective implementation of ICT adoption and training to increase research productivity.

In Australia, a study conducted by Ramsden (1994, cited in Bentley, 2009) on 890 staff at 18 higher education institutions over a five-year period found the average research output in universities to be low and "heavily skewed". Similar findings were obtained from a survey conducted in 2001 in Norway by Kyvik (2003, cited in Bentley, 2009), that research productivity might seem high, but there were still "inequalities in research output", as raised by Fox (1983, cited in Ramsden, 1994).

Low research productivity and dwindling participation in research activities are also reported in the case of the Moi University, Kenya (Moi University Act 1984: article 4c, cited in Sulo et al., 2012). Similar results are presented in a report on the assessment of the research productivity of Nigerian universities by their National Universities Commission, which found that only 20 Nigerian universities (out of over 70) had an acceptable research output (National Universities Commission, 2005).

Quimbo and Sulabo (2013) conducted a study in Philippines, where only one quarter of the respondents had published articles between 2005 and 2010 with LSPU (Laguna State Polytechnic University) and CvSU (Cavite State University). This situation of very low research productivity level is similarly found in all state universities studied and it supports the findings of earlier studies which found that the majority of state universities' and colleges' faculty members were unproductive in research and many had not seen any research output within the previous five years (Navarra, 1989; Mojica, 1988; Ables et al., 1987). A study of Australian economics departments by Pomfret and Wang (2003) noted that high-quality research output by Australian academic economists was low by international standards, and highly skewed both at the national level and within departments.

A study conducted by Okiki and Iyabo (2013) indicated that the research productivity of the academic staff in Nigerian federal universities was lower in textbook publications, monographs, patents and certified inventions. Russell (2001) states that scientists in developing countries have been slower to adopt ICTs because of the lack of telecommunications, power, and institutional infrastructure.

1.3 RESEARCH AIM, OBJECTIVES AND RESEARCH QUESTIONS

The aim of this study is to design a model for the increase in research productivity by academics in universities after having adopted ICTs.

In order to achieve the aim of this study, the following research objectives will be addressed:

- To analyse the impact of ICT adoption on the research productivity by university academics;
- To examine research productivity using ICT (*EndNote*, *NVivo*, *AMOS*, *SPSS*, and *Turnitin*) with training;
- To examine research productivity using ICT (*EndNote*, *NVivo*, *AMOS*, *SPSS*, and *Turnitin*) without training;
- To examine research productivity using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) and training); and
- To design a model on ICT adoption and training for the increase of research productivity.

In order to achive the research objectives, the above can be translated into the following research questions:

- What is the impact of ICT adoption on research productivity by university academics?
- To what extent does ICT use with training affect research productivity?
- To what extent does ICT use without training affect research productivity?
- To what extent does a manual system (without using research software/tools and training) affect research productivity?
- How can the ICT adoption and ICT training model increase the research productivity?

1.4 RATIONALE

The reason for conducting this study is to contribute to the body of existing knowledge concerning the usage of ICT adoption and training to improve the research productivity of academics. The study will be useful to those who are involved in research because it will act as a guide for them in their decision-making by giving them advice on what to do when their research productivity is low. Furthermore, this study will be a necessary tool in research and it will allow researchers to make informed decisions regarding low and heavily skewed research productivity of academics.

This study was motivated by the research situation of a real-life South African university, University A, the name of which is withheld for ethical reasons. The research output is very low compared to its total number of staff. The information collected from the university's institutional research office clearly shows that although academic staff is increasingly involved in research compared to previous years, the university's overall research productivity is still very low in terms of the academic staff ratio.

1.4.1 Financial Incentives

When asked about the financial incentives provided by the university to motivate staff to produce more research, the response of the institutional research office revealed that the university had several financial incentives, such as monetary incentives for publications (62 staff members were rewarded in 2012); research group of the year (awarded to four research groups from the six faculties such as Accounting and Informatics, Applied Science, Engineering and the Built Environment, Health Sciences, Management Sciences, and Arts & Design); top researcher of the each faculty (awarded to one top researcher from each faculty, total six top researchers); most creative output of the year (awarded to one winner and one runner up); innovation of the year (awarded to one winner and one runner up); top university female researcher award; top research group of the year, top university senior researcher award; top university junior researcher award; and top university research initiative award. The above monetary incentives, however, were only offered at this university in 2012, when a statistical summary of the results shows that approximately 76 staff members benefitted from them, out of a total of 606 academic staff, giving a ratio of 12.5%.

Going back to the 2008, the university consistently applied significant annual increases to the post-publication financial compensation allocated to researchers by the university. In 2008, the post-publication financial compensation allocated to researchers for all types of publications (conference paper, journal, and book) was 26.20 units; in 2009 it was 49.20 units; in 2010 it was 48.45 units; and in 2011 it was 88.88 units. In 2012, the post-publication financial compensation allocated to researchers only for journal publications was 69.77 units.

1.4.2 Non-financial Incentives

When asked about the non-financial incentives provided by the university to motivate staff to produce more research, the response of the institutional research office shows that it had several non-financial incentives, such as recognition awards and promotion. In 2008, one associate professor was promoted to full professorship; in 2009, two associate professors were promoted; in 2010, one associate professor was promoted; in 2011, and also in 2012, three associate professors were promoted. The analysis of recognition awards in the university shows that, in 2008, 11 professors were officially honoured by becoming nationally-rated researchers. Certificates of recognition were also issued to financial incentive winners. A statistical summary of these figures shows that 106 staff members benefitted from the non-monetary (non-financial) incentives in 2012, out of a total of 606 academic staff, giving a ratio of 17.5%.

1.4.3 Comparing Financial and Non-financial Incentives

The above figures show that financial (12.5% of staff) and non-financial (17.5% of staff) incentives were more successful among university academic staff in the year 2012, hence the direction taken by the present study to design a model that can contribute to improving the research productivity for university academics in the years to come.

This study intends to find ways of improving research productivity, particularly in higher institutions. The methods that will be employed are an example of what needs to be done to create a more desired environment of research productivity. Ultimately, it is hoped that the results of studies of this nature will contribute to the assurance of standards of quality to improve the research productivity of academics. This research, therefore, will attempt to contribute to increasing research productivity using ICT adoption and training.

In Nigeria, a study conducted on 1,057 academic staff members from the federal universities in the six geo-political zones showed that academic staff acquired skills through attending workshops and seminars, self-taught, assistance from other colleagues, trial and error, guidance form library staff and faculty or departmental training (Okiki and Iyabo, 2013). However, their studies also indicated that academic staff research productivity of Nigerian federal universities was higher in journal publications, technical reports, conference papers, working papers and occasional papers. Results of Okiki and Iyabo’s (2013) studies are in line with those of Banionyté and Vaškeričiene (2006), which reported that, in Luthuania, 90% of research libraries and 65% of public libraries provided regular formal training for their users. On the other hand, 96% of the respondents agreed that the processed skill to recognise the information and their ability to use the resources has greatly influenced their research output.

Another study in Nigeria, conducted by Adekunjo et al. (2013) using a questionnaire-based survey, showed that the use of computers, televisions, GSM (Global System for Mobile Communications), Internet and printer ranked the highest among the ICTs tools in the institutes. However, they also indicated that the majority of the scientists showed a high level of proficiency in the use of ICT in rendering the research activities in the institutes. The positive influence of ICT and staff training on research outputs of the scientists was very high.

Akande (2000, cited in Adekunjo et al., 2013) stated that training is an integral part of the technological development, and it can be provided on a continous basis as a regular activity. He further stated that training provides awareness and good communication skills which enhance the research activities. Adekunjo et al. (2013) found the application of ICT and staff training through information literacy programme has remarkably enhanced research outputs for the scientists in institutes, with both having a positive influence on the research output in the institutions and society at large. Edem (2008) states that the Internet and computers are some of the modern ICT tools that are used to process and disseminate information. However, Edem (2008) also indicated that the fastest media for transferring and receiving information for researchers are results of research and publications.

The analysis of the impact of ICTs on the research productivity of academic staff is also important, mainly because of the predominance of ICTs in modern society and their reported impact on employees' productivity for various domains.

1.5 METHODOLOGY

Firstly, this study was conducted within a quantitative paradigm and the target population was selected staff members from four universities in KwaZulu-Natal (KZN). All the faculties were included in this studies. Seconly, it was experimental, based on a total of 45 participants, of whom ±15 were trained by professional facilitators on the use of *EndNote, NVivo, AMOS, SPSS,* and *Turnitin* software; ±15 were not trained in the use of the above software but software manuals were provided to use; and ±15 participants were asked to use traditional methods without the use of ICT software/tools (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*). For the first phase, it was important to see the impact of ICT adoption on the research productivity and, for the second phase, using ICT training to improve the research productivity.

On one hand, a self-administered questionnaire was extracted from the existing literature for the ICT adoption and validated within the theoretical framework proposed by Bland et al. (2005) on academic research productivity. On the other hand, for the ICT training the self-administered questionnaire was also extracted from the existing literature and validated by the Technology Acceptance Model (TAM) (Davis, 1989). Questionnaires were distributed to specific academic staff (phase 1–ICT adoption) and invited academic staff (phase 2–ICT training). The questionnaire was designed in a manner that made it easy to read and understand. The data was analysed using *SPSS 20.0* and *WarpPLS 4.0* software (phase 1) and *WarpPLS 4.0* software (phase 2).

1.6 THESIS OUTLINE

This thesis comprises of six chapters, delineated as follows:

Chapter 1 has introduced the basic concepts of the university research, ICT adoption and ICT training in relation to the aim of this study that is to design a model which can improve research productivity in universities after having adopted ICTs.

Chapter 2 of the thesis presents an overview of existing literature on the improvement of research productivity in universities.

Chapter 3 of the thesis outlines the theoretical frameworks, theories, and models related to ICT adoption and ICT training for research productivity.

Chapter 4 provides the research design and methodologies used in this research to design a model for the increase of research productivity and for the analysis of perceived impact of ICT adoption and ICT training on the research productivity of academics.

Chapter 5 provides the findings of the research productivity for university academics as well as findings of the perceived impact of ICT adoption and ICT training that are presented on the research productivity of academics.

Chapter 6 discusses the conclusions and recommendations of this research on the research productivity of academic staff. Further, this chapter also combines all the findings of this study into a coherent single model that can contribute to the increase of research productivity in universities. Lastly, appropriate recommendations and propositions for future research on the research productivity of university academics is discussed.

1.7 SUMMARY

Universities were initially created as social entities that were able to create, store, and transmit knowledge for various professions, including the legal, medical and religious. Since then, they have evolved to become the cornerstone of what is now called 'higher education', a sector highly affected by ICTs, as with most other human activities. In universities, some uses of ICT tools such as online journals, electronic databases, and the Google Scholar search engine are identified as essential tools for research. Unfortunately, reports of low research productivity are still widespread among academics, despite their usages of ICT's. This research is mainly concerned with addressing the problem of low research productivity in universities. It aims to design a model to increase the research productivity of academics in higher institutions.

The next chapter focuses on the relevant literature review of this study.

"I may not agree with what you say, but I'll defend to the death your right to say it."

– Voltaire

Chapter 2: Literature Review

2.1 INTRODUCTION

The purpose of this chapter is to review the empirical studies from existing literature on the research productivity of university academics. This chapter is divided into three sections: section one is an analysis of the empirical studies on the general research productivity factors (demographics, individual factors, and institutional factors) that affect university academics; section two is a discussion of the impact of ICT on research productivity; and section three is an examination of the joint effect of technology adoption and of technology training on productivity in various domains. The chapter concludes with a summary of the literature review.

The main purpose of this review is to study and identify relevant literature on the research productivity factors that affect university academics' research productivity and consolidating literature on the relevant factors. Prior research has identified a number of antecedents of commitment in different contexts, but the researcher aims to identify issues that have been omitted by previous researchers into similar topics internationally. The literature review will cover research productivity factors in general and, more specifically, university academics at four universities in KwaZulu-Natal (KZN). Other aspects of academic research productivity which will be examined include the number of master's degree graduated, doctoral degrees graduated, externally-funded contracts and grants, awards for teaching, professional conference papers, books and chapters published, volumes edited, internal publications, invitations to visiting professors or guest speakers honoured, and textbooks published or co-published. Particular attention will be paid to research productivity or output for the year of 2011, since this is the key aspect in this study.

2.2 RESEARCH AND RESEARCH PRODUCTIVITY

For the purposes of this investigation, it is important to clarify the key terms. ‘Research’ means careful study or investigation of new problems, collecting data or information about problems, drawing conclusion and making recommendations (Iqbal and Mahmood, 2011; Oxford University, 1995). According to Rashid (2001), it is the conscious effort to collect information, verify information and analyse it. ‘Productivity’, meanwhile, is the output compared with the inputs for the duration of time (Iqbal and Mahmood, 2011; Witzel, 1999). According to Creswell (1986), research productivity includes research publications in professional journals and conference proceedings, book or chapter writing, gathering and analysing original evidence, working with postgraduate students on dissertations and class projects, securing research grants, carrying out editorial duties, getting patents and licenses, writing monographs, developing experimental designs, producing the work of an artistic of a creative nature, and engaging in public debates and commentaries. Green and Baskind (2007) state that in higher education the research productivity for the faculty members is growing worldwide and research scholarship in the reputed peer-reviewed publication appears essential for success by academic staff at all universities (O’Meara, 2005). According to Jaunch and Glueck (1975), in higher education, research productivity is based on the number and quality of articles published by researchers (affiliated), faculties and departments, evaluated on their ‘publication count’. Debate on the research productivity is essential for government and university since it is the part of an economy (Offermann and Growing, 1990; Quinn et al., 1990; Roach, 1991).

2.3 GENERAL RESEARCH PRODUCTIVITY FACTORS

Research productivity factors are classified under three categories, namely, demographics, environmental, and institutional.

In general, demographics that were found in most of the studies that impact on faculty members’ research productivity were age (Hedjazi and Behravan, 2011; Alghanim and Alhamali, 2011); gender (Alghanim and Alhamali, 2011; Jung, 2012; North et al., 2011); highest qualification (Bentley, 2012; Jung, 2012; Sulo et al., 2012); academic rank (Bentley, 2012; Hedjazi and Behravan, 2011; Jung, 2012); tenure status (Buchheit et al., 2011; Kaufman and

Chevan, 2011; Hu and Gill, 2000); academic discipline (Jung, 2012; Blackburn and Lawrence, 1995); family situation (Jung, 2012; Bentley, 2012; Azad and Seyyed, 2007); religion (Isfandyari-Moghaddam et al., 2012; Ogbogu, 2009); and personal contingencies (Azad and Seyyed, 2007; Isfandyari-Moghaddam et al., 2012; Buchheit et al., 2011).

In general, individual factors found in most of the studies that impact on faculty members' research productivity were promotion (Isfandyari-Moghaddam et al., 2012; Tien, 2000; Kaufman and Chevan, 2011); collaboration or network (Bentley, 2012; Jung, 2012; Sulo et al., 2012); time management (Buchheit et al., 2011; Hedjazi and Behravan, 2011; Alghanim and Alhamali, 2011); funding (Iqbal and Mahmood, 2011; McGill and Settle, 2012; Sulo et al., 2012); prior research record (Jung, 2012; Migosi et al., 2011), research assistance and postgraduate supervision (Alghanim and Alhamali, 2011; Azad and Seyyed, 2007; Hadjinicola and Soteriou, 2006); research skills and training (Alghanim and Alhamali, 2011; Iqbal and Mahmood, 2011; Shariatmadari and Mahdi; 2012); motivation (Migosi et al., 2011; Lertputtarak, 2008; Migosi et al., 2011); research confidence (Bai, 2010; Kotrlik et al., 2002; Griffiths et al., 2010); and making research plans (Ito and Brotheridge, 2007; Levitan and Ray, 1992).

In general, institutional factors that were found in most of the studies that impact on faculty members' research productivity were institutional prestige (Lamari and Jacob, 2011; North et al., 2011; Kaufman and Chevan, 2011); workload policies and practice (Iqbal and Mahmood, 2011; Jung, 2012; Sulo et al., 2012); financial incentives and rewards (Azad and Seyyed, 2007; Sulo et al., 2012; Lertputtarak, 2008); leadership and coordination (Sulo et al., 2012; McGill and Settle, 2012; Jung, 2012); research mentorship (Azad and Seyyed, 2007; Buchheit et al., 2011; Paul et al. 2002); research centers and doctoral schools (Hadjinicola and Soteriou, 2006; Hu and Gill, 2000); research culture (Hedjazi and Behravan, 2011; Iqbal and Mahmood, 2011; Teodorescu, 2000); external funding (Sulo et al., 2012; McGill and Settle, 2012); practical support (Azad and Seyyed, 2007; Paul et al., 2002); research resources (Hedjazi and Behravan, 2011; Iqbal and Mahmood, 2011; Sulo et al., 2012); collegial commitment (Blackburn and Lawrence, 1995; Jauch et al., 1978); and sufficient time (Ramsden, 1994; Ito and Brotheridge, 2007).

Figure 2.1 combines the different research productivity factors presented above relating to the general factors affecting the research productivity of university academics. Although literature does address ceratin issues of ICT adoption and research productivity, existing literature is almost silent with regard to the use of ICT adoption and training with a view to increase research productivity. Therefore, this study will consider this gap in literature.

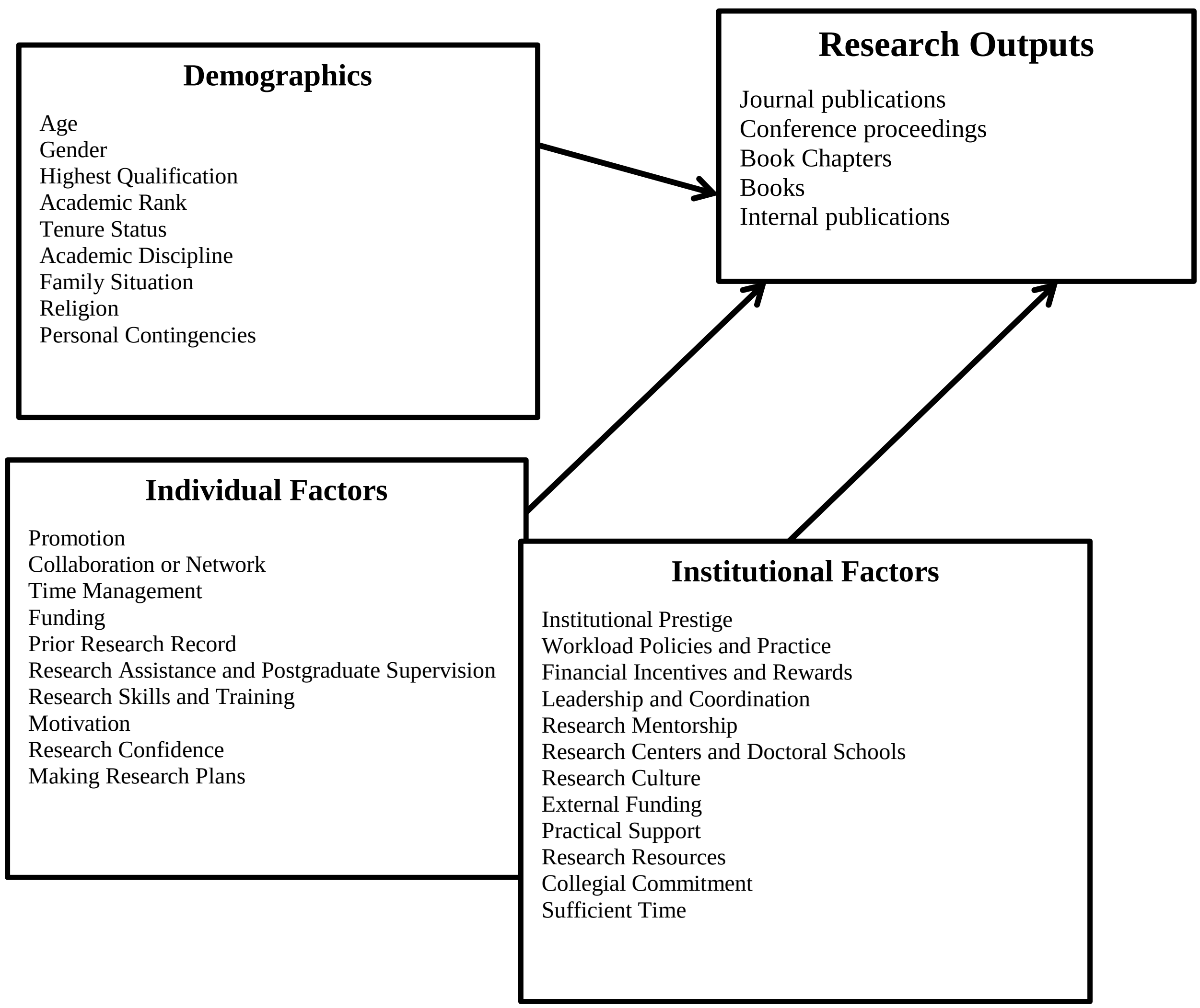


Figure 2.1: Research Productivity Factors

2.4 IMPACT OF ICT ON RESEARCH PRODUCTIVITY

The main purpose of this review is to study and identify relevant literature on the impact of ICT on the research productivity and studies whose publications were retrieved from the Internet using the keywords “Impact of ICT on research productivity”. Initially the review consolidates literature on the relevant impact of ICT on the research productivity factors. The major focus of this section is to consolidate the empirical findings on the impact of ICT on the research productivity factors. Prior research has identified a number of antecedents of commitment in different contexts, but here the researcher aims to identify issues that have been omitted by those who were researching similar topics in other parts of the world. The literature review will cover ICT adoption on research productivity in general and more especially university academics in four universities in KZN. Other aspects of ICT adoption which will be examined include use of search engines tools; productivity software tools; social networks tools; the University’s portal tools; general communication tools; e-learning instruction tools and e-learning assessment tools; online survey tools; e-currriculum tools for curriculum development work; and MIS (ITS) tools for work and using document management systems (e.g., scanning, photocopying, archiving). Particular attention will be paid to ICT adoption since this is the key aspect in this study.

In Nigeria, a study was conducted by Adogbeji and Akporhonor (2005) using a questionnaire-based survey and a total of the 100 questionnaires were administered among the students on a university campus and ten different cybercafés located within Abraka, near the university. They found that the advent of ICT had made a great impact, making research and studying easier for students. The results also revealed that access to the Internet helped them in downloading materials, seeking others’ views, sending and receiving research materials and questionnaires, peer reviewing, all kinds of accessing a range of databases and information, finding up-to-date materials, and exchanging study materials. Similarly, in the United Arab Emirates, Azad and Sayyed (2007) conducted a study using a questionnaire-based survey on full-time faculty members, with a total of 233 questionnaires distributed on the three business schools in two waves. The results showed that IT support services had an influence on the research productivity of the faculty. This study will show similar results, however, in a different context.

Paul et al. (2002) conducted a study in the USA on the role of mentoring on the overall research productivity of an Occupational Therapy faculty, sampling 350 faculty members who were randomly identified from the American Occupational Therapy Association (AOTA) faculty member list. Research findings showed that availability of statistical computing help correlated positively with research productivity for all faculties. From Houcine's (2011) case study on the impact of ICT on teaching and learning in universities, the results showed that ICT enhanced linguistic competence and, combined with motivation and challenge, led to more autonomy and imitative to use the Web, propose links, and use online dictionaries and encyclopaedias. In Ghana, Obiri-Yeboah et al. (2013) conducted a questionnaire-based survey on the trend and use of ICT adoption and its effect on teaching, research, and learning in tertiary institutions. A sample size of 212 was targeted with a total of 190 respondents consisting of 30 lecturers, 150 students, and 10 ICT officers from different colleges on campus. They found that ICT had a positive effective on teaching, research, and learning. Ali et al. (2013) conducted a survey from selected higher institutions of learning in Uganda, with a sample of 90 teachers and 75 administrators. The questionnaire elicited opinions of the respondents on the factors influencing the use of ICT to make teaching-learning effective in higher institutions of learning. A study by Ali et al. (2013) found that the majority of teaching staff used computers for teaching-learning, mostly to prepare lesson plans, and they were familiar with the relevant software so were able to teach the students more easily. Some of the software they used included Tally and Microsoft Office with their programming languages. In this study, the research indicated ICT has an impact on the productivity in line with the above existing findings.

In Iran, a quasi-experimental study was conducted by Arani (2004) on 60 second-year students of medicine on an English for Specialised Purposes (ESP) course to assess and compare their learning comparing two approaches, traditional textbook and Internet-based articles. The data was collected by means of pre-and post-test questionnaires. A pre-test was given to both groups two weeks prior to the beginning of the semester. In one group, the students were taught the traditional book, English for the Students of Medicine, in the other group, ESP was taught according to articles chosen from Internet. The research findings from Arani (2004) reveal that 83.2% of respondents believed that ICT-based ESP classes encouraged them to continue studying ESP. Chainda (2011) conducted a study on academic staff and the results show that ICT enhanced their quality of learning. Geoffrey (2010) conducted a study on academic staff on the impact of ICT for teaching and learning using primary and secondary sources of data, from which it was found that ICT improved students' organization skills.

In the United Kingdom (UK), an empirical study conducted by Kirkup and Kirkwood (2005) on ICT-based teaching in classroom activities in four large-scale postal surveys of the Open University tutors found that ICT improved the quality of tutors' work, most significantly their ability to respond to student queries and contact with faculty members.

A study by Islam and Fouji (2010) in business administration studies on the impact of ICT for teaching and learning found that access provided to students was not been utilised to enhance academic performance but rather as a source of recreation. Jensen and Folley (2011) conducted a study survey "Teaching with Technology in Higher Education" for the University of Chichester involving 26 higher education institutions on business and administration studies, medicine, arts and design, education, and an engineering faculty. The survey sought thoughts and opinions on undergraduate teaching, the use of technology and how university lecturers used technology when teaching. The results showed that ICT enhanced teaching and learning.

Mkomange et al. (2013) conducted a survey on the use of ICT in classroom mathematical problem-solving, using questionnaires to collect data from prospective teachers at the Faculty of Education in Universiti Teknologi Malaysia. The study involved 76 mathematics education student teachers at the undergraduate degree study level. Results indicated that ICT had an impact on solving problems and gave students a better choice in resolving their tasks.

Oye et al. (2012) conducted a survey of the undergraduate offering MA112 (introduction to calculus) as a major course in the school of pure and applied science FUTY (Federal University of Technology, Yola), Nigeria. From 150 questionnaires administered to the first-year students, it was found that ICT made education easier and more effective. In Cyprus, Sari (2012) studied the impact of ICT on students' performance as a tool for teaching and learning, using a case study. The total number of students who participated in this project was 200 out of a university total of 3,150. The research was a questionnaire-based survey and the secondary sources were published books, journals and information available on the Internet. Additionally, some data was obtained from particular websites. Simple random sampling was used to select 100 target respondents from the European University of Lefke. They used primary and secondary sources of data. Results showed that ICT had an impact on student performance. In Australia, Yang (2008) conducted research on university students' and academics' perceptions of the impact of ICT in higher education on academic teaching practice and learning strategies. The researcher used a qualitative case study approach and bounded system limited to the University of Tasmania. The target population comprised the academic staff members and some of the domestic and international students. Interviews were used in this case study as a method of data gathering in conjunction with questionnaires as well as the 90 participants recruited from students, another 30 were selected from academic staff members. Yang (2008) found that ICTs had an impact on improving the quality of education.

Figure 2.2 is a combination of the impact of ICT adoption on research productivity factors used for the description of the findings of the literature review conducted relating to the impact of ICT adoption on the research productivity of university academics.

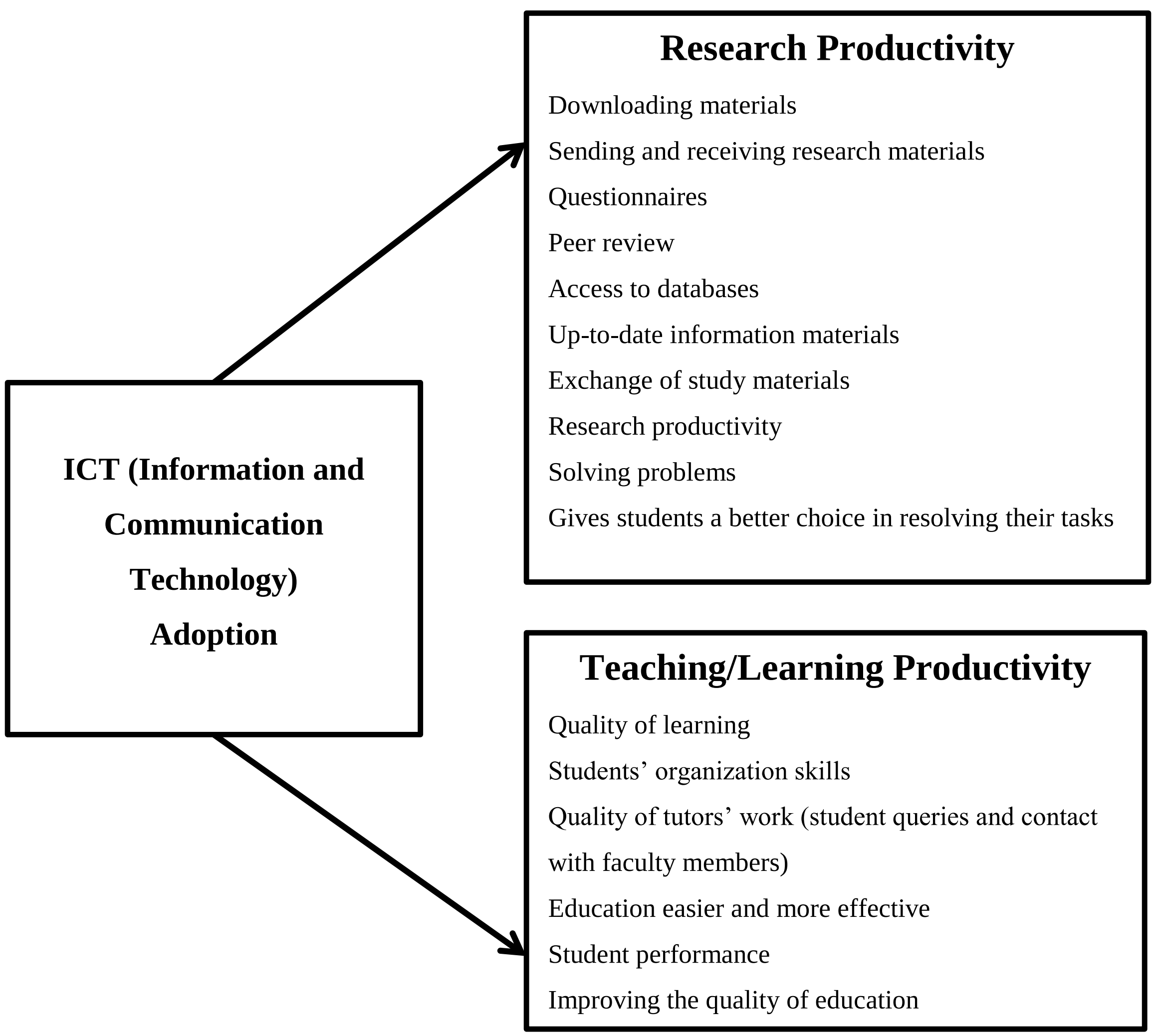


Figure 2.2 Impact of ICT on the Research Productivity

Although the literature indicates that the issue of ICT adoption by university academics have been examined in a number of international studies, this is not the case with ICT adoption in research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons influencing ICT adoption in research productivity.

2.5 JOINT EFFECT OF TECHNOLOGY ADOPTION AND OF TECHNOLOGY TRAINING ON WORK PERFORMANCE (PRODUCTIVITY)

The main purpose of this review is to study and identify relevant literature on the joint effect of technology adoption and of technology training on work performance (productivity) and studies whose publications were retrieved from the Internet using the keywords "Joint impact of ICT adoption and ICT training on productivity". Initially, the review consolidates literature on the relevance of the joint effect of technology adoption and of technology training on work performance for various domains (manufacturing, airport security, and banking). Unfortunately, there is little literature on the joint effect of technology adoption and of technology training on research productivity. The major focus of this section is to consolidate the empirical findings on the joint effect of ICT adoption and ICT training on productivity. Prior research has identified a number of antecedents of commitment in different contexts. The researcher aims to identify issues that have been omitted by previous researchers who were researching similar topics in other parts of the world. The literature review will cover the joint effect of ICT adoption and ICT training on productivity including manufacturing, airport security, and banking sector. Other aspects of the joint effect of ICT adoption and ICT training on research productivity which will be examined include perceived usefulness, perceived ease of use, and acceptance level before and after training of the *EndNote, NVivo, AMOS, SPSS, and Turnitin*. Particular attention will be paid to the joint effect of ICT adoption and training on the research productivity.

Joint effects of ICT adoption and training found in most of the studies to have had an impact on productivity were *manufacturing (*Boothby et al., 2010; Dede, 1986; Liang et al., 2009), *airport security* (Karaaslan, 2013; Pramod, 2012; Rokibul et al., 2013), and *banking* (Pramod, 2012; Rokibul et al., 2013; Samuel et al., 2012) but little was found on ICT adoption and training for the academic research productivity.

Manufacturing. According to research conducted by Boothby et al. (2010), firms that adopt advanced technologies and, at the same time, provide strategic training are, on average, more productive than other technology adopters who, in turn, are more productive than those who do not use advanced technologies. Since strategic training for a technology is defined as those types of training whose provision is most influenced by the technology, the results indicate that the majority of firms providing strategic training are pursing the right business strategies to use the adopted technologies to best effect, at least, in terms of productivity performance. They also found that "appropriate combinations of new technologies and training lead to higher productivity than adoption of new technologies alone".

According to Agbogo (2010), computer-based testing and training provides flexibility, instant feedback, individual assessment and lower costs than manual systems. Studies by Dede (1986) and Sleeman (1984) indicated that the Computer Based Training System (CBTS) provides the specifics necessary to the trainee with the diagnosis and the feedback mechanism. They also stated that it could easily be adopted to simulate the relevant work environment. However, Dossett and Hulvershorn (1982) and Wexley (1984) concluded that the CBTS was as effective as the conventional training methods and economical. Liang et al. (2009) indicated, from their web-based training system (WBTS) for the technician training and for the performing maintenance tasks that teams' risk cognition, situation awareness, and performance increased more than the traditional work-card instructions. In this study, technology adoption and training needs to be investigated in terms of research productivity.

Airport Security. According to Schwaninger et al., (2007), "Computer-based training (CBT) is a powerful tool to increase detection performance and efficiency of screeners in x-ray image interpretation". Moreover, the results of "training could be generalized to the real life situation as shown in the increased detection performance in threat image projection (TIP) not only for trained items, but also for new (untrained) items". These results illustrate that "CBT is a very useful tool to increase airport security from a human factors perspective". Similarly, a study by Michel et al. (2007) found that "training not only leads to an increase of detection performance but also results in faster response times when an x-ray image contains a threat object. Thus, recurrent CBT can be a powerful tool to increase efficiency in x-ray image interpretation by airport security screeners".

In a study by Schwaninger et al. (2005), a comparison of the detection performance of the novice and trained screeners found the latter to be higher on the different shapes such as self-defence gas spray and electric shock devices, but in this context for the former on x-ray images. Similarly, a study by McCarley et al. (2004) indicated that the performance was better after providing training on the detection of knives for the x-ray images. Hardmeier et al. (2006) conducted a study on the 334 screeners before and after the computer-based training (CBT) and the Prohibited Items Test (PIT) can measure the knowledge-based factors, and the X-Ray Object Recognition Text (X-Ray ORT) image-based factors. The findings from their results show that the training after two years of CBT increased the knowledge of prohibited items.

Smith et al. (2005) conducted several experimental studies in which they found new (untrained) exemplars of the trained category were usually better at recognition after repeated presentation for the training exemplars by the adapting well-known 'dot distortion paradigm' (Posner et al., 1967; Posner and Keele, 1968). A study by Schwaninger and Hofer (2004) indicated that the CBT training was very effective for the effectiveness and efficiency in the aviation security screening. Similarly, a study by Bastian et al. (2008) indicated that training for the airport's security screeners increased the advantage and reduced disadvantages of the multi-view x-ray systems. Studies by Schwaninger and Hofer (2004), Hardmeier et al. (2006), and Schwaninger et al. (2007) found that the effectiveness of the CBT training increased the x-ray image interpretation competency of the security screening officers.

Hardmeier et al. (2010: 1) conducted two studies in which 420 and 433 airport security screeners reported. However, security screeners used the CBT program to improve the x-ray image interpretation competency during several years. Furthermore, they also stated that

> "In study 1, screeners were tested with a computer-based test containing conventional and inert IEDs before and after CBT for several months including both types of IEDs. In study 2, X-ray operators were tested with a computer-based test containing conventional, unconventional and inert IEDs before and after CBT for several months including all three types of IEDs. The following results were revealed in both studies: 1) Detection performance in the first test was high for those types of IEDs that X-ray operators knew form previous CBT and 2) IEDs that were not detected well were effectively trained using CBT that contains these types of IEDs".

Studies by Schwaninger and Hofer (2004) and Koller et al. (2008) found that training effects on the performance indicated that several months' training on the improvised explosive devices (IEDs) improved the detection performance. On the other hand, McCarley et al. (2004) found better performance after training for the detection of the knives for the x-ray images of the novices. Koller et al. (2008) conducted studies at two different airports in x-ray images of the passengers' bags before and after the three and six months' of recurrent (about 20 minutes per week) computer-based training (CBT). Their studies indicated that the training with the x-ray tutor (XRT) and individually adaptive CBT resulted in large performance increases, especially for detecting IEDs. They also found that training with the XRT helped the screeners to recognise the new threat objects. In line with the above findings, this study investigates technology adoption and training with a view to increase research productivity.

Banking. Training is a vital factor for technology diffusion for the following three hypotheses set by a study conducted by Quaddus and Intrapairot (2008). It increases the rate of technology diffusion, training increases relative advantages, and training increases sales. In a study by Karaaslan (2013), it was found that "web-based training is a new opportunity to create a harmonious labor force with new technology and to increase the efficiency of business productivity. Web-based training is effective in increasing the bank employees' professional achievements, but was reported to vary according to individual differences".

An empirical study was conducted by Pramod (2012) on the public sector banks (PSB's) with regard to the technology training on the development of officers on their performance. His study found that most of the officers believe that T & D programmes improves the productivity of the officers in the banking sector. Another study in Bangladesh by Rokibul et al. (2013) found a relation between the training and the productivity because technology training reduces the effect of the training cost of the profitability. In Nigeria, a study by Samuel et al. (2012) found that staff training and the development had a significant effect on the organisation's effectiveness and that staff training and the development increased the employees' performance in Sterling Bank Nigeria Plc. Mubashar and Aslam (2011) conducted a study on the increase of the performance of employees and found that technology training gave the progressive shape to achieve the organisation's performance levels.

Although the literature indicates that the issue of ICT adoption and training has been examined in a number of studies around the world in different domains such as manufacturing, airport security, and banking, this is not the case in academic research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons influencing ICT adoption and training that increase research productivity.

2.6 RESEARCH PRODUCTIVITY TOOLS

2.6.1 Turnitin

Turnitin is a global leader for detecting electronic plagiarism detection and is recognised by the researchers around the world (Jones, 2008). According to Batane (2010), it is web-based software that helps to check for plagiarism. Crisp (2007) conducted a survey and found that 21% of the academic staff significantly improved their assessment practices as a result of using the Turnitin software. A study by Jocoy and DiBiase (2006) indicated that a manual system can detect plagiarism in only 3% of the assignments whereas Turnitin.com revealed a total of 13% plagiarism rate in the same assignments. Furthermore, they also indicated that the software can increase the performance to detect infraction. Badge and Scott (2009 cited in Literature Review: IPSTS, n.d) reported that:

> "Turnitin was the only service that checked for student collusion and copying from the internet within the same service; that instructors save time using electronic detection services and use reports generated to educate students about writing from sources and citation rules; and, that, for effective deterrence, use of electronic services for detecting plagiarism should be coupled with educating students about plagiarism penalties and consequences".

Cheach and Bretag (2008, cited in Literature Review: IPSTS, n.d) "show that using Turnitin as a teaching tool resulted in fewer cases of plagiarism and increased students' understanding of academic integritiy issues." According to Davis and Carroll (2009), it helps students to avoid the plagiarism in their work and improves the citation practices and paraphrasing skills. According to O'Hara et al. (2007), "Turnitin as a formative tool to support student's progress can be effective, particularly in relation to building confidence and competencies." Sheridan et al. (2005) conducted a study at the University of Auckland in the

School of Pharmacy. Their results revealed that Turnitin helped students to improve their originality of their work (essays, document outside sources correctly).

Although the literature indicates that the issue of Turnitin has been examined in a number of studies around the world, this is not the case with the training to increase the research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons why Turnitin training can increase the research productivity.

2.6.2 Analysis of Moment Structure (AMOS)

IBM AMOS is the added SPSS module and it gives the power to easily perform the structural equation modelling (SEM) to build models with more accuracy than the standard multivariate statistics techniques (statistics.com). AMOS is a statistical software and used for Structural Equation Modelling, path analysis and confirmatory factor analysis, analysis of covariance or causal modelling software. In AMOS, models can be drawn graphically using simple drawing tools and it quickly performs the computations for SEM and displays the results (StatisticsSolution, n.d).

According to Kühnel (2001), AMOS is frequently used at postgraduate level for the teaching of SEM. SEM computer packages utilise graphical interfaces that are rarely considered as a teaching tool that enhance the communication and understanding of the statistical concepts at the undergraduate level. A study by Cunningham and Wang (2005) indicated that the graphical interface of AMOS has the potential to enhance conceptual understanding and communication of the results in undergraduate statistical courses. Several researchers indicated that the ”educational research has benefited from the use of SEM to examine: (a) the factor structure of the learner trains assessed by test or questionnaires (Silverman, 2010; Schoonen et al., 2003); (b) the equivalency of models across populations (Byrne et al., 1998; In’nami and Koizumi, 2012; Shin, 2005); and (c) the effects of learner variables on proficiency or academic achievement at a single point in time (Ockey, 2011; Wang and Holcombe, 2010) or across time (Kieffer, 2011; Marsh and Yeung, 1998; Tong et al., 2008; Yeo et al., 2011)”. According to Bollen (1989 and Byrne, 2012 cited in Khine 2013: 23), compared with a number of statistical methods that used in the educational research:

"SEM excels in four aspects (Bollen, 1989; Byrne, 2012). First, SEM adopts a confirmatory, hypothesis-testing approach to the data. This requires researchers to build a hypothesis based on previous studies. Although SEM can be used in a model-exploring, data-driven manner, which could often be the case with regression or factor analysis, it is largely a confirmatiory method. Second, SEM enables an explicit modelling of measurement error in order to obtain unbiased estimates of the relationships between variables. This allows researchers to remove the measurement error from the correlation/regression estimates. Third, SEM can include both unobserved (i.e., latent) and observed variables. This is in contrast with regression analysis, which can only model observed variables, and with factor analysis, which can only model unobserved variables. Fourth, SEM enables the modelling of complex multivariate relations or indirect effects that are not easily implemented elsewhere. Complex multivariate relations include a model where relationships among only a certain set of variables can be estimated".

A study by Saenz et al. (1999) modelled the relationship between the college experience and the academic performance for minority students in American colleges and universities. The structural equation modelling techniques were used to test the model. Their studies revealed "identifying several characteristics of an academically successful student, including having a moderate family socioeconomic and educational background, possessing a high level of self understanding, being assertive in seeking assistance, and being socially active in a variety of campus events". According to Paswan and Young (2002), course organisation and student-instructor interaction influence instructor involvement and student interest positively, while factors related to course demands affect them negatively. According to Tomarken and Waller (2005), the structural equation modelling (SEM) enables researchers effectively to assess the relationships among both manifest (i.e., observed) and latent (i.e., underlying theoretical construct) variables for the purposes of testing complex theoretical models or confirming the factor structure of a psychological instrument (Tomarken and Waller, 2005).

Although the literature indicates that the issue of AMOS has been examined in a number of studies around the world, this is not the case with the AMOS training to increase the research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons why AMOS training can increase the research productivity.

2.6.3 NVIVO

NVivo is a computer software developed by QSR International and it is widely used by academic, government, health, and commercial researchers across various research fields. NVivo software can be used for two purposes, namely, for literature review and for the qualitative data analysis (e.g., interview, audio, and video).

2.6.3.1 Literature Review

According to Bandara (2006), NVivo is a computer program for the literature review analysis that is used to import and code textual data, edit the text; retrieve, review and recode coded data; search for combinations of words in the text or patterns in the coding; and import from or export data to other quantitative analysis software. NVivo was developed by QSR International and the makers of NUD*IST and NUD*IST to support the social science research and the contained tools for innovative 'No-Nuemerical Unstructured Data Indexing Searching and Theorizing' (Bandara, 2006). "Literature reviews are a common feature of all dissertations, regardless of discipline or subject matter. However, they are usually overlooked as a form of qualitative analysis, yet the processes involved in building an argument from a body of literature are similar to processes involved in analysing qualitative data" (Di Gregario, 2000: 2). Tools like EndNote supports the bibliographic management aspect of a literature review and the qualitative software tool like NVivo can be used for the synthesis process rather than being competitors. Di Gregario (2000:2) states "only NVivo (to date) has a particular set of tools that is ideal for analysing literature".

According to Beekhuyzen (2008), well-known qualitative research software (NVivo) gives the researchers new opportunities to explore and piece together the challenging task of the literature review. According to di Gregario (2000), literature reviews are a common feature of all the dissertations, regardless of any discipline or subject. NVivo software package can be used to support the analysis processes involved in the literature review. Of all the qualitative analysis software packages, only NVivo has a particular set of tools that is ideally appropriate for analysing the literature. The author also stated that literature review can be analysed with other software but they are not as flexible as NVivo. According to Azeem and Salfi (2012), the software package NVivo is being used in a literature review to support the analysis processes involved for the literature review. NVivo, among all the qualitative analysis software packages, has a particular set of tools and it is the most significant feature for analysing the literature and flexible as compared to other qualitative analysis of the software packages.

2.6.3.2 Qualitative Data Analysis (e.g., interview, audio, and video)

A study by Wong (2008) indicated that "NVivo, a Qualitative Data Analysis (QDA) computer software package produced by QSR International, has many advantages and may significantly improve the quality of research. Analysis of qualitative data has become easier and yields more professional results. The software indeed reduces a number of manual tasks and gives the researcher more time to discover tendencies, recognise themes and derive conclusion". On the other hand, Hoover and Koerber (2011) also indicated that the qualitative data analysis NVivo software enhances research in terms of efficiency, multiplicity, and transparency.

According to Azeem and Salfi (2012), qualitative data analysis software NVivo helps researchers to link-DataBites, DocLinks, and NodeLinks. According to Patton (2002), "reducing the volume for raw information, shifting trivial from significance, identifying significant patterns, and constructing a framework for communicating the essence of what the data reveal". Several researchers indicated that the size of the data in qualitative researchers is extremely large enough to handle manually but the qualitative theorists have encouraged the use of qualitative data analysis software packages (Berg, 2001; Denzin and Lincoln, 1998; Krueger, 1998; Merriam, 2001; Miles and Hueberman, 1994; Morse and Richards, 2002; Patton, 2002; Silverman, 2001; Taylor and Bogdan, 1998; Tesch, 1990). Richards (1999) indicated that NVivo can assist the researcher in terms of manipulating the data records, browsing them, coding them, and annotating and gaining access to data records quickly and accurately.

Castelberry (2014) states that "NVivo allows researchers to collect, organize, and analyse these varied data types. Documents can be imported from Microsoft Word (.doc and .docx), Portable Document Format (.pdf), Rich Text (.rtf), and Plain Text (.txt) formats. Almost any form of audio, photo, and video files can be imported along with Excel spreadsheets and Access databases. A cool new feature of version 10 supports the use of Web pages, Social Media (Facebook, Linkedln, and Twitter), YouTube, and SurveyMonkey to import data directly. Bibliographic references can even be imported from EndNote, Mendeley, RefWorks, and Zotero to help manage literature reviews. This wide range of data importation makes this software attractive to researchers using various methods of data collection". According to Bringer et al. (2006), NVivo can facilitate many aspects of the iterative process that are associated with the grounded theory and, finally, it can help researchers to provide a transparent account that ultimately enhances the researcher's study validity.

Although the literature indicates that the issue of NVivo has been examined in a number of studies across the world, this is not the case with the NVivo training to increase the research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons why NVivo (for literature review and qualitative data analysis (interview, audio, and video)) training can increase the research productivity.

2.6.4 SPSS (Statistical Package for the Social Sciences)

SPSS (now called PASW Statistics) is a powerful tool for entering data, creating new variables, performing EDA, and performing formal statistical analyses (Learning SPSS: Data and EDA, n.d). Moore (1997) suggested that the use of technology helps to automate many routine operations which, in turn, facilitate the learning process. Moore **(**1997), Hoerl et al. (1997), Scheaffer (1997), Giesbrecht (1996), Goodman (1986), Gratz et al. (1983), Velleman dn Moore (1996), and Weinberg and Abramowitz (2002) reported that students can benefit academically when they have included assignments in conjunction with the instruction that could involve the utilisation of the data analysis procedures. Mills (2003) and Landau and Everitt (2004) stated that, in education and in the behavioural and social sciences, SPSS is a popular choice and it is a fairly user-friendly statistics software program that is windows-driven, and offers users a point-and-click way to generate the output. "In the era of computers, it is the high time to use computers in our statistical calculations, through the use of SPSS package during our research project. No doubt, before the advent of SPSS Package, many researchers have been using computers for their statistical analysis of data, but that process was not economical in terms of time, money and efforts" (DoE and ICSSR, 2014).

Although the literature indicates that the issue of SPSS have been examined in a number of studies across the world, this is not the case with the SPSS training to increase the research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons why SPSS training can increase the research productivity.

2.6.5 EndNote

According to Fitzgibbons and Meert (2010), bibliographic management software package such as EndNote is well established among researchers and students as a time saving tool for writing academic papers. EndNote, in particular, is used in university bookstores as well as through independent distributors worldwide. Harrison et al. (2005) stated that EndNote benefits the following: "improved management of references and the use of those references within citations and lists of references, increased confidence when undertaking academic work". References can be easily entered into the database manually from the existing files or even from online sources (Ferrán-Urdaneta, 2001). EndNote allows the researchers "to save search strategies, going a long way in assisting researchers with keeping a research log. For projects as large as a thesis/dissertation and for the faculty, the most interesting features are that metadata can be extracted from PDF's, including the ability to search across the full text of PDF's, including the ability to search across the full text of PDF's, and records can be compared and edited side by side" (Hensley, 2011).

Although the literature indicates that the issue of EndNote has been examined in a number of studies across the world, this is not the case with the EndNote training to increase the research productivity where there is a need to undertake such research. Therefore, this study undertakes to provide greater insight into some of the reasons why EndNote training can increase research productivity.

2.7 SUMMARY

This chapter has presented a literature review guided by the research objectives. This includes presentation of the research productivity factors such as demographics, individual factors, and institutional factors. It presented the impact of ICT on research productivity and the joint effect of ICT adoption and ICT training on productivity.

The next chapter relates to theoretical frameworks, theories, and models that are pertinent to this study.

"The most basic function of government is to provide a framework of law and order, within which the people are free to choose." – Thomas Sowell

CHAPTER 3: THEORETICAL FRAMEWORKS, THEORIES AND MODELS

This chapter presents theoretical frameworks, theories, and models relevant to this research with regard to developing a model. The following are considered the most relevant:

1) Theories of employee productivity (general productivity, employee motivation, and research productivity); and

2) Theories, models, and frameworks of research productivity with ICT adoption and of the underlying role of ICT training.

3.1 SUPPORTING THEORY

In examining the previous studies reviewed in chapter two, it became apparent that the 'motivation theory' and ICT adoption frameworks are used predominantly by researchers studying academic research productivity after having adopted ICT. This section, therefore, describes the supporting theory for motivation theory and supporting frameworks or models for ICT adoption. This study was identified through a review of motivation theories, related theories and, finally, ICT adoption frameworks. The details of each theory, model, and framework will be discussed, compared and contrasted with a view to developing a suitable model.

3.1.1 Employee Productivity Theories

This section begins with a presentation of general productivity theories, then examines motivation theories as a reflection of the importance of motivation in the productivity of employees and it concludes with research productivity theories.

3.1.1.1 General Productivity Theories

The concept of productivity is usually associated with other ones, such as profitability, economic growth, efficiency, surplus value, quality, performance, partial productivity, and need (Saari, 2006). Productivity theories found in the existing literature have their origins in sociology and psychology, more precisely from theoretical frameworks attempting to examine human attitudes. These theories include the Hawthrone effect, Taylor's productivity theory, Maslow's needs theory, and Alderfer's ERG theory.

3.1.1.1.1 The Hawthrone Effect

The Hawthorne Effect is usually defined as an increase in worker productivity produced by the psychological stimulus of being singled out and made to feel important, and as a possible explanation for the changes observed in the evaluation of various types of intervention studies carried out in industry. The term is mostly used to refer to the behaviour-modifying effects of being the subject of social investigation, regardless of context (Marshall, 1994). The studies were initiated in 1924 by the management of the Hawthorne plant of the Western Electric Company in Chicago, Illinois, in the United States of America (USA) as Harvard professor George Elton Mayo conducted a series of experiments on the effect of light on employee productivity. Ensuing debates on the findings included Parsons' (1974) argument that the workers' skills might have improved naturally over the course of experiment, or as a result of the feedback workers received from their supervisor.

Although the Hawthorne Effect and its overarching principles continue to provide a useful reference for managers seeking to understand employee motivation, Mayo's experiments indicate that supervising employees in a supportive manner can have a positive impact on productivity. While it is important to avoid a 'micro-managing' approach, the Hawthorne Effect indicates that an entirely 'hands-off' management style might not necessarily be an effective alternative. His initial theory proved a poor correlation between these physical factors in relation to heightened or reduced employee performance (Cheminais et al., 1998:192; Dresang, 2009:90-91; Safferstone, 2007:3), but it culminated in Mayo's adjusted focus from the physical environment affecting performance to the individual and personal aspects that motivate people to work effectively (Cheminais et al., 1998:192; Dresang, 2009:91; Safferstone, 2007:3). In this study, the Hawthorne's theory was considered because of the psychological stimulus for employee performance.

3.1.1.1.2 Taylor's Productivity Theory

Soldering is a situation whereby workers do not work to their full capacity, regarded by Taylor (1911) as occurring when employees fear that high performances will lead to increased productivity requirements and hence losing their jobs. However, this situation does not prevail with contemporary employees if organisations evaluate them through their performance. Taylor's study also found support for the suggestion by Katz (1964) that in the early months in work, new employees are either insensitive to or react negatively to challenging job characteristics, such as autonomy and skill variety. Taylor found that poorer performance resulted from high-rather than low-challenge initial assignments, suggesting that the negative psychological effects of performing poorly on an initial assignment may have long-lasting negative effects on their confidence and self-efficacy. While Taylor's methods produced higher productivity, they also produced worker unrest, as they felt they had been turned into mere automatons. Performing a single, repetitive task all day led to boredom and worker dissatisfaction, and his methods also allowed companies to lay off workers and thus increase joblessness. In 1911, Taylor was questioned by a special committee of the House of Representatives, resulting in a law banning the use of stopwatches by civil servants (Magloff and Media, n. d.). This study did not use this theory because it plays on employees' fears that high performance can lead to increased productivity.

3.1.1.1.3 Maslow's Needs Theory

In his 'Hierarchy of Needs', psychologist Maslow (1943) noted that people typically must have certain basic needs fulfilled in order for them to operate to their full potential. This means that the maximisation of productivity requires management to satisfy employees' needs, specifically for safety and high self-esteem (Chinn, n. d.). He developed a five-category needs scale of physiological, safety, belonging, self-esteem, and self-actualisation. When physiological needs are satisfied, they cease to act as primary motivational factors and the individual moves 'up' in the hierarchy and seeks to satisfy security needs. This process continues until self-actualisation needs are finally satisfied. Maslow's argument is that employees who are too hungry or ill to work will find it difficult to make a contribution to productivity.

In 1957, Maslow introduced business discipline through a textbook in North America by Davis (1957). However, some researchers indicated that 'the Maslowian paradox' is widely accepted but there is little research evidence to support it (Wahba and Bridwell, 1973). Similarly, Cardinell (1981) and Weller (1982) also stated that Maslow's theory did not include 'knowledge and understanding', but Weller (1982) added that knowledge and the understanding should appear between the need for esteem and need for self-actualization. Campbell and Pritchard (1976) argued that peoples' needs are more complex and difficult to control than is represented in Maslow's original hierarchy, whilst Whaba and Bridwell (1976) reviewed research findings on the need hierarchy concept but found no clear evidence that shows the human needs are classified into five categories or that these categories are structured in a special hierarchy (see Figure 3.1).

Other important criticisms have been directed towards his methodology, notably the selection of too few people, his declaration of self-actualising, talking to the participants, and, finally, drawing conclusions about what self-actualisation means. This was regarded as not being 'good science, by many critics (Boeree, 2006:7), and has not been used in the framework for this study.

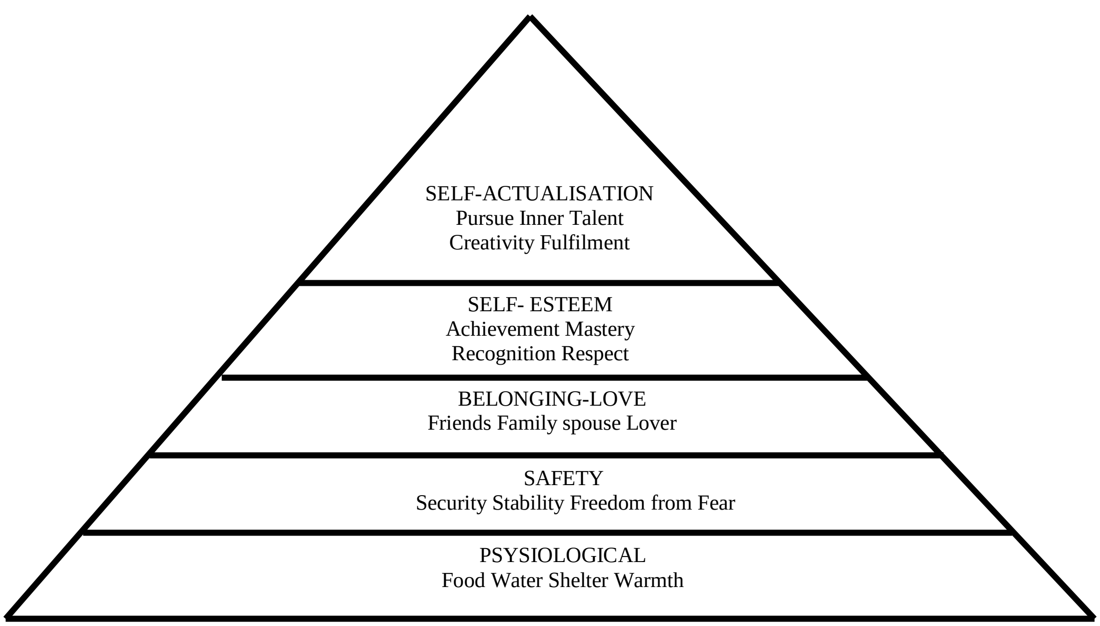


Figure 3.1 Maslow's Hierarchy of Needs

3.1.1.1.4 Adlerfer's ERG Theory

Alderfer asserts in his Existence Relatedness and Growth theory (commonly known as the ERG theory) that there are three basic human needs: existence, relatedness, and growth, which must be met by an employee in order to enable him or her to increase performance (see Figure 3.2). His classification modifies Maslow's five levels of needs and compressed them into three levels, as *existence, relatedness,* and *growth,* to align it more closely with empirical research. The principal difference between the two is that ERG theory does not assume that a lower need must be satisfied before an individual develops the desire for a higher level need. ERG theory, therefore, allows individuals to seek satisfaction of various needs from different levels of the hierarchy simultaneously.

ERG theory is similar to Maslow's theory as the process of need fulfilment consists of moving along the continuum in relation to satisfaction progression, with the difference being the content and process terms (Landy and Trumbo, 1980). Maslow's theory is one of fulfilment-progression, while Alderfer's theory contains both fulfilment-progression and frustration-regression. The Alderfer's theory was not considered because this study did not take into account the basic human needs to design a proposed conceptual framework.

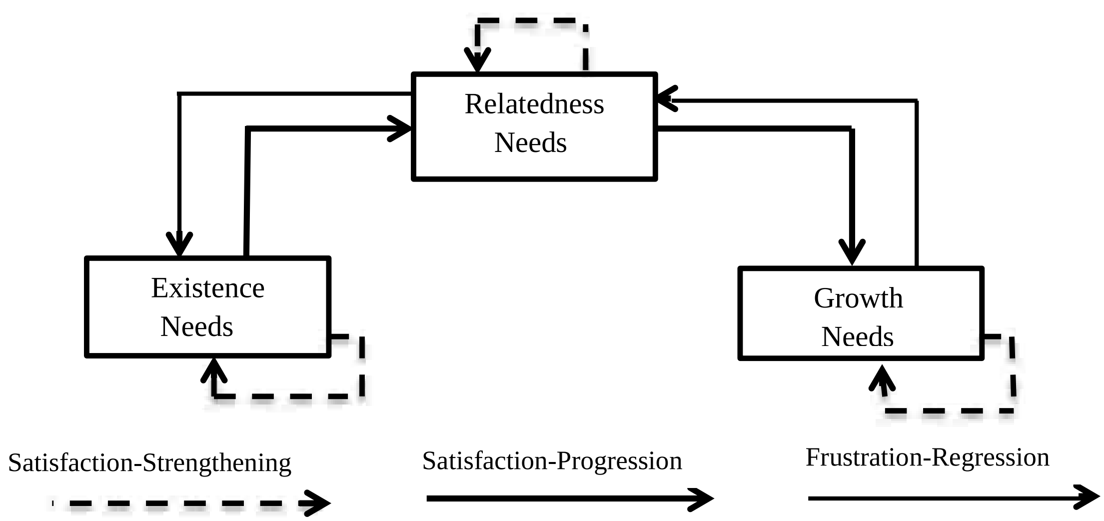


Figure 3.2 The Concept of ERG Theory
(Data Source: Alderfer, 1969)

3.1.1.2 Motivation Theories

Employee productivity is usually associated with motivation, and the four theories presented above can also be classified as motivational theories. Others are listed as follows.

3.1.1.2.1 Vroom's Expectancy Theory

Vroom (1964) proposed that people are motivated by how much they want something and how likely they think they are to get it. He suggests that motivation leads to effort, which, in turn, combines with ability and environmental factors to result in performance (see Figure 3.3). Expectancy theory may be classified under three categories, namely, effort-performance expectancy, performance-outcome expectancy, and valence (Bateman and Zeithaml, 1993), with performance-outcome expectancy (PO) being the possibility of an achieved performance leading to certain outcomes, and the valence being the individual's assessment of anticipated value of the various outcomes or rewards (Bartol et al., 1998).

Expectancy theory has represented a popular and influential approach since its introduction, but has been criticised for its assumption that people are calculating and rational in their decision-making. According to Hadebe (2001), the theory is limited to use and is more valid for the prediction of behaviour when the effort–performance-rewards links may be clearly perceived by individuals. It has also been criticised for failing to take adequate account of people's cognitive limitations (Baron et al., 2002). Consequently, in the workplace, there has been mixed level of support for the theory's usefulness.

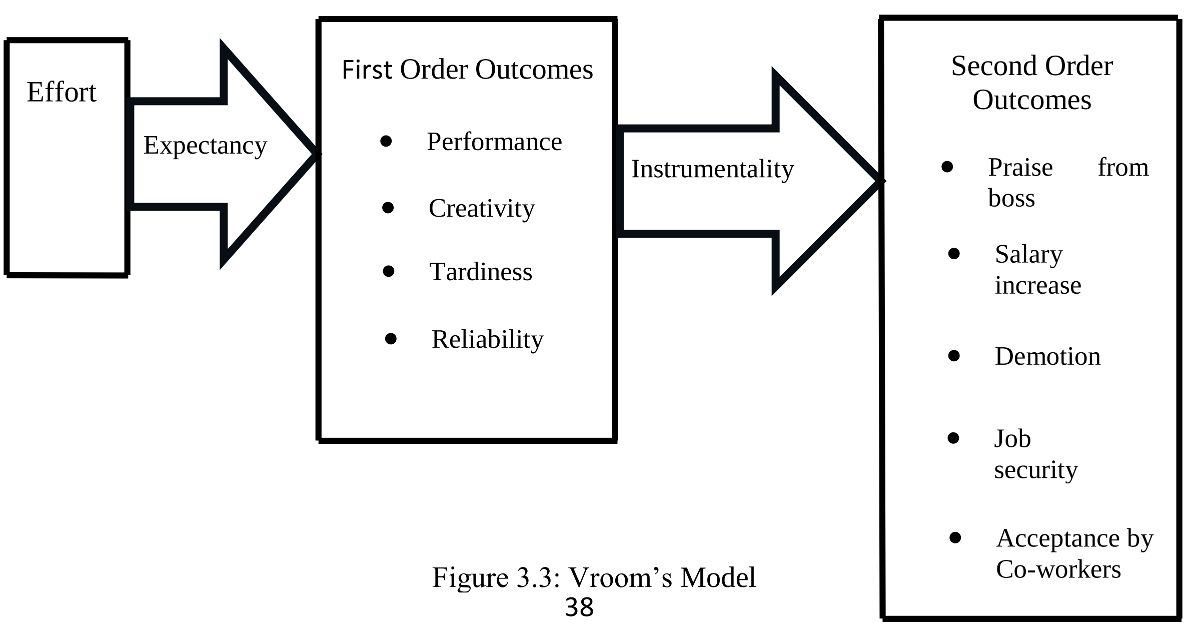


Figure 3.3: Vroom's Model

Kanfer and Ackerman (1989) described the way in which Vroom (1964) predicts that ability and motivation combined to determine performance, finding that when motivation is low, both low-and high ability individuals demonstrate similar low levels of performance. Conversely, when motivation is high, the performance variability due to individual difference in ability will be more evident. Heneman and Schwab (1972) evaluated nine studies of the expectancy theory's prediction of employee performance, finding valence, instrumentality, and expectancy to be related to performance, while ability was not. Vroom's Expectancy Theory was included in this study's model since it takes into account that motivation leads to effort, which, in turn, combines with ability and environmental factors for employees and increases employees performance.

3.1.1.2.2 Adams's Equity Theory

Adams (1965) suggests that people are motivated by their quest for social equity in the rewards they receive from their high performances. Work outcomes include pay, recognition, promotion, social relationship, and intrinsic rewards. To receive these rewards, various inputs must be given by employees, including time, experience, effort, education, and loyalty. He suggests that people tend to view their outcomes and inputs as a ratio and to compare their ratio with that of other employees, tending to become motivated when their ratio is high.

In conditions in which the individual perceives that his/her outcomes are equal to those of others, satisfaction may be achieved by those in the relationship (Greenberg, 1999). On the other hand, inequity treatments are expected to produce tension and dissonance (Adams, 1963). For Cosier and Dalton (1983), inequity consists of four principles: (i) perceived inequity creates tension within a person; (ii) the amount of resultant tension is proportional to the size of the perceived inequity; (iii) the tension stemming from perception of inequity motivates the persons to reduce it; and (iv) the degree of motivation to reduce the perceived inequity proportional to its size.

Equity theory is unlike any other theory as it focuses on fair and unfair treatment, however, it can be applied across a range of topics, including the power structure in marital relationships (Webster and Rice, 1996), satisfaction with bargaining (Darke and Dahl, 2003), the relationship between friends (Roberto and Jean, 1986), and perceptions of fairness of reward allocation in teams (Wilke et al., 2000) (see Figure 3.4). Adam's theory was not considered since this study did not take into account social equity in the rewards for the performance in designing a model.

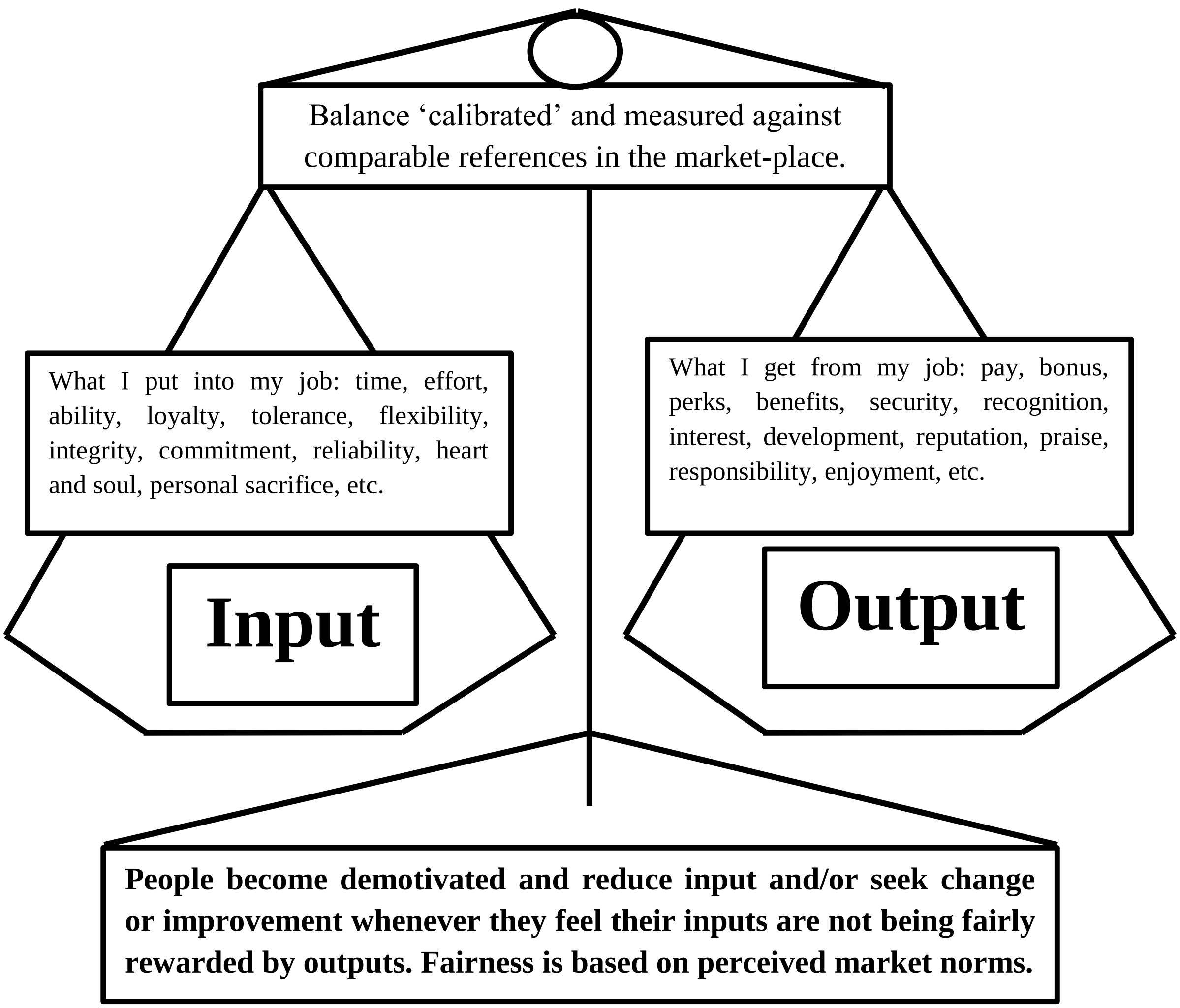


Figure 3.4: Adam's Equity Theory (1965)

3.1.1.2.3 Geogopalau's Path Goal Theory

The Geogopalau's Path Goal motivational theory states (Greene, 1974) that a worker who sees high productivity as a path leading to the attainment of one or more of his or her personal goals will turn into a high producer, but those who see low productivity as the path leading to the attainment of their goal will become low producers, hence the need to motivate them (see Figure 3.5). Since the original publication of the path-goal theory of leader effectiveness (House, 1971), there have been between 40 and 50 studies designed to test propositions of the theory, with mixed results of these empirical investigations, some showing support and others not. Yukl (1994) criticised the theory for having been tested, with inappropriate methods, partially due to the methodological precedents established in the original tests (House, 1971), as well as the prevailing norms in the 1970s and 1980s which were lenient with respect to methodological and conceptual rigour.

The path-goal theory of leader effectiveness was developed to reconcile prior findings and anomalies resulting from empirical investigations of the effects of leader task orientation and leader person orientation on subordinate satisfaction and performance (Stogdill and Coons, 1957). The findings were mixed, some studies showing positive relationships between these two variables and leader, work-unit, or subordinate performance and satisfaction, others finding either no such relationships or a positive one between only one of the two leader behaviours and dependent variables. Several studies showed negative relationships between leader initiating structure and various indicators of subordinate satisfaction (Bass, 1990; Korman, 1966). The Geogopalaus's Path Goal Theory was selected in this study because this study has taken into account the high performance as path leading which increases employee performance in order to design a model.

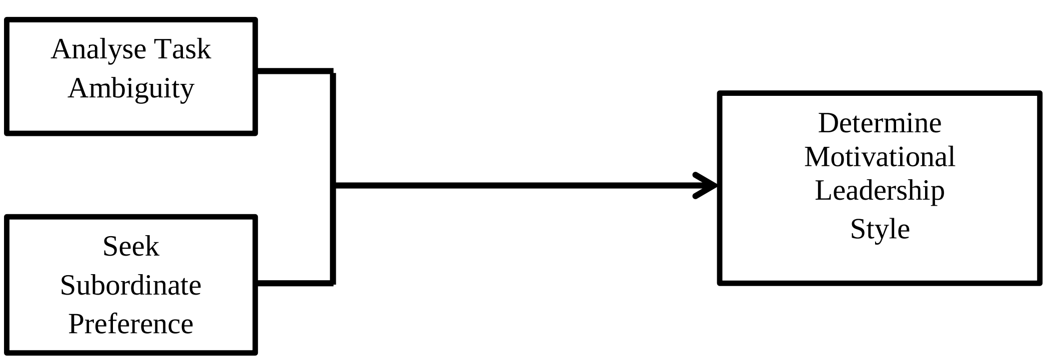


Figure 3.5: Path-Goal Leadership Components

3.1.2 Vroom's Expectancy Theory Supporting This Study

In this study, Vroom's expectancy theory is selected to determine research productivity. Many researchers (Butler and Cantrell, 1989; Tein and Blackburn, 1996; Blackburn and Lawrance, 1995; Williams, 2000; Williams, 2003; Chen et al., 2006) have chosen it and it is suitable for this study because it views motivation and performance as critical aspects of concepts such as research productivity. Nadler and Lawler (1977) summarised four assumptions of expectancy theory:

(i) "Behaviour is determined by forces that exist within the individual and their work environment;

(ii) Individuals make decisions about work behaviour based on examining whether they are part of the group (membership) plus their effort to perform the task for 'how hard to work, how much to produce, and at what quality' (p. 27);

(iii) People have different needs, desires and goals; and

(iv) People make decisions among a variety of choices based on their expectations that a particular behaviour will lead to desired outcomes".

3.1.1.3 Research Productivity Theories and Models

Existing literature contains many theories and models regarding research productivity, as follows.

3.1.1.3.1 Cumulative Advantage Theory

The concept of cumulative advantage theory frequently appears in the social science literature on social mobility, poverty, race, crime, education, and human development. Cumulative advantage is also known as 'the Matthew effect' and is defined as "the accruing of greater increments of recognition for particular scientific contributions to scientists of considerable repute and withholding of such recognition from scientists who have not yet made their mark" (Merton, 1973:446). In the related process of accumulative or cumulative advantage, exceptional performances in the early career of a young scientist attract new resources, as well as rewards that facilitate continued high performances (Zuckerman, 1998). Subsequent research by Cole and Cole (1973) suggested that it extends beyond issues of recognition and also applies to the domain of research productivity.

The essence of cumulative advantage is well captured by the common sense notion that "the rich get richer at a rate that makes the poor become relatively poorer" (Merton, 1968), yet the simplicity of this formulation contrasts with the diversity and complexity of its underlying processes. In science, the key form of riches is recognition form peers (prestige) for published research (Merton, 1957; Hagstrom, 1965; Storer, 1966). Scientists who are rich in recognition find it easier to obtain the resources that facilitate research, for example, grants, free time, laboratories, stimulating colleagues, and capable students. They are also encouraged by their colleagues to continue to invest time and energy in research (Zuckerman and Merton, 1968). The Cumulative theory was not taken into account because this study did not consider the early career that attract new resources and rewards for employees which increases employee's performance in order to design a model.

3.1.1.3.2 Economic Theory (Marginal Productivity Theory)

Economic theory is a broad concept which explains the movement of goods in a market. Although there appears to be a strong age-productivity and experience-productivity relationship, i.e., as age and experience increase, productivity also increases up to a point and then appears to level off, it has been found to be more mixed in higher education (Clark and Lewis, 1985; Levin and Stephen, 1989). Nevertheless, it has also been noted that, generally, full and more senior academics, particularly professors at research universities, tend to have an accumulative advantage over most academics, such as assistant and associate professors, and this translates into higher levels of productivity (Cole and Cole, 1972; Clark and Lewis, 1985; Long, 1978). Knorr et al. (1979) demonstrate that age is not a significant factor when the effect that exercises the administrative task is controlled for. Also, Cole and Cole (1972), Long (1978), and Carayol and Matt (2006) found that researchers occupying higher positions in the university hierarchy, namely, full-time senior professors, showed greater scientific productivity than their more junior colleagues, the assistant and associate professors. The earliest studies on this issue show that women tend to publish less than their male colleagues (Cole and Zuckerman, 1984), although it has also been shown that this result can be attributed to gender differences associated with position and other factors (Xie and Shauman, 1998; Smeby and Try, 2005). The Economic Theory or Marginal Productivity Theory was not taken into account since this study did not consider the movement of goods in a market for employees which increases employees' performance in order to design a model.

3.1.1.3.3 Bland's Model (BM)

Bland et al. (2005) proposed that academic research productivity has three dimensions or characteristics: *staff individual* (socialisation, motivations, content knowledge, basic and advanced research skills, simultaneous projects, orientation, autonomy and commitment, work habits); *institutional* (recruitment and selection, clear coordinating goals, culture, positive group climate, mentoring, communication with professional network, resources, sufficient work time, size/experience/expertise, communication, rewards, brokered opportunities, decentralised organisation, assertive participative governance); and *leadership* (scholar, research oriented, uses an assertive, participative style of leadership)

The Bland et al. (2005) model asserts that high research productivity is strongly associated with eight individual characteristics, fifteen institutional characteristics and four leadership characteristics (Bland et al., 2005:227). It clearly identifies leadership as an important factor for research productivity. While it could be said that research could be undertaken without leadership, the underlying stance in this research study is that effective research leadership can improve research productivity. Similar views are also taken by Ball (2007) and Bushaway (2003).

Further, the Bland et al. (2002) model suggests a hierarchical order to these three sets of qualities. The individual characteristics are essential, but they have more or less power in assuring faculty research productivity depending on how research-conducive the faculty member's institution is. Finally, the impact of the institution is mediated by the qualities and style of the leader. The Bland et al. (2005) model was taken into account since this study considered three dimensions, namely, staff individual, institutional, and leadership for employees in order to increase performance to design a model (see Figure 3.6 on page no. 45).

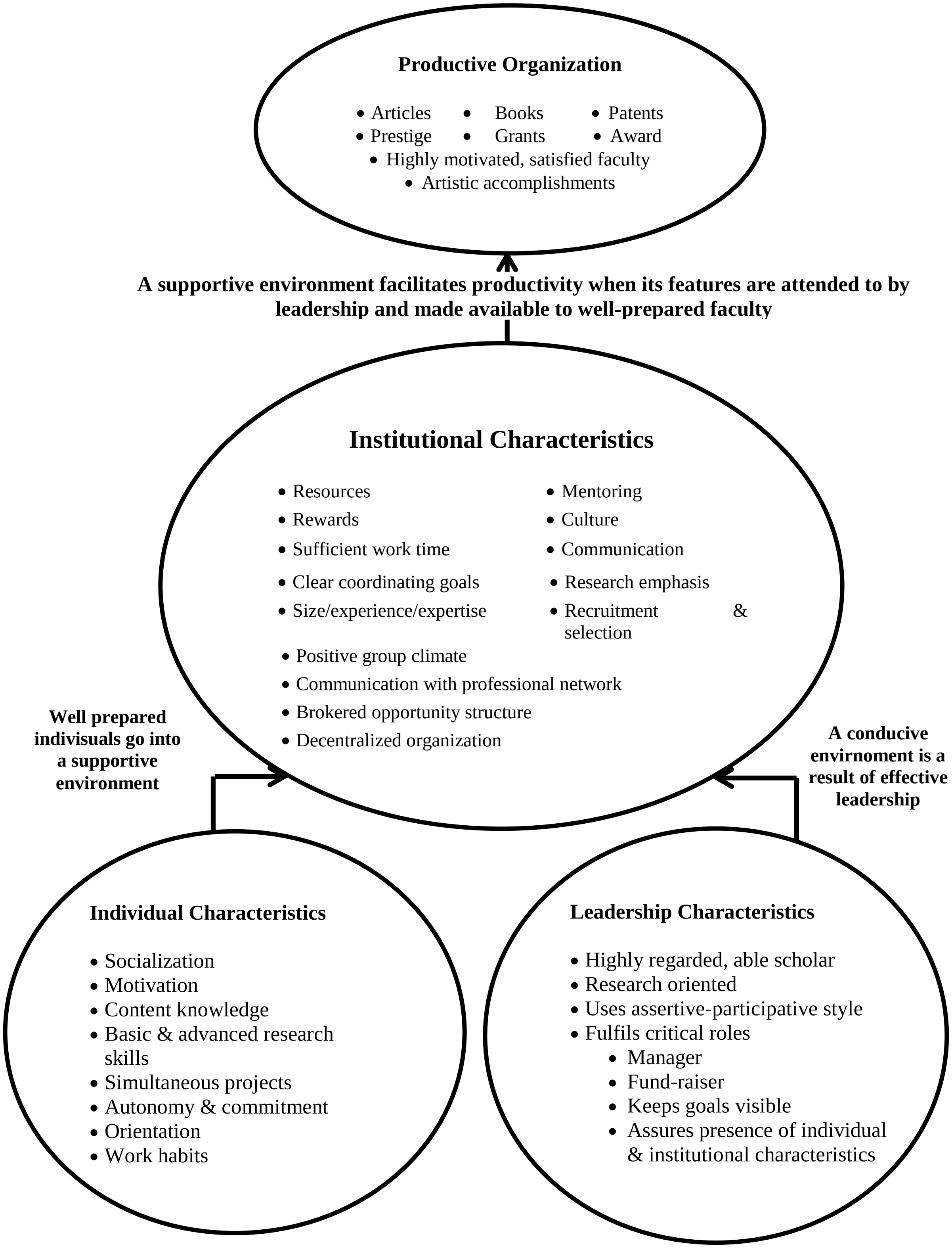


Figure 3.6: Bland Model

3.1.1.3.3 Dundar and Lewis's Model

Dundar and Lewis (1998) proposed a model in which faculty research productivity was primarily associated with two attributes: *individual*, that relate to personal traits and to environmental experiences, and *institutional and departmental*, that entail variables related to leadership, culture, structure, and policies. The Dundar and Lewis model is regarded as one of the most significant predictors of faculty research productivity.

Kelly and Warmbrod (1986: 31) stated that "Perceived institutional and departmental support for research is seen as the most important enablers to research productivity". Dundar and Lewis (1998) found that the percentage of graduate students hired as research assistants correlated closely with research production and only one study could be found (Dundar and Lewis, 1998) that addressed faculty. They reported that programmes with smaller numbers of faculties could not compete in the area of research productivity with larger universities. Gorman and Scruggs (1984) and Vasil (1992) also reported that institutional size was related to research productivity, however, Blackburn et al. (1991) reported that the characteristics of the employing institution were not related to research productivity.

Fox (1981, cited in Hughes, 1998:1) conducted a literature review of the early work on variables that influence publication productivity among scientists in which she categorised the factors into three major groups: individual-level (including psychological traits); environmental location (including institutional prestige of both one's employer and one's graduate degree), and feedback processes (such as peer recognition or citation). Fox's conclusion was that:

> While certain variables from each perspective do correlate strongly with productivity no one study or perspective explains the vast variation in … productivity, and the challenge for productivity studies lies in the capacity to combine perspective and untangle effects (Blackburn and Lawrence, 1995).

The Dundar and Lewis model was not taken into account since this study did not consider the two attributes that are associated with the research productivity, namely, individual and institutional and department for employees as increasing performance in order to design a model.

.

3.1.1.3.4 Blackburn and Lawrence's Model

Blackburn and Lawrence (1995) formulated their model of faculty productivity. Their model places the greatest emphasis on self-knowledge, which includes personal interest, commitment, efficacy, psychological characteristics, satisfaction, and morale. Less important according to Blackburn and Lawrence, is social knowledge, which includes social support, perceived institutional preference, and institutional values (e.g., rewards). Environmental influences have a tertiary role in their model. Others authors also have emphasised the psychological and behavioural implications of faculty experiences. Bess (1978), Clark (1987), and Clark and Corcoran (1986) claim that experiences during graduate school help shape the future faculty members' attitudes and behaviour. Alpert (1985), Baldwin and Blackburn (1981), Boice (1992), and Reynolds (1992) claim that the experiences during the early part of the faculty member's career also affect psychological development and orientation, and thereby influence behaviour.

Blackburn and Lawrence (1995), the eponymous proponents of this model, found that the most important factors in faculty research productivity were demographic characteristics (e.g., rank) and "behaviours." The latter category includes obtaining external research funding, which some authors claim is a research productivity measure in its own right (Konrad and Pfeffer, 1990). In other studies of faculty teaching and research behaviour, respectively, Fairweather and Rhoads (1995) and Diamond (1993) found rewards to be the strongest correlate of faculty behaviour, not socialisation or attitudes. The Blackburn and Lawrence's Model was not considered because this study did not place great emphasis on self-knowledge for employee performance in order to design a conceptual framework.

3.1.1.3.5 Teodorescu's Model

Teodorescu (2000) proposed an international model of the research publication productivity of faculties, asserting that individual achievement variables and institutional characteristic variables are predictors of the research productivity of faculties across national boundaries. In a test of this model across ten nations (Australia, Brazil, Chile, Hong Kong, Israel, Japan, Korea, Mexico, the UK and the USA), Teodorescu found that a faculty's research productivity varies across national boundaries, and their involvement in disciplinary affiliations (such as membership in professional societies and attendance at professional conferences) was significantly related to their research productivity (see Figure 3.7). Age and gender, the individual ascriptive variables, did not predict research output. The individual achievement variables indicated that a strong affiliation with the subject discipline, i.e., membership of societies, academic rank, as well as access to professional international networks, was a very strong indicator of research output overall.

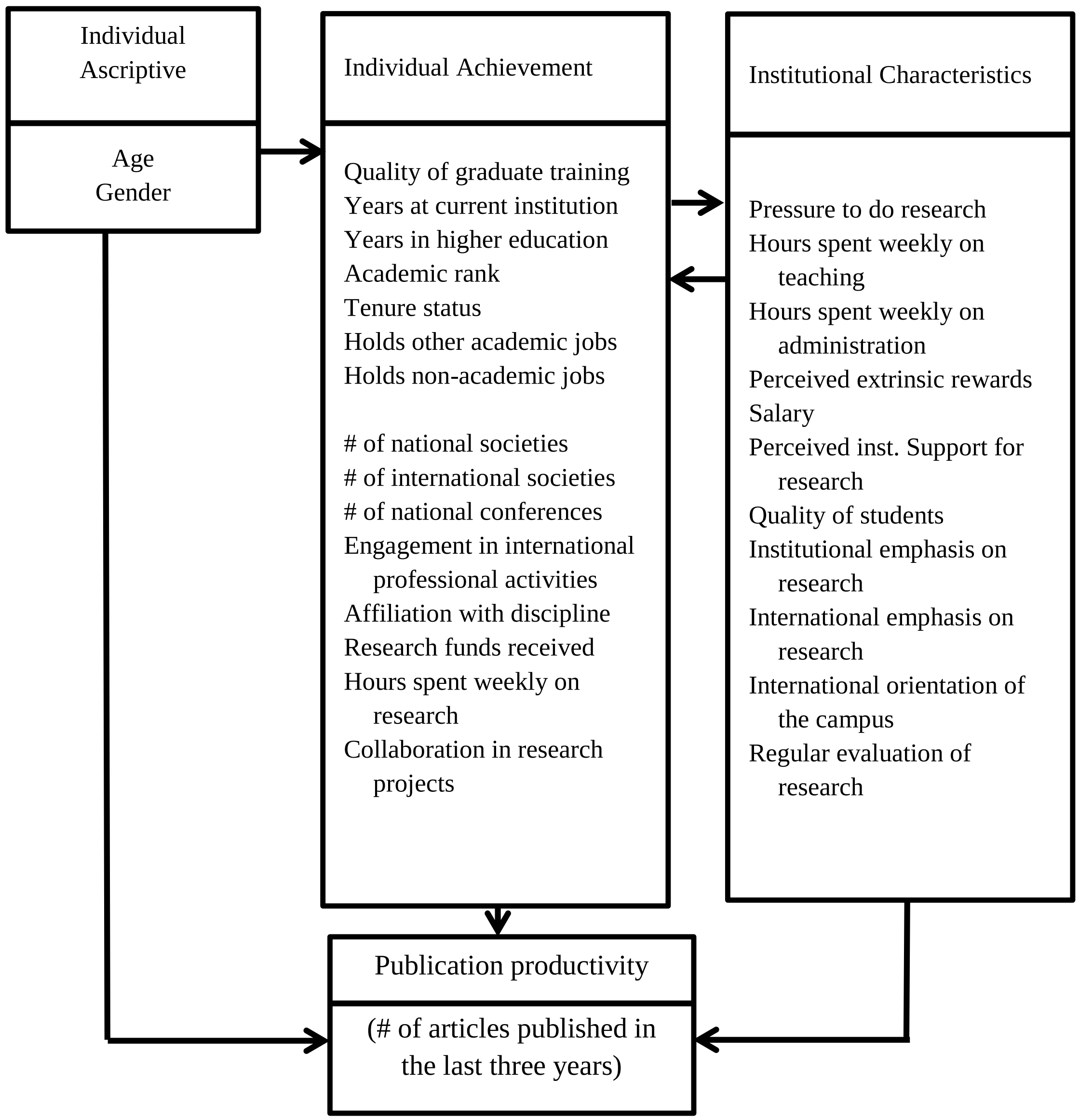


Figure 3.7: Teodorescu's Model

In contrast to the Teodorescu's study, Wissing et al. (2002) stated that the research productivity of academics in South African historically advantaged universities is influenced by time and work overload, lack of support from the institution, role overload with conflicting expectations and the conflict between teaching, research and service delivery. Whatever the reasons for the differences, the Teodorescu (2000) and Wissing et al. (2002) studies clearly indicated that the factors motivating publication productivity differ markedly across national academic settings. Publication productivity is, therefore, one of the most prevalent indicators of research productivity. Others indicators could be the number and size of research grants and contracts and other forms of peer recognition. Teodorescu's model was not taken into account since this study did not consider the individual achievement variables and institutional characteristics variables for employees which increase employee's performance in order to design a model.

3.1.3 Bland et al.'s (2005) Model Supporting This Study

In this study, the research productivity framework is the selected framework to determine research productivity. The research productivity framework was chosen because many researchers (Bland and Schmitz, 1986; Bland and Ruffin, 1992; Bland and Bergquist, 1997) also used the research productivity framework in their studies for the academic research productivity. The Bland et al. (2005) model illustrated three broad groupings of characteristics as necessary for high levels of research productivity, i.e., individual, institutional, and leadership. This model suggests that all features in each component must be present and accessible and that there is a hierarchical order to these three sets of qualities.

A research productivity framework was considered suitable for this study since it views productivity as critical aspects to concepts such as research productivity. Bland et al. (2005) summarised the five assumptions of the research productivity framework:

(i) "What individual, institutional, and leadership variables best predict an individual faculty member's research productivity? (p. 226);

(ii) What variables best predict group research productivity? (p. 226);

(iii) What variables best predict a faculty member's satisfaction, as measured by a willingness to choose the same organization again? (p. 226);

(iv) How well does the Bland et al. (2002) model explain faculty research productivity? (p. 226); and

(v) How is this information practically applied to facilitate an individual's or a group's research productivity? (p. 226)".

3.1.1.4 ICT Adoption Theories, Frameworks, and Models

Existing literature contains many ICT adoption theories, frameworks and models, presented here in historical order: the Theory of Reasoned Action (TRA); the Theory of Planned Behaviour (TPB); the Technology Acceptance Model (TAM); the Technology, Organization, and Environment framework (TOE); the Theory of the Diffusion of Innovations (DOI); and the Unified Theory of Acceptance and Use of Technology (UTAUT).

3.1.1.4.1 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) was proposed by Fishbein and Ajzen (1975) to predict or explain the actual behaviour of a person when faced with new options of action. According to Fishbein and Ajzen (1975), a person's actual behaviour is determined by his/her beliefs and prior intention towards the given behaviour and that prior intention, also referred to as behavioural intention, is a significant predictor of behaviour. Behavioural intention itself depends on attitude towards behaviour and on subjective norms, whilst beliefs and evaluations of a person influence a person's attitude towards a given behaviour. Furthermore, normative beliefs and motivation influence subjective norms. Behavioural intention is defined as "a measure of one's intention to perform a behaviour" (Chuttur, 2009). Attitude reflects the positive and negative feelings a person has towards a behaviour. Subjective norms and normative beliefs are the result of the influence of other people on a person's actual behaviour. Beliefs refer to the strength of conviction of a person towards a behaviour, and evaluations are a reflection of one's prior experiences. Motivation refers to one's drive to pursue an endeavour (Fishbein and Ajzen, 1975).

According to the TRA, a person's behavioural intention is a function of two basic determinants, one personal in nature, the other reflecting social influence (Ajzen and Fishbein, 1977). The personal factor is the individual's positive or negative evaluation of performing the behaviour or attitude toward the behaviour. Attitudes refer to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question (Ajzen, 1991) (see Figure 3.8). The second, social determinant of intention is the person's perception of the social pressures put on him/her to perform or not perform the behaviour in question.

TRA was criticised for neglecting the importance of social factors that in real life could be a determinant for individual behaviour (Gradon and Mykytyn, 2004; Werner, 2004). Social factors are all the influences of the environment surrounding the individual (such as norms) which may influence his or her behaviour (Ajzen, 1991). To overcome TRA's weakness, Ajzen (1991) proposed an additional factor in determining individual behaviour in TPB, which is Perceived Behavioural Control. Perceived behavioural control is an individual perception on how easily a specific behaviour will be performed (Ajzen, 1991). Perceived behavioural control might indirectly influence behaviour. TRA was not considered because this study did not take into account to actual behaviour for employees which increases their performance in order to design a model.

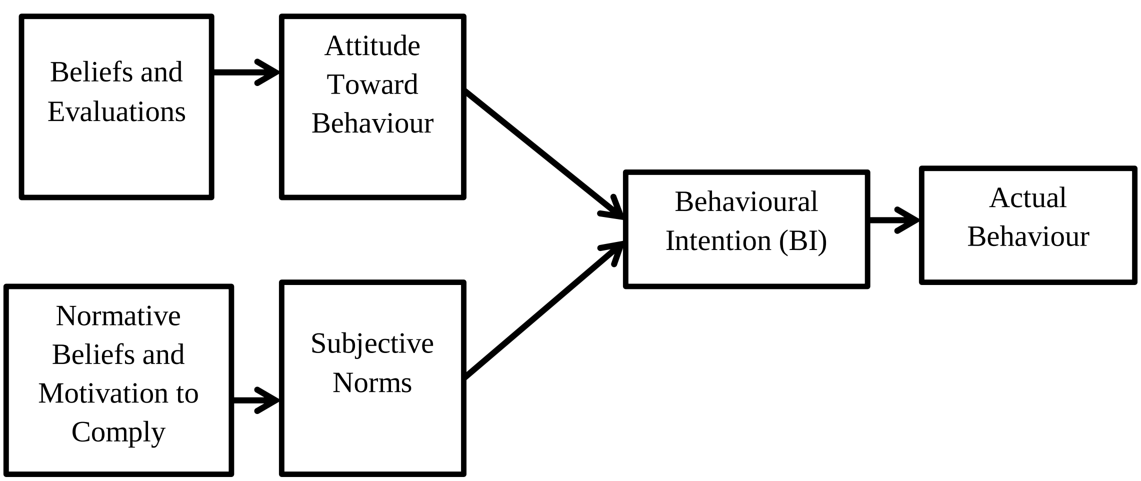


Figure 3.8: Theory of Reasoned Action

3.1.1.4.2 Theory of Planned Behaviour

In 1985, Ajzen proposed the Theory of Planned Behaviour (TPB) as an extension of the Theory of Reasoned Action. The main difference between the two theories is the inclusion of the concept of perceived behavioural control in the Theory of Planned Behaviour. Perceived behavioural control is defined as the level of control that a person has in the processes leading to a particular behaviour. According to Ajzen (1985), perceived behavioural control is influenced by ‘control beliefs’ and by ‘perceived facilitation’. Control beliefs are peoples’ perceptions on the availability of skills, resources, and opportunities, in the processes leading to an intended behaviour. Perceived facilitation is an individual’s evaluation of whether the expected outcomes will be achieved with the resources provided (Ajzen, 1985) (see Figure 3.9). Stone et al. (2010) conducted a study in Oklahoma which studied the Theory of Planned Behaviour predicting academic misconduct intentions and behaviour. They studied the cheating intentions and behaviour of a sample of 241 business undergraduates, and found that the TPB model was a valuable tool for predicting cheating behaviours. Robinson and Doverspike (2006) applied the Theory of Planned Behaviour to individual’s intentions to enrol in either an online version or a traditional classroom version of an experimental psychology class. They also found that the beliefs of their loved ones, their perceived behavioural control, and their personal beliefs were important in predicting their intention to receive hormone replacement therapy (Quine and Rubin, 1997).

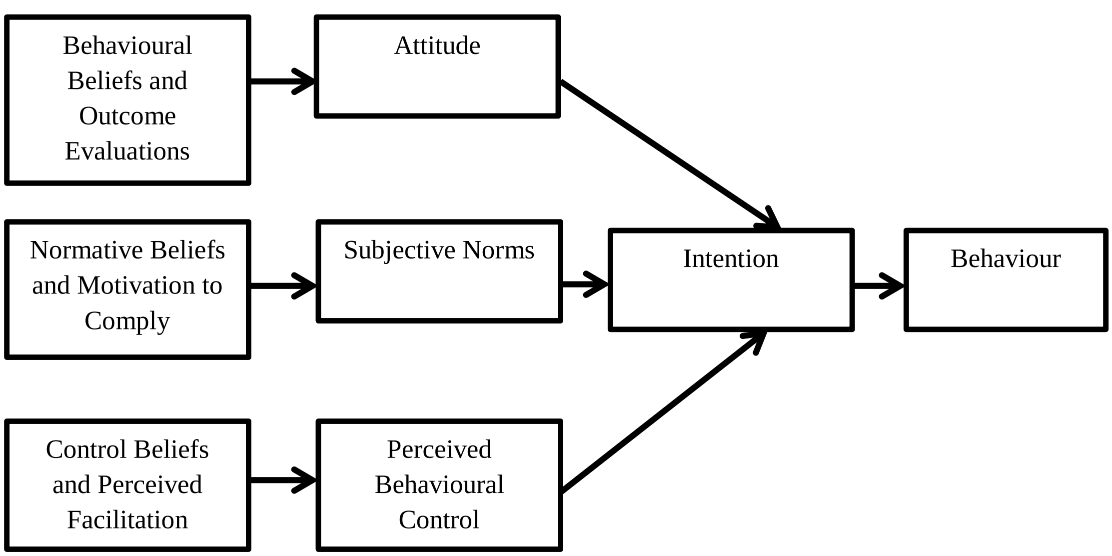


Figure 3.9: Theory of Planned Behaviour

However, although the TPB is generally successful, the TPB variables still cannot account for a large proportion of variance in both intentions and behaviour. Therefore, recent research has attempted to identify a range of moderator variables that could affect the cognition-intention and cognition-behaviour relationships and contribute to the amount of the variance explained (Cooke and Sheeran, 2004). TPB was not considered because this study did not take into account perceived behavioural control that is influenced by 'control beliefs' and by 'perceived facilitation' for employees which increases their performance in order to design a model.

3.1.1.4.3 Technology Acceptance Model

Davis (1985) useed the Theory of Reasoned Action to develop a conceptual model for technology acceptance, and Davis (1989) uses the conceptual model proposed by Davis (1985) to develop the original Technology Acceptance Model (TAM), which identifies perceived ease of use, perceived usefulness, and attitude as key factors affecting actual systems use. Davis (1989) further explains that attitude plays a major role in determining technology acceptance, and is influenced both by perceived ease of use and perceived usefulness. Furthermore, perceived ease of use directly influences perceived usefulness. TAM was originally empirically validated by two studies conducted by Davis (1989) on file editor software and email software, and on two graphics systems. Davis (1993) introduced a new construct, the system characteristics, as a factor affecting the perceived usefulness of a system, its perceived ease of use, and the attitude towards using that system. It was also found that the perceived usefulness of a system affects its actual use. The final version of TAM replaces the attitude variable by the behavioural intention variable and the systems characteristics variable by the external variables construct, with no direct influence between these two new constructs.

In the final version of TAM, perceived usefulness, perceived ease of use, and behavioural intention, are considered as internal variables, and these variables are internal to the user since they are describing the user's beliefs as opposed to external variables that are intended to describe everything else except the user's beliefs (Yousafzai et al., 2007). Generally, TAM specifies general determinants of individual technology acceptance and, therefore, can be and has been applied to explain or predict individual behaviours across a broad range of end user computing technologies and user groups (Davis et al., 1989). The goal of TAM is to provide an explanation of the determinants of computer acceptance that is, in general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while, at the same time, being both parsimonious and theoretically justified. However, because it incorporates findings accumulated from over a decade of IS research, it may be especially well-suited for modelling computer acceptance (Davis et al., 1989) (see Figure 3.10).

TAM has strong behavioural elements, as it assumes that when someone forms an intention to act, he/she will be free to act without limitation. In the real world, there will be many constraints, such as limited ability, time constraints, environmental or organisational limits, or unconscious habits which will limit the freedom to act (Bagozzi, 1992). TAM was considered because this study did take into account perceived ease of use, perceived usefulness, and attitude as key factors affecting actual systems' use for employees which increases their performance in order to design a model.

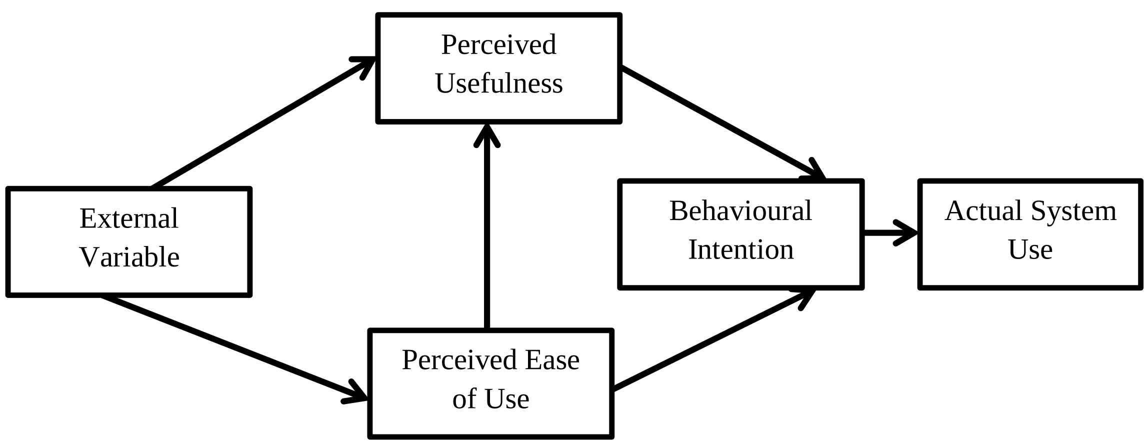


Figure 3.10: TAM 2 - Technology Acceptance Model

TAM was extended by Bjørn et al. (2003) to represent the effect of training on ease of use, and a similar effect is propsed by Amoako-Gyampah and Salam (2004) on the shared belief on the system.

3.1.1.4.4 Technology, Organisation, and Environment Framework

According to Tornatzky and Fleischer (1990), the adoption of technological innovations is influenced by three organisational contexts (see Figure 3.11). The *technological* context refers to the types of technologies used by an organisation both for its internal operations and for its interactions with external entities. The *organisational* context refers to the corporate identity in terms of vision, mission, policies, practices, managerial structure, size, and core business. The *environmental* context refers to the setting in which an organization conducts its affairs: What industry is the organisation a part of? Who are its competitors? What are some of its dealings? These have an impact on a firm's adoption process of technological innovation (Tornatzky and Fleischer, 1990), with technology separated from organisation and environment to show how its features can influence a firm to adopt the technology. However, the Technology, Organisation, and Environment (TOE) framework did not discuss specifically the characteristics or features of technology as compared to Diffusion of Innovations Theory by Rogers (1995 and 2003). TOE was not considered because this study did not take into account the three contexts for employees as increasing their performance in order to design a model.

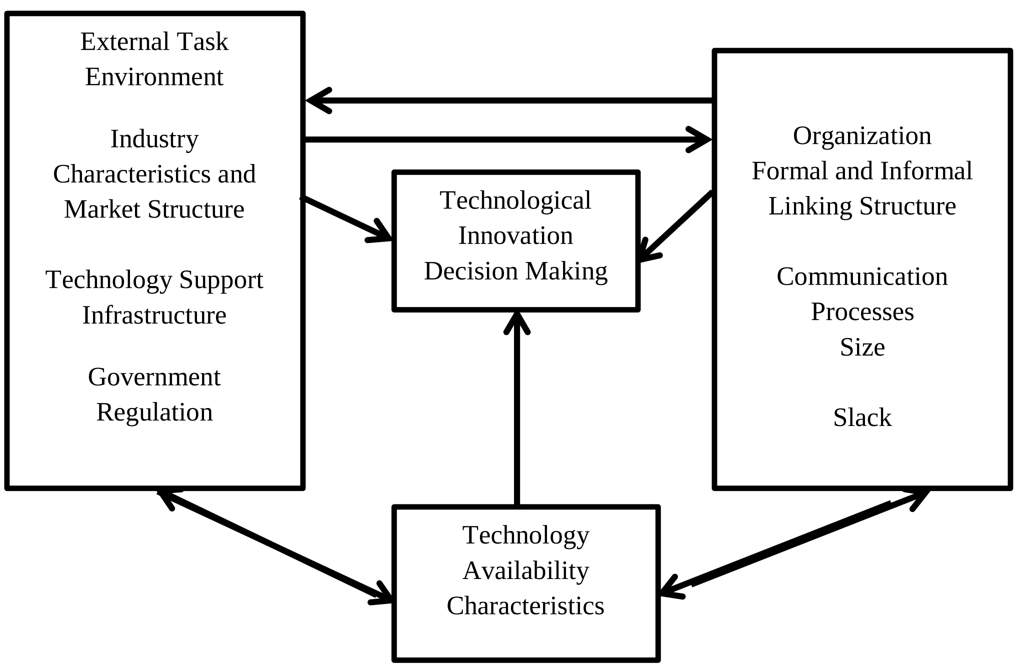


Figure 3.11: Technology, Organisation, and Environment Framework

3.1.1.4.5 The Diffusion of Innovation Theory

Diffusion of Innovation Theory (DOI), also known as Innovation Diffusion Theory (IDT), has been widely used to predict innovation adoption behaviour at organisation and individual levels (Masrom and Hussein, 2008; Smith et al., 2008; Venkatesh et al., 2003) (see Figure, 3.12). The theory of the diffusion of innovations was designed by Rogers (1999) to analyse the spread of innovations in society both at the individual and organisational levels. It classifies individuals into five innovativeness groups: innovators, early adopters, early majority, late majority, and laggards. These groups represent a scale of innovation adoption in which innovators are those who are first in the process.

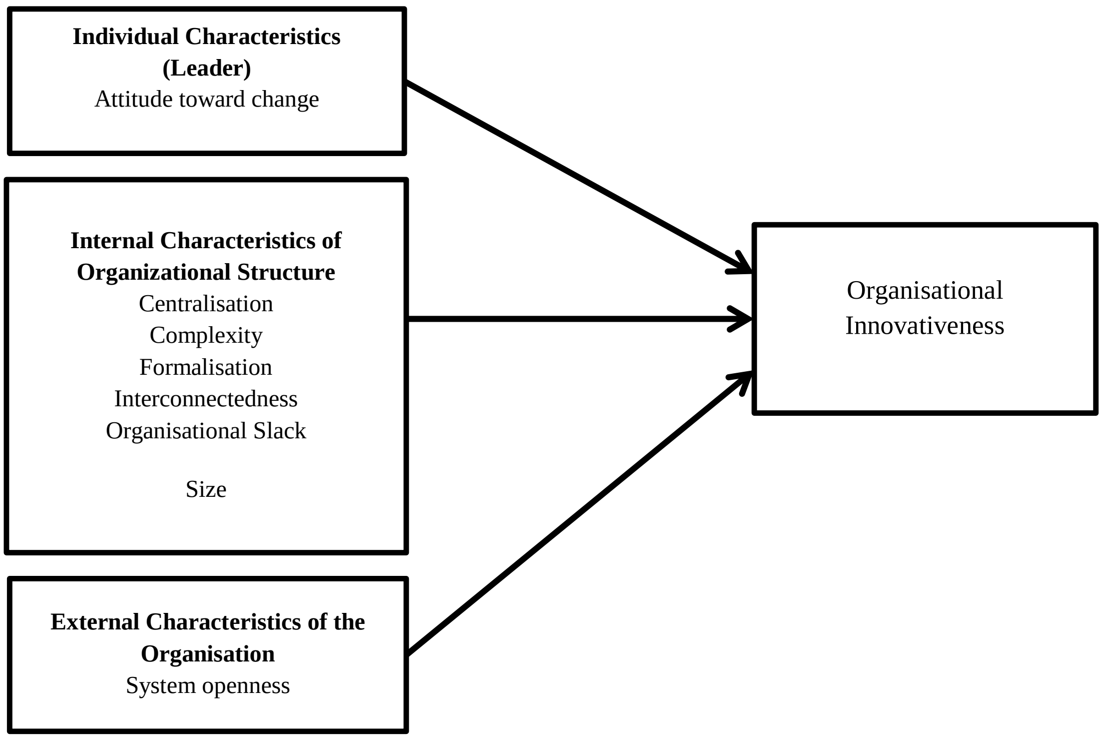


Figure 3.12: Diffusion of Innovation Theory

According to the DOI theory, the diffusion of innovations in organisations depends on the following attributes: the individual characteristics of the leader, the internal structural characteristics of the organisation, and its external characteristics. Leaders' individual characteristics are simply defined as their attitude towards change, whilst organisations' internal structural characteristics include aspects such as centralisation, complexity, formalisation, interconnectedness, organisational slack, and size. External characteristics are related to the openness of the system which "refers to how cosmopolitan the firm is, that is, how networked individuals in the firm are to outsiders" (Russell and Hoag, 2004:107). Rogers' diffusion of the innovation model is the most widely tested and implemented model (Engel et al., 1995), but although it does not adequately provide a basis for predicting outcomes and providing guidance on how to accelerate the rate of adoption, it is best applied to the socio-economic issues of information and communication technology in the social system (Minishi-Majanja and Kiplang'at, 2005).

Rogers (1995) stated that an innovation's relative advantage, compatibility, complexity, trialability and observability were found to explain 49 to 87% of the variance in the rate of its adoption. Other research projects, including the meta-analysis of 75 diffusion articles conducted by Tornatzky and Klein (1982), found that only relative advantage, compatibility and complexity were consistently related to the rate of innovation adoption. DOI was not considered because this study did not take into account prediction of innovation adoption behaviour at organisational or individual level for employees as increasing employee performance in order to design a model.

3.1.1.4.6 The Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) was created by Venkatesh et al. (2003), who synthesised existing models in an attempt to arrive at a comprehensive understanding not offered by any single model. They merged the following existing eight IT/IS adoption theories and technology acceptance models into an integrated model: the theory of reasoned action (TRA); the technology acceptance model (TAM); the motivational model (MM); the theory of planned behaviour (TPB); a model combining the theory of planned behaviour and the technology acceptance model (C-TAM-TPB); the model of PC utilisation (MPCU); the innovation diffusion theory (IDT), and social cognitive theory (SCT). All eight models aimed at predicting and explaining user behaviour through the use of a range of independent variables. The unified model was constructed and based on the empirical and conceptual commonalities among the eight models. UTAUT was updated by Marshall et al. (2011) to include the training variable, whereby training is linked to both performance and effort expectancy.

Venkatesh et al. (2003) found that performance expectancy, effort expectancy, social influence and facilitating conditions are directly associated with behavioural intention to use a technology that consequently affect a user's decision to adopt a technology. This intention has been found to be a driving factor toward individual's actual behaviour as deliberated in the Theory of Reasoned Action (Taylor and Todd, 1995) (see Figure 3.13). However, although attitude, which refers to the individuals' feelings (positive or negative) towards the use of the technologies (Fishbein and Ajzen, 1975), is an important component of the TRA and the TAM, it is not explicitly included in the UTAUT model. Oshlyansky et al. (2007) observed the validation of the UTAUT tool as a significant result of the UTAUT construct in the nine countries, thus suggesting that the model was well validated to withstand the translation and to be used cross-culturally. Furthermore, the UTAUT tool will also uncover the cultural differences, hence, providing a valuable insight for human computer interaction scholars without being concerned about its validity. Similarly, Sundaravej (2009) investigated the validity and consistency of the UTAUT model regarding user acceptance of information technology, and, in dictating the result of coefficient analysis, proved its acceptable construct validity. UTAUT was considered because this study did take into account the performance expectancy, effort expectancy, social influence or facilitating conditions as directly associated with behavioural intention to use a technology that consequently affect users' decisions to adopt a technology for employees in order to design a model.

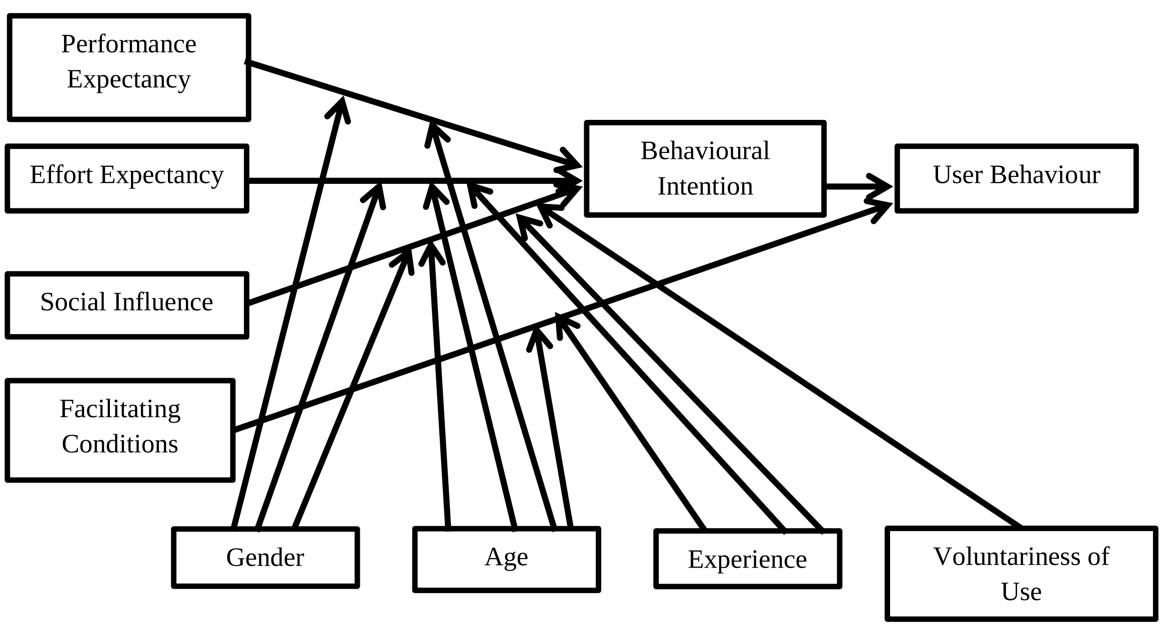


Figure 3.13: Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)

3.1.4 Unified Theory of Acceptance and Use of Technology Framework Supporting This Study

In this study, the technology acceptance framework is the selected framework to determine research productivity, because of the many researchers who (Thomas et al., 2013; Alwahaishi and Snášel, 2013; Sundaravej, 2010; Alshehri et al., 2012) also used it in their studies of academic research productivity. The UTAUT framework was considered suitable for this study as it can view the productivity as a critical aspect of research productivity. Thomas et al. (2013) summarised the four assumptions of the research productivity framework:

(i) "Performance Expectancy: The degree to which the individuals believe that the use of the technologies will results in performance gains. This may also be viewed as the perceived usefulness of the technologies;

(ii) Effort Expectancy: The ease of the technologies;

(iii) Social Factors: The extent to which the individuals believe that others believe that they should use the technologies; and

(iv) Facilitating Conditions: The perceived extent to which the organisational and technical infrastructure required for the support of the technologies exists".

3.1.1.5 Proposed Model

There are two theories, a model and two frameworks used to build the final proposed model regarding research productivity. The following theories, model and frameworks were considered, namely, Vroom's Expectancy Theory, Geogopalaus's Path Goal Theory, Bland et al. (2005) Model; the Unified Theory of Acceptance and Use of Technology (UTAUT); and the Technology Acceptance Model (TAM) to construct the proposed model. The final proposed model was built on **four stages,** namely, **stage 1**–*impact of ICT adoption on the research productivity by university academics;* **stage 2**–*using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) with training on research productivity;* **stage 3**–*using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training on research productivity;* **stage 4**–*using a manual system (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) on research productivity;* and the final– *A proposed model on ICT adoption and* *training for the increase of research productivity*. However, more insight could be achieved by consolidating the trust and commitment building process conceptualised in the chapter five. Therefore, the study incorporates those conceptual bases in a competing model (see Figures 3.14, 3.15, 3.16, 3.17, and 3.18) to explore the mediating role of trust for empirical testing in path analysis.

3.1.1.5.1 Impact of ICT Adoption on the Research Productivity by University Academics

This study included 103 academic staff from whom ten individual constructs as antecedents of faculty ICT adoption on the research productivity were identified: search engine tools, productivity software tools (word processing, presentation, spreadsheets, database, charts, and graphs), social network tools, university's portal tools, general communication tools (e.g., e-mail, telephone), e-learning instruction tools and e-learning assessment tools, online survey tools, e-curriculum tools, MIS (ITS) tools and the document management systems (e.g., scanning, photocopying, archiving). On the other hand, factors affecting research productivity were identified: master's student graduated, doctorate students graduated, externally-funded contracts and grants received, awards received, professional conference papers and presentations done, books and book chapters published, volumes edited, internal publications, invitations as a visiting professor or a guest speaker honoured, and text books published/co-published.

Figure 3.14 (stage 1): Impact of ICT Adoption on Research Productivity by University Academics (Source: Researcher)

In this study, the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) supported and presented the relationship among search engine tools, productivity software tools (word processing, presentation, spreadsheets, database, charts, and graphs), social network tools, university's portal tools, general communication tools (e.g., e-mail, telephone), e-learning instruction tools and e-learning assessment tools, online survey tools, e-curriculum tools, MIS (ITS) tools and the document management systems (e.g., scanning, photocopying, archiving). Academic staff members usually have to adopt ICT with the surrounding environment which includes their research productivity and, at the same time, they have to have the benchmark in terms of the research productivity. This is important to know since ICT adoption may increase research productivity for university academics.

3.1.1.5.2 (stage 2) Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) with training on research productivity; (stage 3) *Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training on research productivity; (stage 4) Using a manual system (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) on research productivity.*

This research proposed a model for the research productivity by university academics to test the direct impact of three variables (perceived usefulness, perceived ease of use, and acceptance level) using ICT with training on research productivity; using ICT without training on research productivity; using a manual system (without using research software/tools and training) on research productivity. However, more insight could be achieved by consolidating the trust and commitment building process conceptualised in the chapter five. Therefore, the study incorporates those conceptual bases in a competing model (see Figures 3.15, 3.16, 3.17, and 3.18) to explore the mediating role of trust for empirical testing in path analysis.

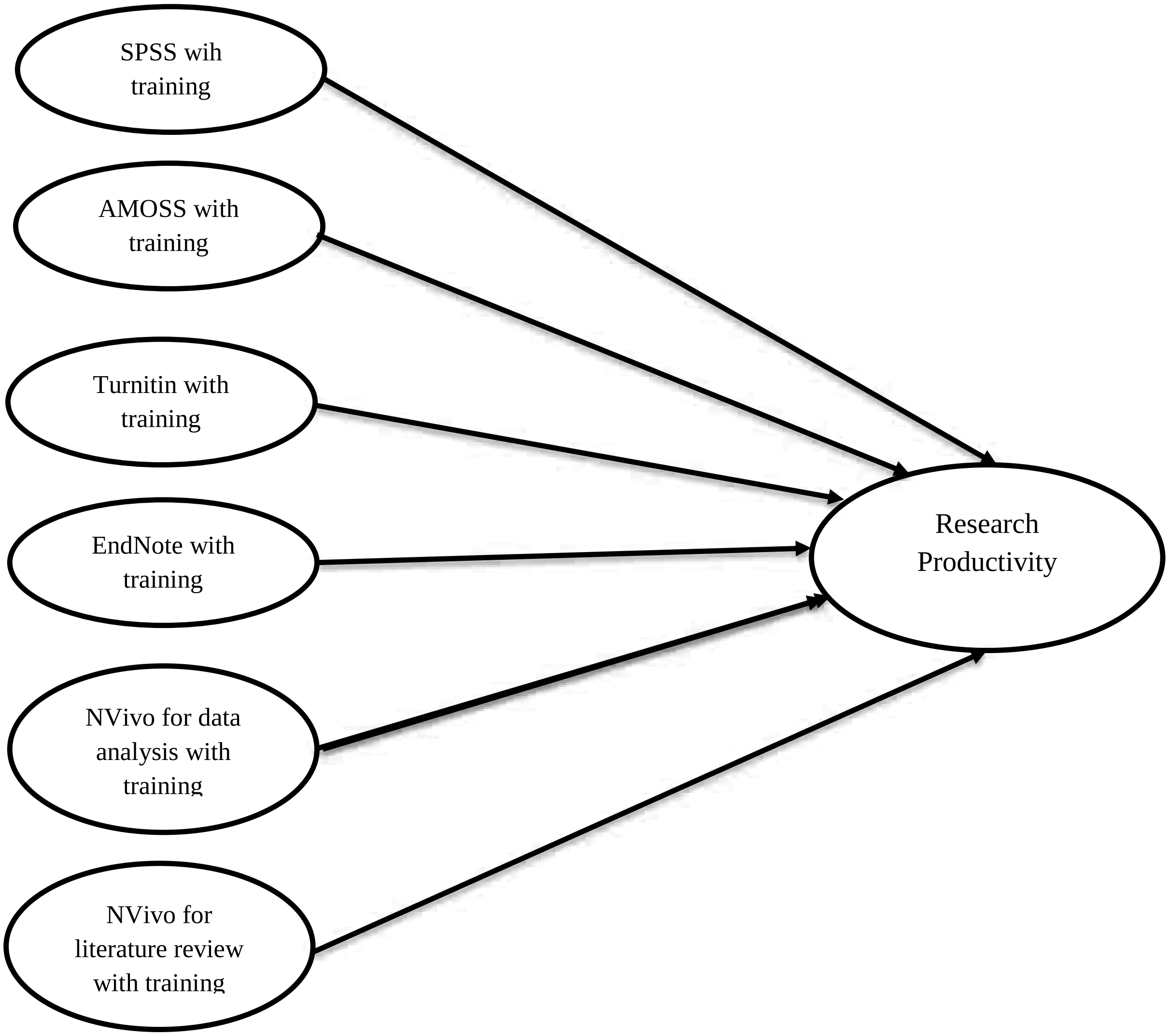


Figure 3.15 (stage 2): Using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) with Trainingon Research Productivity (Source: Researcher)

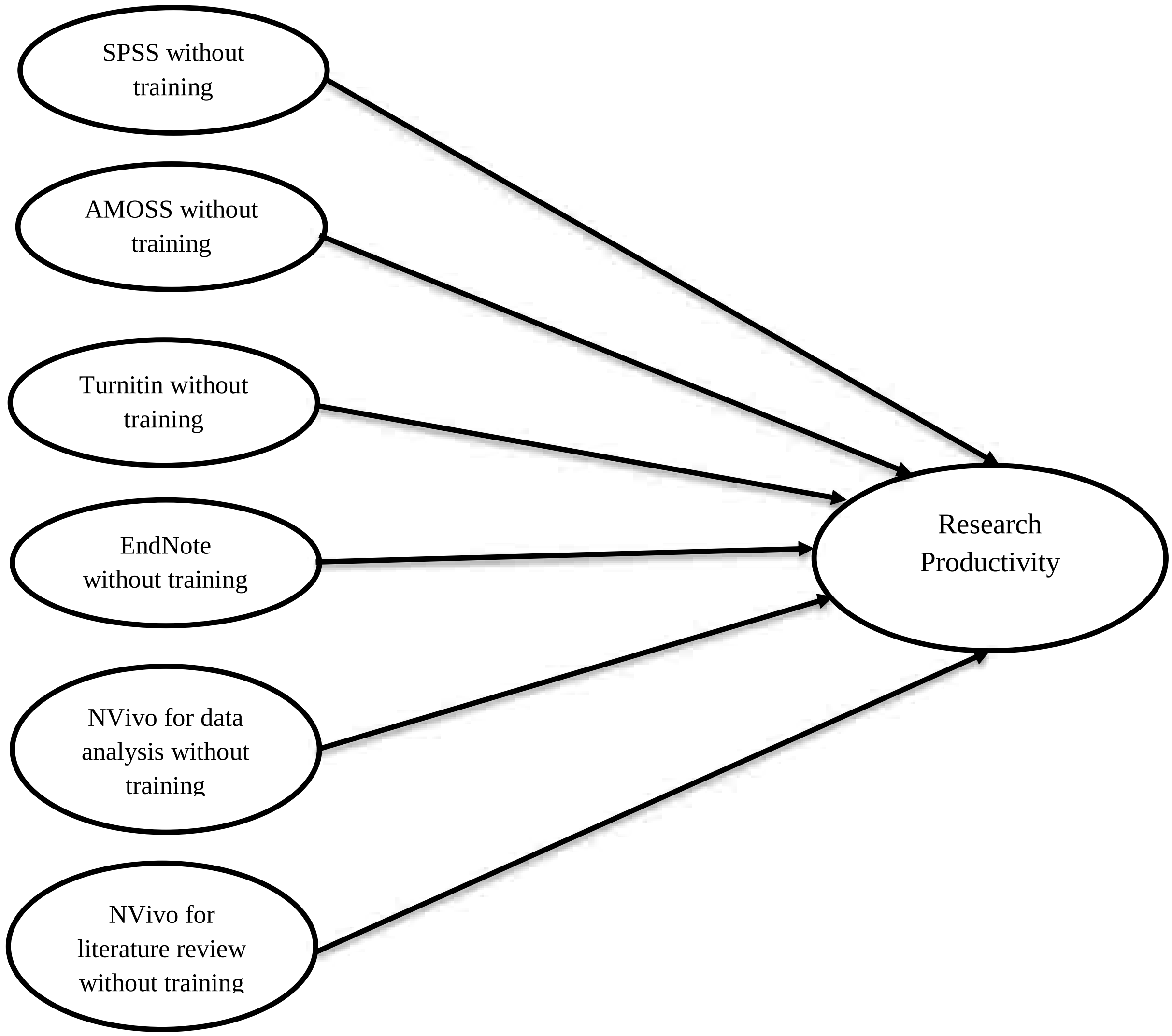


Figure 3.16 (stage 3): Using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) without Training on Research Productivity (Source: Researcher)

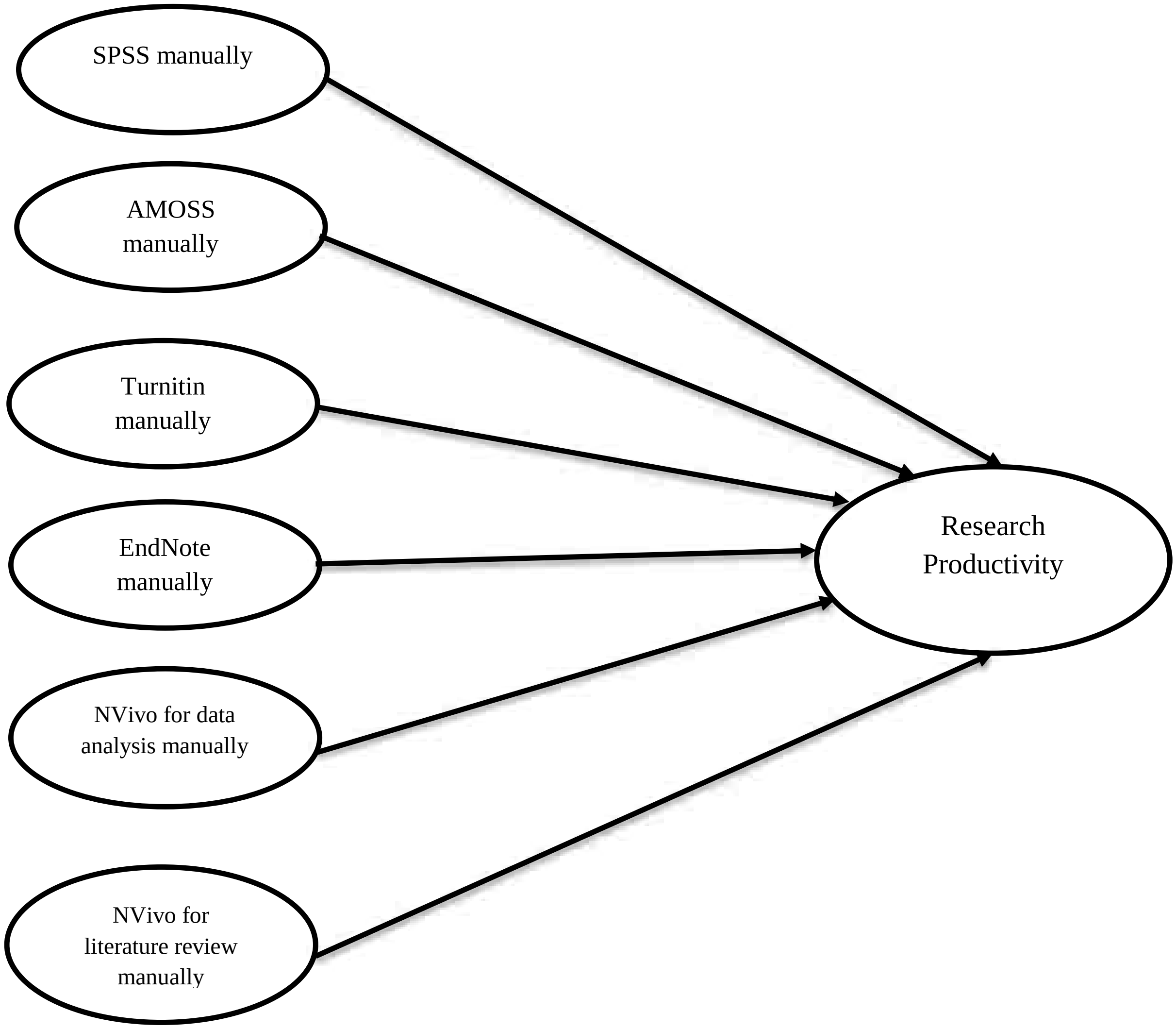


Figure 3.17 (stage 4): Using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) on research productivity (Source: Researcher)

In this study, the Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003) supported and presented the relationship among perceived usefulness, perceived ease of use, and acceptance level. It is important to know the comparison among using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) with training on research productivity; using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training on research productivity; using a manual system (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) on research productivity.

3.1.1.5.3 A Proposed Model on ICT Adoption and Training for the Increase of Research Productivity

This research proposed a model for the research productivity by university academics to test the direct impact of ICT adoption and training on the research productivity. However, more insight could be achieved by consolidating the trust and commitment building process conceptualised in the chapter five. Therefore, the study incorporates those conceptual bases in a competing model (see Figure 3.18, below) to explore the mediating role of trust for empirical testing in path analysis. The proposed competing model follows the discussion of research questions relationships.

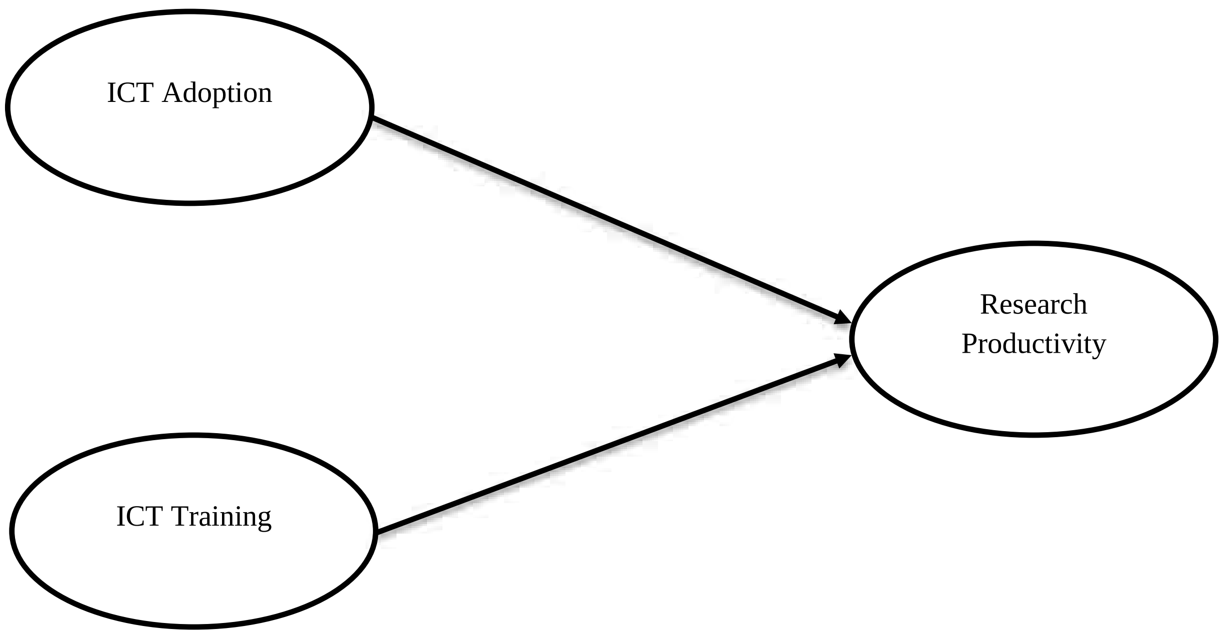


Figure 3.18: A Proposed Model on ICT Adoption and Training for the Increase of Research Productivity (Source: Researcher)

The study included 103 academic staff for the ICT adoption from which ten individual constructs were formulated as antecedents of faculty ICT adoption on research productivity and ±15 academic staff included for the ICT with training from which three individual constructs were formulated as antecedents of faculty ICT training on research productivity. In this study, the Path-Goal Leadership Components (Greene, 1974) supports and presents the relationship between ICT adoption and ICT training since both adoption and training together increase their research productivity.

3.4 SUMMARY

Models, frameworks, and theories for this study integrate research on the faculty research productivity. The selected motivation theory in this research consists of expectancy theory by Vroom (1964) Models in this research consists of : Bland et al. (2005) for the academic research productivity, Unified theory of acceptance and use of technology (UTAUT) by Venkatesh et al. (2003), Geogopalaus's Path Goal Theory, and the Technology Acceptance Model (TAM). The intention of the present study is to use these theories and models in attempting to design a model to increase the research productivity in universities.

The next chapter will demonstrate the research methodology employed.

"Design is a plan for arranging elements in such a way as best to accomplish a particular purpose." – Charles Eames

Chapter 4: Research Design and Methodology

Having presented a literature review, theoretical frameworks, models, and theories, the purpose of this chapter is to present the research methods employed. According to Bhattacharyya (2003), a research method provides the researchers with knowledge and skills needed to solve problems and meet challenges in the competitive world. De Vos et al. (2001) stated that the research design is a blueprint or plan that clearly explains how the research will be implemented, whilst Welman and Kruger (2003) regard it as the plan by which research participants are selected and how the information is collected from them. This chapter covers the instrument design, target population, sample, data collection, training, and data analysis. Collected data was subjected to descriptive statistical and inferential statistical analysis, measurement model, and structural equation modelling in order to provide the objectives formulated by this study. It starts with a presentation of the survey from four universities in KwaZulu-Natal on ICT adoption to increase research productivity for university academics. The second part of the chapter presents the experiment conducted by this study to test the impact of ICT training on research productivity. This chapter does not describe how the model ties up with the design of the survey or with that of the experiment, because these links are related to the findings and it is not appropriate to reveal such findings at this stage.

4.2 AIMS AND OBJECTIVES OF THE SURVEY AND EXPERIMENT

The objective of the survey and experiment was to determine the impact of ICT adoption and training on research productivity among academics. However, ICT adoption and ICT training should not be seen as isolated but need to be placed in the context of the research productivity for university academics. Without this background, any discussion may be irrelevant. The assessment of the impact of ICT adoption and training on the research productivity of university academics was conducted in the present study, using two research methods, namely, survey and experimental.

The purpose of the survey conducted by this study was to measure the impact of ICT adoption on research productivity. The survey data was analysed using *SPSS 20.0*. On the other hand, the purpose of the experiment conducted by this study was to measure the joint impact of ICT adoption and training on research productivity. This study included a research variable using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) with training on research productivity; using ICT without training on research productivity; using a manual system (without using research software/tools and training) on research productivity. This experiment was motivated by the findings of the above described survey. This experiment was designed in the form of three experimental cases consisting of ±45 academics working at the University A, and the collected data was analysed using *WarpPLS 4.0*. For the experiment, tasks were designed which included the quantitative analysis of data from a questionnaire, structured equation modelling, referencing, pliagrism and qualitative data analysis. All of these tasks were attempted using software tools without training, using software tools with training and without the use of software tools.

4.3 SCOPE AND RESEARCH METHODOLOGY

The empirical study is discussed in this section.

4.3.1 Survey Population

Saunders et al. (2009) stated that the population is the full set of cases from which the sample is drawn. For ICT adoption (survey), the target population was academic staff from four tertiary institutions of KwaZulu-Natal and for ICT training the target population was academic staff from University A. The target population for survey consisted of academic staff from all the faculties. The target population for the experiment consisted of academic staff from University A. Since it was not possible to focus on the entire population, a sample was chosen.

4.3.2 Sampling

For the ICT adoption (survey), a list of academic staff was obtained from the four tertiary institutions of KwaZulu-Natal. Data was collected in one week at the end of August 2012 and the beginning of September 2012 from four universities. A sample of 106 academic staff were initially selected for the survey (see Table 4.1, below), although only 103 respondents actually participated in the survey.

Table 4.1: Sampling of the Academic Staff Members

<table>
<tr><th>University</th><th>Targeted sample size</th><th>Number of Colleges / Faculties</th><th>Initial Sample size per Faculty / College</th><th>Bachelors Degree</th><th>Masters Degree</th><th>Doctoral Degree</th><th>Final sample size per Faculty / College</th><th>Final Sample Size per University</th></tr>
<tr><td>A</td><td>30</td><td>6</td><td>5</td><td rowspan="3">60% staff</td><td rowspan="3">30% staff</td><td rowspan="3">10% staff</td><td>5</td><td>5*6 = 30</td></tr>
<tr><td>B</td><td>10</td><td>3</td><td>3.3 ~= 3</td><td>4</td><td>4 * 3 = 12</td></tr>
<tr><td>C</td><td>10</td><td>4</td><td>2</td><td>4</td><td>4 * 4 = 16</td></tr>
<tr><td>D</td><td>50</td><td>4</td><td>12.5 ~= 12</td><td>0% staff</td><td>50% staff</td><td>50% staff</td><td>12</td><td>12 * 4 = 48</td></tr>
<tr><td>Total</td><td>100</td><td></td><td></td><td></td><td></td><td></td><td></td><td>106</td></tr>
</table>

The value of the initial sample size was purposely set at 100 academic staff members for the entire survey, with a representation of 50% of the staff from the largest university (University D), 30% from the second largest university (University A), and 10% from each of the two smallest universities (Universities B and C). The targeted sample size from each university was divided by the number of faculties or colleges so as to have a proportional representation. However, that initial sample size for each university could slightly adjusted to the nearest smallest integer. On the other hand, one department was randomly selected from each faculty of the three smallest universities, and two departments were randomly selected from the largest university. The distribution of the questionnaire and its collection was accomplished through face-to-face meetings with staff members in the course of one week at the end of August 2012 and the beginning of September 2012.

For the experiment, using ICT (*EndNote*, *NVivo, AMOS, SPSS, and Turnitin*) with training on research productivity; using ICT (*EndNote*, *NVivo, AMOS, SPSS, and Turnitin*) without training on research productivity; using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) on research productivity, a list of academic staff was obtained from University A. Data was collected over the first week and second week of October 2014. Professional trainers were hired to train software use for academics in order to see the impact of ICT training. A sample of 45 academic staff were initially selected for the experiment (see Table 4.2, below), although these participants varied due to their availability.

Table 4.2: Sampling of the Academic Staff Members Who Participated in the Study for the Experiment

Name of the Software	Initially expected total no. of participants for all the three categories	using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) training participated	using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training participated	Using a manual system (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) participated	Total no. of participants participated
SPSS	15*3=45	18	12	15	45
Turnitin	15*3=45	13	13	15	41
EndNote	15*3=45	13	12	15	40
AMOS	15*3=45	14	15	15	44
NVivo for data analysis	15*3=45	14	12	15	41
NVivo for literature review	15*3=45	13	11	15	39
Total	270	85	75	90	250

4.3.3 Data Collection

Churchill and Iacobucci (2005) indicated that data collection is important in solving problems to clarify the purpose of any research. On the other hand, Ferreira (2005) stated that three ways the primary data can be classified are survey, observation and experiments. The researcher distributed questionnaires to academic staff of the respective department of four universities of KwaZulu-Natal. A total of 103 questionnaires were collected from each member of staff. Most respondents completed them in front of the researcher. For the ICT training, a total of 250 questionnaires were distributed to participants.

4.3.3.1 Questionnaire Design

According to Wegner (1993:17), "the design of a questionnaire is critical to ensure that the correct research questions are addressed and that accurate and appropriate data for statistical analysis is collected". Extensive research was conducted to obtain the most valid and reliable research productivity questionnaires. Welman and Kruger (2003) indicated that the measurement of the instrument serves as reliable source for the design of questionnaires. The questionnaire is designed to be short and concise and straightforward to the research. However, Cooper and Schindler (2001) outlined four elements to design a questionnaire, namely, management question, research questions, investigative questions and measurement question. The questionnaire in this study was designed around the key issues highlighted in the literature review.

In the case of *the impact of ICT*, the data was collected using a questionnaire consisting of Integer number rating questions and Likert scale rating questions, except for the first section on the respondents' background. The questionnaire consisted of the following three sections: background data, research productivity or output for the year of 2011, and ICT adoption. In the case of *using ICT with training on research productivity; using ICT without training on research productivity; using a manual system (without using research software/tools and training) on research productivity*, the data was collected using a questionnaire consisting of Likert scale rating. The questionnaire consisted of the following three sections: perceived usefulness, ease of use, and the acceptance level.

Section A: Faculties' Background Data

Section A of the questionnaire arose from the existing literature and requested research participants to provide data on the following biographical attributes: the name of their faculty and university, designation, gender, age group, highest qualification, academic experience, employment status, highest level of course taught by them, and Internet access at home.

Respondents were not required to write their names on the questionnaire; but to simply indicate their biographical details by marking a tick in appropriate blocks.

Section B: Research Productivity or Output for the Year of 2011

Section B of the questionnaire was drawn from the existing literature, with each item being a statement intended to measure the research output of the participant for the 2011 academic year measured in terms of items such as graduation statistics for supervised students and publications. For each statement, another participant was requested to auto-assess his or her research output for 2011 by simply putting an integer number such as 0, 1, 2 in the appropriate block.

Section C: ICT Adoption

Section C of the questionnaire consisted of 10 items, each extracted from the existing literature as a statement intended to measure how an academic staff member assesses his or her level of ICT adoption, including the adoption of technologies such as search engines tools, research productivity software, social networks software, and e-learning software. For each statement, another participant was requested to auto-assess his or her experience using a five-point Likert rating scale ranging from 'Strongly Disagree' (1) to 'Strongly Agree' (5). The questionnaire was designed so that respondents could put a tick in an appropriate block to indicate their choice of answer.

4.3.4 Data Capturing and Variables Coding

After the printed questionnaires were collected from the respondents, their data was coded and captured in *SPSS*. Variables were categorised according to the "NOIR" classification or measure (Field, 2005:254) for variables, namely, Nominal (N), Ordinal (O), Interval (I) or Ratio (R): N and O are non-parametric data, while I and R represent parametric data. This is important because the measure of the dependent variable determines the nature of statistical tests. Tables 4.5 to 4.10 give the details of the measures and codes for the research variables of this study.

The nominal (N) measure was chosen for the following demographic items: designation, gender, highest qualification, age, academic experience, faculty, university employment status, highest level of course taught, and Internet access at home. This measure was chosen as a result of these items being representative of different item categories and not containing any form of order. For example, there is no particular order as a faculty can be Science (Natural or Applied)/Engineering/Agriculture, Arts and Humanities, Health Science, Management/Commerce/Law, Computing, or Education.

The Ordinal (O) measure was chosen for the experimental questionnaires (using ICT with training; using ICT without training; and using a manual system (without using research software/tools and training)) as they are based on the Likert scale, which allows respondents' perceoptions to be ranked using a gradual scale.

The Ratio (R) measure was chosen for the research productivity for the year of 2011 as they are bsed on the Integer number, which allows respondents' with specific points.

4.3.5 Data Analysis (Survey Phase)

According to Tustin (2005), once data has been captured and stored in the form of a data set, it can be used for analysis. Data analysis began with the testing of the reliability and validity of the collected data. Then, in order to find meaningful results from the collected data, a number of statistical tests were executed with the help of the *PASW Statistics 20.0* (*SPSS*) software package.

4.3.5.1 Data Reliability and Validity

Reliability is defined as the proportion of the variability in the responses to the survey resulting from differences in the respondents (Dellinger and Leech, 2007). According to Santo (1999), the reliability comes to the forefront when variables are developed from the summated scales and used as the predictor components in the objective models. Maree (2007) regards the Cronbach's alpha (α) as an important measure of the reliability of the psychometric instrument, with a level at 0.731 used for this study. According to Saunders et al. (2003), there are four threats to the reliability, namely: subject error, subject bias, observer error, and observer bias.

Therefore, the researcher took the following measures to ensure the reliability of the study under investigation: (i) a questionnaire, to make certain that all questions and statements were both relevant and easily understood; (ii) the questionnaire for this study to ensure the anonymity of the respondents; and (iii) questionnaire used in open-ended question format.

On the other hand, according to Johnson and Christensen (2000:106), validity refers to the judgment of the appropriateness of interpretations and actions that researchers make based on scores from a test. However, validity refers to the results of the test, not the test itself. There are different categories of validity, namely, low or high (Salkind, 1997). In order to establish the validity, the following questions regarding the study were asked: (i) Does the research actually measure ICT adoption regarding the research productivity? (ii) Do the findings of the research agree with the research objectives?

The ICT adoption variable in Section C of the questionnaire was the only variable that was subjected to reliability and validity tests because of the division of the other research variables. Data reliability for Section C of the questionnaire was established in this study using the Cronbach's alpha (α) method. According to Field (2005:254), Cronbach's alpha (α) stipulates that reliability coefficients less than 0.700 are considered to be poor; while Cronbach's alpha (α) between 0.700 and 0.799 are acceptable, and Cronbach's alpha (α) above 0.800 are good. For variables with a poor Cronbach's alpha (α), there is a need to perform a further factor analysis in order to improve the reliability of the variable by removing items spreading on more than two components.

Overall Validity

The researcher needed to establish the overall data validity of the Likert scale-based ICT adoption variable. This overall validity was achieved using factor analysis for all valid and reliable Likert scale items for this independent research variable, namely, C3, C4, C6, C7, C8, and C9 (see details in Tables 4.3 and 4.4).

Table 4.3: Case Processing Summary

	N	%
Case Valid	10	100%
Excluded	4	40%
Total	6	60%

Table 4.4: Reliability for the ICT Adoption Research Variable

Research Variable	Questionnaire Item	Cronbach's Alpha (α)
ICT adoption	C3+C4+C6+C7+C8+C9	0.731

4.3.5.2 Statistical Analysis

After completion of validity and reliability tests, the research data was analysed using descriptive and inferential statistical methods. Descriptive statistical methods using frequencies, means, summation, standard deviations and variances were utilised to count the number of participants in the sample for the different biographical attributes groups, and to measure meaningful values for the Likert scale-based research variables. Inferential statistics were calculated using correlations, in order to interpret the data by showing associations among research variables, i.e., associations between participants' research productivity or output for the year of 2011, and their ICT adoption.

4.3.5.3 Descriptive Statistics

Descriptive statistics is used to summarise or identify the general nature of all the responses obtained. According to Sekaran (2003), the descriptive statistics are a useful technique to present and summarise tables, charts, graphs, and other diagrammatic forms. According to McDaniel and Gates (2002), the analyst calculates one or more numbers that can reveal something about the characteristics of the large sets of data. The following descriptive statistics were used in this research during data analysis in order to summarise the data: frequencies, means, standard deviations and variance (see Appendix C). The following paragraphs present the three major steps used in this study during descriptive statistical analysis in *PASW Statistics 20.0*

(*SPSS*). Table 4.5 and Table 4.6 represents coding of background data and coding of research productivity for the year 2011, respectively.

Table 4.5: Coding of Background Data

Variable/ Item	**Measure**	**Questionnaire Section**	**Coded Value**
Designation	Nominal	A	1="Jnr. Lect." 2= "Lect." 3= "Snr. Lect./Assoc. Dir." 4="Ass. Prof." 5="Prof."
Gender	Nominal	A	1="Female" 2="Male"
Highest qualification	Nominal	A	1="Below Masters" 2= "Masters" 3= "Doctorate"
Age	Ordinal	A	1="20-30 years" 2="31-40 years" 3= "41-50 years" 4="51 years and over"
Academic experience	Ordinal	A	1="1-3 years" 2="4-6 years" 3="7-9 years" 4="10-12 years" 5="13 years and over"
Faculty	Nominal	A	1="Science (Natural or pplied)/Engineering/Agriculture" 2="Arts and Humanities" 3= "Health Science" 4= "Management/Commerce/Law" 5="Computing" 6="Education"
University	Nominal	A	1="DUT" 2="MUT" 3="UKZN" 4="UniZulu"
Employment status	Nominal	A	1="Permanent" 2="Long term contract" 3="Short term contract"
Highest level of course taught	Nominal	A	1="Undergraduate 2="Postgraduate
Internet access at home	Nominal	A	1="None" 2="Cell-phone" 3="Laptop/Computer" 4="Both (Cell-phone & Laptop/Computer)"

Table 4.6 Coding of Research Productivity for the Year of 2011

Variable/Item	Measure	Questionnaire Section	Coded Value
Masters student graduated	Ratio	B	"Integer number" Open-ended questions
Doctorate student graduated	Ratio	B	"Integer number" Open-ended questions
External funded contracts and grants received	Ratio	B	"Integer number" Open-ended questions
Awards received	Ratio	B	"Integer number" Open-ended questions
Professional conference paper and presentation	Ratio	B	"Integer number" Open-ended questions
Book and book chapters published	Ratio	B	"Integer number" Open-ended questions
Volume edited	Ratio	B	"Integer number" Open-ended questions
Internal publications done	Ratio	B	"Integer number" Open-ended questions
Visiting professor or a guest speaker	Ratio	B	"Integer number" Open-ended questions
Textbooks published/co-published	Ratio	B	"Integer number" Open-ended questions

4.3.5.4 Inferential Statistics

McCall (1994) referrred to inferential statistics as the methods used to make inferences about a large group of individuals on the basis of data collected from a smaller group. The objective of inferential statistics is to enable the researcher to determine "whether or not a difference between two treatment conditions occurred by chance or is a true difference" (Sekaran and Bougie, 2009:117). For the purpose of this research study and based on the nature of its variables, the Pearson's Correlation Test was used.

Table 4.7, Table 4.8, Table 4.9, and Table 4.10 represent coding of ICT adoption data, coding of using ICT with training, coding of using ICT without training, and coding of using a manual system (without using research software/tools and training), respectively.

Table 4.7: Coding of ICT Adoption Data

Variable/Item	Measure	Questionnaire Section	Coded Value
Search engines tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
Productivity software tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
Social networks tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
University's portal tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
General communication tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
E-learning instruction tools and e-learning assessment tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
Online survey tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
E-curriculum tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
MIS (ITS) tools	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"
Document management systems	Ordinal	C	1="Strongly Disagree" 2="Disagree" 3="Neutral" 4="Agree" 5="Strongly Agree"

Table 4.8: Coding of Using ICT with Training

Variable/Item	Measure	Questionnaire Section	Coded Value
Perceived Usefulness			
Before training how useful did you perceive software?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
Before training how useful did you perceive software training?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
After training how useful did you perceive software?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
After training how useful did you perceive software training?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
Perceived Ease of Use			
Before training how easy to use did you perceive software?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
Before training how easy to use did you perceive software training?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
After training how easy to use did you perceive software?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
After training how easy to use did you perceive software training?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
Acceptance Level			
Before training what was your perceived acceptance	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average"

level for software?			5="High" 6="Very High" 7="Extremely High"
Before training what was your perceived acceptance level for software training?	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average" 5="High" 6="Very High" 7="Extremely High"
After training what was your perceived acceptance level for software?	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average" 5="High" 6="Very High" 7="Extremely High"
After training what was your perceived acceptance level for software training?	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average" 5="High" 6="Very High" 7="Extremely High"

Table 4.9: Coding of Using ICT without Training

Variable/Item	**Measure**	**Questionnaire Section**	**Coded Value**
Perceived Usefulness			
ICT use without training but using software how useful did you perceive software?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
ICT use without training but using software how useful do you perceive software training?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
Perceived Ease of Use			
ICT use without training how easy to use did you perceive the software?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
ICT use without training how easy to use did you perceive the software training?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
Acceptance Level			

ICT use without training what was your perceived acceptance level of the software?	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average" 5="High" 6="Very High" 7="Extremely High"
ICT use without training what was your perceived acceptance level of the software training?	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average" 5="High" 6="Very High" 7="Extremely High"

Table 4.10: Coding of Using a Manual System (without using research software/tools and training)

Variable/Item	**Measure**	**Questionnaire Section**	**Coded Value**
Perceived Usefulness			
How useful did you perceive the manual system?	Ordinal	A	1="Totally Useless" 2="Very Useless" 3="Useless" 4="Neutral" 5="Useful" 6="Very Useful" 7="Extremely Useful"
Perceived Ease of Use			
How easy to use did you perceive the manual system?	Ordinal	B	1="Extremely Difficult" 2="Very Difficulty" 3="Difficult" 4="Neutral" 5="Easy" 6="Very Easy" 7="Extremely Easy"
Acceptance Level			
What was your perceived acceptance level of the manual system?	Ordinal	C	1="Extremely Low" 2="Very Low" 3="Low" 4="Average" 5="High" 6="Very High" 7="Extremely High"

4.3.5.5 Pearson's Correlation Test

Pearson's correlations could be of any nature and are normally labelled X and Y (Downie and Health, 1997). When describing the strength of the linear relationship between two variables, the Pearson r ranges in values between -1.00 to +1.00. A correlation coefficient of 0.00 is an anchor point which indicates that there is no linear relationship. Any change from r=0.00 in either direction (positive or negative) shows that a relationships exists. The larger the absolute value of a coefficient, the greater the relationship between the variables. A correlation coefficient of either -1.00 or +1.00 indicates a perfect linear relationship between variables (Downie and Heath, 1997).

For the purpose of this study, the researcher performed Pearson's correlation tests to identify pairwise relationships between variable items such as internal publications, conference publications, and ICT adoption.

4.4 RESEARCH STRATEGY USING ICT WITH TRAINING EXPERIMENT

The design of the experiment conducted in this research study was grounded within two theoretical frameworks: a training needs assessment framework and an ICT adoption model. The role of these two frameworks was respectively to guide the design of the ICT training experiment and the approach adopted by this study was to measure research performance or productivity in terms of references, in terms of structural equation model, in terms of quantitative and qualitative data analysis, and in terms of plagiarism. Finally, questionnaires run by this section of the study are described below. The inclusion of a research variable on ICT training in the experiment was motivated by the findings of the above described survey. A total of ±15 academics participated for each software in this section of the study and a total of 85 questionnaires (*SPSS* 18 questionnaires to 18 participants, *AMOS* 14 questionnaires to 14 participants, *NVivo* for qualitative data analysis 14 questionnaires to 14 participants, *NVivo* for literature review 13 questionnaires to 13 participants, *EndNote* 13 questionnaires to 13 participants, and *Turnitin* 13 questionnaires to 13 participants) were distributed. All academics were from the University A. Sometimes this number (15) have changed because of the availability of academic staff. Data was analysed using the *WarpPLS 4.0* version software.

4.4.1 Using ICT with Training Experiment Design

±15 academic staff members were requested to work on the same given exercise under the guidance of the facilitators to use the following software: (i) referencing (using *EndNote* software), modelling (using *AMOS* software), qualitative data analysis (using *NVivo* software), literature review (using *NVivo* software) and quantitative data analysis (using *SPSS* software), and plagiarism (using *Turnitin* software). Each of the staff was free to voluntarily choose any of these three options (using ICT with training, using ICT without training, and using a manual system (without using research software/tools and training), but the same staff member was not allowed to participate in two options.

Training was conducted on *EndNote*, *AMOS, Turnitin, SPSS, NVivo* with ±15 participants for two days by the professional trainers. The training was conducted with the aid of a projector in a classroom by the facilitators on the specific examples and all the participants were using their own laptops to work on the same examples along with the facilitators. If any participants had a problem, the facilitators helped to sort it out before moving forward. All participants were able to finish the specific examples along with the facilitators. In the case of *NVivo* for literature review, participants were attended one by one and in a group of two staff members because of the availability of the academic staff. During the training sessions, all participants signed the attendance sheet. Each academic's training was designed according to the 'why, who, how, what, and when' training assessment framework (Barbazette, 2006).

The *'why'* construct of this training assessment model refers to the identification of the aspects in which the performance of an organisation is deficient, and to a comparison of the training cost against the training remedy. In this study, the identification of the above-mentioned deficiencies were conducted by analysing the citations and referencing, modelling, data analysis, and plagiarism mistakes on the given exercise for their research work. There was a financial cost to the training because facilitators were hired from Johannesburg (*Osmoz Consulting*, see Appendix F). The '*who'* construct refers to the identification of the people in the organisation who might benefit from the training. The training was designed for the three participants identified earlier in this section. The *'how'* construct refers to the identification of how the performance deficiency can be corrected through training. Academics were trained on how to fix the above identified referencing, modelling, data analysis, literature review analysis, and plagiarism using different software such as *EndNote, AMOS, NVivo, SPSS,* and *Turnitin*. The '*when'* construct refers to the identification of the time scheduling of training so as to minimise disruptions in the functioning of the organisation. Academic staff trainees had a two-day training session (*SPSS, NVivo* (qualitative data analysis such as interview), *EndNote*, and *Turnitin*) from morning to evening consecutively, but in the case of *NVivo* for the literature review, it was conducted on a one on one basis or with a group two staff members. In the *'what'* construct, an experiment was conducted. In this experiment, the use of the *EndNote*, *AMOS, SPSS, NVivo,* and *Turnitin* software was identified as the best way of dealing with citations and references, modelling, quantitative and qualitative data analysis, literature review analysis, and plagiarism, with a clear warning of the dangers of mixing them with "manual referencing/modelling/data analysis/plagiarism".

4.4.2 Using ICT with Training Experiment Evaluation

Each of the 15 academics was given a questionnaire at the end of the experiment in order to evaluate the effectiveness of the *EndNote, AMOS, NVivo, SPSS,* and *Turnitin* software training in terms of their perceived impact on research productivity. This training evaluation questionnaire was designed according to the Technology Acceptance Model (TAM) which was built around the three constructs of perceived ease of use, perceived usefulness, and technology acceptance. The design of the first two sections of the training evaluation questionnaire was intended to represent the 'before training' and the 'after training' perceptions of the respondents on the usefulness and ease of the *EndNote, AMOS, NVivo, SPSS,* and *Turnitin* software. The last section of the training evaluation questionnaire represented the acceptance level of the software. A summarised description of the questionnaire sections is given below. However, before briefly describing these questionnaire sections, it is necessary to note that the collection of this questionnaire yielded research data that was later quantitatively and graphically analysed by means of the *WarpPLS 4.0* software using basic statistics mainly consisting of proportions and structural equation modelling.

4.4.3 Questionnaire Design Using ICT with Training

Section A: Perceived Usefulness

Section A of the training evaluation questionnaire consisted of four items that were extracted from the existing literature. Each item was a statement on the perceived usefulness of the software before and after the training experiment. The two questions (doubled by the 'before' and 'after' modes) were based on the perceived usefulness of the: How useful did you perceive the *EndNote/AMOS/NVivo/SPSS/Turnitin software* for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? How useful did you perceive the *EndNote/AMOS/NVivo/SPSS/Turnitin software training* for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of their research work? For each statement, another participant was requested to make an assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could put a tick in an appropriate block to indicate their choice (see details in Appendix B).

Section B: Perceived Ease of Use

Section B of the training evaluation questionnaire consisted of four items that were extracted from the existing literature. Each item was a statement on the perceived ease of use of the software before and after the training experiment. The two questions (doubled by the 'before' and 'after' modes) were based on the perceived ease of use of the *EndNote/AMOS/NVivo/SPSS/Turnitin software*: How easy to use did you perceive the *EndNote/AMOS/NVivo/SPSS/Turnitin Software* for the referencing/modelling/qualitative data analysis and literature review analysis/plagiarism of your research work? How easy did you perceive the *EndNote/AMOS/NVivo/SPSS/Turnitin software training* for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? For each statement, another participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)*, to *'Extremely useful' (7)*. The questionnaire was designed in a way that the respondents could put a tick in an appropriate block to indicate their choice (see details in Appendix B).

Section C: Acceptance Level

Section C of the training evaluation questionnaire consisted of four items that were extracted from the existing literature. Each item was a statement on the acceptance level of the software before and after the training experiment. Here are the two questions (doubled by the 'before' and 'after' modes) asked the respondents on the acceptance level of the *EndNote/AMOS/NVivo/SPSS/Turnitin software*: What is your level of acceptance of the *EndNote/AMOS/NVivo/SPSS/Turnitin software* for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? What is your level of acceptance of the *EndNote/AMOS/NVivo/SPSS/Turnitin software* *training* for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *‘‘Extremely low’ (1)* to *‘Extremely high’ (7)*. The questionnaire was designed in such a way that the respondents could put a tick in an appropriate block to indicate their choice (see details in Appendix B).

4.5 RESEARCH STRATEGY USING ICT WITHOUT TRAINING

The purpose of the experiment conducted by this study was the inclusion of a research variable using ICT without training and this experiment was motivated by the findings of the above described survey. ± 15 academic staff participated in this section of the study and a total of 75 questionnaires (*SPSS* 12 questionnaires to 12 participants, *AMOS* 15 questionnaires to 15 participants, *NVivo* for qualitative data analysis 12 questionnaires to 12 participants, *NVivo* for literature review 11 questionnaires to 11 participants, *EndNote* 12 questionnaires to 12 participants, and *Turnitin* 13 questionnaires to 13 participants) were distributed. ±15 academics were from the University A.

4.5.1 Using ICT without Training Experiment Design

Each of the ±15 members of academic staff were requested to work on the same given exercise under the guidance of the researcher to use the following software: referencing (using *EndNote* software without training), modelling (using *AMOS* software without training), qualitative data analysis (using *NVivo* software without training), literature review (using *NVivo* software without training) and quantitative (using *SPSS* software without training), and plagiarism (using *Turnitin* software without training). Each of the staff was free to voluntarily choose (using ICT with training, using ICT without training, and using a manual system (without using research software/tools and training)) the option, but the same staff member was not allowed to participate in more than one option.

All ±15 participants participated for a week and the researcher presented the same exercises used during the ICT training. All were given the manuals to use the specific software and were asked to fill in a questionnaire. Participants attended on *EndNote, AMOS, NVivo, SPSS,* and *Turnitin* for a week on a one on one basis or in a group of two members. During the experiment, sessions, all the participants had signed the attendance sheet. In this study, the identification of the above mentioned deficiencies was conducted by analysing the citations and referencing, modelling, qualitative data analysis and literature review analysis, quantitative data analysis, and plagiarism on the given exercise for their research work. There was no financial cost to this session because the facilitator was the researcher.

4.5.2 Using ICT without Training Experiment Evaluation

Each of the participants was given a questionnaire at the end of the experiment in order to evaluate the effectiveness of the software using ICT without training in terms of its perceived impact on research productivity. This was designed according to the TAM built around the three constructs of perceived ease of use, perceived usefulness, and technology acceptance. The design using ICT without training evaluation questionnaires was intended to represent the ‘software’ and the ‘software training’ perceptions of the respondents on the usefulness, perceived ease of use, and acceptance level on the software. A summarised description of the questionnaire sections is given below. The collection of this questionnaire yielded research data that was later quantitatively and graphically analysed by means of *WarpPLS 4.0* software using basic statistics mainly consisting of proportions and structural equation modelling.

4.5.3 Questionnaire Design Using ICT without Training

Section A: Perceived Usefulness

Section A of the training evaluation questionnaire consisted of two items and was extracted from the existing literature. Each item was a statement on the perceived usefulness, perceived ease of use, and acceptance level of the *EndNote/AMOS/NVivo/SPSS/Turnitin* Software on the software and software experiment training. Here are the two questions were: Using ICT (*EndNote/AMOS/NVivo*/*SPSS*/*Turnitin software*) without training, i.e., how useful did you perceive/how easy to use/what was your perceived acceptance level of the *EndNote/AMOS/NVivo/SPSS/Turnitin software* for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? Using ICT (*EndNote/AMOS/NVivo*/*SPSS*/Turnitin software) without training, how useful did you perceive/how easy to use/what was your perceived acceptance level of the *EndNote/AMOS/NVivo/SPSS/Turnitin software* training for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice (see details in Appendix B).

Section B: Perceived Ease of Use

Section B of the training evaluation questionnaire consisted of two items and were extracted from the existing literature. Each item was a statement on the perceived ease of use of the *EndNote/AMOS/NVivo/SPSS/Turnitin Software* on the software and software experiment training. Here, the two questions were (doubled by the 'software' and 'software training' modes) asked to the respondents on the perceived ease on use of the *EndNote/AMOS/NVivo/SPSS/Turnitin software*: Using ICT (*EndNote/AMOS/NVivo/SPSS/Turnitin software*) without training, how easy was it to use the *EndNote/AMOS/NVivo/SPSS/Turnitin software* for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? Using ICT (*EndNote/AMOS/NVivo/SPSS/Turnitin software*) without training, how easy was it to use the *EndNote/AMOS/NVivo/SPSS/Turnitin software* training for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice (see details in Appendix B).

Section C: Acceptance Level

Section C of the training evaluation questionnaire consisted of two items that were extracted from the existing literature. Each item was a statement on the acceptance level of use of the *EndNote/AMOS/NVivo/SPSS/Turnitin* s*oftware* on the software and software experiment training. The two questions were: Using ICT (*EndNote/AMOS/NVivo/SPSS/Turnitin software*) without training, what was your acceptance level on the *EndNote/AMOS/NVivo/SPSS/Turnitin* *software* for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? Using ICT (*EndNote/AMOS/NVivo/SPSS/Turnitin software*) without training, what was your acceptance level on the use of the EndNote/AMOS/NVivo/*SPSS*/Turnitin software training for the referencing/modelling/ qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice (see details in Appendix B).

4.6 RESEARCH STRATEGY FOR USING A MANUAL SYSTEM (without using research software/tools and training)

The purpose of the experiment conducted by this study was the inclusion of a research variable for using a manual system (without using research software/tools and training) and this experiment was motivated by the findings of the above described survey. ±15 academics participated in this section of the study and a total of 90 questionnaires (*SPSS* 15 questionnaires to 15 participants, *AMOS* 15 questionnaires to 15 participants, *NVivo* for qualitative data analysis 15 questionnaires to 15 participants, *NVivo* for literature review 15 questionnaires to 15 participants, *EndNote* 15 questionnaires to 15 participants, and *Turnitin* 15 questionnaires to 15 participants) were distributed. All the 15 academics were from the University A.

4.6.1 Using a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) Experiment Design

Each of the ±15 academic staff members was requested to work on the same given exercise under the guidance of the researcher. ±15 participants for a week participated and researcher presented the same exercises that were used during the ICT training (see Table 4.2). All the participants were asked to identify the exercises (see Appendix H) that were completed using the software and computer to complete the questionnaires on the referencing, modelling, qualitative data analysis, literature review analysis, quantitative data analysis, and plagiarism.

Academics participated for a week on a one on one basis or in a group two members. During the experiment sessions, all the participants signed an attendance sheet. There was no financial cost to this session because the facilitator was the researcher.

4.6.2 *Using a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training) Experiment Evaluation*

Each of the ±15 academics were given questionnaires at the end of the experiment in order to evaluate the effectiveness of the referencing, modelling, qualitative data analysis, literature review analysis, and plagiarism for their research work in terms of the research productivity. Using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training), evaluation questionnaires were designed according to the TAM built around the three constructs of perceived ease of use, perceived usefulness, and technology acceptance. The design of a Manual System (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) questionnaires were intended to represent the 'manuals system' perceptions of the respondents on the usefulness, perceived ease of use, and acceptance level on the referencing, modelling, qualitative data analysis, literature review analysis, literature review, and plagiarism. A summarised description of the questionnaire sections is given below. However, before briefly describing these questionnaire sections, it is worth mentioning that the collection of this questionnaire yielded research data that were later quantitatively and graphically analysed by means of *WarpPLS 4.0* software using basic statistics mainly consisting of proportions and structural equation modelling.

4.6.3 *Questionnaire Design for a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training)*

Section A: Perceived Usefulness

Section A of using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin)* and training), evaluation questionnaires consisted of one item and was extracted from the existing literature. The item was a statement on the perceived usefulness. The question was (singled by the 'manual' mode), "How useful did you perceive the manual system without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) for the referencing, modelling, qualitative data analysis, literature review analysis, and plagiarism for your research work?" For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice (see details in Appendix B).

Section B: Perceived Ease of Use

For section B (without using research software/tools *(EndNote, NVivo, AMOS, SPSS, and Turnitin)* and training), evaluation questionnaires consisted of one item and was extracted from the existing literature. The item was a statement on the perceived ease of use. The question was (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training), "How easy to use did you perceive the manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) for the referencing, modelling, qualitative data analysis, literature review analysis, and plagiarism for your research work?" For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice (see details in Appendix B).

Section C: Acceptance Level

Section C of the (without using research software/tools *(EndNote, NVivo, AMOS, SPSS, and Turnitin)* and training) evaluation questionnaires consisted of one item and was extracted from the existing literature. The item was a statement on the acceptance level. The question was, "What was your perceived acceptance level of the manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) for the referencing, modelling, qualitative data analysis, literature review analysis, and plagiarism for your research work?" For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from *'Totally useless' (1)* to *'Extremely useful' (7)*. The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice (see details in Appendix B).

4.7 SUMMARY

This chapter presented the methodology used by the study, as guided by the research objectives. This included the presentation of a questionnaire based survey that served as a research instrument for the assessment of the impact of ICT adoption on research productivity. The chapter ended with the presentation of the design of the experiment that was conducted in the course of the present study to determine the impact of ICT adoption and ICT with training on research productivity.

The next chapter presents the analysis of the results of this study.

"Never promise more than you can perform." – Publilius Syrus

Chapter 5: Analysis of the Results

This chapter presents the findings of the present study for the different methods described in the previous chapter. The structure of the chapter is designed according to the five main objectives of this study, namely: to analyse the impact of ICT adoption on the research productivity by university academics; to examine research productivity using ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) with training; to examine research productivity using ICT (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) without training; to examine research productivity using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin)*; and, finally, to design a model on ICT adoption and training for the increase of research productivity. The impact of ICT adoption was analysed using *SPSS* 20.0 software, whilst the training experiment was analysed using *WarpPLS* 4.0.

5.1 ICT ADOPTION IMPACT ANALYSIS

This section presents the results of the survey and experiment conducted by the present study on the analysis of the perceived impact of ICT adoption on research productivity, based on the research methods described in the previous chapter.

5.1.1 Results of the Survey

These results consist of the assessment of the reliability of the survey's data, followed by the descriptive statistics on the collected data, and, finally, by the inferential statistics on this data.

5.1.1.1 Data Reliability and Validity

Table 4.3 in Chapter 4 shows that the data collected for the ICT adoption section passed the reliability and validity tests for six of its items (Cronbach's Alpha (α) value > 0.731). The research productivity section did not pass the reliability test. The descriptive analysis of these two sections revealed that there was a high proportion of zero values for most of their items (Table 5.6). According to Table 5.5, only item conference in 2011 and internal publications in 2011 show enough variations for their data to be considered by this study.

5.1.1.2 Descriptive Statistics

According to Saunders et al. (2003), the descriptive statistics help researchers to describe and compare the main feature of the collected quantitative data. Descriptive statistics on demographics mainly consist of proportions but descriptive statistics on the other research variables consist of means. In this study, the descriptive statistics was presented in a simple way to give an overall impression of the data that was analysed.

5.1.1.2.1 Demographics

Demographics consist of 10 items, namely, designation, gender, highest qualification, age, academic experience, faculty, university, employment status, highest level of courses taught, and Internet access at home. Out of 10, a total of 3 items separately have been explained below with tables and graphs and, finally, for the remaining with 7 items, similar interpretations have been done. However, after the explanation of these three items, a brief summary was given in a table for all the 10 items (see Appendix C).

5.1.1.2.1.1 Experience

Table 5.1 shows that almost two-fifth of the respondents (40.8%) had experience of 13 years or over. On the other hand, 16.5% had the lowest experience with 1-3 years. A graphical representation of this distribution is depicted in Table 5.1 and Figure 5.1.

Table 5.1: Experience Frequency Distribution

Experience					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1-3 years	17	16.5	16.5	16.5
	4-6 years	18	17.5	17.5	34.0
	7-9 years	14	13.6	13.6	47.6
	10-12 yrs	12	11.7	11.7	59.2
	13 yrs & over	42	40.8	40.8	100.0
	Total	103	100.0	100.0	

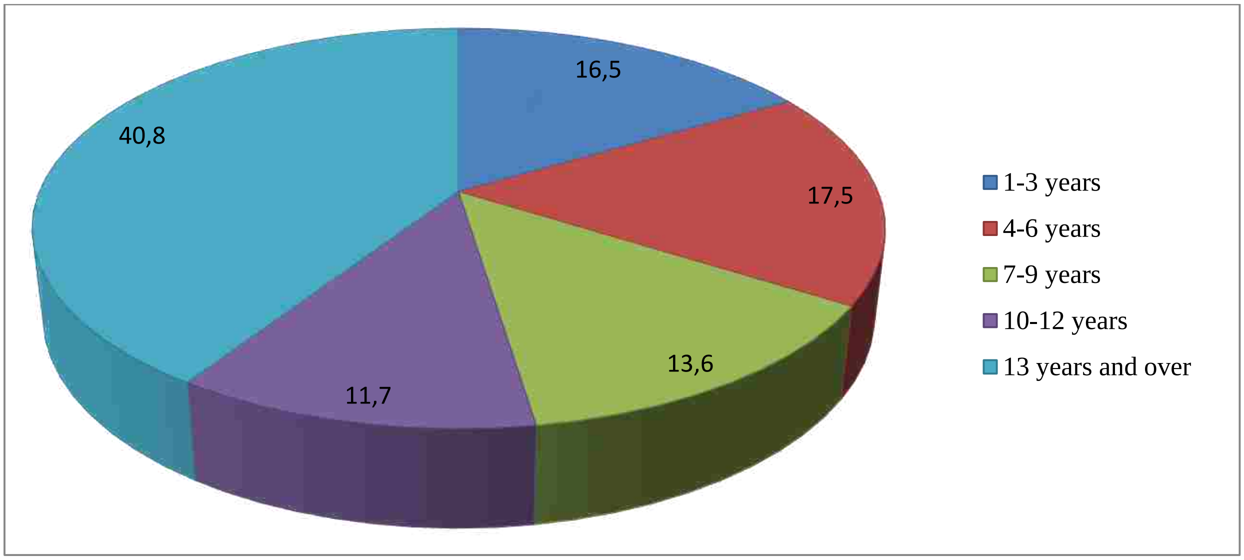


Figure 5.1. Experience Distribution

5.1.1.2.1.2 Job Status

Table 5.2 and Figure 5.2 represent the different levels of job status of the respondents. They show the distribution of the respondents' job status across all the categories in the questionnaire.Table 5.2 shows that the 9.7% of the respondents have long-term contracts and on the other hand, 11.7% have short-term contracts. Table 5.2 also shows that most of the respondents (78.6%) were permanent. A graphical representation of this distribution is depicted by Figure 5.2.

Table 5.2: Job Status Frequency Distribution

Job status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Permanent	81	78.6	78.6	78.6
	Long term contract	10	9.7	9.7	88.3
	Short term contract	12	11.7	11.7	100.0
	Total	103	100.0	100.0	

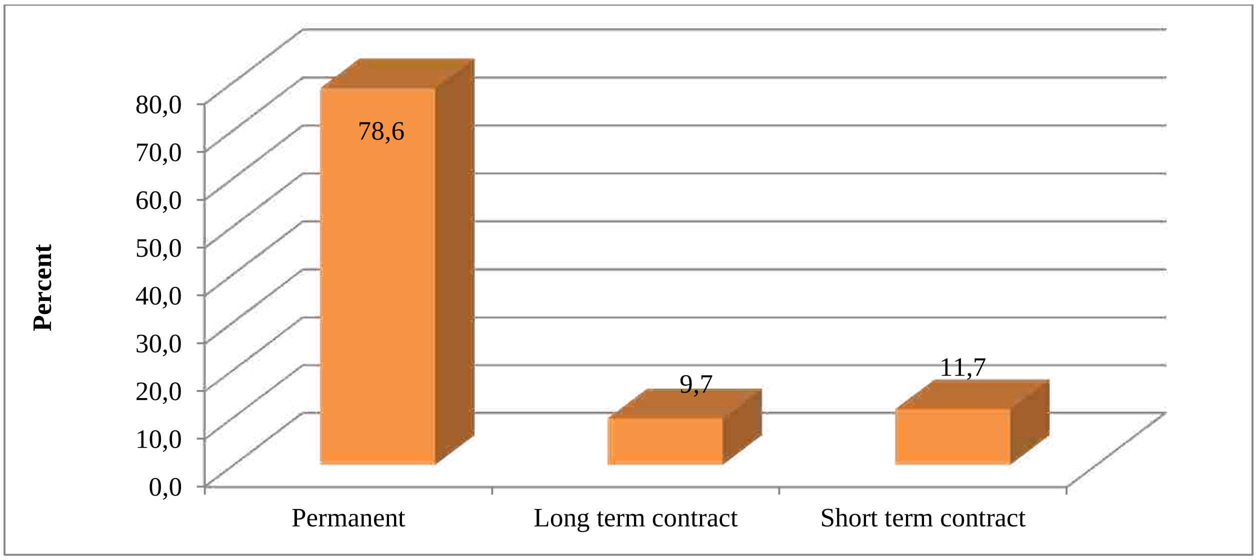


Figure 5.2: Job Status Distribution

5.1.1.2.1.3 Internet Access

Table 5.3 and Figure 5.3 represent the Internet access of the respondents and it shows that the 7.8% of the respondents do not have Internet access at home but 57.3% of the respondents can access Internet at home via the laptop or computer. However, 24.3% of the respondents indicated that they do access Internet at home via the cell-phone, laptop/computer. A total of 10.7% of the respondents only use cell-phones at home. A graphical representation of this distribution is depicted by Figure 5.3.

Table 5.3: Internet Access Frequency Distribution

Internet access					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Laptop/Computer	59	57.3	57.3	75.7
	Cell-phone, Laptop/Computer	25	24.3	24.3	100.0
	Cell-phone	11	10.7	10.7	18.4
	None	8	7.8	7.8	7.8
	Total	103	100.0	100.0	

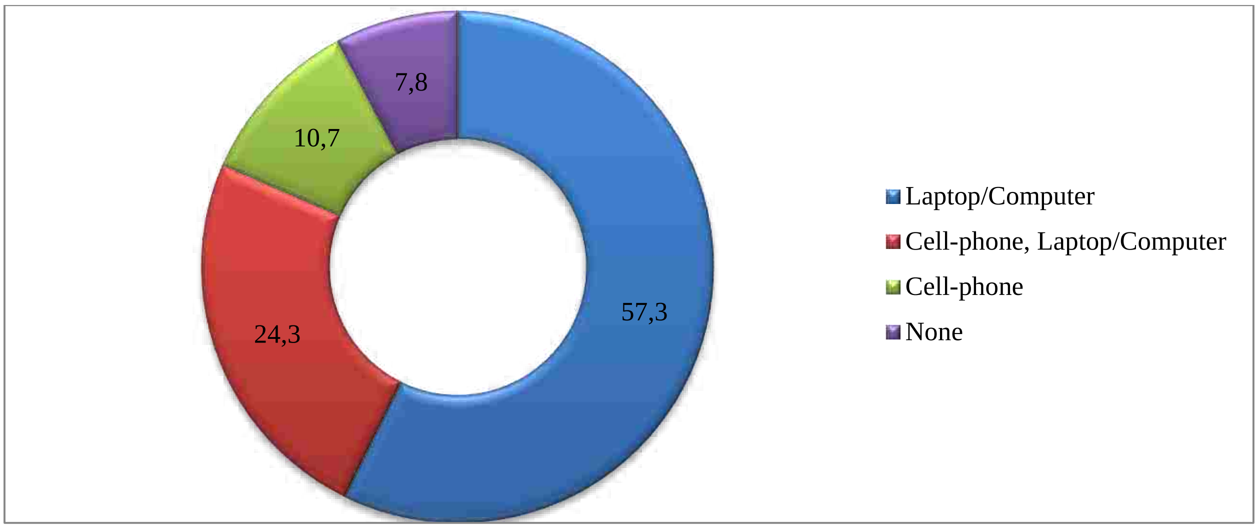


Figure 5.3. Internet Access Distribution

5.1.1.2.1.4 Summary of Demographics

Table 5.4 presents the demographic profile of the academic staff surveyed in this study. Interesting results from these demographic statistics are: a vast majority (78.6%) of staff hold a permanent position; almost half (40.8%) of them are women, the same proportion (40.8%) have many years of experience (13 year and over) in academia, almost all staff members (92.2%) have Internet access at home, the highest (based on ratio) number of academic staff was from the faculty of science (31.1%) and the lowest number of academic staff was from faculty of education (3.9%), almost half of them were lecturers (47.6%) and 33.7% of the staff held a Masters' degree. The above information is presented in a Table 5.4 and in Figure 5.4.

Table 5.4: Demographics

Designation	Jnr. Lect. (15.5%)	Lect. (47.6%)	Snr. Lect./Asso. Dir. (25.2%)	Asso. Prof. (8.7%)	Prof. (2.9%)	
Gender	Female (40.8%)	Male (59.2%)				
Highest qualification	< Masters (24.3%)	Masters (43.7%)	Doctorate (32%)			
Age	20 – 30 yrs (13.6%)	31 – 40 yrs (35.9%)	41 – 50 yrs (27.2%)	51 yrs and over (23.3%)		
Academic experience	1 – 3 yrs (16.5%)	4 – 6 yrs (17.5%)	7 – 9 yrs (13.6%)	10 – 12 yrs (11.7%)	13 yrs and over (40.8%)	
Faculty	Science (31.1%)	Arts & Humanities (19.4%)	Health Science (16.5%)	Mangt./ Commer./Law (24.3%)	Computing (4.9%)	Edu. (3.9%)
University	A (27.2%)	B (10.7%)	C (46.6%)	D (15.5%)		
Employment status	Permanent (78.6%)		Long term contract (9.7%)	Short term contract (11.7%)		
Highest level of courses taught	Undergraduate (42.7%)		Postgraduate (57.3%)			
Internet access at home	None (7.8%)		Cell-phone (10.7%)	Laptop/Computer (57.3%)	Cell-phone / Laptop /Computer (24.3%)	

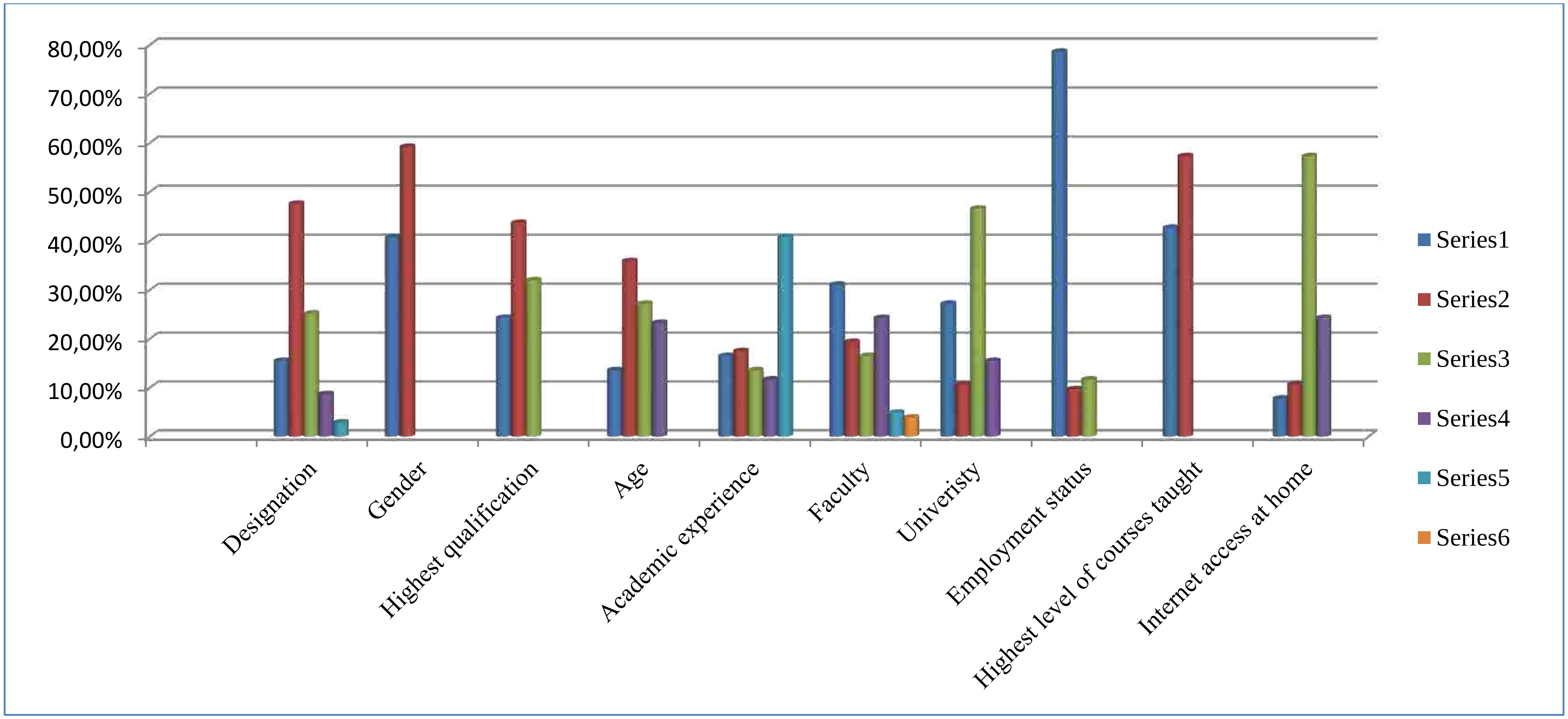


Figure 5.4. Demographics distribution

N.B: Series 1=row 1 in Table 5.4
Series 2=row 2 in Table 5.4
Series 3=row 3 in Table 5.4
Series 4=row 4 in Table 5.4
Series 5=row 5 in Table 5.4
Series 6=row 6 in Table 5.4

5.1.1.2.2 Research Productivity or Output for the Year of 2011

This section investigates the research productivity of the selected department from four universities in the year 2011. Table 5.5 presents the average outputs per category.

Table 5.5: Research Productivity or Output for the Year of 2011

	Total Number	Mean Per Academic	Std. Deviation
Masters graduated in 2011	25	.25	.622
Doctorate graduated in 2011	5	.05	.293
External funds and grants in 2011	23	.23	.581
Awards received in 2011	15	.15	.406
Conference in 2011	124	1.21	1.570
Books / chapters in 2011	19	.19	.578
Volume edited in 2011	15	.15	.617
Internal publication in 2011	47	.46	.838
Visiting professors in 2011	17	.17	.445
Text books published in 2011	9	.09	.346
Valid *N* (listwise) 103	299		

Interesting results from Table 5.5 show that only conference publication in 2011 had a standard deviation of 1.570% and internal publication had a standard deviation of 0.838%. These two items have an impact on the research productivity by academics. On the other hand, the remaining items had a very low standard deviation due to the high frequency responses per option. This data is shown in Table 5.6.

Table 5.6: Percentages of the Research Productivity of 2011 per Academic

	Total Number of Students Graduated by Academics for Each of the Cateogories in 2011							
	0% (zero)	**1% (one)**	**2% (two)**	**3% (three)**	**4% (four)**	**5% (five)**	**6% (six)**	**9% (nine)**
Master's graduates	82.5	11.7	3.9	1.9				
Doctoral graduates	97.1	1.0	1.9					
Funds and grants	83.5	10.7	4.9	1.0				
Awards	87.4	10.7	1.9					
Conference	45.6	20.4	17.5	7.8	5.8	1.0	1.0	1.0
Books & book chapters	86.4	9.7	2.9		1.0			
Volume edited	91.3	6.8		1.0		1.0		
Internal publication	71.8	15.5	7.8	4.9				
Visiting professor	86.4	10.7	2.9					
Book published	93.2	4.9	1.9					

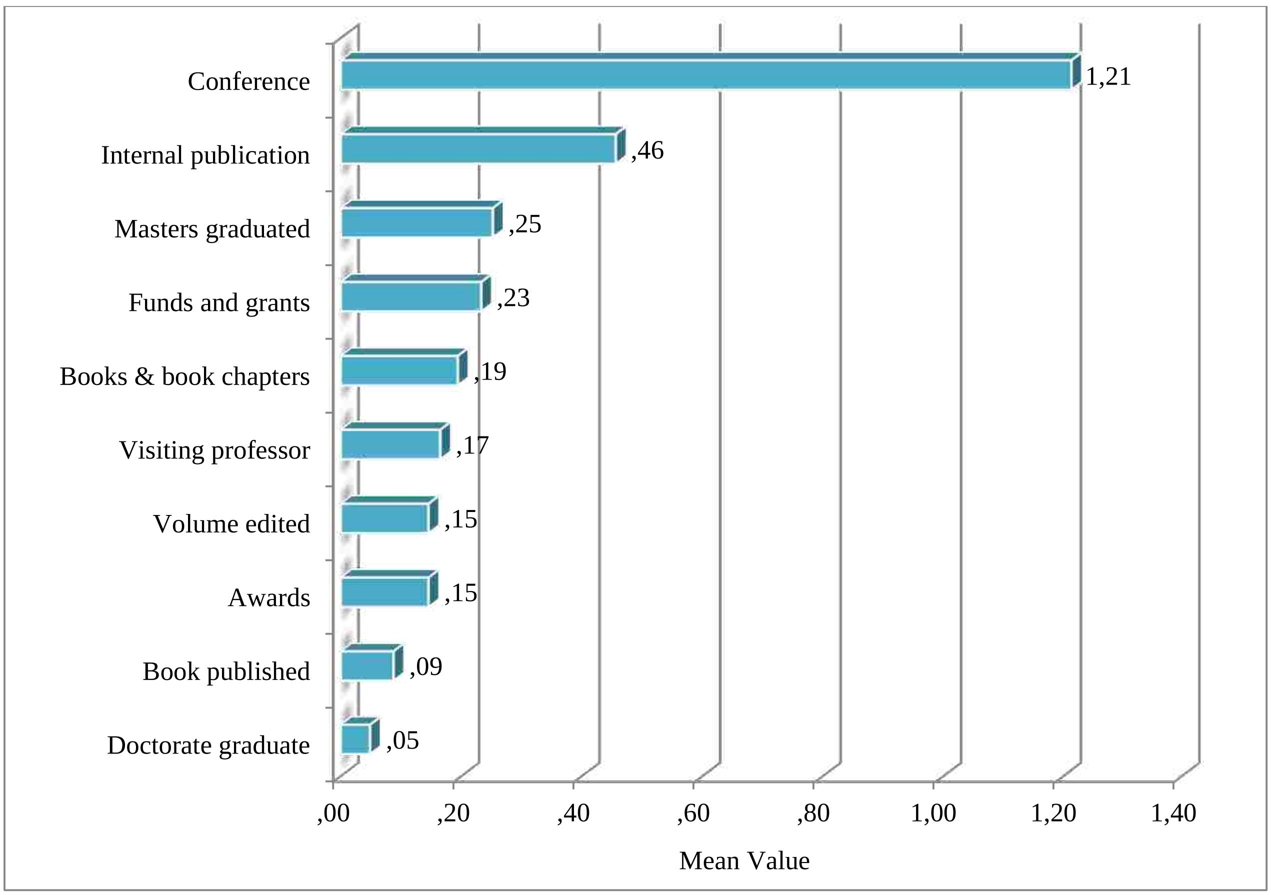


Figure 5.5. Research Productivity or Output of 2011 from Four Universities

5.1.1.2.3 ICT Adoption

This section investigates the impact that ICT adoption has on research productivity. From Table 5.7, it is evident that only four items have a high impact on research productivity, namely, search tools (91.3%), productivity tools (94.2%), general communication tools (94.2%), and the management tools (88.3%). On the other hand, for the remaining items, respondents did not agree that they could increase or have a high impact on research productivity. These items are social tools (20.4%), instruction tools (48.5%), survey tools (36.9%), curriculum tools (32.0%), and the ITS tools (46.6%). This information is presented in Table 5.7 and Figure 5.6.

Table 5.7: ICT Adoption on Research Productivity

	Disagree	Neutral	Agree
Search tools	2.9	5.8	**91.3**
Productivity tools	2.9	2.9	**94.2**
Social tools	47.6	32.0	**20.4**
Varsity portal tools	12.6	21.4	**66.0**
General communication tools	1.9	3.9	**94.2**
Instruction tools	27.2	24.3	**48.5**
Survey tools	35.0	28.2	**36.9**
Curriculum tools	37.9	30.1	**32.0**
ITS tools	25.2	28.2	**46.6**
Management tools	3.9	7.8	**88.3**

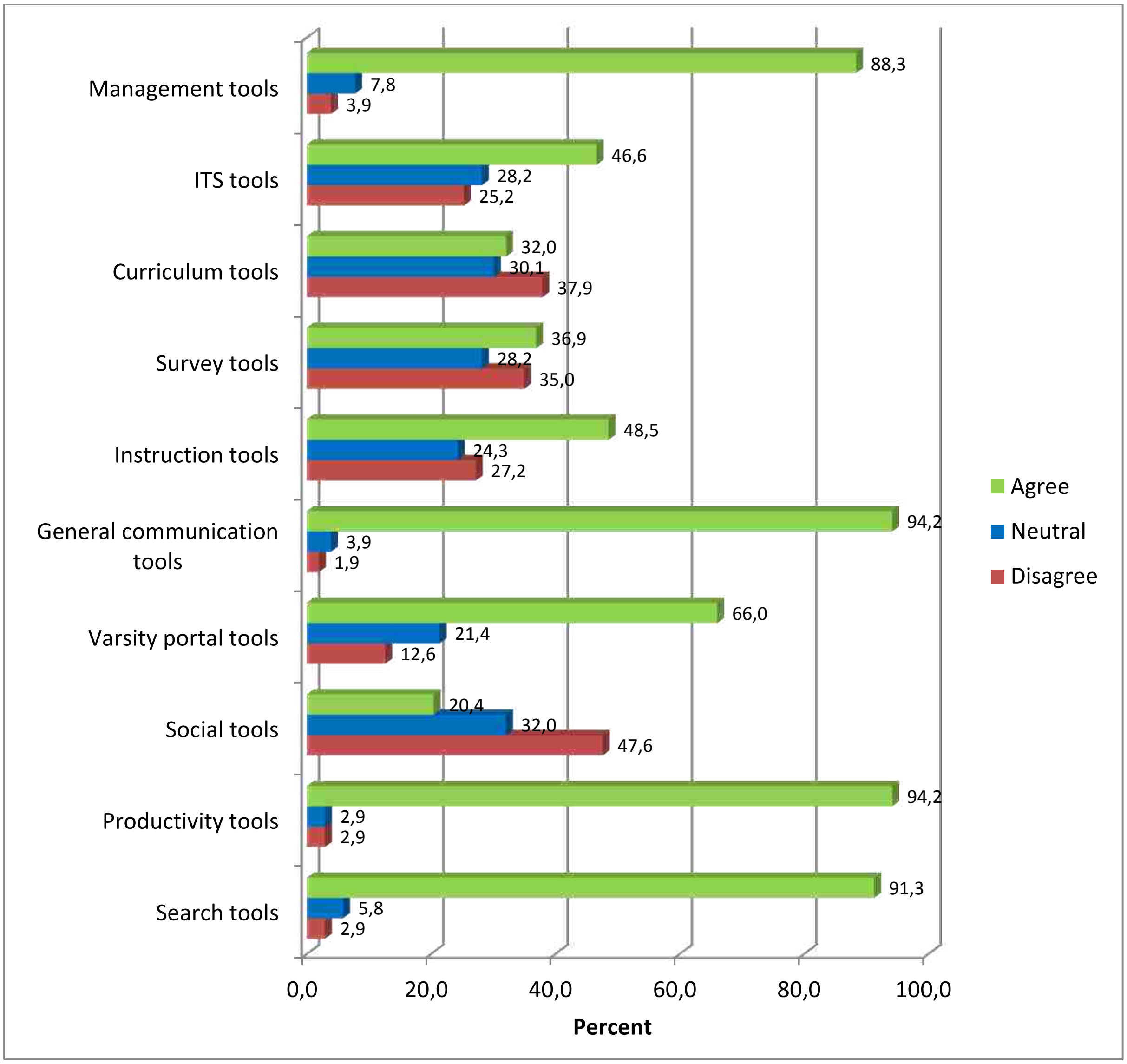


Figure 5.6. ICT Adoption on Research Productivity Distribution

5.1.1.2.4 Rotated Components Matrix for the ICT Adoption

Table 5.8 shows that the inter-correlation between variables which are highlighted in different colours. The highlights show that respondents have categorised two types of tools (see column 1 and column 2). Column 1 refers to social tools, varsity portal tools, instruction tools, survey tools, curriculum tools, and ITS tools. Column 2 refers to search tools, productivity tools, general communication tools, and management tools. All the highlighted values are almost 0.5 or more than 0.5 and they strongly indicate that the items are cross-loaded and effectively measured along the various components.

Table 5.8: Rotated Components Matrix for the ICT Adoption

Rotated Component Matrix		
	Component	
	1	2
Search tools	-.083	.720
Productivity tools	.031	.659
Social tools	.717	.274
Varsity portal tools	.547	.187
General comm tools	-.016	.764
Instruction tools	.709	-.006
Survey tools	.630	-.201
Curriculum tools	.814	-.198
ITS tools	.495	.047
Management tools	.141	.697
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalisation.		
a. Rotation converged in 3 iterations.		

Component 1 from Table 5.8 can be related to the practical aspects of one's research productivity (social tools, varsity portal tools, Instruction tools, Survey tools, Curriculum tools and ITS tools). Component 2 could be related more to one's management and facilitation of one's research (Search tools, Productivity tools, General Comm Tools, Management tools).

5.1.1.2.5 Impact of ICT Aoption on Research Productivity

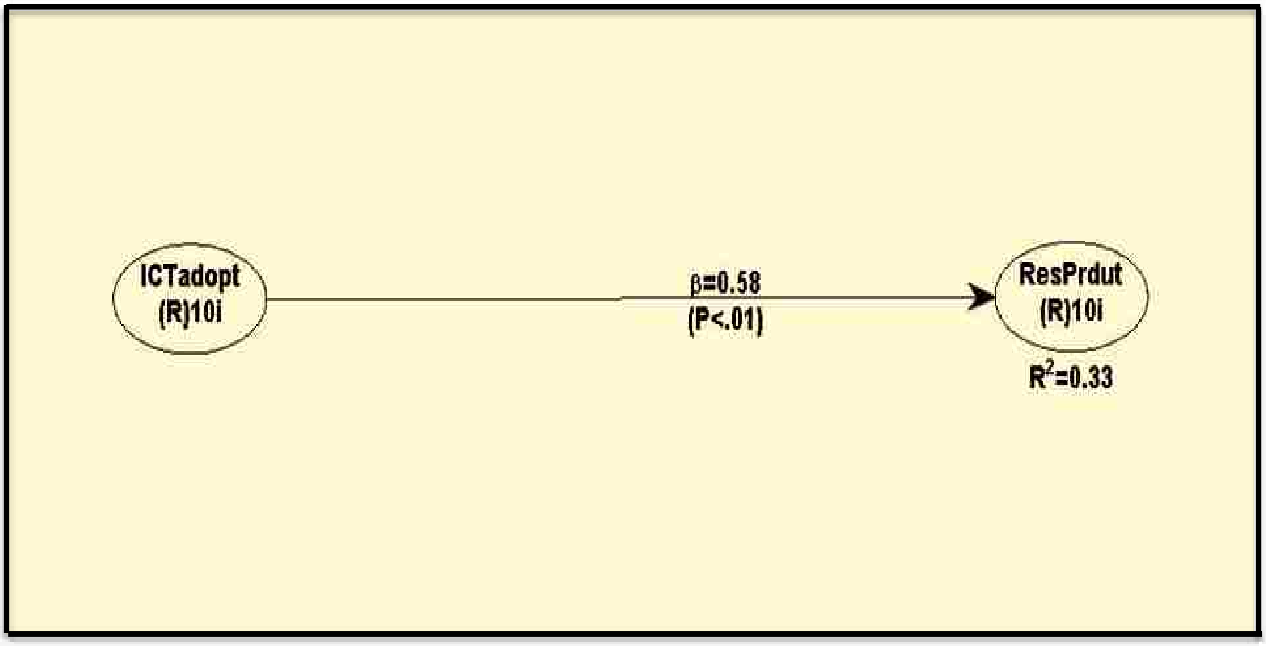


Figure 5.7 (stage 1): Impact of ICT Adoption on the Research Productivity by University Academics

Figure 5.7 shows that the relationship between ICT adoption and research productivity does have significance with values of $\beta = 0.58$ and $p < 0.05$. This is in line with the research objective one. The above model was generated using *WarpPLS 4.0*.

5.1.1.3 Inferential Statistics

This section presents the results of the inferential statistics tests.

5.1.1.3.1 Pearson's Correlations Test

For the purpose of this research, a two-tailed Pearson's correlation test was used. Table 5.9 displays Pearson's correlation coefficients (ρ), significance values (p), and number of cases with non-missing values (N) for each variable. The correlation coefficients on the main diagonal are always equal to 1, since each of the variables has a perfect positive linear relationship with itself. The significance value (p) of each of the correlation coefficients has been displayed in the correlation table. When the significance value (p) is very small (less than or equal to 0.05), the correlation is significant. On the other hand, when the p is relatively large (greater than 0.05), the correlation is not significant.

According to Table 5.9, *masters' graduates* correlated with *doctorate graduates, funds & grants,* and *conference.* There was no correlation found with *docoral graduates, visiting profressor, awards,* and *book published*. Similarly, other correlations were as follow: *funds and grants* correlated with *awards, conference, and internal publications; conference* correlated with *books and books chapter, volume edited, internal publications, visiting professor; books and books chapter* correlated with *volume edited*, *internal publications*, *visiting professor*, and *book published; volume edited* correlated with *internal publications*, *book published.*

On the other hand, *search tools* correlated with *productivity tools, general communication tools,* and *management tools.* No correlation was found between *ITS tools* and *management tools.* Similarly, other correlations found were as follows: *productivity tools* correlated with *general communication tools, management tools; social tools* correlated with *university portal tools, instruction tools, survey tools, and communication tools; university portal tools* correlated with *instruction tools* and *curriculum tools; general communication tools* correlated with *management tools; instruction tools* correlated with *survey tools* and *curriculum tools; survey tools* correlated with *curriculum tools; curriculum tools* correlated with *ITS tools.*

Table 5.9 Person's Correlation Analysis of the Likert-scale Research Variables

		Masters graduated	Doctorate graduate	Funds and grants	Awards	Conference	Books & book chapters	Volume edited	Internal publication	Visiting professor	Book published	Search tools	Productivity tools	Social tools	Varsity portal tools	General comm tools	Instruction tools	Survey tools	Curriculum tools	ITS tools	Management tools
Masters graduated	Pearson Correlation	1																			
	Sig. (2-tailed)																				
	N	103																			
Doctorate graduate	Pearson Correlation	.470**	1																		
	Sig. (2-tailed)	.000																			
	N	103	103																		
Funds and grants	Pearson Correlation	.324**	-.067	1																	
	Sig. (2-tailed)	.001	.501																		
	N	103	103	103																	
Awards	Pearson Correlation	.202*	.105	.270**	1																
	Sig. (2-tailed)	.040	.292	.006																	
	N	103	103	103	103																
Conference	Pearson Correlation	.256**	.020	.278**	.105	1															
	Sig. (2-tailed)	.009	.842	.004	.293																
	N	103	103	103	103	103															
Books & book chapters	Pearson Correlation	.135	.060	.214*	.171	.343**	1														
	Sig. (2-tailed)	.174	.550	.030	.085	.000															
	N	103	103	103	103	103	103														
Volume edited	Pearson Correlation	.159	-.039	.178	.149	.332**	.744**	1													
	Sig. (2-tailed)	.109	.692	.072	.132	.001	.000														

	N	103	103	103	103	103	103	103													
Internal publication	Pearson Correlation	.153	-.091	.263**	.004	.380**	.402**	.382**	1												
	Sig. (2-tailed)	.122	.360	.007	.964	.000	.000	.000													
	N	103	103	103	103	103	103	103	103												
Visiting professor	Pearson Correlation	.131	-.062	.229*	.137	.356**	.255**	.019	.269**	1											
	Sig. (2-tailed)	.186	.533	.020	.168	.000	.009	.851	.006												
	N	103	103	103	103	103	103	103	103	103											
Book published	Pearson Correlation	-.058	-.042	.044	-.022	.146	.404**	.307**	.199*	.160	1										
	Sig. (2-tailed)	.561	.672	.659	.828	.142	.000	.002	.044	.106											
	N	103	103	103	103	103	103	103	103	103	103										
Search tools	Pearson Correlation	.085	.106	.069	.021	.110	.006	-.025	-.055	.101	-.082	1									
	Sig. (2-tailed)	.395	.288	.486	.831	.270	.952	.802	.582	.308	.408										
	N	103	103	103	103	103	103	103	103	103	103	103									
Productivity tools	Pearson Correlation	.012	.096	-.071	.084	.079	-.154	-.047	-.166	-.068	-.072	.362**	1								
	Sig. (2-tailed)	.901	.333	.474	.399	.427	.120	.637	.094	.493	.468	.000									
	N	103	103	103	103	103	103	103	103	103	103	103	103								
Social tools	Pearson Correlation	-.033	.005	.020	-.124	-.111	.077	.121	-.116	.007	.044	.142	.210*	1							
	Sig. (2-tailed)	.740	.961	.842	.213	.264	.437	.224	.243	.940	.662	.152	.033								
	N	103	103	103	103	103	103	103	103	103	103	103	103	103							
Varsity portal tools	Pearson Correlation	.019	.038	-.114	-.236*	-.110	-.018	-.095	-.117	.003	.032	.013	.010	.360**	1						
	Sig. (2-tailed)	.845	.701	.251	.017	.270	.854	.339	.240	.979	.751	.897	.921	.000							
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103						
General comm tools	Pearson Correlation	.157	.081	-.031	.111	.033	-.156	-.185	-.224*	.003	-.106	.423**	.316**	.135	.113	1					
	Sig. (2-tailed)	.114	.414	.752	.266	.741	.115	.061	.023	.975	.286	.000	.001	.173	.257						
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103					

Instruction tools	Pearson Correlation	-.083	.041	.122	.032	.068	.152	.021	.031	.054	.077	-.131	.115	.375**	.327**	-.024	1				
	Sig. (2-tailed)	.405	.678	.221	.752	.495	.126	.835	.756	.590	.442	.189	.247	.000	.001	.813					
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103				
Survey tools	Pearson Correlation	.031	.140	.165	.055	-.033	.203*	.061	.099	.069	.124	-.067	-.196*	.347**	.223*	-.075	.271**	1			
	Sig. (2-tailed)	.754	.159	.095	.583	.740	.040	.539	.319	.486	.214	.499	.047	.000	.024	.452	.006				
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103			
Curriculum tools	Pearson Correlation	-.019	.188	.058	.032	.066	.118	.047	.069	.143	.106	-.160	-.021	.485**	.254**	-.168	.501**	.449**	1		
	Sig. (2-tailed)	.851	.057	.562	.748	.511	.237	.637	.489	.148	.287	.107	.833	.000	.010	.091	.000	.000			
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103		
ITS tools	Pearson Correlation	.030	.058	.064	.090	-.041	.032	.082	-.059	.214*	.023	.052	-.002	.215*	.099	.075	.233*	.199*	.389**	1	
	Sig. (2-tailed)	.762	.564	.519	.366	.684	.752	.410	.552	.030	.820	.605	.981	.029	.318	.453	.018	.044	.000		
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	
Management tools	Pearson Correlation	.131	.083	-.149	.150	-.139	-.016	-.131	-.271**	.011	-.017	.312**	.287**	.192	.230*	.437**	.088	-.025	-.039	.061	1
	Sig. (2-tailed)	.187	.405	.134	.130	.160	.875	.189	.006	.916	.866	.001	.003	.052	.019	.000	.375	.803	.698	.542	
	N	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103

5.1.1.3.2 Hypothesis Testing (P-Values and Statistical Significance)

The traditional approach to reporting a result requires a statement of statistical significance. A **p-value** is generated from a **test statistic.** A significant result is indicated with "p < 0.05". These values are highlighted in yellow. The Chi-square test was performed to determine whether there was a statistically significant relationship between the variables (rows vs columns).

The null hypothesis states that there is no association between the two. The alternate hypothesis indicates that there is an association. Table 5.10 represents the summay of the results of the Chi-square tests.

Table 5.10: Summary of the Results of the Chi-square Tests.

	Position	Gender	Qualification	Age	Experience	Univarsity Faculty	Institution	Job status	Courses taught	Network access
Search tools	0.59	0.28	0.33	0.39	0.83	0.62	0.31	.049*	0.45	0.12
Productivity tools	0.87	0.71	0.46	0.78	0.88	0.54	0.53	0.65	0.92	0.27
Social tools	0.56	0.20	0.27	0.25	0.82	0.51	0.20	.010*	0.14	0.89
Varsity portal tools	0.12	0.08	0.22	0.83	.013*	0.50	0.79	0.38	0.24	.030*
General comm tools	0.19	0.20	0.47	0.81	0.14	0.84	0.73	0.28	0.45	0.90
Instruction tools	0.68	0.37	0.17	0.39	0.76	0.57	0.14	0.53	.047*	0.22
Survey tools	0.87	0.24	0.81	0.16	0.70	0.79	0.87	0.34	.021*	.043*
Curriculum tools	0.71	0.83	0.27	0.33	0.49	0.13	0.21	0.28	.040*	0.11
ITS tools	0.59	0.54	0.16	0.49	.014*	0.08	.032*	0.49	0.14	.028*
Management tools	0.61	0.77	0.45	0.33	.042*	0.72	0.23	.002*	0.20	0.88

The p-values for *Experience* by *ITS tools*, *Varsity portal tools*, *Management tools* are 0.013, 0.014, and 0.042, respectively. The respondents with different experiences view the statement on *Varsity portal tools*, *ITS tools*, and *Management tools* in a dissimilar manner. That is, there is a significant relationship between experience and use of *ITS tools*, *Varsity portal tools,* and *Management tool*s. The p-value for Institution by *ITS tools* is 0.032. This means the respondents with different institutions view the statement on *ITS tools* in a dissimilar manner. That is, there is a significant relationship between institution and use of *ITS tools*. The p-values for Job status by *Search tools*, *Social tools*, and *Management tools* are 0.49, 0.010, and 0.002, respectively. This means the respondents with different job status view the statement on *Search tools*, *Social tools*, and *Management tools* in a dissimilar manner. That is, there is a significant relationship between job status and use of *Search tools*, *Social tools*, and *Management tools*. Finally, the p-values for *Network access* by "*Varsity portal tools*, *Survey tools*, *ITS tools* are 0.030, 0.043, and 0.028, respectively. This means that the respondents with different network access view the statement on varsity portal tools, survey tools, and ITS tools, in a dissimilar manner. The above table also shows that instruction tools and curriculum tools are highly correlated with the course taught.

5.1.1.3.3 Summary of the Survey's Results

The respondents of this survey predominantly hold a permanent academic position and have Internet access at home. Lecturers with masters' degrees form half of the respondents but the academic fields of education and of computing are under-represented. ICT adoption and research productivity are, respectively, average and minimal among these academics. ICT adoption has significance on the research productivity and some items are correlated with each other.

5.2 RESULTS OF THE EXPERIMENT

The fact that the survey conducted by this study did not find a correlation between the research productivity of academic staff and their adoption of ICT in its totality prompted the researcher to look further at the possible reasons behind this lack of correlation, especially because almost all the respondents reported that they had an Internet connection both at the office and at home. The main hypothesis adopted here was that ICT adoption does not influence the research productivity of academic staff in instances where staff members have not received ICT training specifically aiming at improving their research skills. This hypothesis was tested through an experiment whose methodology was described in the previous chapter and whose descriptive findings are presented here mainly in the form of tables, graphs, and models.

5.2.1 Reliability and Validity

According to Pahnila and Warsta (2010), reliability must exceed 0.70 for each factor. Similarly, another study by Bhattacherjee and Sanford (2009) also indicated reliability should exceed 0.70. Table 5.11 shows the Confirmatory Factor Analysis (CFA) with a maximum of 0.965 and a minimum of 0.5.4. According to Roca et al. (2009), the composite reliability is a measure for the overall reliability of a collection of heterogeneous, but similar items. On the other hand, Henseler et al. (2009) indicated that the composite reliability (CR) estimate of the outer loading of an item λ_i to represent the correlations between the item and the factor and it can be calculated as:

$$CR = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum (1 - \lambda_i^2)} \qquad \text{(i)}$$

According to Cronbach (1951), the Cronbach alpha measurement is a set of items of the factors that can measure a single uni-dimensional factor and it can be calculated as:

$$\alpha = \frac{N - \bar{r}}{1 + (N-1) - \bar{r}} \qquad \text{(ii)}$$

Table 5.11. Composite Reliability Coefficients and Cronbach's Alpha Coefficients

Using ICT with Training	**Using ICT without Training**	**Using a Manual System (without using research software/tools and training)**	**Composite Reliability Coefficients**	**Cronbach's Alpha Coefficients**
		*SPSS*man	0.935	0.899
		*AMOSS*ma	0.760	0.874
		TitinMa	0.859	0.923
		EdNotMa	0.904	0.895
		NVoDMan	0.939	0.905
		NVoLMan	0.963	0.950
*SPSS*wt			0.864	0.823
*AMOSS*wt			0.790	0.702
TuitinW			0.914	0.888
EndNotW			0.941	0.931

*Nvivo*DW			0.917	0.900
*Nvivo*LW			0.885	0.855
	*SPSS*wot		0.799	0.680
	*AMOSS*wo		0.841	0.764
	TitinWo		0.843	0.773
	EdNotWo		0.821	0.727
	NVoDWoT		0.794	0.673
	NVoLWoT		0.739	0.504

5.2.2 Correlations among Latent Variables with sq. rts. of AVEs

According to Henseler et al. (2009), the Average Variance Extracted (AVE) can determine the amount of the variance from the measurement items. Tables 5.12, 5.13, and 5.14 show the AVEs values and the correlations among factors, with the square root of AVE in brackets on the diagonal. However, the diagonal values exceed the inter-factor correlations, and it can be inferred and discriminated that the validity was acceptable. Henseler et al. (2009) also pointed out that measurement scales have the sufficient validity and the high reliability after having calculated AVE as follows:

$$AVE = \frac{\sum \lambda_i^2}{\sum \lambda_i^2 + (1-\lambda_i^2)} \qquad \text{(iii)}$$

According to Spiegel (1972), the discriminate validity (r) can be calculated as follows:

$$r = \frac{\sum (x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum (x_i - \overline{x})^2 (y_i - \overline{y})^2}} \qquad \text{(iv)}$$

Table 5.12. Correlations among Latent Variables with sq. rts. of AVEs **using ICT with Training**

	*SPSS*wt	*AMOSS*wt	TuitinW	EndNotW	*Nvivo*DW	*Nvivo*LW	ResPrDu
*SPSS*wt	(0.598)	-0.338	0.265	0.086	-0.218	0.364	0.442
*AMOSS*wt	-0.338	(0.502)	-0.042	0.178	0.102	-0.055	0.223
TuitinW	0.265	-0.042	(0.701)	0.568	0.168	0.300	0.837
EndNotW	0.086	0.178	0.568	(0.755)	0.244	-0.174	0.662
*Nvivo*DW	-0.218	0.102	0.168	0.244	(0.697)	-0.417	0.317
*Nvivo*LW	0.364	-0.055	0.300	-0.174	-0.416	(0.632)	0.327
ResPrDu	0.442	0.223	0.837	0.662	0.317	0.327	(0.517)

Table 5.13. Correlations among Latent Variables with sq. rts. of AVEs using **ICT without Training**

	*SPSS*wot	*AMOSS*wo	TitinWo	EdNotWo	NVoDWoT	NVoLWoT	ResPrDu
*SPSS*wot	(0.649)	-0.275	-0.298	-0.181	0.359	0.062	0.235
*AMOSS*wo	-0.275	(0.691)	-0.259	0.425	-0.541	-0.351	0.185
TitinWo	-0.298	-0.259	(0.691)	-0.137	0.270	0.186	0.368
EdNotWo	-0.181	0.425	-0.137	(0.669)	-0.097	-0.419	0.310
NVoDWoT	0.359	-0.541	0.270	-0.097	(0.640)	0.116	0.442
NVoLWoT	0.062	-0.351	0.186	-0.419	0.116	(0.624)	0.317
ResPrDu	0.235	0.185	0.368	0.310	0.442	0.317	(0.285)

Table 5.14. Correlations among Latent Variables with sq. rts. of AVEs **using a manual system (without using research software/tools and training)**

	*SPSS*man	*AMOSS*man	TitinMa	EdNotMa	NVoDman	NVoLMan	ResPrDu
*SPSS*man	(0.910)	0.780	0.748	0.282	0.836	0.694	-0.239
*AMOSS*man	0.780	(0.750)	0.799	0.154	0.672	0.641	-0.330
TitinMa	0.748	0.799	(0.822)	0.222	0.719	0.604	-0.241
EdNotMa	0.282	0.154	0.222	(0.872)	0.365	0.255	0.156
NVoDman	0.836	0.672	0.719	0.365	(0.915)	0.749	-0.350
NVoLMan	0.694	0.641	0.604	0.255	0.749	(0.947)	-0.167
ResPrDu	-0.239	-0.330	-0.241	0.156	-0.350	-0.167	(1.000)

5.2.3 Structural Model (comparison of using ICT with training, using ICT without training, using a manual system (without using research software/tools and training)

The structural model assessed using *WarpPLS 4.0 software*, after having confirmed the reliability and validity for the measurements. The variance (R^2) of each dependent factor is an indication of how well the model fits the data. R^2, which shows the amount of variance in a dependent factor, which the research model explains, is computed as (Cornell and Berger, 1987):

$$R^2 = 1 - \frac{\sum (y_i - \bar{y})^2}{\sum (y_i - \bar{y})^2} \qquad \text{(v)}$$

Tenenhaus et al. (2005) noted that the global goodness-of-fit (GoF) criterion for the PLS path modelling accounts for PLS model performance for the measurement and for the structural equation modelling. However, the overall aim is to find predictive power of the model and shows the geometric mean of average Communality Index (CI) and average R^2, computed as follows (Tenenhaus et al. 2005):

$$GoF = \sqrt{\overline{CI} * \overline{R^2}} \qquad \text{(vi)}$$

The assessment of the structural model is to validate the model fitness, which is a measure of model validity of the model. Figure 5.8 shows the results of the structural model assessment with ICT training, with the calculated R^2 values (explanatory power) and significance of individual paths summarised.

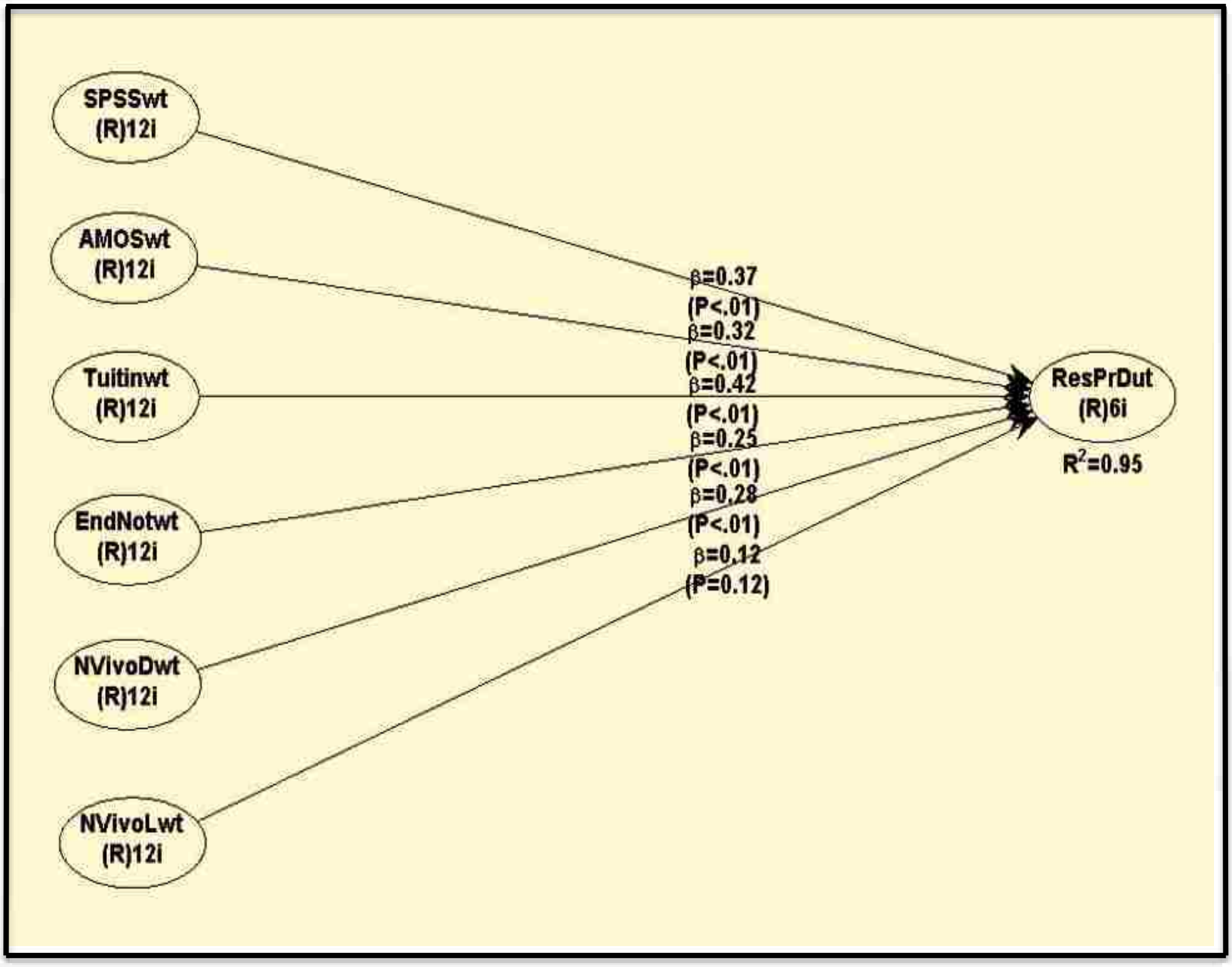


Figure 5.8 (stage 2): Using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) with Training on Research Productivity (Source: Researcher)

Figure 5.8 shows that *SPSS* with training has significant values of β =0.37 and p <0.01 on research productivity. *AMOS* with training has significant values of β =0.32 and p <0.01 which is less significant than *SPSS* with training. Similarly, *EndNote* for referencing, and *NVivo* for data analysis, have significant values of β =0.25 and p =<0.01; and β =0.28 and p =<0.01, respectively, on research productivity. However, among all the six software, *Turnitin* has the highest significance on research productivity with β =0.42 and p =<0.01.

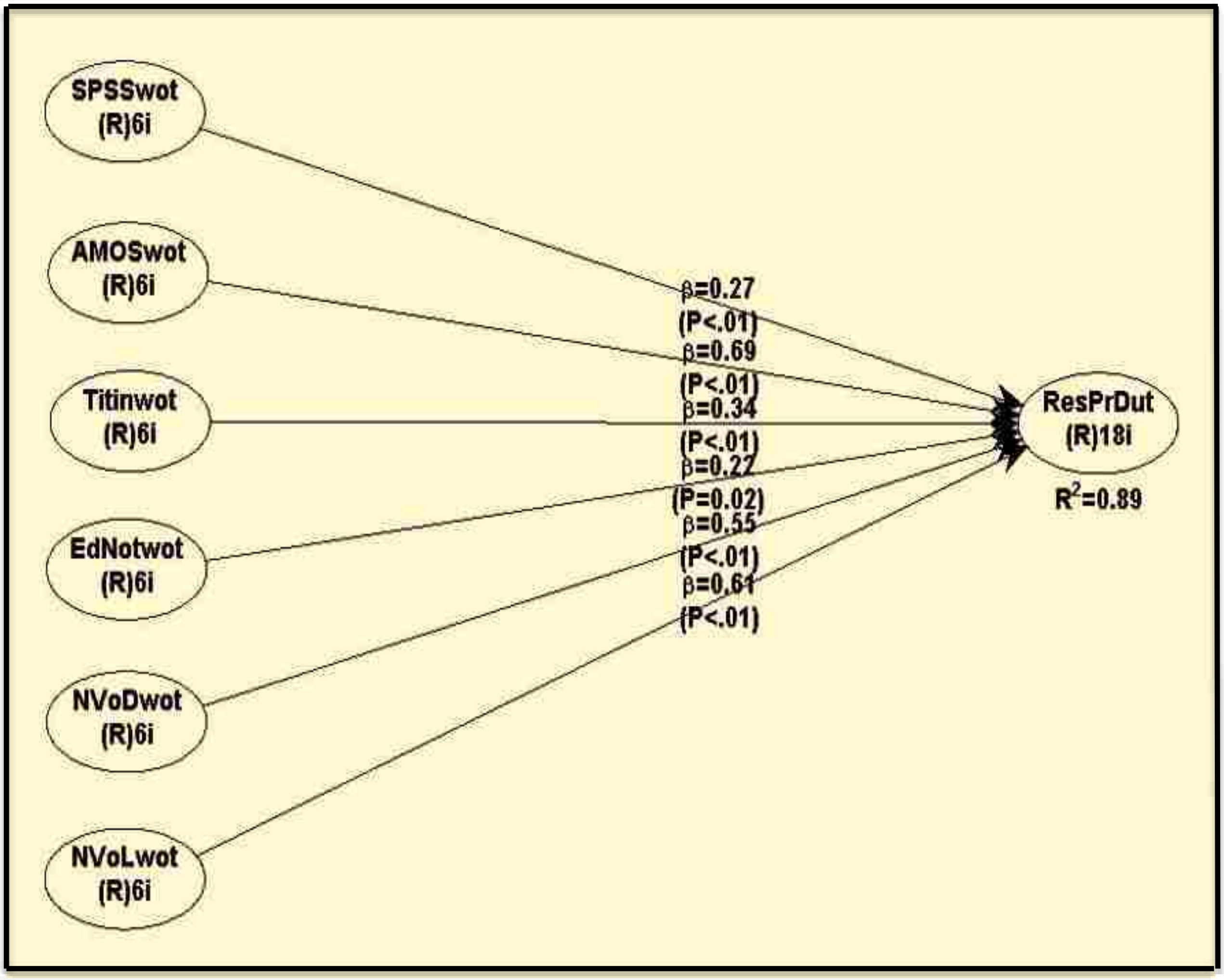


Figure 5.9 (stage 3): Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without Training on Research Productivity (Source: Researcher)

Figure 5.9 shows that *SPSS* without training has significant values of β =0.27 and p =<0.01 on research productivity. *AMOS* without training has significant values of β =0.69 and p =<0.01 which is more significant than *SPSS* without training. Similarly, *Turnitin* for plagiarism, *EndNote* for referencing, and *Nvivo* for data analysis have significant values of β =0.34 and p =<0.01, β =0.22 and p =<0.01, and β =0.55 and p =<0.01, respectively, on research productivity. However, among all the six software, *NVivo* for literature review has the highest significance on research productivity with β =0.61 and p =<0.01.

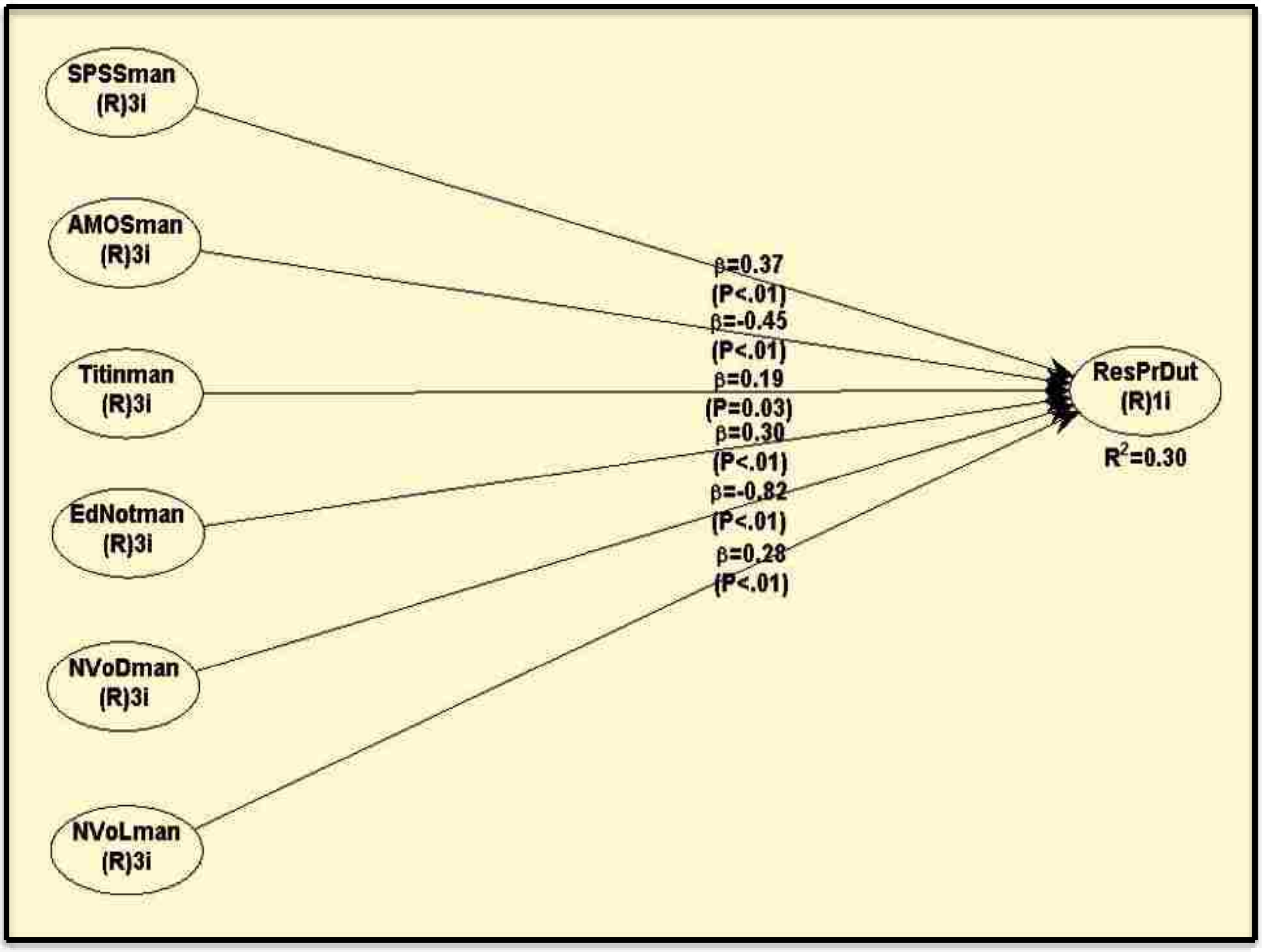


Figure 5.10 (stage 4): Using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training) on research productivity (Source: Researcher)

Figure 5.10 shows that *AMOS* task and *NVivo* task for data analysis using a manual system (without using research software/tools and training) has a low significant value on the research productivity with β =-0.45 and p =<0.01 and β =-0.82 and p =<0.01 as compared to the *SPSS* task for quantitative data analysis β =0.37 and $p =< 0.01$, *Turnitin* task for plagiarism β =0.19 and $p = 0.03$, *EndNote* task for referencing β =0.30 and $p =< 0.01$, *NVivo* task for literature review manually β =0.28 and $p =< 0.01$. However, among all the six tasks, *SPSS* task for quantitative data analysis has the highest significance on research productivity with β =0.37 and $p =< 0.01$.

5.2.4 Case for Comparison and Evaluation of Three Categories

Table 5.15, Table 5.16, Table 5.17, Table 5.18, Table 5.19, and Table 5.20 represent the comparison of each software using ICT with training, using ICT without training, and using a manual system (without using research software/tools and training).

Table 5.15: Comparison of *SPSS* with Three Categories

Software	***Significance***	***Research Productivity***
Using SPSS with training	$\beta = 0.37$	$R^2 = 0.95$
Using SPSS without training	$\beta = 0.27$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.37$	$R^2 = 0.30$

Table 5.16: Comparison of *AMOS* with Three Categories

Software	***Significance***	***Research Productivity***
Using AMOS with training	$\beta = 0.32$	$R^2 = 0.95$
Using AMOS without training	$\beta = 0.69$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = -0.45$	$R^2 = 0.30$

Table 5.17: Comparison of *Turnitin* with Three Categories

Software	***Significance***	***Research Productivity***
Using Turnitin with training	$\beta = 0.42$	$R^2 = 0.95$
Using Turnitin without training	$\beta = 0.34$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.19$	$R^2 = 0.30$

Table 5.18: Comparison of *EndNote* with Three Categories

Software	***Significance***	***Research Productivity***
Using EndNote with training	$\beta = 0.25$	$R^2 = 0.95$
Using EndNote without training	$\beta = 0.22$	$R^2 = 0.89$
Using a manual system (without using research	$\beta = 0.30$	$R^2 = 0.30$

software/tools and training)		

Table 5.19: Comparison of *NVivo (for data analysis)* with Three Categories

Software	***Significance***	***Research Productivity***
Using NVivo (for data analysis) with training	$\beta = 0.28$	$R^2 = 0.95$
Using NVivo (for data analysis) without training	$\beta = 0.55$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = -0.82$	$R^2 = 0.30$

Table 5.20: Comparison of *NVivo (for literature review)* with Three Categories

Software	***Significance***	***Research Productivity***
Using NVivo (for literature review) with training	$\beta = 0.12$	$R^2 = 0.95$
Using NVivo (for literature review) without training	$\beta = 0.61$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.28$	$R^2 = 0.30$

all of the above tables show that each type of software with training has a R^2 value of 0.95 which is the highest when compared to software without training and a manual system. Therefore, one can conclude that software with training is the best fit model. The beta values do differ since there were a different number of items for each experiment (12 items for with training, 6 items for without training and 3 items for the manual system).

5.2.5 Proposed Model

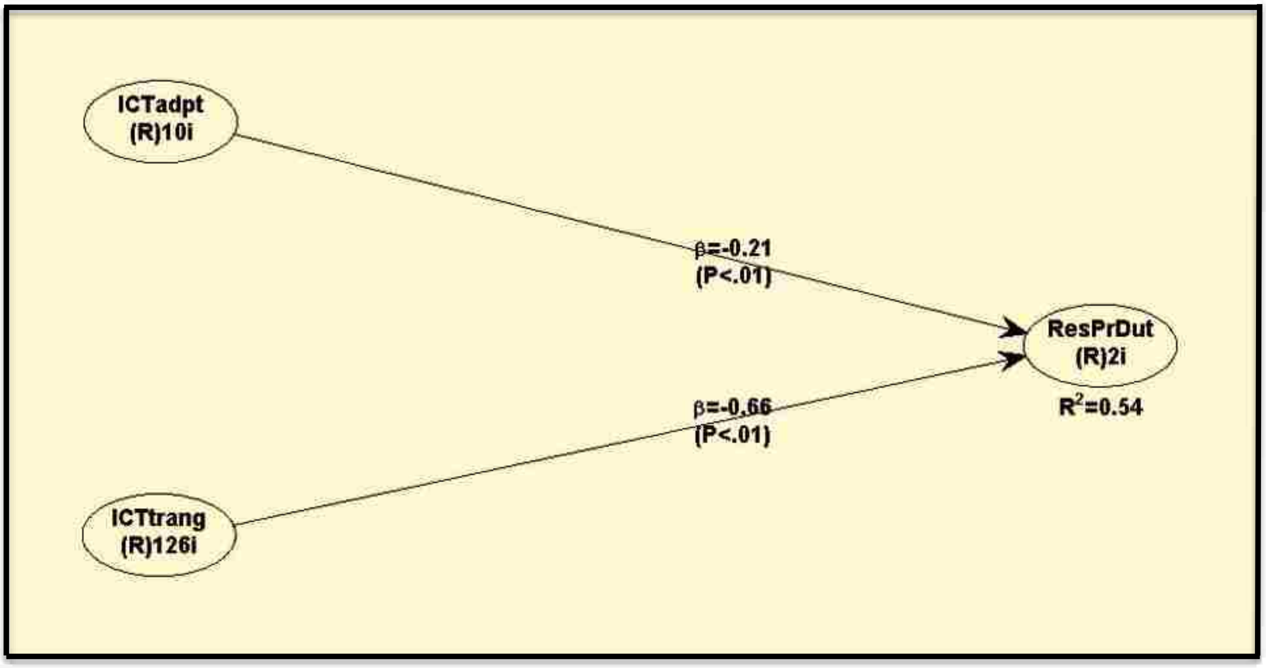


Figure 5.11. A Proposed Model on ICT Adoption and Training for the Increase of Research Productivity (Source: Researcher)

The proposed model (Figure 5.11) shows that ICT adoption has very little significance on the research productivity with a value of $\beta = -0.21$ and $p =< 0.01$. The ICT adoption value is less significant because ICT adoption alone will not have a high impact on research productivity. ICT training also shows that it has very little significance on the research productivity with a value of $\beta = -0.66$ and p<.01. However, after combining the values of ICT adoption and ICT training, they show that they will have a higher significance on the research productivity.

5.2.6 Effect Size

According to Helm et al. (2010), the effect of the predictor factors depend on the dependent factor and it can be derived by computing the R^2 values for the independent factors, where each factor is calculated $R^2(e)$. However, it also included $R^2(i)$ to test for the significance.

The effect size f^2 can be calculated as follows:

$$f^2 = \frac{R^2(i) - R^2(e)}{1 - R^2(i)} \tag{vii}$$

Table 5.21, Table 5.22, and Table 5.23 show the quality of effect size of the model factors. By investigating effect sizes, the researcher is able to ascertain if the effects of the path coefficients are small, medium or large, according to these recommended values: 0.02, 0.15 or 0.35, respectively (Kock, 2010). Values below 0.02 are too weak to be considered effective (Kock, 2010) Thus, all values of this research model for the ICT training are effective.

Table 5.21: Effect Sizes for Total Effect Using ICT with Training

	*SPSS*wt	*AMOSS*wt	*TuitinW*	*EndNotW*	*NvivoDW*	*NvivoLW*	*ResPrDu*
SPSSwt	0.369						
*AMOSS*wt		0.317					
TuitinW			0.418				
EndNotW				0.254			
*Nvivo*DW					0.283		
*Nvivo*LW						0.118	
ResPrDu	0.193	0.073	0.350	0.172	0.099	0.058	

Table 5.22: Effect Sizes for Total Effect Using ICT without Training

	SPSSwot	*AMOSSwo*	*TitinWo*	*EdNotWo*	*NVoDWoT*	*NVoLWoT*	*ResPrDu*
SPSSwot	0.274						
AMOSSwo		0.692					
TitinWo			0.336				
EdNotWo				0.220			
NVoDWoT					0.546		
NVoLWoT						0.611	
ResPrDu	0.086	0.133	0.143	0.068	0.242	0.219	

Table 5.23: Effect Sizes for Total Effect Using a Manual System (without using research software/tools and training)

	SPSSman	*AMOSSma*	*TitinMa*	*EdNotMa*	*NVoDMan*	*NVoLMan*	*ResPrDu*
SPSSman	0.373						
AMOSSma		-0.451					
TitinMa			0.190				
EdNotMa				0.305			
NVoDMan					-0.819		
NVoLMan						0.284	
ResPrDu	0.089	0.149	0.046	0.047	0.287	0.048	

5.2.7 Model Fit

According to Hair et al. (2010), the strength of the measurement model is demonstrated through measures of the convergent and the discriminant validity. Kock (2010) refers to ten categories: the average path coefficient (APC), Average R-squared (ARS), Average adjusted R-squared (AARS), Average block VIF (AFVIF), Average full collinearuty VIP (AFVIF), Tenenhaus Goodness of Fit (GoF), Sympson's paradox ratio (SPR), R-squared contribution ratio (RSCR), Statistical suppression ratio (SSR), and Nonlinear bivariate causality direction ratio (NLBCDR) (Table 5.24).

Table 5.24: Model Fit and Quality Indices for Using ICT with Training, Using ICT without Training, and Using a Manual System (without using research software/tools and training)

	Using ICT Training		**Using ICT Without Training**		**Using a Manual System (Without Using Research Software/Tools and Training)**	
Fit index	Model	Recommendation	Model	Recommendation	Model	Recommendation
Average path coefficient (APC)	0.293	Good if P=0.002	0.447	Good of P<0.001	0.404	Good of P<0.001
Average R-squared (ARS)	0.945	Goof if P<0.001	0.891	Good if P<0.001	0.300	Good if P=0.002
Average adjusted R-squared (AARS)	0.904	Good if P<0.001	0.809	Good if P<0.001	-0.224	Good if P=0.009
Average block VIF (AVIF)	2.130	Acceptable if <=5, ideally <=3.3	1.642	Acceptable if <=5, ideally <=3.3	3.342	Acceptable if <=5, ideally <=3.3
Average full collinearity VIF (AFVIF)	26.788	Acceptable if <=5, ideally <=3.3	16.559	Acceptable if <=5, ideally <=3.3	3.318	Acceptable if <=5, ideally <=3.3
Goodness of Fit (GoF)	0.618	Small >=0.1, medium >=0.25, large >=0.36	0.587	Small >=0.1, medium >=0.25, large >=0.36	0.489	Small >=0.1, medium >=0.25, large >=0.36
Sympson's paradox ratio (SPR)	1.000	Acceptable if >=0.7, ideally =1	1.000	Acceptable if >=0.9, ideally=1	0.500	Acceptable if >=0.7, ideally=1
R-squared contribution ratio (RSCR)	1.000	Acceptable if >=0.9, ideally =1	1.000	Acceptable if >=0.9, ideally=1	0.726	Acceptable if >=0.9, ideally=1
Statistical suppression ratio (SSR)	0.833	Acceptable if >=0.7	0.667	Acceptable if >=0.7	0.167	Acceptable if >=0.7
Nonlinear bivariate causality direction ratio (NLBCDR)	0.833	Acceptable if >=0.7	0.750	Acceptable if>=0.7	0.583	Acceptable if>=0.7

5.2.8 P Values Correlations Using ICT with Training, Using ICT without Training, and Using a Manual System (without Using Research Software/Tools and Training)

Table 5.25, Table 5.26, and the Table 5.27 show the p values correlations.

Table 5.25. P Values Correlations Using ICT with Training

	SPSSwt	*AMOSwt*	*TuitinW*	*EndNotW*	*NvivoDW*	*NvivoLW*
SPSSwt	**1.000**					
AMOSwt	0.217	**1.000**				
TuitinW	0.341	0.882	**1.000**			
EndNotW	0.761	0.526	0.027	**1.000**		
NvivoDW	0.435	0.718	0.550	0.380	**1.000**	
NvivoLW	0.182	0.846	0.277	0.536	0.123	**1.000**

Table 5.26. P Values Correlations Using ICT without Training

	SPSSwot	*AMOSwo*	*TitinWo*	*EdNotWo*	*NVoDWoT*	*NVoLWoT*
SPSSwot	**1.000**					
AMOSwo	0.321	**1.000**				
TitinWo	0.280	0.352	**1.000**			
EdNotWo	0.520	0.114	0.625	**1.000**		
NVoDWoT	0.189	0.037	0.331	0.731	**1.000**	
NVoLWoT	0.827	0.200	0.507	0.120	0.681	**1.000**

Table 5.27. P Values Correlations Using a Manual System (without using research software/tools and training)

	SPSSman	*AMOSma*	*TitinMa*	*EdNotMa*	*NVoDMan*	*NVoLMan*
SPSSman	**1.000**					
AMOSma	<0.001	**1.000**				
TitinMa	0.001	<0.001	**1.000**			
EdNotMa	0.309	0.584	0.425	**1.000**		
NVoDMan	<0.001	0.006	0.003	0.1811	**1.000**	
NVoLMan	0.004	0.010	0.017	0.358	0.001	**1.000**

Table 5.25, Table 5.26, and the Table 5.27 show p-values correlations of each software, namely, SPSS, AMOS, Turnitin, EndNote, NVivo for data analysis, and NVivo for literature reivew to increase the research productivity using ICT with training, using ICT without training, and a manual system (without using research software/tools and training).

5.2.9 Mean and Standard Deviation for Research Productivity, ICT Adoption, and ICT Training

The interpretation of Table 5.28 and Table 5.29 will be discussed in the next section.

Table 5.28. Mean and Standard Deviation of AMOS, EndNote, NVivo (for data analysis and for literature review), SPSS, Turnitin, and for the Research Productivity with training

Software	**Mean**	**Standard Deviation**	**Variable**	**Mean**	**Standard Deviation**
AMOS	3.36	1.44	Research Productivity	15.05	2.81
EndNote	4.77	1.47	Research Productivity	15.05	2.81
NVivo for data analysis	5.00	1.00	Research Productivity	15.05	2.81
NVivo for literature review	3.67	1.27	Research Productivity	15.05	2.81
SPSS	3.87	1.46	Research Productivity	15.05	2.81
Turnitin	4.15	1.73	Research Productivity	15.05	2.81

Table 5.29. Mean and Standard Deviation of Research Productivity, ICT Adoption and ICT Training

Variable	**Mean**	**Standard Deviation**	**Variable**	**Mean**	**Standard Deviation**
ICT Adoption	4.64	0.74	Research Productivity	172.92	11.02
ICT Training	5.73	0.30	Research Productivity	172.92	11.02

5.2.10 Graphs Using ICT with Training

Graphs have been presented for each latent variable with the research productivity. Here, only certain graphs have been shown: using ICT with training, namely, *SPSS* software with training and research productivity, *AMOS* software with training and research productivity, *Turnitin* software with training and research productivity, *EndNote* software with training and research productivity, *NVivo* software for qualitative data analysis with training and research productivity, and, finally, *NVivo* software for literature review with training and research productivity. On the other hand, graphs using ICT without Training (see Appendix D) and using a manual system (Without using research software/tools and training) have been shown in Appendix D.

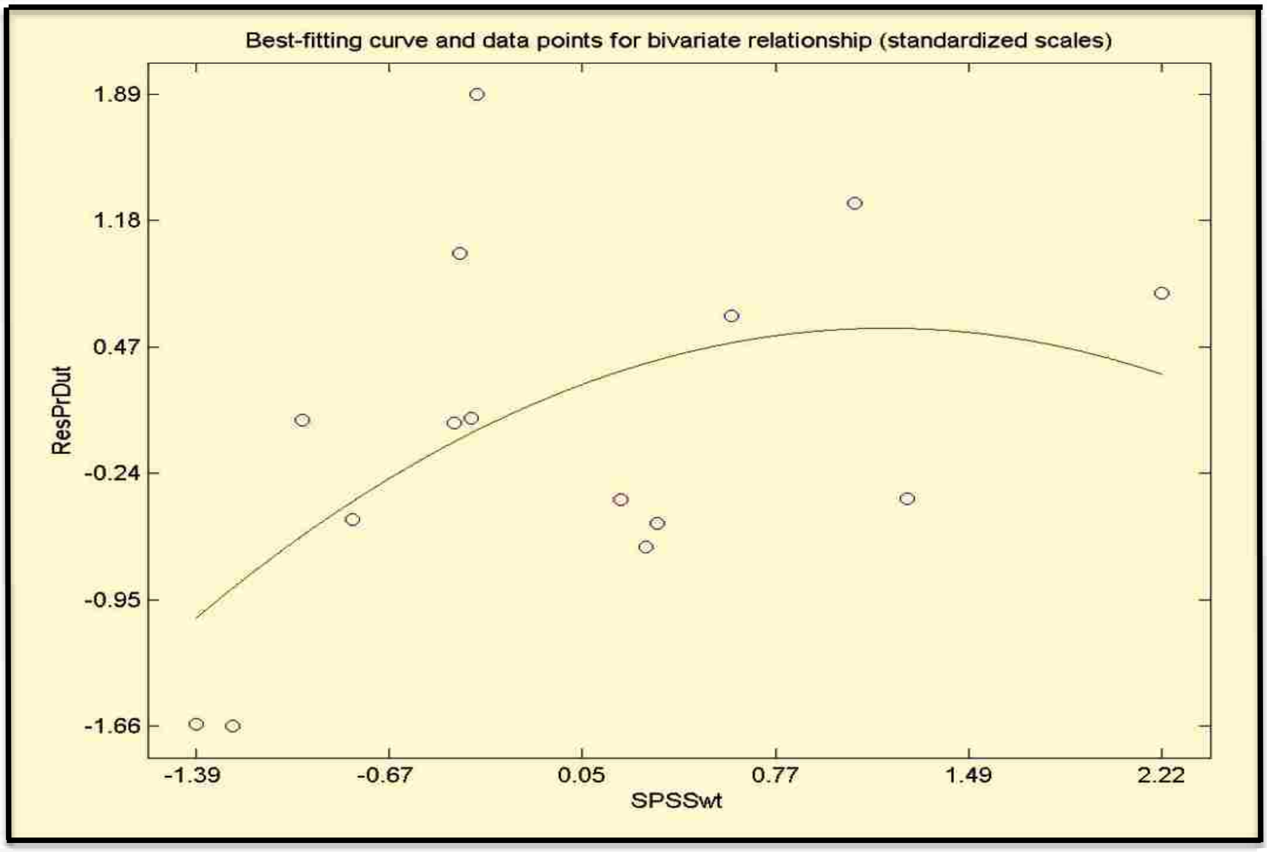


Figure 5.12: Using *SPSS* Software with Training and Research Productivity

Figure 5.12 shows that the relationship is positively supported and it is not linear. The relationship intensifies at approximately -0.67 standard deviation to the right of the mean of the standardised data. Further, the unstandardized scales figure (see Appendix E) shows the nonlinear relationship where research productivity begins to increase when the mean for the research productivity is 15.05 and standard deviation is 2.81 (see Table 5.28). Similarly, using *SPSS* software with training, the mean is 3.87 and the standard deviation is 1.46 (see Table 5.28). Finally, it shows that using *SPSS* software with training for quantitative data analysis significantly increases research productivity.

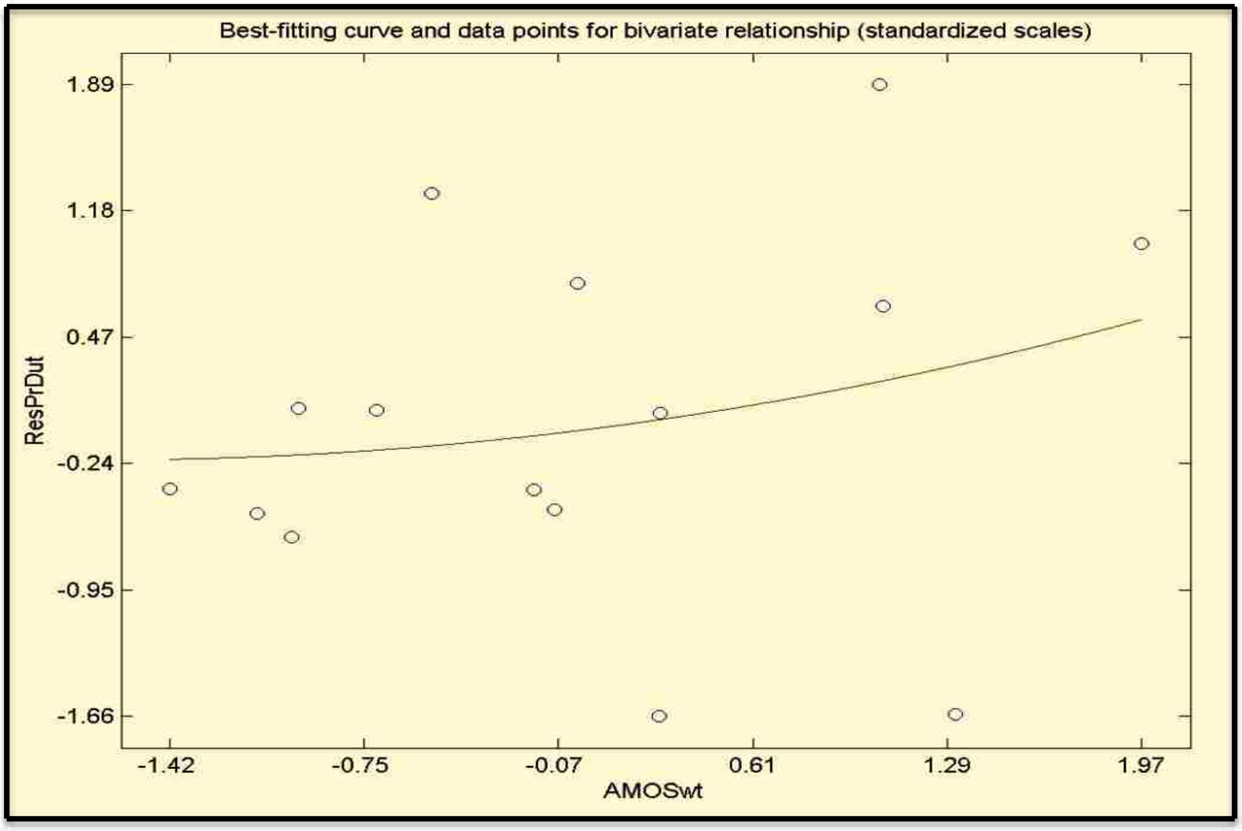


Figure 5.13: Using *AMOS* Software with Training and Research Productivity

Figure 5.13 shows that the relationship is positively supported and it is not linear. It begins to intensify at approximately -0.75 standard deviation to the right of the mean of the standardized data. Furtehr, the unstandardized scales figure (see Appendix E) shows the nonlineare relationship were research productivity begins to increase when the mean for the research productivity is 15.05 and standard deviation is 2.81 (see Table 5.28). Similarly, using *AMOS* software with training, the mean is 3.36 and the standard deviation is 1.44 (see Table 5.28). Finally, it shows that using *AMOS* software with training for modelling significantly increases research productivity.

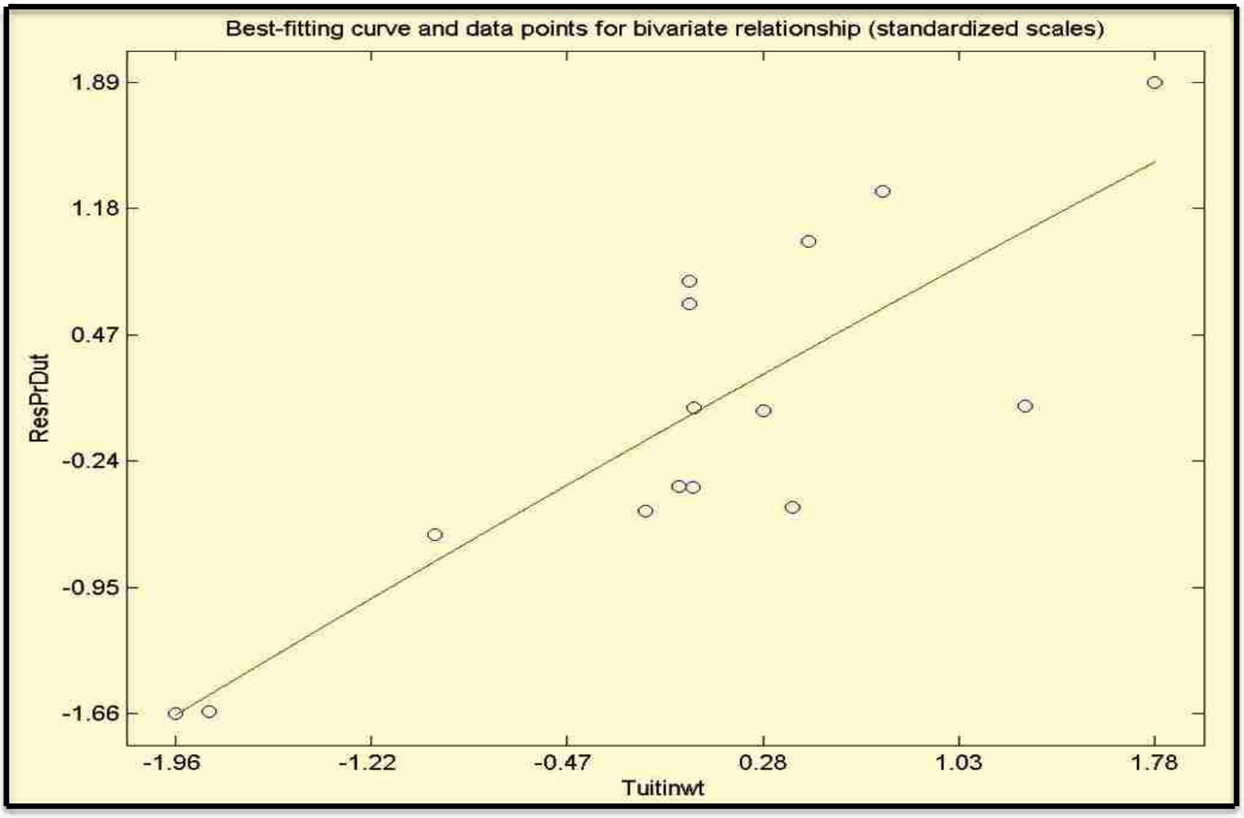


Figure 5.14: Using *Turnitin* Software with Training and Research Productivity

Figure 5.14 shows that the relationship is positively supported and it is linear. It begins to intensify at approximately -1.22 standard deviation to the right of the mean of the standardized data. Further, the unstandardized scales figure (see Appendix E) shows the linear relationship where research productivity is 15.05 and standard deviation is 2.81 (see Table 5.28). Similarly, using *Turnitin* software with training, the mean is 4.15 and the standard deviation is 1.73 (see Table 5.28). Finally, it shows that using *Turnitin* software with training for plagiarism significantly increases research productivity.

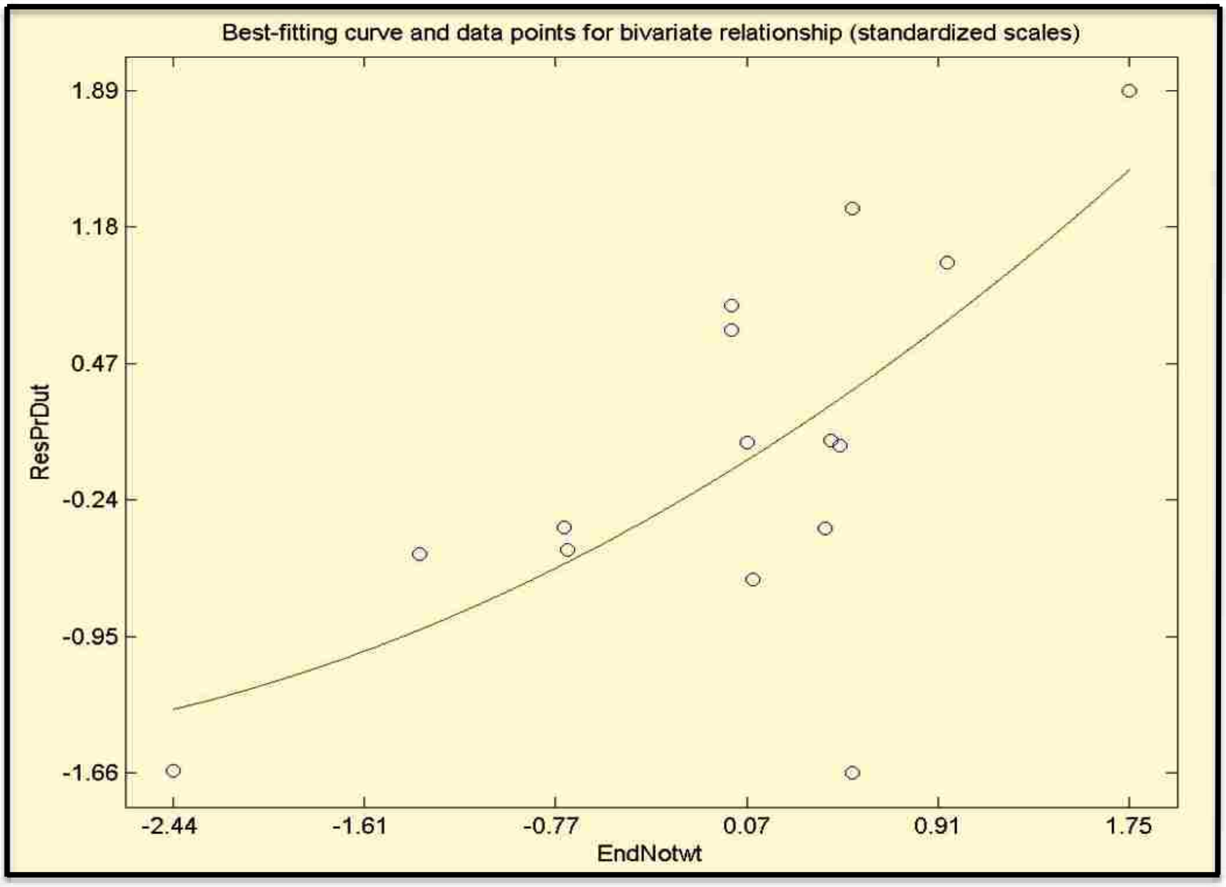


Figure 5.15: Using *EndNote* Software with Training and Research Productivity

Figure 5.15 shows that the relationship is positively supported and it clearly shows that it is not linear and it begins to intensify at approximately -1.61 standard deviation to the right of the mean of the standardised data. Further, the unstandardized scales (see Appendix E) shows the nonlinear relationship where research productivity begins to increase when the mean for the research productivity is 15.05 and standard deviation is 2.81 (see Table 5.28). Similary, using *EndNote* software with training, the mean is 4.77 and the standard deviation is 1.47 (see Table 5.28). Finally, it shows that using *EndNote* software with training for referencing significantly increases research productivity.

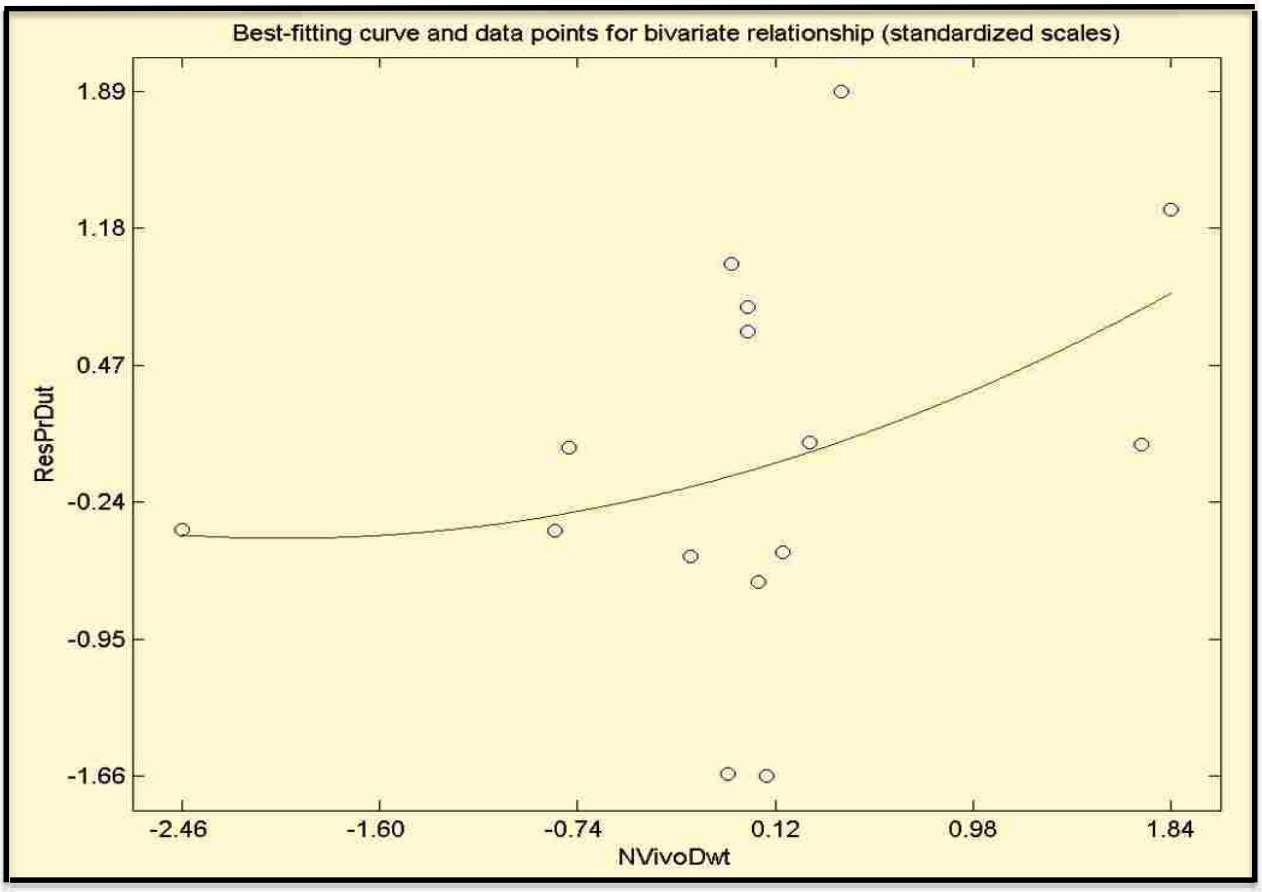


Figure 5.16: Using *Nvivo* software for Qualitative Data Analysis with Training and Research Productivity

Figure 5.16 shows that the relationship is positively supported and it is not linear. It begins to intensify at approximately -1.60 standard deviation to the right of the mean of the standardized data. Further, the unstandardized scales (see Appendix E) shows the nonlinear relationship where research productivity begins to increase when the mena for the research productivity is 15.05 and standard deviation is 2.81 (see Table 5.28). Similarly, using *NVivo* software with training for qualitative data analysis, the mean is 5.00 and the standard deviation is 1.00 (see Table 5.28). Finally, it shows that using *NVivo* software with training for qualitative data analysis significantly increases research productivity.

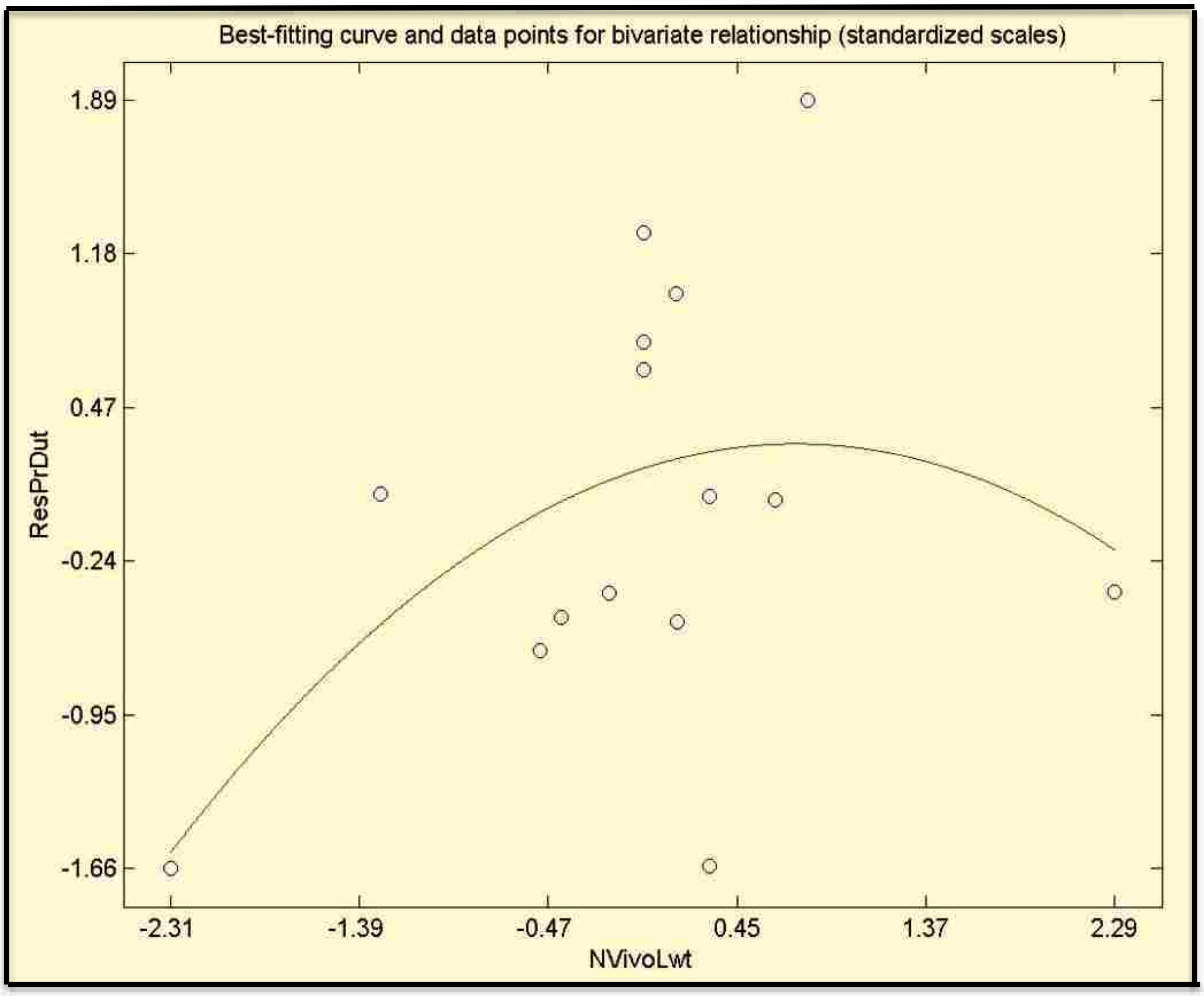


Figure 5.17: Using *Nvivo* Software for Literature Review with Training and Research Productivity

Figure 5.17 shows that the relationship is positively supported and it is not linear. It begins to intensify at approximately -1.39 standard deviation to the right of the mean of the standardized data. Further the unstandardized scales (see Appendix E) shows the nonlinear relationship where research productivity begins to increase when the mean for the research productivity is 15.05 and standard deviation is 2.81 (see Table 5.28). Similarly, using *NVivo* software with training, the mean is 3.67 and the standard deviation is 1.27 (see Table 5.28). Finally, it shows that using *NVivo* software with training for literature review significantly increase research productivity.

5.2.11 Model Graphs

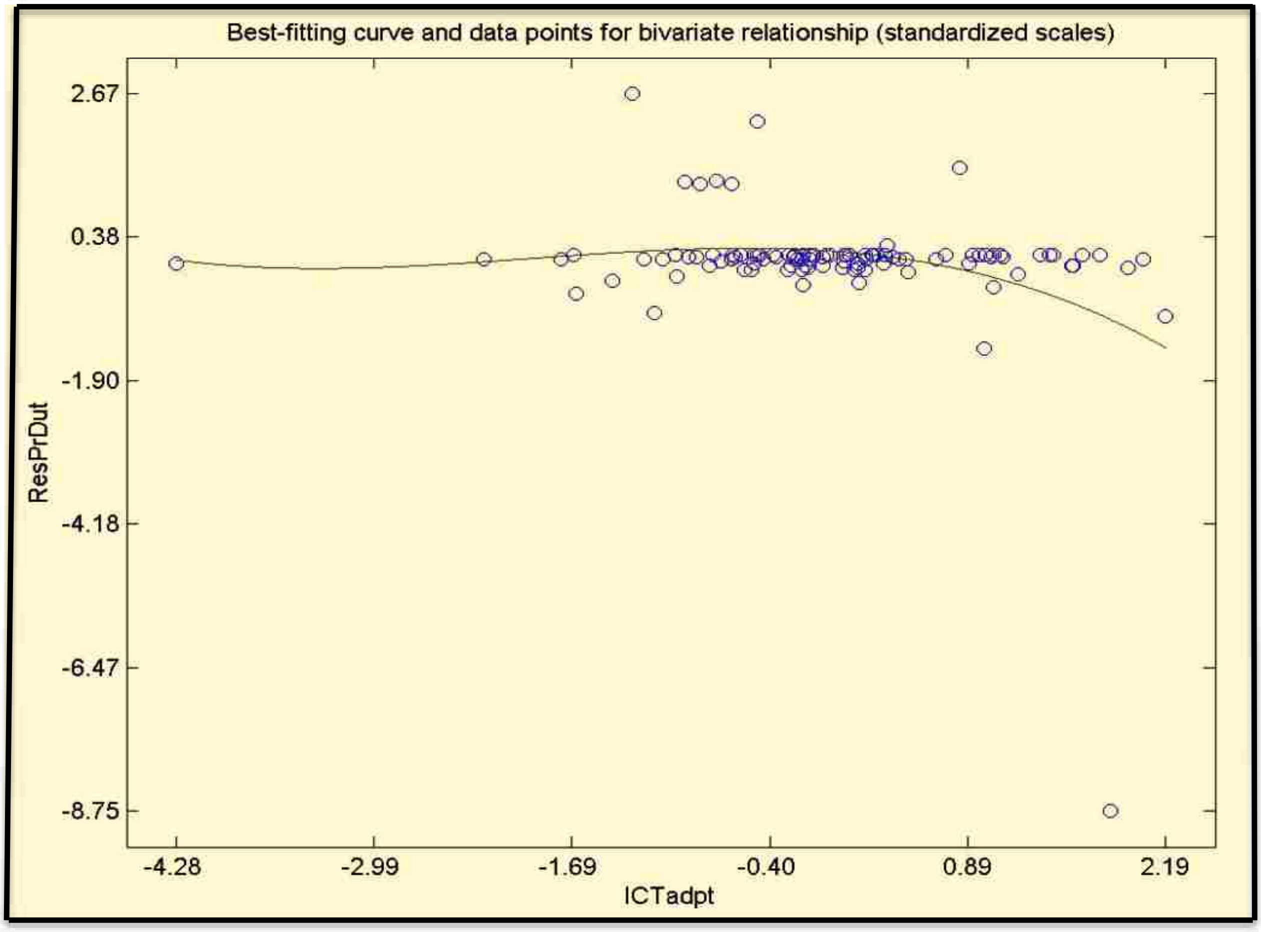


Figure 5.18: ICT Adoption and Research Productivity

Figure 5.18 shows that the relationship is positively supported and it is not linear. It begins to intensify at approximately -2.99 standard deviation to the right of the mean of the standardized data. Further, the unstandardized scales (see Appendix E) shows the nonlinear relationship where research productivity begins to increase when the mean for the research productivity is 172.92 and standard deviation is 11.02 (see Table 5.29). Similarly, using *ICT adoption* for research productivity, the mean is 4.64 and the standard deviation is 0.74 (see Table 5.29). Finally, it shows that there is a significant relationship that *ICT adoption* has an impact on the research productivity.

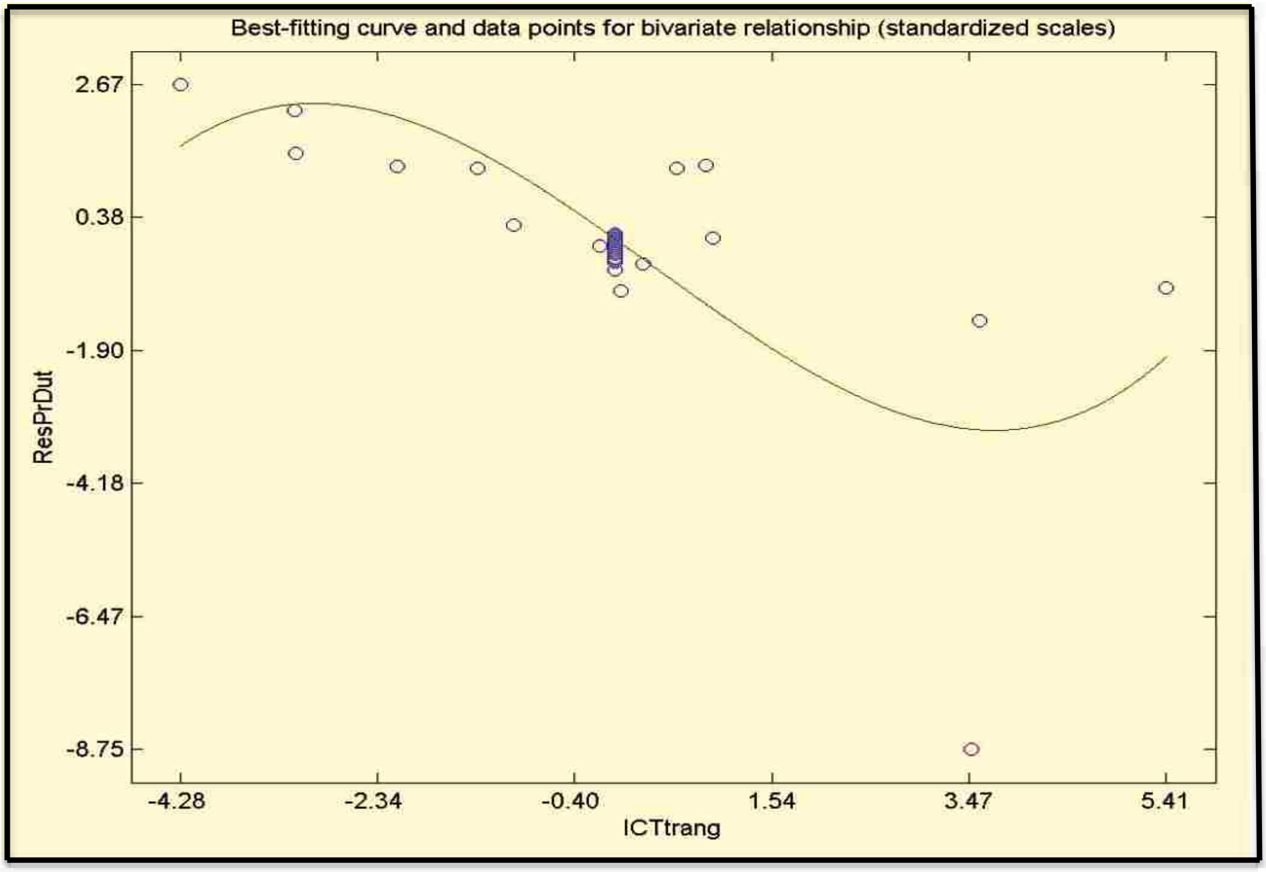


Figure 5.19: ICT Training and Research Productivity

Figure 5.19 shows that the relationship is positively supported and it is not linear. It begins to intensify at approximately -2.34 standard deviation to the right of the mean of the standardized data. Further, the unstandardized scales (see Appendix E) shows the nonlinear relationship where research productivity begins to increase when the mean for the research productivity is 172.92 and standard deviation is 11.02 (see Table 5.29). Similarly, using *ICT with training* for research productivity, the mean is 5.73 and the standard deviation is 0.30 (see Table 5.29). Finally, it shows that there is a significant relationship that *ICT with training* has an impact on the research productivity.

5.2.12 Summary of the Experiment Results

Respondents of this experiment predominantly showed increased research productivity using ICT with training when $R^2 = 0.95$. The experiment shows that training increases the research productivity as compared to using ICT without training ($R^2 = 0.89$) and using a manual system (without using research software/tools and training) ($R^2 = 0.30$).

5.3 Conclusion

The purpose of this section was to analyse the results in light of the research questions/objectives. These research questions/objectives are, firstly, to analyse the impact of ICT adoption on the research productivity by university academics; secondly, to examine research prouductivity using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin)* with training; thirdly, to examine research productivity using ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) without training; fourthly, to examine research productivity using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) and training); and, finally, to design a model on ICT adoption and training for the increase of research productivity. In order to achieve these objectives, a survey and experiment were conducted. The survey method was used to collect data from 103 academics from four universities in the KwaZulu-Natal province from all the faculties and the second experiment was conducted with ± 45 academics on six software/tools. The survey data was analysed using the *SPSS* 20.0 and the experiment data was analysed using the *WarpPLS 4.0* modelling technique.

The results shows that ICT adoption has a significant relationship on the research productivity with significance values of $\beta = .058$ and $p =< .01$.

Furthermore, this chapter also presented results on the software training influence on research productivity. The model results demonstrated that ICT use with training ($R^2 = 0.95$) influences research productivity. On the other hand, using ICT without training ($R^2 = 0.89$) does not significantly influence research productivity as compared to using ICT with training for the research productivity. Finally, the use of a manual system (without using research software/tools and training) ($R^2 = 0.30$) does have very little impact on research productivity.

The next chapter presents the conclusions and recommendations of this study.

*"It's not the heart that compels conclusions in cases, it's the low." –*Sonia Sotamayor

Chapter 6: Conclusions and Recommendations

6.1. Introduction

The main purpose of this chapter is to summarise the current study and to present its contribution in comparison to the existing literature on the role of ICT adoption and training for the improvement of research productivity.

As stated previously, a noticeable trend in the research world is that academic staff tends to increase their research productivity. However, universities still face low and skewed research productivity and the cause for this is unknown. Therefore, this study attempted to understand this problem by looking at the impact of ICT adoption and training with a view to improve research productivity.

6.2 Research Aim, Objectives and Research Questions

The aim of this study was to design a model for the increase in research productivity by academics in universities after having adopted ICTs.

In order to achieve the aim, the following research objectives were addressed:

- To analyse the impact of ICT adoption on the research productivity by university academics;
- To examine research productivity using ICT (*EndNote*, *NVivo*, *AMOS*, *SPSS*, and *Turnitin*) with training;
- To examine research productivity using ICT (*EndNote*, *NVivo*, *AMOS*, *SPSS*, and *Turnitin*) without training;
- To examine research productivity using a manual system (without using research software/tools (*EndNote, NVivo, AMOS, SPSS,* and *Turnitin*) and training); and
- To design a model on ICT adoption and training for the increase of research productivity.

In order to archive the above research objectives, the following research questions were developed:

- What is the impact of ICT adoption on research productivity by university academics?
- To what extent does ICT use with training affect research productivity?
- To what extent does ICT use without training affect research productivity?
- To what extent does a manual system (without using research software/tools and training) affect research productivity?
- How can the ICT adoption and ICT training model increase the research productivity?

6.3 Achievement of the Objectives

This section will present conclusions that have been reached for each of the objectives as stated above.

Objective One: *To analyse the impact of ICT adoption on the research productivity by university academics*

ICT adoption was examined on the academics from four universities in KwaZulu-Natal. A face-to-face survey was conducted with 103 academics and questionnaires were distributed according to the ratio as given in the methodology chapter. It was revealed that ICT adoption has a significant impact on research productivity.

Objective Two: *To examine research productivity using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) with training*

Using ICT with training was examined on ±15 academics where the research took place. A model was generated using *WarpPLS 4.0,* which clearly showed that using ICT (*SPSS, AMOS, Turnitin, EndNote, and NVivo*) with training had high significance ($R^2 = 0.95$) on research productivity for academics. Therefore, it can be concluded that using ICT with training increases researcher performance in terms of research productivity.

Objective Three: *To examine research productivity using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training*

ICT use without training was examined on ±15 academics where the research took place. A model was generated using *WarpPLS 4.0*, which clearly showed that using ICT (*SPSS, AMOS, Turnitin*, *EndNote*, *NVivo*) without training had low significance on research productivity ($R^2 = 0.89$) for academics as compared to objective two ($R^2 = 0.95$). Therefore, it can be concluded that using ICT without training does not have high significance on research productivity as compared to the ICT use with training.

Objective Four: *To examine research productivity using a manual system (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and training);*

A manual system was examined on ±15 academics where the research took place. A model was generated using *WarpPLS 4.0*, which clearly showed that using a manual system had the lowest significance ($R^2 = 0.30$) on research productivity for academics as compared to objectives two ($R^2 = 0.95$) and three ($R^2 = 0.89$). Therefore, it can be concluded that, when using a manual system, research productivity is very low.

Objective Five: *To design a model on ICT adoption and training to increase research productivity*

The joint impact of ICT adoption and training clearly showed an increase in research productivity. This objective was achieved by combining ICT adoption from 103 academics and ICT training from ±15 academic staff (±15 academic staff for each software). Finally, the model shows that ICT adoption and training together enhances research productivity ($R^2 = 0.54$) for academics.

6.4 Summary of Findings

The aim of this study was to investigate and describe the use of ICT adoption and training to increase research productivity. Based on the results, the following conclusions are drawn:

- ✓ A vast majority of the academic staff who participated were permanent staff, almost half of whom were female. However, almost all staff members had access to Internet access at home.
- ✓ Among university academics, conference publications and internal publications had a high impact on research productivity.
- ✓ Search tools, productivity tools, general communication tools, and the management tools had a high impact on research productivity.
- ✓ ICT adoption had an impact on the research productivity.
- ✓ Respondents classified two types of ICT adoption tools. *The first category comprised of* social tools, university portal tools, instruction tools, survey tools, curriculum tools, and ITS tools. *The second category comprised of* search tools, productivity tools, general communication tools, and management tools.
- ✓ There was a significant relationship between *experience* and *use of ITS, university, and management tools*. Furthermore, there were significant relationships between *institution* and *use of ITS tools*; followed by relationships between *job status* and *use of search, social, and management tools*. Finally, respondents with different network access viewed differently statements on the *university portal, survey*, and *ITS tools*.
- ✓ Internal publications contribute to empowering staff towards publishing in conferences.
- ✓ Pearson correlation test were found with the following: Masters graduates correlated with *doctorate graduates, funds & grants,* and *conference*. There was no correlation found with *doctoral graduates, visiting professor, awards,* and *book published*. The following correlations were found: *funds and grants* correlated with *awards, conference,* and *internal publications*; *conference* correlated with *books* and *books chapter, volume edited, internal publications, visiting professor*; *books* and *books chapter* correlated with *volume edited, internal publications, visiting professor*, and *book published*; and *volume edited* correlated with *internal publications, book published*.
- ✓ Pearson correlation test were found with following: *Search tools* correlated with *productivity tools, general communication tools,* and *management tools*. No correlation

was found between *ITS tools* and *management tools*. Similarly, other correlations found were as follows: *productivity tools* correlated with *general communication tools and management tools*; *social tools* correlated with *university portal tools, instruction tools, survey tools,* and *communication tools*; *university portal tools* correlated with *instruction tools* and *curriculum tools*; *general communication tools* correlated with *management tools*; *instruction tools* correlated with *survey tools* and *curriculum tools*; *survey tools* correlated with *curriculum tools*; *curriculum tools* correlated with *ITS tools*.

- ✓ ICT (*SPSS*, *AMOS*, *Turnitin*, *EndNote*, and *NVivo*) with training had a significant $(R^2 = 0.95)$ influence on research productivity for the university academics as compared to the ICT (*SPSS*, *AMOS*, *Turnitin*, *EndNote*, and *NVivo*) use without training $(R^2 = 0.89)$ and using a manual system (without using research software/tools and training) ($R^2 = 0.30$).
- ✓ ICT (*SPSS*, *AMOS*, *Turnitin*, *EndNote*, and *NVivo*) use without training had less significance ($R^2 = 0.89$) on research productivity for the university academics as compared to the ICT use with training ($R^2 = 0.95$) on research productivity and using a manual system (without using research software/tools and training) ($R^2 = 0.30$).
- ✓ Using a manual system (without using research software/tools and training) had less significance ($R^2 = 0.30$) on research productivity than using ICT with training $(R^2 = 0.95)$ and using ICT without training ($R^2 = 0.89$) for university academics staff.
- ✓ The combined effect of the ICT adoption and ICT training had high significance $(R^2 = 0.54)$ on research productivity for university academics.

6.5 Limitations of the Study

Research studies usually have some limitations that may raise doubts as to the validity and reliability of the findings.

One major limitation of the study was that, due to cost and limited time, training could only take place over a limited period of time. In future studies, more time for training should be allocated which could enhance the study.

Another limitation was the limited sample size, which forced the researcher to use *WarpPLS 4.0* rather than *AMOS* for modelling.

6.6 Key Models' Contribution

The main contribution of this research is that it has conceptualised new constructs of ICT adoption and training, and empirically investigated its relationship with research productivity. *Firstly*, this study found that ICT adoption has significance ($R^2 = 0.33$) on research productivity (see Figure 6.1 (stage 1)).

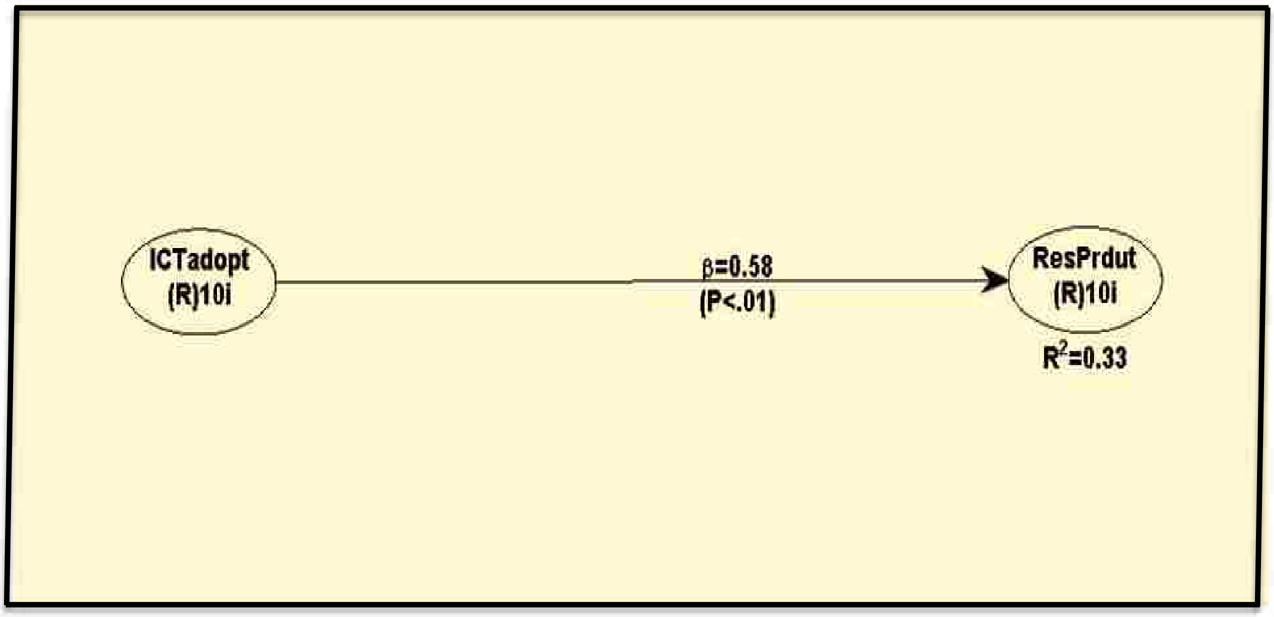


Figure 6.1 (stage 1): Impact of ICT Adoption on Research Productivity (Source: Researcher)

Secondly, this study revealed that ICT (*EndNote, NVivo, AMOS, SPSS, and Turnitin*) training can increase research productivity which correlates with the following studies (Azeem and Salfi, 2012; Di Gregario, 2000; Paswan and Young, 2002; Crisp, 2007; Landau and Everitt, 2004; Fitzgibbons and Meert, 2010). The Figure 6.2 (stage 2) shows that ICT training has significance ($R^2 = 0.95$) on research productivity.

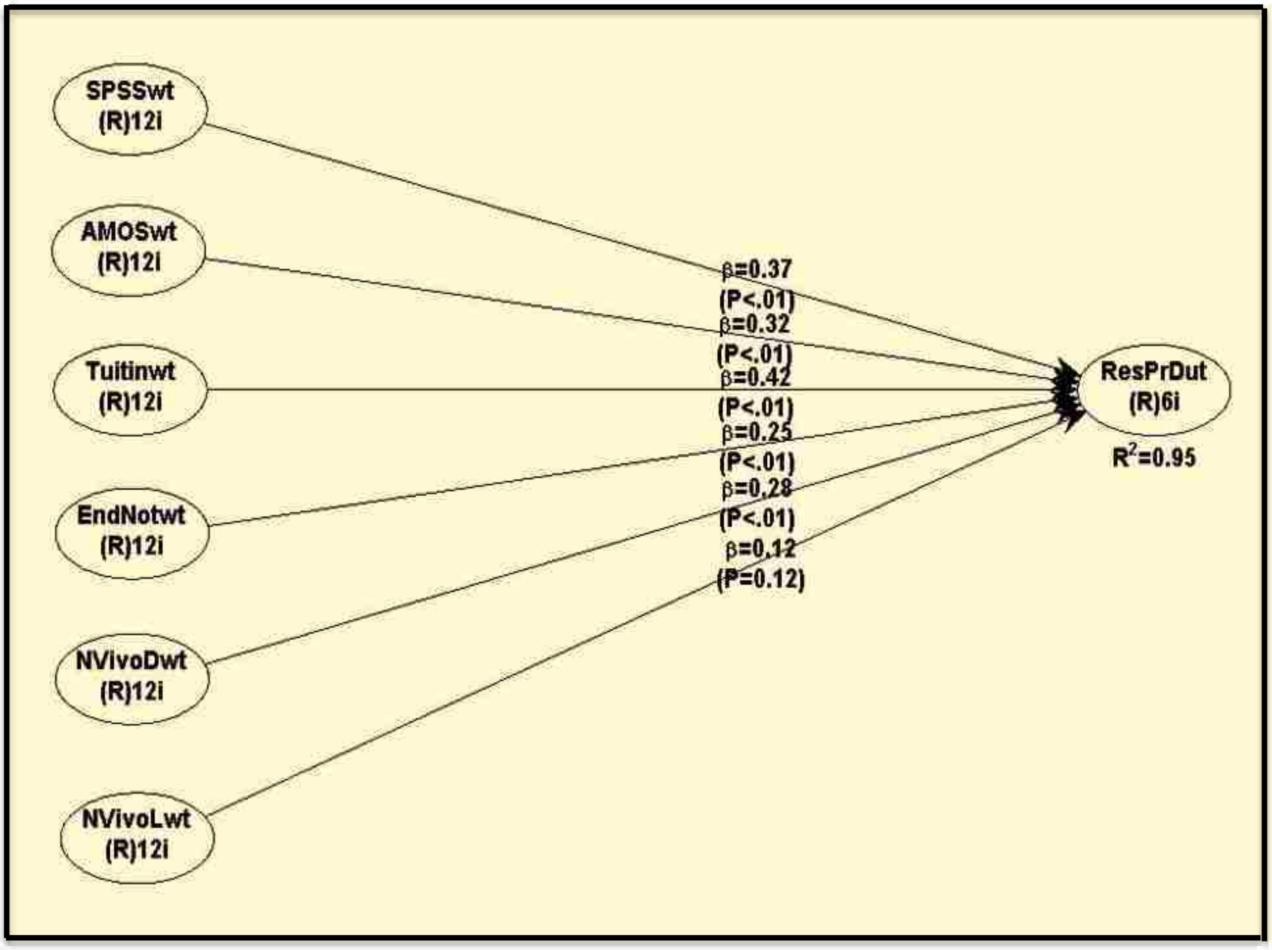


Figure 6.2 (stage 2): Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) with Training on Research Productivity (Source: Researcher)

Thirdly, this study also shows that using ICT (*SPSS*, *AMOS*, *Turnitin*, *EndNote*, *NVivo*) without training cannot increase the research productivity ($R^2 = 0.89$) as compared to using ICT with training ($R^2 = 0.95$) to increase research productivity. The Figure 6.3 (stage 3) shows low significance on research productivty for using ICT without training.

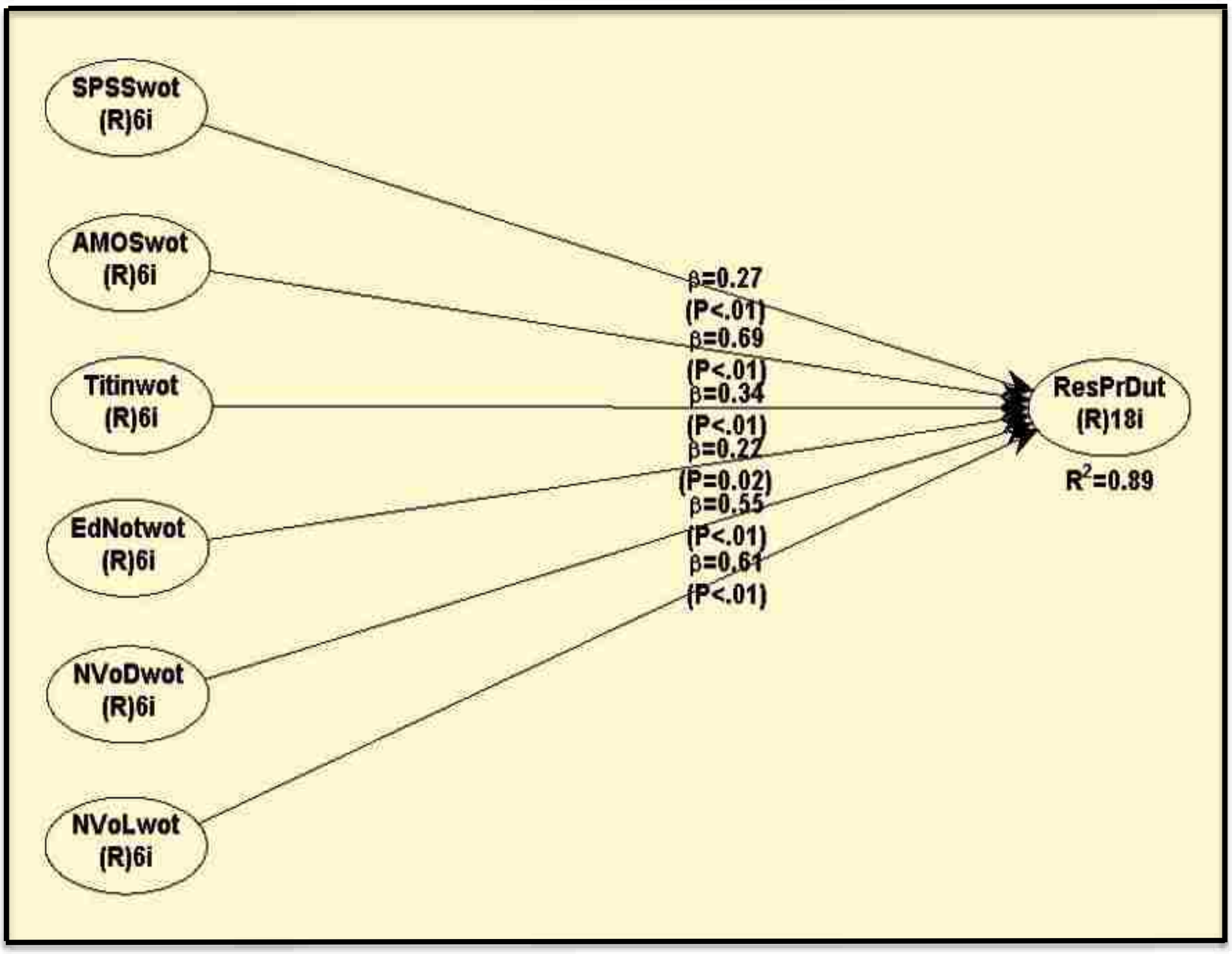


Figure 6.3 (stage 3): Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without Training on Research Productivity (Source: Researcher)

Fourthly, this study revealed that using a manual system (without using research software/tools and training) cannot increase research productivity ($R^2 = 0.30$). Figure 6.4 (stage 5) clearly indicates that a manual system has very low significance ($R^2 = 0.30$) on reseach productivity.

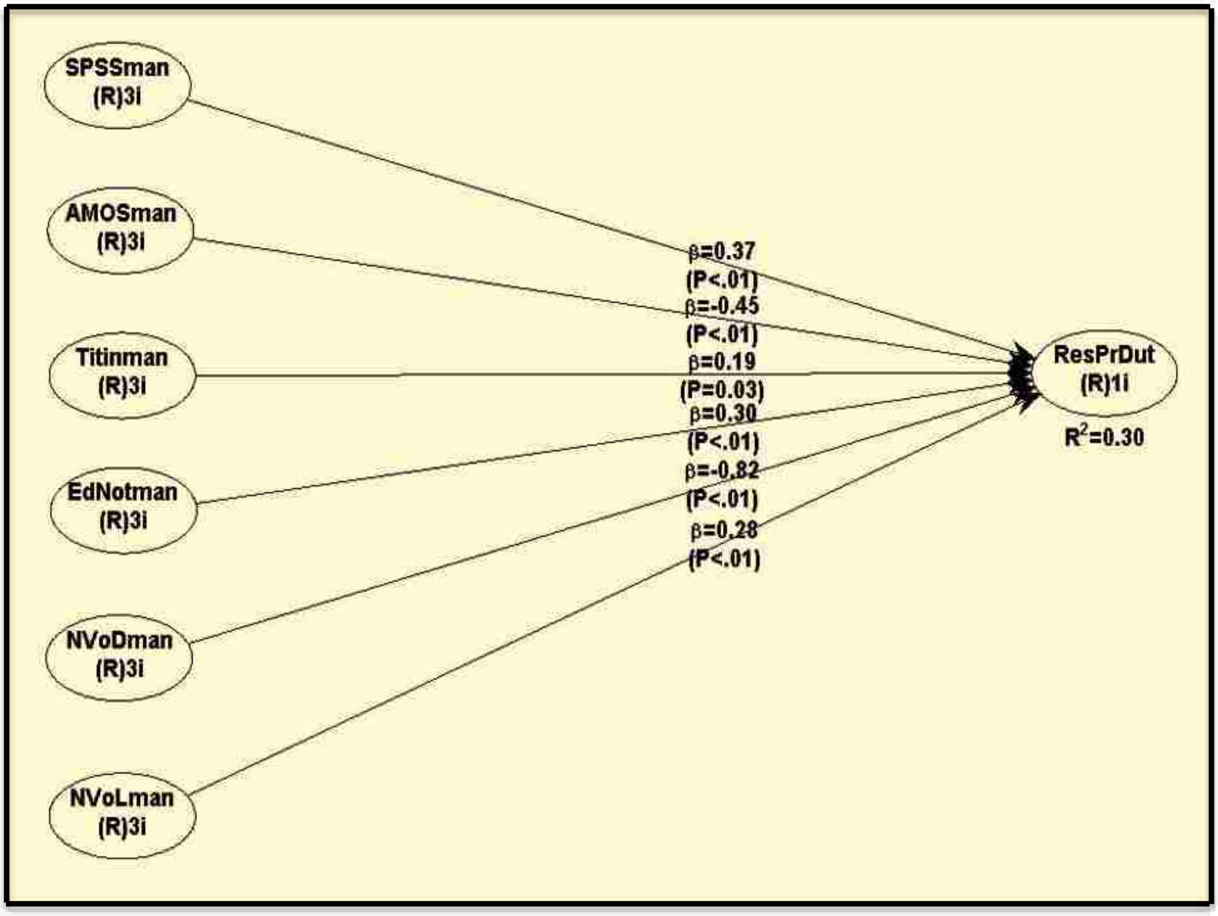


Figure 6.4. (stage 4): Using a Manual System (without using research software/tools (EndNote, NVivo, AMOS, SPSS, and Turnitin) and Training) on Research Productivity (Source: Researcher)

6.7 Case for Comparison and Evaluation of Three Categories

Table 5.30, Table 5.31, Table 5.32, Table 5.33, Table 5.34, and Table 5.35 represent the comparison of each software with using ICT with training, using ICT without training, and using a manual system (without using research software/tools and training).

Table 5.30: Comparison of *SPSS* with Three Categories

Software	***Significance***	***Research Productivity***
Using SPSS with training	$\beta = 0.37$	$R^2 = 0.95$
Using SPSS without training	$\beta = 0.27$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.37$	$R^2 = 0.30$

Table 5.31: Comparison of *AMOS* with Three Categories

Software	***Significance***	***Research Productivity***
Using AMOS with training	$\beta = 0.32$	$R^2 = 0.95$
Using AMOS without training	$\beta = 0.69$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = -0.45$	$R^2 = 0.30$

Table 5.32: Comparison of *Turnitin* with Three Categories

Software	***Significance***	***Research Productivity***
Using Turnitin with training	$\beta = 0.42$	$R^2 = 0.95$
Using Turnitin without training	$\beta = 0.34$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.19$	$R^2 = 0.30$

Table 5.33: Comparison of *EndNote* with Three Categories

Software	***Significance***	***Research Productivity***
Using EndNote with training	$\beta = 0.25$	$R^2 = 0.95$
Using EndNote without training	$\beta = 0.22$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.30$	$R^2 = 0.30$

Table 5.34: Comparison of *NVivo (for data analysis)* with Three Categories

Software	***Significance***	***Research Productivity***
Using NVivo (for data analysis) with training	$\beta = 0.28$	$R^2 = 0.95$
Using NVivo (for data analysis) without training	$\beta = 0.55$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = -0.82$	$R^2 = 0.30$

Table 5.35: Comparison of *NVivo (for literature review)* with Three Categories

Software	***Significance***	***Research Productivity***
Using NVivo (for literature review) with training	$\beta = 0.12$	$R^2 = 0.95$
Using NVivo (for literature review) without training	$\beta = 0.61$	$R^2 = 0.89$
Using a manual system (without using research software/tools and training)	$\beta = 0.28$	$R^2 = 0.30$

all of the above tables show that each type of software with training has a R^2 value of 0.95 which is the highest when compared to software without training and a manual system. Therefore, one can conclude that software with training is the best fit model. The beta values do differ since there were a different number of items for each experiment (12 items for with training, 6 items for without training and 3 items for the manual system).

6.8 A Proposed Model

The research found empirical evidence that different constructs, such as ICT adoption and ICT training combined ($R^2 = 0.54$), can increase research productivity. This study empirically confirmed and that ICT adoption and training makes an original contribution to the theory of technology acceptance, as indicated in figure 6.5.

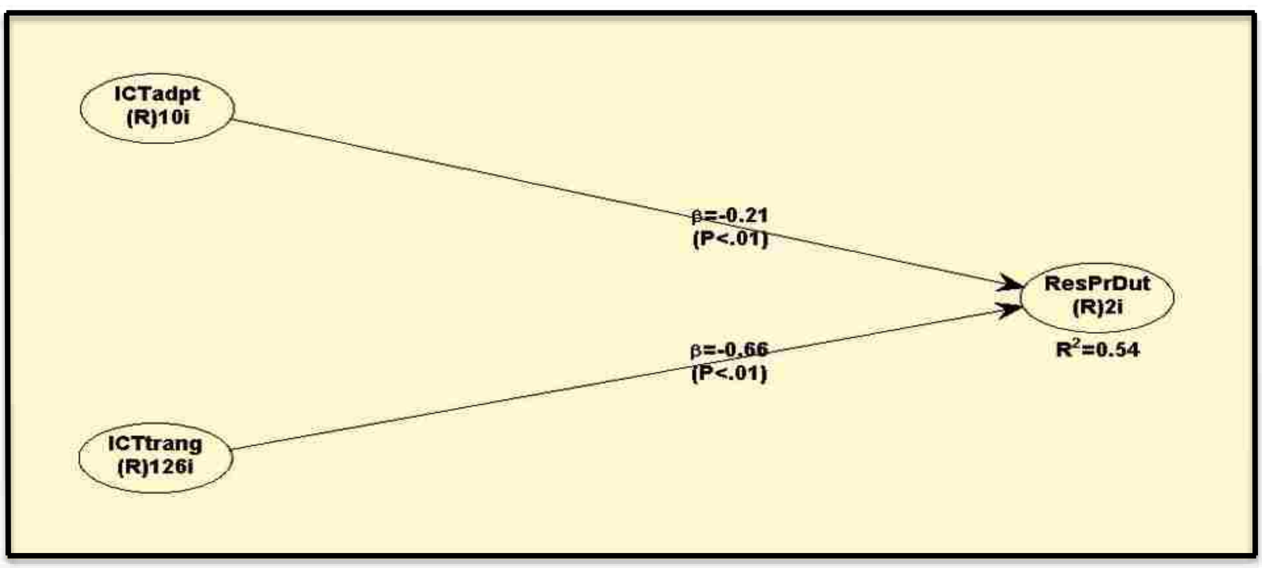


Figure 6.5: A Proposed Model on the ICT Adoption and Training to Increase Research Productivity

(Source: Researcher)

6.9 Research Implications

This study uncovered and addressed a gap in the literature on research productivity. However, the findings may drive the attention of researchers to many other aspects of productivity. ICT adoption was proposed as a new construct in research productivity; therefore, an implication of the new construct might be that these factors may not be able to be tested together most of the time without risking the validity of the results by the structural equation modelling techniques. In the context of this research, it was found that ICT adoption does have an influence ($R^2 = 0.30$) on research productivity. Similarly, ICT with training has high significance ($R^2 = 0.95$) on research productivity. Using ICT without training ($R^2 = 0.89$), and using a manual system (without using research software/tools and training) ($R^2 = 0.30$) do not have high influence on research productivity as compared to ICT use with training ($R^2 = 0.95$). However, it may attract the attention of researchers to the importance of probabilistic aspects of model fit in structural equation modelling as an indicator of significance for models as a whole.

6.10 Practical Implications

A practical implication of this research is linked to academic institutions in order to increase research productivity among academics. However, this study identified that ICT adoption and training positively influences research productivity. It means that the better the application between ICT adoption and ICT with training, the higher the research productivity (Adogbeji and Akporhonor, 2005; Azad and Seyyed, 2007). This study's findings may also have implications for changes and interventions demanding to move away from current practice of using ICT without training and using a manual system (without using research software/tools and training) for research productivity.

6.11 Recommendations Based on the Results of the Study

This section contains the recommendations based on findings from this study that enable researchers to improve research productivity.

6.11.1 ICT Adoption on Research Productivity

The role of ICT adoption has been recognised worldwide as key to academics. However, according to the respondents of this study, there was limited impact of ICT adoption alone on research productivity. In this regard, universities need to formulate strategies on ICT adoption for the improvement of research productivity.

6.11.2 Using ICT with Training Increases Research Productivity

The role of ICT (*EndNote*, *AMOS, Turnitin*, *SPSS*, and *NVivo*) training has been recognised worldwide as key to academic researchers. According to respondents in this study, ICT with training does increases research productivity. The findings indicated that ICT with training has a high significant impact ($R^2 = 0.95$) on research productivity as compared to using ICT without training ($R^2 = 0.89$), and using a manual system (without using research software/tools and training) ($R^2 = 0.30$). In this regard, universities need to formulate strategies on ICT with training for researchers to use each software package in relation to improve their research productivity.

6.11.3 Using ICT without Training Increases Research Productivity

The role of using ICT (*EndNote, AMOS, Turnitin, SPSS,* and *NVivo*) without training but using software manuals has been recognised worldwide as key to academic research. However, according to respondents, it has less effect ($R^2 = 0.89$) on research productivity as compared to the ICT use with training ($R^2 = 0.95$). The findings indicated that, when using ICT without training, the significance was low for research productivity. Universities, therefore, need to formulate strategies to motivate researchers to be trained in each software package, instead of using ICT without training.

6.11.4 Using a Manual System (without using research software/tools and training) on Research Productivity

The role of using a manual system (without using research software/tools and training) is still in practice. However, according to respondents, manual systems do not increase research productivity ($R^2 = 0.30$) as compared to the ICT use with training ($R^2 = 0.95$) and ICT use without training ($R^2 = 0.89$). Universities thus need to formulate strategies to motivate researchers to leave the manual system and opt for using ICT with training to increase research productivity.

6.12 Recommendations for Future Research

In the first consideration, it would be more interesting to examine the impact of ICTs on research productivity of university academics using real life research data rather than a survey-based data. Secondly, it will also be interesting to examine the results, when the number of participants is increased and the number of days for training is increased.

6.13 Final Word

The results of ICT adoption and ICT with training conducted by this study confirm findings from existing literature on the impact of research skills and training on research productivity. Findings from Alghanim and Alhamali (2011), Iqbal and Mahmood (2011), Migosi et al. (2011), Lerputtarak (2008), and Sharitmadari and Mahdi (2012) are unanimous in finding that research skills gained through research methods training positively affect research productivity.

The present study contributes to knowledge by adding ICTs that positively affect research productivity provided that there is proper ICT with training. This research is novel compared to the current state of research in the nexus between ICTs and research productivity. When applied, ICT adoption and ICT training for academics from the proposed model showed that it is intended to boost research productivity and allow staff members to improve their research productivity.

REFERENCES

Ables, H. Valera, J. and Ocampo, P. 1987. *Realities, reflections and reform: A study of state colleges and universities in the Philippines.* Los Banos: University Press.

Adams, J. 1963. Toward an understanding of inequity, *Journal of Abnormal and Social Psychology,* 67 (5): 422-436.

Adams, J. S. 1965. *Inequity in Social Exchange.* New York: Academic Press.

Adekunjo, O. A., Ebohon, S. and Hamzat, S. A. 2013. The impact of information and communication technology on research output of scientist in two selected Nigerian agricultural research institutes, *ARPN Journal of Science and Technology,* 3 (5): 568-573.

Adeya, N. C. 2002. *ICTs and Poverty: A Literature Review.* UNESCO, Laurent Elder, Acacia, 1-43.

Adkins, D. and Budd, J. 2006. Scholarly productivity of U.S. LIS faculty. *Library & Information Science Research,* 28 (3): 374-389.

Adogbeji, O. B. and Akporhonor, B. A. 2005. The impact of ICT (internet) on research and studies: the experience of Delta State University students in Abraka, Nigeria. *Library Hi Tech News,* 22 (10): 17-21.

Agbogo, M. A. 2010. *Effect of computer based training and testing on structured on-the-job training programs.* Master of Engineering Thesis. North-West University, South Africa.

Ajzen, I. 1985. *From Intentions to Actions: A Theory of Planned Behavior.* Heidelberg: Springer.

Ajzen, I. 1991. The theory of planned behaviour. *Organizational Behavior and Human Decision Processes,* 50 (2): 179-211.

Ajzen, I. and Fishbein, M. 1977. Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin,* 84 (5): 888-918.

Alfred, R. L. and Weissman, J. 1987. Higher education and the public trust: Improving stature in colleges and universities. ASHE-ERIC Higher Education Res. Rep. No. 6. Washington, DC: Association for the study of higher education.

Alghanim, S. A. and Alhamali, R. M. 2011. Research productivity among faculty members at medical and health schools in Saudi Arabia. *Saudi Medical Journal,* 32 (12), 1297-1303.

Ali, G., Haolader, F. A. and Khushi, M. 2013. The role of ICT to make teaching-learning effective in higher institutions of learning in Uganda. *International Journal of Innovative Research in Science, Engineering and Technology,* 2 (8): 4061-4073.

Alpert, D. 1985. Performance and paralysis: The organizational context of the American research university. *Journal of Higher Education,* 56 (3): 241-281.

Alshehri, M., Drew, S. and AlGhamdi, R. 2012. Analysis of Citizens' Acceptance for E-government Services: Applying the UTAUT Model. *Presented to IADIS International Conferences Theory and Practice in Modern Computing and Internet Applications and Research.*

Altbach, P. G. 2008. The complex roles of universities in the period of globalization. *Higher Education in the World 2008, GUI Series on the Social Commitment of Universities,* 5-13.

Alwahaishi, S. and Snášel, V. 2013. Consumers' acceptance and use of information and communications technology: A UTAUT and Flow Based Theoretical Model. *Journal of Technology Management and Innovation,* 8 (2): 61-73.

Amoako-Gyampah, K. and Salam, A. F. 2004. An extention of the technology acceptance model in an ERP implementation environment. *Journal Information and Management,* 41 (6): 731-745.

Arani, J. A. 2004. The effect of ICT-based teaching method on medical students' ESP learning. *Journal of Medical Education,* 4 (2): 81-83.

Australian Research Council. 2010. *ERA* 2010 *Evaluation Guidelines.* Excellence in Research for Australia, Australian Government, Australian Research Council, Canberra.

Azad, A. and Seyyed, F. 2007. Factors influencing faculty research productivity: Evidence from AACSB accredited schools in the GCC countries. *Journal of International Business Research,* 6 (1): 91:112.

Azeem, M. and Salfi, N. A. 2012. Usage of NVIVO software for qualitative data analysis. *Academic Research International,* 2 (1): 262-266.

Badge, J. and Scott, J. 2009. cited in Literature review: Independently published studies on Turnitin services. Available at http://turnitin.com/static/resources/documentation/turnitin/company/Turnitin_Independent_Literature_Review_hires.pdf.

Bai, L. *Enhancing research productivity of TEFL academics in China.* PhD Thesis. Queensland University of Technology, Australia.

Baldwin, J. R. and Sabourin, D. 2002. Advanced technology use and firm performance in Canadian manufacturing in the 1990s. *Industrial and Corporate Change*, 11 (4): 761- 789.

Baldwin, R. and Blackburn, R. 1981. The Academic Career as a Developmental Process: Implications for Higher Education. *The Journal of Higher Education,* 52 (6): 598-614.

Ball, D. L. 2007. What kind of mathematical work is teaching and how does it shape a core challenge for teacher education. *Paper presented at the Judith E. Jacobs lecture given at the annual meeting of the Association of Mathematics Teacher Educators.*

Bandara, W. 2006. Using NVivo as a research management tool: a case narrative. In Ruth, A. (Ed). *Quality and Impact of Qualitative Research: Proceedings of the 3rd International Conference on Qualitative Research in IT & IT in Qualitative Research,* Griffith University, Brisbane, 6-19.

Banionyté, E. and Vaškeričiene, A. 2006. Usage of electronic information in Lithuanian libraries. *Proceedings of the 4th Nordic-Balic Library Meeting Research and Innovation*, 76-83.

Barbazette, J. 2006. *Training needs assessment: Methods, tools, and techniques.* San Francisco: John Wiley & Sons.

Bass, B. M. 1990. *Bass and Stogdill's handbook of leadership: theory, research and managerial applications. 3rd ed.* New York: Free Press.

Baron, H., Henley, S., McGibbon, A. and McCarthy, T. 2002. *Motivation questionnaire manual and user's guide.* Sussex: Saville and Holdsworth Limited.

Bartol, M., Tien, M. and Matthews, G. 1998. *ManagementL A Pacific Rim Focus. 2nd ed.* Sydney: The McGraw-Hill Company.

Bastian, C. C. van., Schwaninger, A. and Michel, S. 2008. Do multi-view X-ray systems improve X-ray image interpretation in airport security screening? *Zeitschrift für* Arbeitswissenschaften, 3: 166-173.

Batane, T. 2010. Turning to turnitin to fight plagiarism among university students. *Educational Technology & Society*, 13 (2): 1-12.

Bateman, T. and Zeithaml, C. 1993. *Management Function and Strategy. 2nd ed.* Boston, Irwin, Homewood, IL.

Beech, J., Chadwick, S. and Tapp, A. 2000. Emerging trends in the use of the Internet–lessons from the football sector. *Qualitative Market Research: An International Journal*, 3 (1): 38-46.

Ben-David, J. and Zloczower, A. 1962. Universities and academic systems in modern societies. *European Journal of Sociology,* 3 (1): 45-84.

Bentley, P. 2009. *Gender differences in research productivity: A comparative analysis of Norway and Australia.* Masters Thesis. Institute for Educational Research, University of Oslo.

Bentley, P. 2012. Gender differences and factors affecting publication productivity among Australian university academics. *Journal of Sociology,* 48 (1): 85-103.

Berg, B. L. 2001. *Qualitative Research Methods for the Social Sciences (4th ed.).* Boston: Allyn & Bacon.

Bess, J. L. 1978. Anticipatory socialization of graduate students. *Research in Higher Education,* 8 (4): 289-317.

Beekhuyzen, J. 2008. Conducting a Literature Review: A puzzling Task. *Paper Presented at the AARE Annual Conference,* Brisbane, 1-10.

Bernal, J. D. 1939. *The Social Function Science.* Routledge & Kegan Paul, London, England.

Bhattacharyya, D. K. 2003. *Research Methodology.* New Delhi: Excel Books.

Bhattacherjee, A. and Sanford, C. 2009. The intention–behaviour gap in technology usage: the moderating role of attitude strength. *Behaviour & Information Technology,* 28(4): 389-401.

Bjørn, P., Fitzgerald, B. and Scopula, A. 2003. The role of social awareness in technology acceptance of groupware in virtual learning teams. In: Proceedings of *Proceedings of the 26th Information Systems Research Seminar in Scandinavia (IRIS, Haikko Manor, Finland).*

Blackburn, R.T., Bieber, J. P., Lawrence, J.H. and Trautvetter, L. 1991. Faculty at work: Focus on research, scholarship, and service. *Research in Higher Education,* 32(4): 385-413.

Blackburn, T. and Lawrence, H. 1995. *Faculty at Work: Motivation, Expectation, Satisfaction.* London: The Johns Hopkins University Press.

Bland, C. J., Center, B. A., Finstad, D. A., Risbey, K. R. and Staples, J. G. 2005. A theoretical, practical, predictive model of faculty and department research productivity, *Academic Medicine*, 80 (3): 225-237.

Bland, C. J. and Bergquist, W. H. 1997. The vitality of senior faculty members: snow on the roof-fire in the furnance. *ASHE-ERIC Higher Education Report,* 25(7). Washington, DC: George Washington University, Graduate School of Education and Human Development.

Bland, C. J. and Ruffin, M. T. 1992. Characteristics of a productive researcher environment: literature review. *Academic Medicine,* 67 (6): 385-397.

Bland, C. J. and Schmitz, C. C. 1986. Characteristics of the successful researcher and implications for faculty development, *Journal of Medical Education.* 61 (1): 22-31.

Bland C. J., Seaquist, E., Pacala, J. T., Center, B. and Finstad, D. 2002. One school's strategy to assess and improve the vitality of its faculty. *Academic Medicine.* 77 (5): 368-376.

Boeree, G. 2006. Abraham Maslow, http://webspaces.ship.edu/cgboer/maslow.html, accessed 25-04-2008, cited in Stella, O. 2008. Motivation and Work Performance: Complexities in Achieving Good Performance Outcomes; *A study focusing on motivation measures and improving workers performance in Kitgum District Local Government,* Masters thesis in Development Studies.

Boice, R. 1992. *The New Faculty Member: Supporting and Fostering Professional Development.* San Francisco: Jossey-Bass.

Boothby, D., Dufour, A. and J. Tang. 2010. Technology adoption, training and productivity performance. *Research Policy,* 39: 650-661.

Bollen, K. A. 1989. *Structural Equations with Latent Variables.* New York: Wiley.

Bringer, J. D., Johnston, L. H. and Brackenridge, C. H. 2006. Using computer assisted qualitative data analysis software to develop a grounded theory project. *Field Methods,* 18 (3): 245-266.

Brocato, J. J. 2001. *The research productivity of family medicine department faculty: a national study.* Doctoral Dissertation. Michigan State University, USA.

Buchheit, S., Collins, A. B. and Collins, D. L. 2001. Intra-institutional factors that influence accounting research productivity. *Journal of Applied Business Research (JABR),* 17 (2): 17-32.

Bush, V. 1945. *Science, The Endless Frontier: A Report to the President on a Program for Post-war Scientific Research* (Washington, DC: National Science Foundation).

Bushaway, R.W. (2003), *Managing Research.* Buckingham: Open University Press.

Butler, J. and Cantrell, R. 1989. Extrinsic reward valence and productivity of business faculty: a within and between subjects decision modelling experiment, *Psychological Reports,* 64 (2): 343-353.

Byrne, B. M. 2012. *Structural Equation Modelling with Mplus: Basic Concepts, Applications, and Programming.* Mahwah, NJ: Erlbaum.

Byrne, B. M., Baron, P. and Balev, J. 1998. The beck depression inventory: A cross-validated test of second-order factorial structure for Bulgarian adolescents. *Educational and Psychological Measurement,* 58 (2): 241-251.

Campbell, J. and Prichard, R. 1976. Motivational theory in industrial and organizational psychology'. Cited in Dunnette, M. (ed.), *Handbook of industrial organizational psychology*, 95-107.

Castleberry, A. 2014. NVivo 10 [software program]. Version 10. QSR International: 2012. *American Jouranl of Pharmaceutical Education,* 78 (1): 25.

Carayol, N. and Matt, M. 2006. Individual and collective determinants of academic scientists productivity. *Information Economics and Policy,* 18 (1), 55-72.

Carbonara, N. 2005. Information and communication technology and geographical clusters: Opportunities and spread. *Technovation*, 25 (3): 213-222.

Cardinell, C. 1981. Burnout? Mid-life crisis? Let's understand ourselves, *Contemporary Education*, 52 (2): 103-108.

Chainda, A. M. 2011. Third-year student' perceptions of the use of ICT at a teacher training college in Namibia. Stellenbosch: University of Stellenbosh.

Charney, A. and Leones, J. 1995. Impact of high technology industry on the Arizona economy. *College of Business and Public Administration and College of Agriculture,* University of Arizona, Tucson.

Cheach and Bretag. 2008 cited in Literature review: Independently published studies on Turnitin services. n. d. Available at http://turnitin.com/static/resources/documentation/turnitin/company/Turnitin_Independent_Literature_Review_hires.pdf.

Cheminais, J., Bayat, S., van der Waldt, G. and Fox, W. 1998. *The Fundamentals of Public Personnel Management.* Cape Town: Juta.

Chen, Y. N., Gupta, A. and Hoshower, L. 2006. Factors that motivate business faculty to conduct research: An expectancy theory analysis. *Journal of Education for Business,* 81 (4), 179-189.

Chinn, D. n. d. Theories on Workload and Management. *Chron.* http://smallbusiness.chron.com/theories-workload-time-management-24846.html. *Accessed on 03 May 2013*.

Churchill, G. and Iacobucci, D. 2005. *Marketing research: Methodological foundations.* 9th ed. Mason: South-Western.

Chuttur, M. 2009. Overview of the technology acceptance model: Origins, developments and future directions. Indiana University, USA. *Sprouts: Working Papers on Information Systems,* 9(37). http://sprouts.aisnet.org/9-37.

Clark, D., Bowden, S. and Corner, P. 2002. *Adoption and Implementation of E-Business in New Zealand: Comparative Empirical results for 2001 and 2002.* Hamilton: Waikato University.

Clark, B. R. 1987. *The academic life: Small worlds, different worlds.* Princeton, N. J.: Carnegie Foundation for the Advancement of Teaching.

Clark, S. M. and Corcoran, M. 1986. Perspectives on the professional socialization of women faculty: A case of accumulative disadvantage? *The Journal of Higher Education,* 57: 20-43.

Clark, S. M. and Lewis, D. R. 1985. *Faculty Vitality and Institutional Productivity: Critical Perspectives for Higher Education.* ERIC.

Cole, J. R. and Cole, S. 1972. The Ortega hypothesis. *Science,* 178 (4059): 368-375.

Cole, J. R., and H. Zuckerman. 1984. The Productivity Puzzle: Persistence and Change in Patterns of Publication of Men and Women Scientists. Pages 217-256 in P. Maehr and M. W. Steinkamp, editors. Advances in motivation and achieve ment. JAI Press, Greenwich, Connecticut, USA.

Cole, S. and Cole, J. R. 1973. Scientific output and recognition: A study in the operation of the reward system in science. *American Sociological Review,* 32 (3): 377-390.

Cooke, R. and Sheeran, P. 2004. Moderation of cognition-intention and cognition-behaviour relations: A meta-analysis of properties of variables from the theory of planned behaviour. *British Journal of Social Psychology,* 43 (2): 159-186.

Cooper, D. R. and Schindler, P. S. 2001. *Business Research Methods.* Seventh Edition. Boston: McGraw-Hill.

Cornell, J. A. and Berger, R. D. 1987. Factors that influence the value of the coefficient of determination in simple linear and nonlinear regression models. *Phytopathology,* 77 (1): 63-70.

Cosier, R. and Dalton, D. 1983. Equity theory and time: a reformation, *Academy of Management Review*, 8 (2): 311-319.

Crede, A. and Manell, R. 1998. *ICTs in Development Countries: The Importance for Sustainable Development (Booklet I).* International Institute for Communication and Development, The Hague.

Creswell. 1986. *Measuring Faculty Research Performance.* San Francisco: Jossey-Bass Inc.

Cronbach, L. 1951. Coefficient alpha and the internal structure of tests. *Psychometrika,* 16(3): 297-334.

Crisp, G. T. 2007. Staff attitudes to dealing with plagiarism issues: Perspectives from one Australian University. *International Journal for Educational Integrity,* 3 (1): 3-15.

Cunningham, E. G. and Wang, W. C. 2005. Using AMOS graphics to enhance the understanding and communication of multiple regression, *Paper presented at ISI/IASE Conference on Assessing Student Learning in Statistics.* Guimaraes, Portugal, 1-8.

Darke, K. and Dahl, D. 2003. Fairness and discounts: the subjective value of a bargain, *Journal of Consumer Psychology,* 13 (3): 328-338.

Davis, F. D. 1985. *A technology acceptance model for empirically testing new end-user information systems: theory and results.* PhD Thesis. Massachusetts Institute of Technology, United Sates of America.

Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly,* 13 (3): 319-340.

Davis, F. D. 1993. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International Journal of Man-machine Studies,* 38 (3): 475-487.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. 1989. User acceptance of computer technology: a comparison of two theoretical models, *Management Science*, 35 (8): 982-1003.

Davis, K. 1957. *Human Relations in Business.* New York: McGraw-Hill Book Company.

Davis, M., and Carroll, J. 2009. Formative feedback within plagiarism education: Is there a role for text-matching software? *International Journal for Educational Integrity,* 5 (2): 58-70.

De Vos, A. S., Strydom, H., Fouche, C. B. and Delport, C. S. L. 2001. *Research at Grass Roots: For the Social Sciences and Human Service Profession.* Pretoria: Van Schaik Publisher.

Dede, C. 1986. A review and synthesis of recent research in intelligent computer-assisted instruction. *International Journal of Man-Machine studies*, 24 (4): 329-353.

Dellinger, A. B. and Leech, N. L. 2007. Toward a unified validation framework in mixed methods research. *Journal of Mixed Methods Research*, 1 (4): 309-332.

Denzin, N. K. and Lincoln, Y. S. 1998. *Strategies of Qualitative Inquiry*. California, Thousand Oaks, CA: Sage.

Department of Education and ICSSR. 2014. Research methodology and use of SPSS package. *21, 22, & 23 March, Three, National Workshop.*

Di Gregario, S. 2000. Using NVivo for your literature review. Strategies in qualitative research: issues and results from analysis using QSR NVivo and NUD*IST. *Conference at the institute of Education,* London 29-30 September.

Diamond, R. M. 1993. Changing priorities in the faculty reward system. *New Directions for Higher Education,* 81: 5-12.

Dossett, D. L. and Hulvershorn, P. 1983. Increasing technical training efficiency: Peer training via computer-assisted instruction. *Journal of Applied Psychology*, 68 (4), 552-558.

Downie, J. and Health, A. 1997. *Employee Satisfaction Action Campaign*. Oxford: Oxford University Press.

Dresang, D. L. 2009. *Personnel Management in Government Agencies and Non-profit Organisations. 5th ed.* New York: Pearson Education Inc.

Dundar, H. and Lewis, D. 1998. Determinants of research productivity in higher education. *Research in Higher Education*, 39 (6): 607-631.

Edem, M. 2008. Use of ICT among librarians in selected Nigerian universities libraries in South-South Zone. Communicate: *Journal of Library and Information Science* 10 (2): 47-49.

Engel, J. F., Blackwell, R. D. and Miniard, P. W. 1995. *Consumer Behaviour*. Fort Worth, TX: Dryden Press.

Fairweather, J. S. 1993. Faculty reward structures: Toward institutional and professional homogenization. *Research in Higher Education*, 34 (5): 603-623.

Fairweather, J. S. and Rhoads, R. A. 1995. Teaching and the faculty role: Enhancing the commitment to instruction in American colleges and universities. *Educational Evaluation and Policy Analysis*, 17 (2): 179-194.

Ferrán-Urdaneta. C. 2001. EndNote: Keeping Track of References. *Seventh Americas Conference on Information Systems*, 2301-2305.

Ferreira, M. 2005. Research on ageing in Africa: What do we have, not have and should we have? *Generations Review,* 15 (2): 32-35.

Field, A. 2005. *Discovering statistics using SPSS for Windows: Advanced techniques for beginners (Introducing Statistical Methods series).* SAGE Publications, Thousand Oaks, California, ISBN.

Fishbein, M. and Ajzen, I. 1975. *Belief, Attitude, Intention, and Behaviour: An Introduction on Theory and Research.* Reading, MA: Addison-Wesley.

Fitzgibbons, M. and Meert, D. 2010. Are bibliographic management software search interfaces reliable?: A comparison between search results obtained using database interfaces and the EndNote online search function. *The Journal of Academic Librarianship,* 36 (2): 144-150.

Foundation, E. C. D. L. 2011. ICT Skills Training and Certification Programmes Substantially Improve Employee Productivity and Offer Considerable Savings to Employers and National Economics. Available at http://www.ecdl.org/costofdigitalignorance. Accessed on 2nd May 2013.

Fox, M. F. 1983. Publication productivity among scientists: a critical review. *Social Studies of Science,* 13 (2): 285-305.

Fox, M. F., Mary F. and Faver, C. A. 1981. Achievement and aspiration: patterns among male and female academic career aspirants. *Sociology of Work and Occupations,* 8: 439-463.

Garvin, D. A. 1980. *The Economics of University Behavior.* New York: Academic Press.

Geoffrey, O. 2011. *Effects of Information and Communication Technology on students' learning: A case of Gulu University.* Master of Education. Makerere University.

Giesbrecht, N. 1996. *Strategies for developing and delivering effective introductory-level statistics and methodology courses.* Alberta, Canada. (ERIC Document Reproduction Service No. ED393668).

Goodman, T. A. 1986. Using the microcomputer to teach statistics. *The Mathematics Teacher,* 79 (3): 210-215.

Gorman, A. M. and Scruggs, M. M. 1984. Characteristics of home economics researchers. *Home Economics Research Journal*, 12 (4): 461-469.

Gradon, E. E. and Mykytyn. P. P. 2004. Theory-based instrumentation to measure the intention to use electronic commerce in small and medium sized business, *The Journal of Computer Information Systems,* 44 (3): 44-57.

Gratz, Z. S., Volpe, G. D. and Kind, B. M. 1993. Attitudes and achievement in introductory psychological statistics classes: Traditional versus computer supported instruction. *Proceeding of the Annual Conference on Undergraduate Teaching of Psychology*, Ellenville, Ney York, (ERIC Document Reproduction Service No. 365405).

Greene, C. N. 1974. The path-goal theory of leadership: a replication and analysis of causality. *Proceedings, Academy of Management, Seattle,* 1: 47.

Green, R. G. and Baskind, F. R. 2007. The second decade of the faculty publication project: Journal article publications and the importance of faculty scholarship. *Journal of Social Work Education,* 43(2): 281-295.

Greenberg, J. 1999. *Managing Behaviour in Organization. 2nd ed.* New Jersey: Prentice Hall.

Griffiths, V., Thompson, S. and L. Hryniewicz. 2010. Developing a research profile: Mentoring and support for teacher educators. *Professional Development in Education,* 36 (1): 245-262.

Hadebe, T. P. 2001. *Relationship between motivation and job satisfaction of employees at Vista Information Services.* M. A. Dissertation. Rand Afrikaans University, Johannesburg.

Hadjinicola, G. C. and Soteriou, A. C. 2006. Factors affecting research productivity of production and operations management groups: an empirical study. *Journal of Applied Mathematics and Decision Sciences,* 1-16.

Hagstrom, W. O. 1965. *The Scientific Community.* New York: Basic Books.

Hair, J. F., Black, W. C., Babin, B. J. and Anderson, R. E. 2010. *Multivariate data analysis* (7th ed.). Englewood Cliffs: Prentice Hall.

Hardmeier, D., Hofer, F. and Schwaninger, A. 2006. Increased detection performance in airport security screening using the x-ray ort as pre-employment assessment tool. *Proceedings of the 2nd International Conference on Research in Air Transportation.* ICRAT 2006, Belgrade, Serbia and Montenegro, June 24-28, 393-397.

Hardmeier, D., Jaeger, M., Schibli, R. and Schwaninger, A. 2010. Effectiveness of computer-based training for improving detection of improvised explosive devices by screeners is highly dependent on the types of IEDS used during training. *IEEE International Carnahan Conference on Security Technology (ICCST).*

Harris, G. T. and Kaine, G. 1994. The determinants of research performance: A study of Australian university economists, *Higher Education*, 27 (2): 191-201.

Harrison, M., Summerton, S. and Peters, K. 2005. EndNote training for academic staff and students: The experience of the Manchester metropolitan University Library. *New Review of Academic Librarianship*, 11 (1): 31-40.

Hedjazi, Y. and Behravan, J. 2011. Study of factors influencing research productivity of agriculture faculty members in Iran. *Higher Education*, 62 (5): 635-647.

Helm, S., Eggert, A., and Garnefeld, I. 2010. *Modelling the Impact of Corporate Reputation on Customer Satisfaction and Loyalty Using PLS. In Vinzi, V. E., W. W. Chin, W. W., Henseler, J. and Wang, H. (Eds.),* Handbook of Partial Least Squares. Heidelberg: Springer.

Heneman, H. and Schwab, D. 1972. Evaluation of research on expectancy theory predictions of employee performance, *Psychological-Bulletin*, 78 (1): 1-9.

Hensley, M. K. 2011. Citation management software: Features and futures. *Reference and User Services Quarterly*, 50 (3): 204-208.

Henseler, J., Ringle, C. M. and Sinkovics, R. R. 2009. The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, 20: 277-319.

Hoerl, R., Hahn, G. and Doganaksoy, N. 1997. Comment on new pedagogy and new content: The case of statistics. *International Statistical Review*, 65 (2): 147-153.

Hoover, R. and Koerber, L. 2011. Using NVivo to answer the challenges of qualitative research in professional communication: Benefits and best practices tutorial, *IEEE Transaction on Professional Communication*, 54 (1): 68-82.

Houcine, S. 2011. *The effect of ICT on Learning/Teaching in a Foreign Language.* Retrieved September, 1: 2012.

House, R. J. 1971. A path-goal theory of leader effectiveness. *Administrative Science Quarterly*, 16 (3), 321-338.

Hu, Q. and Gill, T. G. 2000. IS faculty research productivity: Influential factors and implications. *Information Resources Management Journal (IRMJ)*, 13 (2): 15-25.

Hughes, C. A. 1998. Factors related to faculty publishing productivity. *Proceedings of the IATUL Conference*, Paper 14, http://docs.lib.purdue.edu/iatul/1998/papers/14.

Inglis, L. 1999. *Motives and Performance: Why Academics Research.* Department of Management, Monash University, Working Paper 01/99.

In'nami, Y. and Koizumi, R. 2012. Factor structure of the revised TOEIC ® test: A multiple-sample analysis. *Language Testing*, 29 (1): 131-152.

Iqbal, M. Z. and Mahmood, A. 2011. Factors related to low research productivity at higher education level. *Asian Social Science,* 7 (2): 188-193.

Isfandyari-Moghaddam, A., Hasanzadeh, M. and Ghayoori, Z. 2012. A study of factors affecting research productivity of Iranian women in ISI. *Scientometrics,* 91 (1): 159-172.

Islam, M. S. and Fouji, M. H. 2010. *The impact of ICT on students' performance: A case study of ASA University Bangladesh.*

Ito, J. K. and Brotheridge, C. M. 2007. Predicting individual research productivity: More than a question of time. *The Canadian Journal of Higher Education,* 37 (1): 1-25.

Jaunch, L. R. and Glueck, W. 1975. Evaluation of university professors' performance. *Management Science*, 22 (1): 66-75.

Jauch, L., Glueck, W. and Osborn, R. 1978. Organizational loyalty, professional commitment, and academic research productivity. *Academy of Management Journal*, 21 (1): 84-92.

Jensen, K. and Folley, S. 2011. *Teaching with Technology in Higher Education: Exploring how lecturers at the University of Huddersfield use technology in teaching.* Teaching and Learning Institute Working Paper No. 1, University of Huddersfield, UK.

Jocoy, C. and DiBiase, D. 2006. Plagiarism by adult learners online: a case study in detection and remediation. *The International Review of Research in Open and Distance Learning,* 7 (1): 1-15.

Johnson, B. and Christen, L. 2000. *Education research: Qualitative and quantitive research approach.* Boston, London: Allyn and Bacon.

Jones, K. O. 2008. Practical issues for academics using the turnitin plagiarism detection software. *Proceedings of International Conference on Computer Systems and Technology,* Gabrovo, Bulgaria.

Jung, J. 2012. Faculty research productivity in Hong Kong across academic discipline. *Higher Education Studies*, 2 (4): 1-13.

Kanfer, R. and Ackerman, P. 1989. Motivation and cognitive abilities: an integrative/aptitude-treatment interaction approach to skill acquisition. *Journal of Applied Psychology,* 74 (4): 657-690.

Karaaslan, I. A. 2013. The effect of banking personnel's access to e-learning opportunities on their professional achievement. *The Turkish Online Journal of Educational Technology,* 12 (2): 269-280.

Katz, D. 1964. The motivational basis of organizational behaviour. *Behavioural Science,* 9 (2): 131-146.

Kaufman R. R. and Chevan, J. 2011. The gender gap in peer-reviewed publications by physical therapy faculty members: A productivity puzzle. *Physical Therapy.* 91: 122-131.

Kelly, M. E. and Warmbrod, J. R. 1986. Developing and maintaining productive researchers in agricultural education. *Journal of the American Association of Teacher Educators in Agriculture,* 27 (1): 27-32.

Khine, M. S. 2013. *Application of structural equation modelling in educational research and practice,* Netherlands: Sense Publishers.

Kieffer, M. J. 2011. Converging trajectories: Reading growth in language minority learners and their classmates, kindergarten to grade 8. *American Educational Research Journal,* 48 (5): 1187-1225.

Kirkup, G. and Kirkwood, A. 2005. Information and Communication Technologies (ICT) in higher education teaching-a tale of gradualism rather than revolution. *Learning, Media and Technology,* 30 (2): 185-199.

Knorr, K., Mittermeier, R., Aichholzer, G. and Waller, G. 1979. *Individual publication productivity as a social position effect in academic and industrial research units. In: Andrews. F. (Ed.).* The Effectiveness of Research Groups in Six Countries. Cambridge University Press, 55-94.

Kock, N. 2010. Using WarpPLS in e-collaboration studies: An overview of five main analysis steps. *International Journal of e-Collaboration,* 6(4), 1-11.

Koller, S. M., Hardmeier, D., Michel, S. and Schwaninger, A. 2008. Investigating training, transfer, and viewpoint effects resulting from recurrent CBT of x-ray image interpretation. *Journal of Transportation Security,* 1 (2): 81-106.

Konrad, A. M. and Pfeffer, J. 1990. Do you get what you deserve? Factors affecting the relationship between productivity and pay. *Administrative Science Quarterly*, 35 (2): 258-285.

Korman, A. K. 1966. Consideration, initiating structure and organizational criteria-a review. *Personnel Psychology*, 19 (4), 349-361.

Kotrlik, J. Bartlett, J. Higgins, C. and Williams, H. 2002. Factors associated with research productivity of agricultural educational faculty. *Journal of Agricultural Education,* 43 (3): 1-10.

Krueger, R. A. 1998. *Analyzing and Reporting Focus Group Results.* California, Thousand Oaks, CA: Sage.

Kühnel, S. 2001. The didactical power of structural equation modelling. In Cudeck, R. S. du Toit, S. du. and Sörbom, D. (Eds.), *Structural Equation Modeling: Present and Future, A Festschrift in honor of Karl J*öreskog. Chicago: Scientific Software International, Inc.

Kyvik, S. 2003. Changing trends in publishing behaviour among university faculty, 1980-2000. *Scientometrics*, 58 (1): 35-48.

Lamari, M. and Jacob, J. L. 2011. Factors associated with research productivity of education faculty: An econometric analysis of the publication performance within Quebec Universities, 2001-2008. *In Proceedings 3rd International Conference on Education and New Learning Technologies,* Edulearn11 Proceedings, Barcelona, Spain.

Landau, S. and Everitt, B. S. 2004. *A Handbook of Statistical Analyses using SPSS.* Chapman and Hall/CRC Press LLC.

Landy, F. and Trumbo, D. 1980. *The Psychology of Work Behaviour.* Dorsey Press, Homewood, IL.

Learning SPSS: Data and EDA: *An introduction to SPSS with emphasis on EDA.* Available at http://www.stat.cmu.edu/~hseltman/309/Book/chapter5.pdf.

Lertputtarak. S. 2008. *An investigation of factors related to research productivity in a public university in Thailand: A case study.* PhD Thesis. Victoria University, Melbourne, Australia.

Levin, S. G. and Stephan, P. E. 1989. Age and research productivity of academic scientists. *Research in Higher Education*, 30 (5): 531-549.

Levitan, A. S. and Ray, R. 1992. Personal and institutional characteristics affecting research productivity of academic accountants. *Journal of Education for Business,* 67 (6): 335-341.

Liang, G. F., T.Lin, J., Hwang, S. L., Wang, E. M. Y., Patterson, P. and Li, J. F. 2009. *Web-based Training System for Improving Aviation Maintenance Performance.* J.A. Jacko. Human-Computer Interaction, Part IV, HCII 2009, LNCS 5613, 731-740.

Long, J. S. 1978. Productivity and academic positions in the scientific career. *American Sociological Review,* 43 (6): 889-908.

Magloff, L. and Media, D. n. d. Herzberg and Taylor's Theories of Motivation. Available at www.smallbusiness.chron.com/herzberg-taylors-theories-motivate-704.html. Accessed on 23 September 2014.

Maree, K. 2007. *First steps in Research.* Pretoria: Van Schaik Publishers.

Marshall, B., Mills, R. and Olsen, D. 2011. The role of end-user training in technology acceptance. *Review of Business Information Systems (RBIS),* 12 (2): 1-8.

Marshall, P. L. 1994. Four misconceptions about multicultural education that impede understanding. *Action in Teacher Education*, 16 (3): 19-27.

Marsh, H. W. and Yeung, A. S. 1998. Longitudinal structural equation models of academic self-concept and achievement: Gender differences in the development of math and English constructs. *American Educational Research Journal*, 35 (4): 705-738.

Maslow, A. H. 1943. A theory of human motivation. *Psychological review*, 50 (4): 370.

Masrom, M. and Hussein, R. 2008. *User Acceptance of Information Technology: Understanding Theories and Models.* Kuala Lumpur, Malaysia: Venton Publishing.

McCall, B. P. 1994. Testing the proportional hazards assumption in the presence of unmeasured heterogeneity. *Journal of Applied Econometrics,* 9 (3): 321-334.

McCarley, J. S., Kramer, A. F., Wickens, C. D., Vidoni, E. D. and Boot. W. R. 2004. Visual skills in airport screening, *Psychological Science,* 15 (5): 302-306.

McDaniel, C. and Gates, R. 2002. *Marketing Research: The Impact of the Internet.* John Wiley and Sons.

McGill, M. M. and Settle, A. 2012. Identifying effects of institutional resources and support on computing faculty research productivity, tenure, and promotion. *International Journal of Doctoral Studies*, 7*:* 167-198.

McGrath, E. J. 1949. The Goals of Higher Education. *The Journal of Higher Education,* 20 (4): 171-180.

Merriam, S. B. 2001. *Qualitative Research and Case Study Applications in Education (2nd ed.).* San Francisco: Jossey-Bass Publishers.

Merton, R. 1957. *Social Theory and Social Structure (Rev. ed.).* Free Press: New York, US.

Merton, R. K. 1968. The Matthew effect in science. *Science*, 159 (3810): 56-63.

Merton, R. K. 1973. *The Sociology of Science: Theoretical and Empirical Investigations.* University of Chicago press.

Michel, S., Koller, S. M., de Ruiter, J. C., Moerland, R., Hogervorst, M. and Schwaninger, A. 2007. Computer-based training increases efficiency in X-ray image interpretation by aviation security screeners. *IEEE,* 1-6.

Migosi, J. A., Migiro, S. O. and Ogula, P. 2011. Factors that motivate business faculty in Kenya to conduct research, *International Journal of Educational Administration and Policy Studies,* 4 (10): 198-204.

Miles, M. B. and Hueberman, A. M. 1994. *Qualitative Data Analysis: An Expanded Sourcebook (2nd ed.).* Thousand Oaks, CA: Sage.

Mills. J. D. 2003. SPSS textbooks: A review for teachers. *Statistics Education Research Journal,* 2 (2), 59-70.

Minishi-Majanja, M. K. and Kiplang'at, J. 2005. The diffusion of innovations theory as a theoretical framework in library and information science research. *South African Journal of Libraries and Information Science,* 71 (3): 211-224.

Mkomange, W. C., Chukwuekezie, S. C., Zergani, S. and Ajagbe, M. A. 2013. The impact of implementing the use of ICT in mathematical problem solving in Malaysian universities. *Interdisciplinary Journal of Contemporary Research in Business,* 4 (10): 373-383.

Mojica, L. A. 1988. *Research productivity and teaching effectiveness in some state universities and colleges in Region IV, Philippines*. PhD Dissertation. University of the Philippines, Los Banos.

Montesinos, P., Carot, J. M., Martinez, J. M. and Mora, F. 2008. Third mission ranking for world class universities: Beyond teaching and research. *Higher Education in Europe*, 33 (2-3): 259-271.

Moore, D. S. 1997. New pedagogy and new content: The case of statistics. *International Statistical Review,* 65 (2): 123-165.

Moore, D. S. 1997. Comment on new pedagogy and new content: The case of statistics. *International Statistical Review, 65* (2):137-141.

Morse, J. M. and Richards, L. 2002. *Readme First.* Thousand Oaks, CA: Sage.

Mubashar, F. and Aslam, K. M. 2011. Impact of training and feedback on employee performance. *Far East Journal of Psychology and Business,* 23-33.

Nadler, D. A. and Lawler, E. E. 1977. *Motivation: A Diagnostic Approach.* In Hackman, J. R., Lawler, E. E. and Porter, L. W. (Eds.), *Perspectives on behavior in organizations* (pp. 26-34). New York, NY: McGraw-Hill.

National Universities Commission (NUC), 2005. Nigeria.

Navarra, M. L. 1989. *Teaching effectiveness, research productivity and extension performance in selected state colleges*. Dissertation. University of the Philippines, Los Banos.

Nederhof, A. J. and Noyons, E. C. M. 1992. International comparison of departments' research performance in the humanities. *Journal of the American Society for Information Science,* 43 (3): 249-256.

North, D., Zewotir, T. and Murray, M. 2011. Demographic and academic factors affecting research productivity at the University of KwaZulu-Natal. *South African Journal of Higher Education,* 25 (7): 1416-1428.

Obiri-Yeboah, K., Fosu, C. and Kyere-Djan, R. 2013. Exploring the trend of ICT adoption in tertiary institutions in Ghana: A case study at Kwame Nkrumah University of Science and Technology (KNUST). *In: Proceedings of Information and Knowledge Management*, 44-52.

Ockey, G. 2011. Self-consciousness and assertiveness as explanatory variables of L2 oral ability: A latent variable approach. *Language Learning,* 61 (3): 968-989.

Offermann, L. and Growing M. 1990. Organizations of the future: changes and challenges, *American Psychologist,* 45 (2): 95-108.

Ogbogu, C. O. 2009. An analysis of female research productivity in Nigerian universities. *Journal of Higher Education Policy and Management,* 31 (1): 17-22.

O'Hara, M., Carter, C. and Manassee, G. 2007. *Getting it write: a multi-disciplinary approach to student academic. Cited in Literature review: Independently published studies on Turnitin services.* Available at http://turnitin.com/static/resources/documentation/turnitin/company/Turnitin_Independent_Literature_Review_hires.pdf.

Okiki, O. C and Iyabo, M. 2013. Impact of information literacy skills on academic staff research productivity in Nigerian Federal Universities. *Information and Knowledge Management,* 3 (2): 9-18.

O'Meara, K. A. 2005. Encouraging multiple forms of scholarship in faculty reward systems: does it make a difference? *Research in Higher Education,* 46 (5): 479-510.

Oshlyansky, L., Cairns, P., and Thimbleby, H. 2007. Validating the Unified Theory of Acceptance and Use of Technology (UTAUT) tool cross-culturally. In Ramduny-Ellis, D. & Rachovides, D (editors). *Proceedings of the 21st BCS HCI Group Conference.* 3-7 September, 2007. Lancaster University, UK.

Oxford University, 1995. *Oxford Advanced Learner's Dictionary. 7th edn.* New York: Oxford University Press.

Oye, N. 2012. The role of ICT in education: Focus on university undergraduates taking mathematics as a course. *International Journal of Advanced Computer Science and Application,* 3 (2): 136-143.

Pahnila, S. and Warsta, J., 2010. Online shopping viewed from a habit and value perspective. *Behaviour & Information Technology,* 29 (6): 621-632.

Parsons, H. M. 1974. What happened at Hawthorne?: New evidence suggests the Hawthorne effect resulted from operant reinforcement contigencies. *Science,* 183 (4128): 922-932.

Paswan, A. K. and Young, J. A. 2002. Student evaluation of instructor: A nomological investigation using structural equation modelling, *Journal of Marketing Education,* 24 (3): 193-202.

Patton, M. Q. 2002. *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Paul, S., Stein, F., Ottenbacher, K. J. and Liu, Y. 2002. The role of mentoring on research productivity among occupational therapy faculty. *Occupational Therapy International,* 9 (1): 24-40.

Pomfret, R. and Wang, L. C. 2003. Evaluating the research output of Australian universities economics department, *Australian Economics Papers,* 42 (4): 418-441.

Posner, M. I., Goldsmith, R. and Welton, K. E. 1967. Perceived distance and the classification of distorted patterns. *Journal of Experimental Psychology,* 73 (1): 28-38.

Posner, M. I. and Keele, S. W. 1968. On the genesis of abstract ideas. *Journal of Experimental Psychology,* 77 (3Pt. 1): 353-363.

Pramod, G. K. 2012. The impact of training and development on performance of officers of select public sector banks for sustainable human development: A study, *OIDA International Journal of Sustainable Development,* 5 (7): 87-96.

Pratt, M., Margaritis, D. and Coy, D. 1999. Developing a research culture in a university faculty. *Journal of Higher Education Policy and Management,* 21 (1): 43-55.

Quaddus, M. and Intrapairot, A. 2008. System dynamics modelling of Information and Communication Technologies: Policy studies in the banking industry in Thailand, 1-11.

Quimbo, M. A. T. and Sulabo, E. C. 2013. Research productivity and its policy implications in higher education institutions, *Studies in Higher Education,* 39 (10), 1955-1971.

Quinn, J., Doorley, T. and Paquette, P. 1990. Beyond products: service-bared strategy, *Harvard Business Review,* 68: 58-63.

Quine, L. and Rubin, R. 1997. Attitude, subjective norm, and perceived behavioural control as predictors of women's intentions to take hormone replacement therapy. *British Journal of Health Psychology*, 2 (3): 199-216.

Ramsden, P. 1994. Describing and explaining research productivity. *Higher Education*, 28 (2): 207-226.

Rashid, M. 2001. *Educational research*. Islamabad, Pakistan: National Book Foundation.

Rokibul, K. M., Maruf, U. M. and Manir, C. M. 2013. Impact of human resources training on the performances of banks-an empirical study. *China-USA Business Review,* 12 (5): 524-531.

Reynolds, A. 1992. Charting the changes in junior faculty: Relationships among socialization, acculturation, and gender. *Journal of Higher Education,* 63 (6): 637-652.

Richards, L. 1999. Data Alive! The Thinking Behind NVivo. *Qualitative Health Research*, 9 (3): 412-428.

Roach, S. 1991. Service under siege: the restructuring imperative, *Harvard Business Review,* 69 (5): 82-91.

Roberto, K. and Jean, P. 1986. Friendships of older men and women: exchange patterns and satisfaction, *Psychology and Aging,* 1 (2): 103-109.

Robinson, R. P. and Doverspike, D. 2006. Factors predicting the choice of an online versus a traditional course. *Computers in Teaching,* 33 (1): 64-68.

Rogers, E. M. 1995. *Diffusion of Innovations. 4th ed.* New York: The Free Press.

Rogers, E. M. 1999. Diffusion of Innovations. 1995. *Woerkom van C, Kuiper D, Bos E. Communicatie en innovatie, een inleiding. Alphen aan den Rijn: Samsom*: 2.

Rogers, E. M. 2003. *Diffusion of Innovations. 5th ed.* New York: Free Press.

Russell, D. M. and Hoag, A. M. 2004. People and information technology in the supply chain: social and organizational influences on adoption. *International Journal of Physical Distribution & Logistics Management*, 34 (2): 102-122.

Sari, A. 2012. Impact of determinants on student performance towards information communication technology in higher education. *International Journal of Learning and Development*, 2 (2): 18-30.

Saari, S. 2006. Productivity. theory and measurement in business. *In: Proceedings of Espoo, Finland: European Productivity Conference.*

Saenz, T., Marcoulides, G. A., Junn, E. and R. Young, R. 1999. The relationship between college experience and academic performance among minority students. *International Journal of Educational Management,* 13 (4): 199-207.

Safferstone, M. J. 2007. Organisational leadership: classic works and contemporary perspectives. *Academic Leadership Journal,* 5 (1): 28-44.

Salkind, N. J. 1997. *Exploring Research. 3rd edition.* New York: Prentice Hall.

Samuel, O. O., Suleiman, A. A. and Emmanuel, O. C. 2012. Training and development, a vital tool for organizational effectiveness. (A case study of sterling bank Nigeria Plc). *IOSR Journal of Business and Management (IOSR-JBM),* 6 (2): 48-57.

Santo, J. R. A. 1999. Cronbach's Alpha: A tool for assessing the reliability scales. *The Journal of Extension*, 37 (2): 1.

Saunders, M. Lewis, P. Thornhill, A. 2003. *Research Methods for Business Students.* Fifth edition, UK: Prentice Hall.

Saunders, M., Lewis, P. and Thornhill, A. 2009. *Research Methods for Business Students.* 3rd ed. UK: Prentice Hall.

Scheaffer, R. L. 1997. Comment on new pedagogy and new content: The case of statistics by D. Moore. *International Statistical Review,* 65(2): 156-158.

Schoonen, R., Gelderen, A. van., Glopper, K. de., Hulstijn, J., Simis, A., Snellings, P. and Stevenson, M. 2003. First language and second language writing: The role of linguistic knowledge, speed of processing, and metacognitive knowledge. *Language Learning*, 53 (1): 165-202.

Schwaninger, A. and Hoffer, F. 2004. Evaluation of CBT for increasing threat detection performance in x-ray screening. Inn: Morgan, K., Spector, M. J. (ed). *The Internet Society Advances in Learning, Commerce and Security,* 1: 147-156.

Schwaninger, A., Hardmeier, D. and Hofer, F. 2005. Aviation security screeners visual abilities and visual knowledge measurement. *IEEE Aerospace and Electronic Systems,* 20 (6): 29-35.

Schwaninger, A., Hofer, F. and Wetter, O. E. 2007. Adaptive computer-based training increases on the job performance of x-ray screeners. *Proceedings of the 41st Carnahan Conference on Security Technology,* Ottawa, October 8-11, 117-124.

Sekaran, U. 2003. *Research Methods for Business: A skill-bulding approach.* 4th ed. New York: John Willey and Son, Inc.

Sekaran, U. and Bougie, R. 2009. *Research Methods for Business, A skill building approach. Fifth Edition.* United Kingdom: John Wiley & Sons Ltd.

Shariatmadari, M. and Mahdi, S. 2012. Barriers to research productivity in Islamic Azad University: exploring faculty members perception. *Indian Journal of Science and Technology,* 5 (5): 2765-2769.

Shaywitz, S. 2008. *Overcoming Dyslexia: A New and Complete Science-based Program for Reading Problems at Any Level.* New York: Random House LLC.

Sheridan, J., Alany, R. and Brake, D. 2005. Pharmacy students' views and experiences of Turnitin—an online tool for detecting academic dishonesty. *Pharmacy Education,* 5(3/4): 241-250.

Shin, S. K. 2005. Did they take the same test? Examinee language proficiency and the structure of language tests. *Language Testing,* 22 (1): 31-57.

Silverman, D. 2001. *Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction (2nd ed.).* Thousand Oaks, CA: Sage.

Silverman, S. K. 2010. What is diversity? An inquiry into preservice teacher beliefs. *American Educational Research Journal,* 47 (2): 292-329.

Sleeman, D. 1984. An attempt to understand students' understanding of basic algebra. *Cognitive Science,* 8 (4): 387-412.

Smeby, J. and Try, S. 2005. Departmental contexts and faculty research activity in Norway. *Research in Higher Education,* 46 (6): 593-619.

Smith, J. D., Redford, J. S., Washburn, D. A. and Taglialatela, L. A. 2005. Specific-Token Effects in screening tasks: Possible implications for aviation security. *Journal of Experimental Psychology: Learning, Memory, and Cognition,* 31 (1): 1171-1185.

Smith, M., Abdullah, Z. and Abdul Razak, R. 2008. The diffusion of technological and management accounting innovation: Malaysian evidence. *Asian Review of Accounting,* 16 (3): 197-218.

Soliman, I. and Soliman, H. 1997. Academic workload and quality. *Assessment and Evaluation in Higher Education*, 22 (2): 135-157.

Spiegel, M. R. 1972. *Schaum's outline of theory and problems of statistics*. New-York, USA: McGraw-Hill.

StatisticsSolutions: Advancement Through Clarity. n. d Available at: www.statisticssolutions.com/amos/ Accessed on 14th September 2014.

Stogdill, R. M. and Coons, A. E. 1957. *Leader Behaviour: Its Description and Measurement.* Columbus OH: Ohio State University, Bureau of Business Research.

Stone, T. H., Jawahar, I. M. and Kisamore, J. L. 2010. Predicting academic misconduct intentions and behaviour using the theory of planned behaviour and personality. *Basic and Applied Social Psychology,* 32 (1): 35-45.

Storer, N. W. 1966. *The Social System of Science.* New York: Holt, Rinehart & Winston.

Sundaravej, T. 2010. Empirical validation of Unified Theory of Acceptance and Use of Technology Model. *Journal of Global Information Technology Management*, 13 (1): 5-27.

Sulo, T., Kendagor, R., Kosgei, D., Tuitoek, D. and Chelangat, S. 2012. Factors affecting research productivity in public universities of Kenya: the case of Moi University, Eldoret. *Journal of Emerging Trends in Economics and Management Sciences,* 3 (5): 475-484.

Taylor, F. W. 1911. *The Principles of Scientific Management.* New York, 202.

Taylor, S. and Todd, P. A. 1995. Understanding information technology usage: A test of competing models. *Information Systems Research*, 6 (4): 144-176.

Taylor, S. J. and R. Bogdan, R. 1998. *Introduction to Qualitative Research Methods (3rd ed.).* New York: John Wiley & Sons.

Tein, F. and Blackburn, T. 1996. Faculty rank systems, research motivation and faculty research productivity measure refinement and theory testing. *Journal of Higher Education,* 67 (1): 2-22.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M. and Lauro, C. 2005. PLS path modelling. *Computational Statistics and Data Analysis*, 48 (1): 159–205.

Teodorescu, D. 2000. Correlates of faculty publication productivity: A cross-national analysis. *Higher Education*, 39 (2): 201-222.

Tesch. R. 1990. *Qualitative Research: Analysis Types and Software Tools.* New York: The Falmer Press.

Thomas, T. D., Singh, L. and Gaffar, K. 2013. The utility of the UTAUT model in explaining mobile learning adoption in higher education in Guyana. *International Journal of Education and Development using ICT,* 9 (3): 71-85.

Tien, F. F. 2000. To what degree does the desire for promotion motivate faculty to perform research? Testing the expectancy theory. *Research in Higher Education*, 41 (6): 723-752.

Tomarken, A. J. and Waller, N. G. 2005. Structural equation modelling: Strengths, limitations, and misconceptions. *Annual Review of Clinical Psychology*, 1: 31-65.

Tong, F., Lara-Alecio, R., Irby, B., Mathes, P. and Kwok, O. M. 2008. Accelerating early academic oral English development in transitional bilingual and structured English immersion programs. *American Educational Research Journal*, 45 (4): 1011-1044.

Tornatzky, L. G. and Fleischer, M. 1990. *The Processes of Technological Innovation.* Lexington MA: Lexington Books.

Tornatzky, L. Z. and Klein, K. J. 1982. Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management* 29 (1): 28-45.

Trow, M. A. 1984. The Analysis of Status. In B. Clark (Ed.), *Perspectives in Higher Hducation: Eight Disciplinary and Comparative Views*. Berkeley, CA: University of California Press: 132-164.

Tustin, D. H. 2005. *Marketing Research in Practice.* Pretoria: UNISA Press.

Vasil, L. 1992. Self-efficacy expectations and causal attributions for achievement among male and female university faculty. *Journal of Vocational Behaviour*, 41 (3): 259-269.

Velleman, P. F. and Moore, D. S. 1996. Multimedia for teaching statistics: Promises and pitfalls. *The American Statistician*, 50 (3): 217-225.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. *MIS quarterly,* 27 (3): 425-478.

Vroom, V. H. 1964. *Work and Motivation.* New York: Wiley.

Wahba, M. A. and Bridwell, L. G. 1976. Maslow reconsidered: A review of research on the need Hierarchy Theory. *Organizational Behaviour and Human Performance,* 15 (2): 212-240.

Wahba, M. and Bridwell, L. 1973. Maslow Reconsidered: A Review of Research on the Need Hierarchy Theory. *Paper Presented at The Academy of Management Conference,* New Orleans, LA.

Wang, M. T. and Holcombe, R. 2010. Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *American Educational Research Journal,* 47 (3): 633-662.

Webster, C. and Rice, S. 1996. Equity theory and the power structure in a marital relationship. *Advances in Consumer Research,* 23: 491-497.

Wegner, T. 1993. *Applied Business Statistics: Methods and Application.* Kenwyn: Juta.

Weinberg, S. L. and Abramowitz, S. K. 2002. *Data analysis for the behavioural sciences using SPSS*. Cambridge, UK: Cambridge University Press.

Welman, J. C. and Kruger, S. J. 2003. *Research Methodology.* Second Edition. Cape Town: Oxford University Press.

Weller, L. 1982. Principals, meet Maslow: a prescription for teacher retention. *NASSP Bulletin,* 66 (456): 32-36.

Werner, P. 2004. *Reasoned action and planned behaviour. In Peterson, S. J. and Bredow, T. S. (eds). Middle range Theories: Application to Nursing Research.* Lippincott Williams & Wilkins, Philadelphia, 125-147.

Wexley, K. N. 1984. Personnel Training, *Annual Review of Psychology*. 35, 519-551.

Williams, A. 2000. *Research productivity of nursing faculty,* Doctoral Dissertation. University of Louisville, U. S. A. Cited in Lertputtarak, S. 2008. *An investigation of factors related to research productivity in a public university in Thailand: A case study,* Doctoral dissertation, Victoria University, Melbourne, Australia.

Wilke, M., Rutte, C. and Knippenberg, V. 2000. The resentful sucker: do rewards ease politics, *Journal of Business Ethics*, 25 (4): 329-342.

Williams, A. 2003. *A mediated hierarchical regression analysis of factors related to research productivity of human resource education and workforce development postsecondary faculty*. PhD Thesis. Louisiana State University, United States of America.

Wissing, M. P., Du Toit, M. and Rothmann, S. 2002. Faktore wat die navorsingsproduktiwiteit van Universitteitspersoneel beïnvloed. (English translation: Factors that influence the research productivity of university personnel) *South African Journal of Industrial Psychology*, 28 (3): 92-98.

Witzel, M. 1999. *Dictionary of Business and Management.* England: International Thomson Business Press.

Wood, F. 1990. Factors influencing research performance of university academic staff. *Higher Education*, 19 (1): 81-100.

Wong, L. P. 2008. Data analysis in qualitative research: A brief guide to using NVivo. *Malaysian Family Physician* 3 (1).

World Bank, G. I. C. T. D. 2006. 2006 Information and Communications for Development: Global Trends and Policies, Chapter 4: the role of ICT in doing business, available at: http://rru.worldbank.org/documents/others/Chapter 4_ICT_in_DoingBusiness.pdf. World Bank Publications.

www.statistics.com. Accessed on 13 September 2014.

Xie, Y. and Shauman, K. A. 1998. Sex differences in research productivity: new evidence about an old puzzle. *American Sociological Review*, 63 (6): 847-870.

Yang, Y. 2008. Examining university students' and academics' understandings of ICTs in higher education. In: Proceedings of *Proceedings of the Annual Meeting of the Australian Association for Research in Education, Brisbane, Australia, 30 November to 4 December 2008.*

Yeo, S., Fearrington, J. and Christ, T. J. 2011. An investigation of gender, income, and special education status bias on curriculum-based measurement slope in reading. *School Psychology Quarterly*, 26 (2): 119-130.

Yousafzai, S. Y., Foxall, G. R. and Pallister, J. G. 2007. Technology acceptance: a meta-analysis of the TAM: Part 1. *Journal of Modelling in Management*, 2 (3): 251-280.

Yukl, G. 1994. *Leadership in Organizations. 3rd ed.* Englewood Cliffs, NJ: Prentice Hall.

Zamarripa, E. J. 1994. Evaluating research productivity. *Society for Risk Analysis Journal,* 26 (3): 17-27.

Zorn, T. 2002. Politics, emotion, and the discourse of ICT adoption and implementation. *Politics & Emotion*, 1-16.

Zuckerman, H. 1998. Accumulation of Advantage and Disadvantage: The Theory and Its Intellectual Biography. In: Merton, R. K., Mongardini, C. and Tabboni, S. *Contemporary Sociology*: 139-161.

Zuckerman, H. and Merton, R. K. 1968. Age, Aging and Age Structure in Science. In: Riley, M. W., Johnson, M. and Froner, A. *A Sociology of Age Stratification.* 292-356. New York: Russell Sage Foundation.

DURBAN UNIVERSITY OF TECHNOLOGY

SURVEY QUESTIONNAIRE

Appendix A

Dear Participant

My name is Sujit Kumar Basak. I am a student at Durban University of Technology in Department of Information Technology under the supervision of Dr. Desmond W. Govender (Supervisor) and H. L. Garbharran (Co-supervisor). You are invited to participate in a research project entitled: *A Model Using ICT Adoption and Training to Improve the Research Productivity of Academics*.

This questionnaire is designed to gather data on the measuring the joint impact of ICT adoption and training on research productivity. The information is required for Doctoral research and your name will not be use therefore please answer as fully and truthfully as possible.

Please mark your answer with a ✓

If you have any query please feel free to ask:

Sujit Kumar Basak

Department of Information Technology

Ritson Campus

Durban University of Technology

E-mail: sujitbasakmca@gmail.com

Thank you for your consideration. Your help is greatly appreciated.

Please mark your answers with an x

Section A: Background Data

1.	Designation	☐ Jnr. Lect.	☐ Lect.	☐ Snr. Lect. / Ass. Dir.	☐ Ass. Prof.	☐ Prof.
2.	Gender	☐ Female	☐ Male			
3.	Highest qualification	☐ Below Masters	☐ Masters	☐ Doctorate		
4.	Age	☐ 20-30 years	☐ 31-40 years	☐ 41-50 years	☐ 51 years and over	
5.	Academic experience	☐ 1-3 years	☐ 4-6 years	☐ 7-9 years	☐ 10-12 years	☐ 13 years and over
6.	Faculty	☐ Science (Natural or Applied)/ Engineering / Agriculture	☐ Arts & Humanities	☐ Health Sciences	☐ Management / Commerce / Law	
		☐ Computing	☐ Education			
7.	University	☐ DUT	☐ MUT	☐ UKZN	☐ UniZulu	
8.	Employment status	☐ Permanent	☐ Long term Contract	☐ Short term Contract		
9.	Highest level of courses taught	☐ Undergrauate	☐ Postgraduate			
10.	Internet access at home	☐ None	☐ Cell-phone	☐ Laptop / Computer	☐ Cell-phone, Laptop, Computer	

Section B: Research Productivity or Output for the year of 2011

1. Please indicate the number of Master students that graduated in the 2011 academic year under your supervision ☐
2. Please indicate the number of Doctorate students that graduated in the 2011 academic year under your supervision ☐
3. Please indicate the number of externally funded contracts and grants received by yourself in the 2011 academic year ☐
4. Please indicate the number of awards received by yourself for teaching, research, and service in the 2011 academic year ☐
5. Please indicate the number of professional conference papers and presentations done by yourself in the 2011 academic year ☐
6. Please indicate the number of books and book chapters published by yourself in the 2011 academic year ☐
7. Please indicate the number of volumes **edited** by yourself in the 2011 academic year ☐
8. Please indicate the number of internal publications done by yourself in the 2011 academic year ☐
9. Please indicate the number of invitations as a visiting professor or a guest speaker honoured by yourself in the 2011 academic year ☐
10. Please indicate the number of text books published/co-published by yourself in the 2011 academic year ☐

Section C: ICT adoption

	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I always use search engines tools for my work	☐	☐	☐	☐	☐
2.	I always use productivity software tools (word processing, presentation, spreadsheets, databases, charts, graphs) for my work	☐	☐	☐	☐	☐
3.	I always use social networks tools for my work	☐	☐	☐	☐	☐
4.	I always use the University's portal tools for my work	☐	☐	☐	☐	☐
5.	I always use general communication tools (e-mail, phone, etc.) for my work	☐	☐	☐	☐	☐
6.	I always use e-learning instruction tools and e-learning assessment tools for my work	☐	☐	☐	☐	☐
7.	I always online survey tools for my work	☐	☐	☐	☐	☐
8.	I always use e-curriculum tools for my curriculum development work	☐	☐	☐	☐	☐
9.	I always use MIS (ITS) tools for my work	☐	☐	☐	☐	☐
10.	I always use document management systems (scanning, photocopying, archiving, etc.) tools for my work	☐	☐	☐	☐	☐

Thank You

EXPERIMENTAL QUETIONNAIRE

Using ICT with Training

Appendix B

Dear Participant

My name is Sujit Kumar Basak. I am a student at Durban University of Technology in Department of Information Technology under the supervision of Dr. Desmond W. Govender (Supervisor) and H. L. Garbharran (Co-supervisor). You are invited to participate in a research project entitled: *A Model Using ICT Adoption and Training to Improve the Research Productivity of Academics*.

This questionnaire is designed to gather data on the measuring the joint impact of ICT adoption and training on research productivity. The information is required for Doctoral research and your name will not be used therefore please answer as fully and truthfully as possible.

Please mark your answer with a ✓

If you have any query please feel free to ask:

Sujit Kumar Basak

Department of Information Technology
Ritson Campus
Durban University of Technology
E-mail: sujitbasakmca@gmail.com

Thank you for your consideration. Your help is greatly appreciated.

EndNote [Using ICT with training]

Section A: Perceived Usefulness

USB: ***Before*** *the EndNote software* ***training*** *experiment*, how **useful** did you perceive the **EndNote software** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: ***Before*** *the EndNote software* ***training*** *experiment*, how **useful** did you perceive the ***EndNote software training*** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

USA: ***After*** *the EndNote software* ***training*** *experiment*, how useful did you perceive the **EndNote software** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USA							

UTA: ***After*** *the EndNote software* ***training*** *experiment*, how **useful** did you perceive the ***EndNote software training*** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTA							

Section B: Perceived Ease of Use

ESB: ***Before*** *the EndNote software* ***training*** *experiment*, how **easy to use** did you perceive the **EndNote software** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: ***Before*** *the EndNote software* ***training*** *experiment*, how **easy to use** did you perceive the ***EndNote software training*** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

ESA: ***After*** *the EndNote software* ***training*** *experiment*, how **easy to use** did you perceive the **EndNote software** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESA							

ETA: ***After*** *the EndNote software* ***training*** *experiment*, how **easy to use** did you perceive the ***EndNote software training*** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESA							

Section C: Acceptance Level

ASB: ***Before*** *the EndNote software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the **EndNote software** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: ***Before*** *the EndNote software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the ***EndNote software training*** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

ASA: ***After*** *the EndNote software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the **EndNote software** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASA							

ATA: ***After*** *the EndNote software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the ***EndNote software training*** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATA							

Thank You

<u>Turnitin [Using ICT with training]</u>

Section A: Perceived Usefulness

USB: ***Before*** *the Turnitin software* ***training*** *experiment*, how ***useful did you perceive*** the **Turnitin software** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: ***Before*** *the Turnitin software* ***training*** *experiment,* how ***useful did you perceive*** the ***Turnitin software training*** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

USA: ***After*** *the Turnitin software training experiment,* how ***useful did you perceive*** the **Turnitin software** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USA							

UTA: ***After*** *the Turnitin software* ***training*** *experiment,* how ***useful did you perceive*** the ***Turnitin software training*** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTA							

Section B: Perceived Ease of Use

ESB: ***Before*** *the Turnitin software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***Turnitin software*** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: ***Before*** *the Turnitin software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***Turnitin software training*** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

ESA: ***After*** *the Turnitin software* ***training*** *experiment*, how **easy to use** did you perceive the ***Turnitin software*** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESA							

ETA: ***After*** *the Turnitin software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***Turnitin software training*** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETA							

Section C: Acceptance Level

ASB: ***Before*** *the Turnitin software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the ***Turnitin software*** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: ***Before*** *the Turnitin software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the ***Turnitin software training*** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

ASA: ***After*** *the Turnitin software* ***training*** *experiment,* what was your perceived ***acceptance level*** of the ***Turnitin software*** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASA							

ATA: ***After*** *the Turnitin software* ***training*** *experiment,* what was your perceived ***acceptance*** level of the ***Turnitin software training*** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATA							

Thank You

<u>AMOS [Using ICT with training]</u>

Section A: Perceived Usefulness

USB: ***Before*** *the AMOS software* ***training*** *experiment*, how ***useful*** did you perceive the **AMOS software** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: ***Before*** *the AMOS software* ***training*** *experiment*, how ***useful*** did you perceive the ***AMOS software training*** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

USA: ***After*** *the AMOS software* ***training*** *experiment*, how ***useful*** did you perceive the ***AMOS software*** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USA							

UTA: ***After*** *the AMOS software* ***training*** *experiment*, how ***useful*** did you perceive the ***AMOS software training*** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTA							

Section B: Perceived Ease of Use

ESB: ***Before*** *the AMOS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***AMOS software*** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: ***Before*** *the AMOS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***AMOS software training*** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

ESA: ***After*** *the AMOS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***AMOS software*** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESA							

ETA: ***After*** *the AMOS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***AMOS software training*** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETA							

Section C: Acceptance Level

ASB: ***Before*** *the AMOS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***AMOS software*** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: ***Before*** *the AMOS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***AMOS software training*** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

ASA: ***After*** *the AMOS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***AMOS software*** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASA							

ATA: ***After*** *the AMOS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***AMOS software training*** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATA							

Thank You

NVivo [Using ICT with training]

Section A: Perceived Usefulness

USB: ***Before*** *the NVivo software* ***training*** *experiment*, how ***useful*** did you perceive the ***NVivo software*** for the literature review and data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: ***Before*** *the NVivo software* ***training*** *experiment*, how ***useful*** did you perceive the ***NVivo software training*** for the literature review and data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

USA: ***After*** *the NVivo software* ***training*** *experiment*, how ***useful*** did you perceive the ***NVivo software*** for the literature review and data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USA							

UTA: ***After*** *the NVivo software* ***training*** *experiment*, how ***useful*** did you perceive the ***NVivo software training*** for the literature review and data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTA							

Section B: Perceived Ease of Use

ESB: ***Before*** *the NVivo software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***NVivo software*** for the literature review and data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: ***Before*** *the NVivo software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***NVivo software training*** for the literature review and data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

ESA: ***After*** *the NVivo software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***NVivo software*** for the literature review and data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESA							

ETA: ***After*** *the NVivo software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***NVivo software training*** for the literature review and data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETA							

Section C: Acceptance Level

ASB: ***Before*** *the NVivo software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***NVivo software*** for the literature review and data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: ***Before*** *the NVivo software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***NVivo software training*** for the literature review and data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

ASA: ***After*** *the NVivo software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***NVivo software*** for the literature review and data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASA							

ATA: ***After*** *the NVivo software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***NVivo software training*** for the literature review and data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATA							

Thank You

SPSS [Using ICT with training]

Section A: Perceived Usefulness

USB: ***Before*** *the SPSS software* ***training*** *experiment*, how ***useful*** did you perceive the ***SPSS software*** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: ***Before*** *the SPSS software* ***training*** *experiment*, how ***useful*** did you perceive the ***SPSS software training*** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

USA: ***After*** *the SPSS software* ***training*** *experiment*, how ***useful*** did you perceive the ***SPSS software*** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USA							

UTA: ***After*** *the SPSS software* ***training*** *experiment*, how ***useful*** did you perceive the ***SPSS software training*** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTA							

Section B: Perceived Ease of Use

ESB: ***Before*** *the SPSS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***SPSS software*** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: ***Before*** *the SPSS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***SPSS software training*** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

ESA: ***After*** *the SPSS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***SPSS software*** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESA							

ETA: ***After*** *the SPSS software* ***training*** *experiment*, how ***easy to use*** did you perceive the ***SPSS software training*** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETA							

Section C: Acceptance Level

ASB: ***Before*** *the SPSS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***SPSS software*** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: ***Before*** *the SPSS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***SPSS software training*** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

ASA: ***After*** *the SPSS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***SPSS software*** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASA							

ATA: ***After*** *the SPSS software* ***training*** *experiment*, what was your perceived ***acceptance level*** of the ***SPSS training*** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATA							

Thank You

Using ICT without training

Dear Participant

My name is Sujit Kumar Basak. I am a student at Durban University of Technology in Department of Information Technology under the supervision of Dr. Desmond W. Govender (Supervisor) and H. L. Garbharran (Co-supervisor). You are invited to participate in a research project entitled: *A Model Using ICT Adoption and Training to Improve the Research Productivity of Academics*.

This questionnaire is designed to gather data on the measuring the joint impact of ICT adoption and training on research productivity. The information is required for Doctoral research and your name will not be use therefore please answer as fully and truthfully as possible.

Please mark your answer with a ✓

If you have any query please feel free to ask:

Sujit Kumar Basak

Department of Information Technology

Ritson Campus

Durban University of Technology

E-mail: sujitbasakmca@gmail.com

Thank you for your consideration. Your help is greatly appreciated.

EndNote [Using ICT without training]

Section A: Perceived Usefulness

USB: *Without* ***training*** *but using EndNote software manual*, how ***useful*** did you perceive the **EndNote software** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: *Without* ***training*** *but using EndNote software manual*, how ***useful*** did you perceive the ***EndNote software training*** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

Section B: Perceived Ease of Use

ESB: *Without* ***training*** *but using EndNote software manual*, how ***easy to use*** did you perceive the **EndNote software** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: *Without* ***training*** *but using EndNote software manual*, how ***easy to use*** did you perceive the ***EndNote software training*** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

Section C: Acceptance Level

ASB: *Without **training** but using EndNote software manual*, what was your perceived ***acceptance level*** of the **EndNote software** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: *Without **training** but using EndNote software manual*, what was your perceived ***acceptance level*** of the ***EndNote software training*** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

Thank You

Turnitin [<u>Using ICT without training</u>]

Section A: Perceived Usefulness

USB: *Without **training** but using Turnitin software manual*, how ***useful*** did you perceive the **Turnitin software** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: *Without **training** but using Turnitin software manual*, how ***useful*** did you perceive the **Turnitin *software training*** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

Section B: Perceived Ease of Use

ESB: *Without **training** but using Turnitin software manual*, how ***easy to use*** did you perceive the **Turnitin software** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: *Without **training** but using Turnitin software manual*, how ***easy to use*** did you perceive the ***Turnitin software training*** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

Section C: Acceptance Level

ASB: *Without **training** but using Turnitin software manual*, what was your perceived ***acceptance level*** of the **Turnitin software** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: *Without **training** but using Turnitin software manual*, what was your perceived ***acceptance level*** of the ***Turnitin software training*** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

Thank You

AMOS [Using ICT without training]

Section A: Perceived Usefulness

USB: *Without* ***training*** *but using AMOS software manual*, how ***useful*** did you perceive the **AMOS software** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: *Without* ***training*** *but using AMOS software manual*, how ***useful*** did you perceive the **AMOS** ***software training*** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

Section B: Perceived Ease of Use

ESB: *Without* ***training*** *but using AMOS software manual*, how ***easy to use*** did you perceive the **AMOS software** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: *Without* ***training*** *but using AMOS software manual*, how ***easy to use*** did you perceive the ***AMOS software training*** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

Section C: Acceptance Level

ASB: *Without **training** but using AMOS software manual*, what was your perceived ***acceptance level*** of the **AMOS software** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: *Without **training** but using AMOS software manual*, what was your perceived ***acceptance level*** of the ***AMOS software training*** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

Thank You

NVivo for data analysis [Using ICT without training]

Section A: Perceived Usefulness

USB: *Without* ***training*** *but using NVivo software manual*, how ***useful*** did you perceive the **NVivo software** for data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: *Without* ***training*** *but using NVivo software manual*, how ***useful*** did you perceive the ***NVivo software training*** for data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

Section B: Perceived Ease of Use

ESB: *Without* ***training*** *but using NVivo software manual*, how ***easy to use*** did you perceive the **NVivo software** for data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: *Without* ***training*** *but using NVivo software manual*, how ***easy to use*** did you perceive the ***NVivo software training*** for data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

Section C: Acceptance Level

ASB: *Without **training** but using NVivo software manual*, what was your perceived ***acceptance level*** of the **NVivo software** for data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: *Without **training** but using NVivo software manual*, what was your perceived ***acceptance level*** of the ***NVivo software training*** for data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

Thank You

NVivo for literature review [Using ICT without training]

Section A: Perceived Usefulness

USB: *Without **training** but using NVivo software manual*, how ***useful*** did you perceive the **NVivo software** for literature in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: *Without **training** but using NVivo software manual*, how ***useful*** did you perceive the ***NVivo software training*** for literature review in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

Section B: Perceived Ease of Use

ESB: *Without **training** but using NVivo software manual*, how ***easy to use*** did you perceive the **NVivo software** for literature review in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: *Without **training** but using NVivo software manual*, how ***easy to use*** did you perceive the ***NVivo software training*** for literature review in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

Section C: Acceptance Level

ASB: *Without **training** but using NVivo software manual*, what was your perceived ***acceptance level*** of the **NVivo software** for literature review in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: *Without **training** but using NVivo software manual*, what was your perceived ***acceptance level*** of the ***NVivo software training*** for literature review in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

Thank You

<u>SPSS [Using ICT without training]</u>

Section A: Perceived Usefulness

USB: *Without **training** but using SPSS software manual*, how ***useful*** did you perceive the **SPSS software** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

UTB: *Without **training** but using SPSS software manual*, how ***useful*** did you perceive the ***SPSS software training*** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
UTB							

Section B: Perceived Ease of Use

ESB: *Without **training** but using SPSS software manual*, how ***easy to use*** did you perceive the **SPSS software** for the data analysis in your research
work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

ETB: *Without **training** but using SPSS software manual*, how ***easy to use*** did you perceive the ***SPSS software training*** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ETB							

Section C: Acceptance Level

ASB: *Without* ***training*** *but using SPSS software manual*, what was your perceived ***acceptance level*** of the **SPSS software** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

ATB: *Without* ***training*** *but using SPSS software manual*, what was your perceived ***acceptance level*** of the ***SPSS software training*** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ATB							

Thank You

Using a manual system (without using research software/tools and training)

Dear Participant

My name is Sujit Kumar Basak. I am a student at Durban University of Technology in Department of Information Technology under the supervision of Dr. Desmond W. Govender (Supervisor) and H. L. Garbharran (Co-supervisor). You are invited to participate in a research project entitled: *A Model Using ICT Adoption and Training to Improve the Research Productivity of Academics*.

This questionnaire is designed to gather data on the measuring the joint impact of ICT adoption and training on research productivity. The information is required for Doctoral research and your name will not be used therefore please answer as fully and truthfully as possible.

Please mark your answer with a ✓

If you have any query please feel free to ask:

Sujit Kumar Basak

Department of Information Technology

Ritson Campus

Durban University of Technology

E-mail: sujitbasakmca@gmail.com

Thank you for your consideration. Your help is greatly appreciated.

EndNote [Using a manual system (without using research software/tools and training)]

Section A: Perceived Usefulness

USB: How **useful** did you perceive the **Manual System** for the referencing in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

Section B: Perceived Ease of Use

ESB: How **easy to use** did you perceive the **Manual System** for the referencing in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

Section C: Acceptance Level

ASB: What was your perceived **acceptance level** of the **Manual System** for the referencing in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

Thank You

Turnitin [Using a manual system (without using research software/tools and training)]

Section A: Perceived Usefulness

USB: How **useful** did you perceive the **Manual System** for the plagiarism in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

Section B: Perceived Ease of Use

ESB: How **easy to use** did you perceive the **Manual System** for the plagiarism in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

Section C: Acceptance Level

ASB: What was your perceived **acceptance level** of the **Manual System** for the plagiarism in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

Thank You

AMOS [Using a manual system (without using research software/tools and training)]

Section A: Perceived Usefulness

USB: How **useful** did you perceive the **Manual System** for the modelling in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

Section B: Perceived Ease of Use

ESB: How **easy to use** did you perceive the **Manual System** for the modelling in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

Section C: Acceptance Level

ASB: What was your perceived **acceptance level** of the **Manual System** for the modelling in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

Thank You

NVivo for qualitative data analysis [Using a manual system (without using research software/tools and training)]

Section A: Perceived Usefulness

USB: How **useful** did you perceive the **Manual System** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

Section B: Perceived Ease of Use

ESB: How **easy to use** did you perceive the **Manual System** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

Section C: Acceptance Level

ASB: What was your perceived **acceptance level** of the **Manual System** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

Thank You

NVivo for literature review analysis [Using a manual system (without using research software/tools and training)]

Section A: Perceived Usefulness

USB: How **useful** did you perceive the **Manual System** for the literature review in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

Section B: Perceived Ease of Use

ESB: How **easy to use** did you perceive the **Manual System** for the literature review in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

Section C: Acceptance Level

ASB: What was your perceived **acceptance level** of the **Manual System** for the literature review in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

Thank You

SPSS [Using a manual system (without using research software/tools and training)]

Section A: Perceived Usefulness

USB: How **useful** did you perceive the **Manual System** for the data analysis in your research work?

Usefulness	Totally useless	Very useless	Useless	Neutral	Useful	Very useful	Extremely useful
USB							

Section B: Perceived Ease of Use

ESB: How **easy to use** did you perceive the **Manual System** for the data analysis in your research work?

Ease of use	Extremely difficult	Very difficult	Difficult	Neutral	Easy	Very easy	Extremely easy
ESB							

Section C: Acceptance Level

ASB: What was your perceived **acceptance level** of the **Manual System** for the data analysis in your research work?

Acceptance	Extremely low	Very low	Low	Average	High	Very high	Extremely high
ASB							

Thank You

Appendix C

ICT ADOPTION

Section A

Table A1: Experience

Experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-3 years	17	16,5	16,5	16,5
	4-6 years	18	17,5	17,5	34,0
	7-9 years	14	13,6	13,6	47,6
	10-12 years	12	11,7	11,7	59,2
	13 years and over	42	40,8	40,8	100,0
	Total	103	100,0	100,0	

Table A2: Job Status

Job status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Permanent	81	78,6	78,6	78,6
	Long term contract	10	9,7	9,7	88,3
	Short term contract	12	11,7	11,7	100,0
	Total	103	100,0	100,0	

Table A3: Job Status

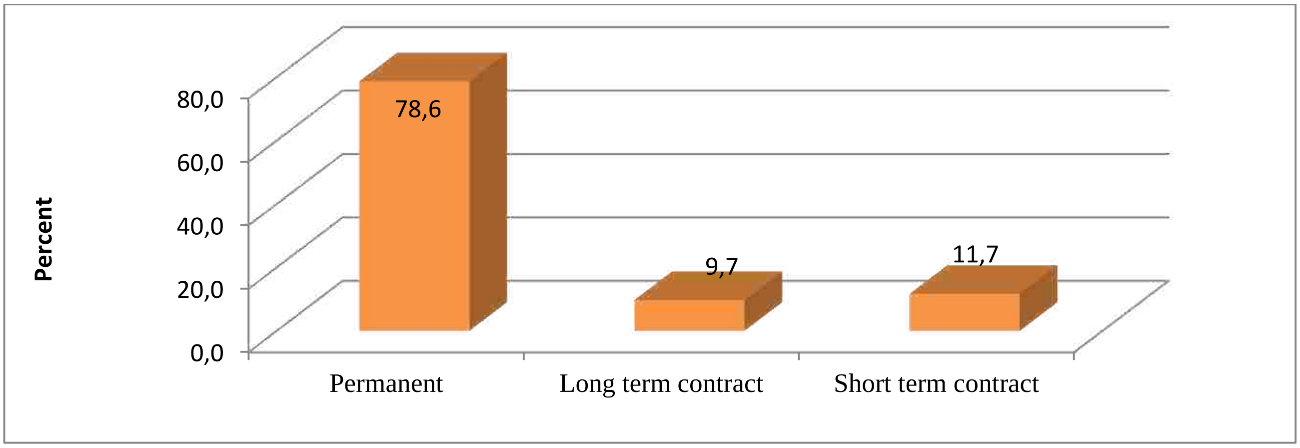


Table A4: Courses Taught

Courses taught					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undergraduate	44	42,7	42,7	42,7
	Postgraduate	59	57,3	57,3	100,0
	Total	103	100,0	100,0	

	Frequency	Percent
Undergraduate	44	42,7
Postgraduate	59	57,3
Total	103	100,0

Table A5: Network Access

Network access					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Laptop/Computer	59	57,3	57,3	75,7
	Cell-phone, Laptop/Computer	25	24,3	24,3	100,0
	Cell-phone	11	10,7	10,7	18,4
	None	8	7,8	7,8	7,8
	Total	103	100,0	100,0	

Section B

Table B1: Research Productivity or Output for the Year of 2011

	Masters graduated	Doctorate Graduate	Funds and grants	Awards	Conference	Books & book chapters	Volume edited	Internal publication	Vising professor	Book Published
N Valid	103	103	103	103	103	103	103	103	103	103
Missing	0	0	0	0	0	0	0	0	0	0
Mean	.25	.05	.23	.15	1.21	.19	.15	.46	.17	.09
Std. Deviation	.622	.293	.581	.406	1.570	.578	.617	.838	.445	.346

Table B2: Mean and Standard Deviation of the Academic Productivity or Output for the Year of 2011

	Mean	Std. Deviation
Doctorate graduate	,05	,293
Book published	,09	,346
Awards	,15	,406
Volume edited	,15	,617
Visiting professor	,17	,445
Books & book chapters	,19	,578
Funds and grants	,23	,581
Masters graduated	,25	,622
Internal publication	,46	,838
Conference	1,21	1,570

Table B3: Masters Graduated in 2011

Masters graduated					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	85	82,5	82,5	82,5
	1	12	11,7	11,7	94,2
	2	4	3,9	3,9	98,1
	3	2	1,9	1,9	100,0
	Total	103	100,0	100,0	

Table B4: Doctorate Graduated in 2011

Doctorate graduate					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	100	97,1	97,1	97,1
	1	1	1,0	1,0	98,1
	2	2	1,9	1,9	100,0
	Total	103	100,0	100,0	

Table B5: Funds Received in 2011

Funds and grants					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	86	83,5	83,5	83,5
	1	11	10,7	10,7	94,2
	2	5	4,9	4,9	99,0
	3	1	1,0	1,0	100,0
	Total	103	100,0	100,0	

Table B6: Awards Received in 2011

Awards					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	90	87.4	87.4	87.4
	1	11	10.7	10.7	98.1
	2	2	1.9	1.9	100.0
	Total	103	100.0	100.0	

Table B7: Conference Paper Presented

Conference					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	47	45.6	45.6	45.6
	1	21	20.4	20.4	66.0
	2	18	17.5	17.5	83.5
	3	8	7.8	7.8	91.3
	4	6	5.8	5.8	97.1
	5	1	1.0	1.0	98.1
	6	1	1.0	1.0	99.0
	9	1	1.0	1.0	100.0
	Total	103	100.0	100.0	

Table B8: Books & Book Chapters Published

Books & book chapters					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	89	86,4	86,4	86,4
	1	10	9,7	9,7	96,1
	2	3	2,9	2,9	99,0
	4	1	1,0	1,0	100,0
	Total	103	100,0	100,0	

Table B9: Volume Edited

Volume edited					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	94	91,3	91,3	91,3
	1	7	6,8	6,8	98,1
	3	1	1,0	1,0	99,0
	5	1	1,0	1,0	100,0
	Total	103	100,0	100,0	

Table B10: Internal Publication

Internal publication					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	74	71,8	71,8	71,8
	1	16	15,5	15,5	87,4
	2	8	7,8	7,8	95,1
	3	5	4,9	4,9	100,0
	Total	103	100,0	100,0	

Table B11: Visiting Professor

Visiting professor					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	89	86,4	86,4	86,4
	1	11	10,7	10,7	97,1
	2	3	2,9	2,9	100,0
	Total	103	100,0	100,0	

Table B12: Book Published

Book published					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	96	93,2	93,2	93,2
	1	5	4,9	4,9	98,1
	2	2	1,9	1,9	100,0
	Total	103	100,0	100,0	

Section C

Table C1: Search Engine Tools

Search tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1,9	1,9	1,9
	Disagree	1	1,0	1,0	2,9
	Neutral	6	5,8	5,8	8,7
	Agree	30	29,1	29,1	37,9
	Strongly Agree	64	62,1	62,1	100,0
	Total	103	100,0	100,0	

Table C2: Productivity Tools

Productivity tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1,9	1,9	1,9
	Disagree	1	1,0	1,0	2,9
	Neutral	3	2,9	2,9	5,8
	Agree	29	28,2	28,2	34,0
	Strongly Agree	68	66,0	66,0	100,0
	Total	103	100,0	100,0	

Table C3: Social Tools

Social tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	27	26,2	26,2	26,2
	Disagree	22	21,4	21,4	47,6
	Neutral	33	32,0	32,0	79,6
	Agree	11	10,7	10,7	90,3
	Strongly Agree	10	9,7	9,7	100,0
	Total	103	100,0	100,0	

Table C4: Versity Portal Tools

Versity portal tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	3,9	3,9	3,9
	Disagree	9	8,7	8,7	12,6
	Neutral	22	21,4	21,4	34,0
	Agree	41	39,8	39,8	73,8
	Strongly Agree	27	26,2	26,2	100,0
	Total	103	100,0	100,0	

Table C5: General Communication Tools

General comm tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1,9	1,9	1,9
	Disagree			0,0	
	Neutral	4	3,9	3,9	5,8
	Agree	21	20,4	20,4	26,2
	Strongly Agree	76	73,8	73,8	100,0
	Total	103	100,0	100,0	

Table C6: Instruction Tools

Instruction tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	10,7	10,7	10,7
	Disagree	17	16,5	16,5	27,2
	Neutral	25	24,3	24,3	51,5
	Agree	31	30,1	30,1	81,6
	Strongly Agree	19	18,4	18,4	100,0
	Total	103	100,0	100,0	

Table C7: Survey Tools

Survey tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	19	18,4	18,4	18,4
	Disagree	17	16,5	16,5	35,0
	Neutral	29	28,2	28,2	63,1
	Agree	27	26,2	26,2	89,3
	Strongly Agree	11	10,7	10,7	100,0
	Total	103	100,0	100,0	

Table C8: Curriculum Tools

Curriculum tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	19,4	19,4	19,4
	Disagree	19	18,4	18,4	37,9
	Neutral	31	30,1	30,1	68,0
	Agree	25	24,3	24,3	92,2
	Strongly Agree	8	7,8	7,8	100,0
	Total	103	100,0	100,0	

Table C9: ITS Tools

ITS tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	16,5	16,5	16,5
	Disagree	9	8,7	8,7	25,2
	Neutral	29	28,2	28,2	53,4
	Agree	20	19,4	19,4	72,8
	Strongly Agree	28	27,2	27,2	100,0
	Total	103	100,0	100,0	

Table C10: Management Tools

Management tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1,0	1,0	1,0
	Disagree	3	2,9	2,9	3,9
	Neutral	8	7,8	7,8	11,7
	Agree	34	33,0	33,0	44,7
	Strongly Agree	57	55,3	55,3	100,0
	Total	103	100,0	100,0	

Appendix D

USING ICT WITHOUT TRAINING, A MANUAL SYSTEM (WITHOUT USING RESEARCH SOFTWARE/TOOLS AND TRAINING) (Standardized scales & Unstandardized scales)

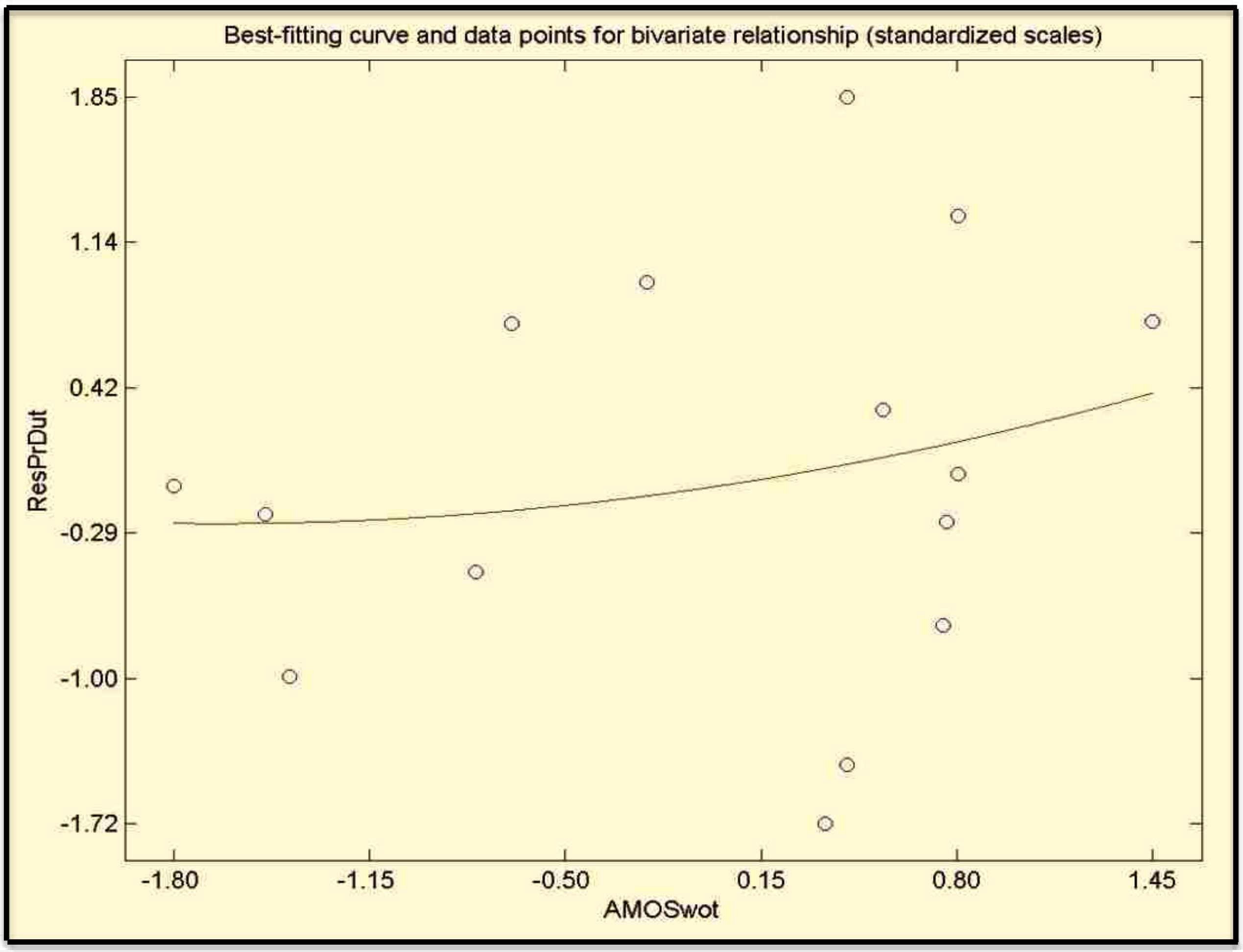


Figure D1: Graphical Representation of the *AMOS* Software without Training (Standardized scales)

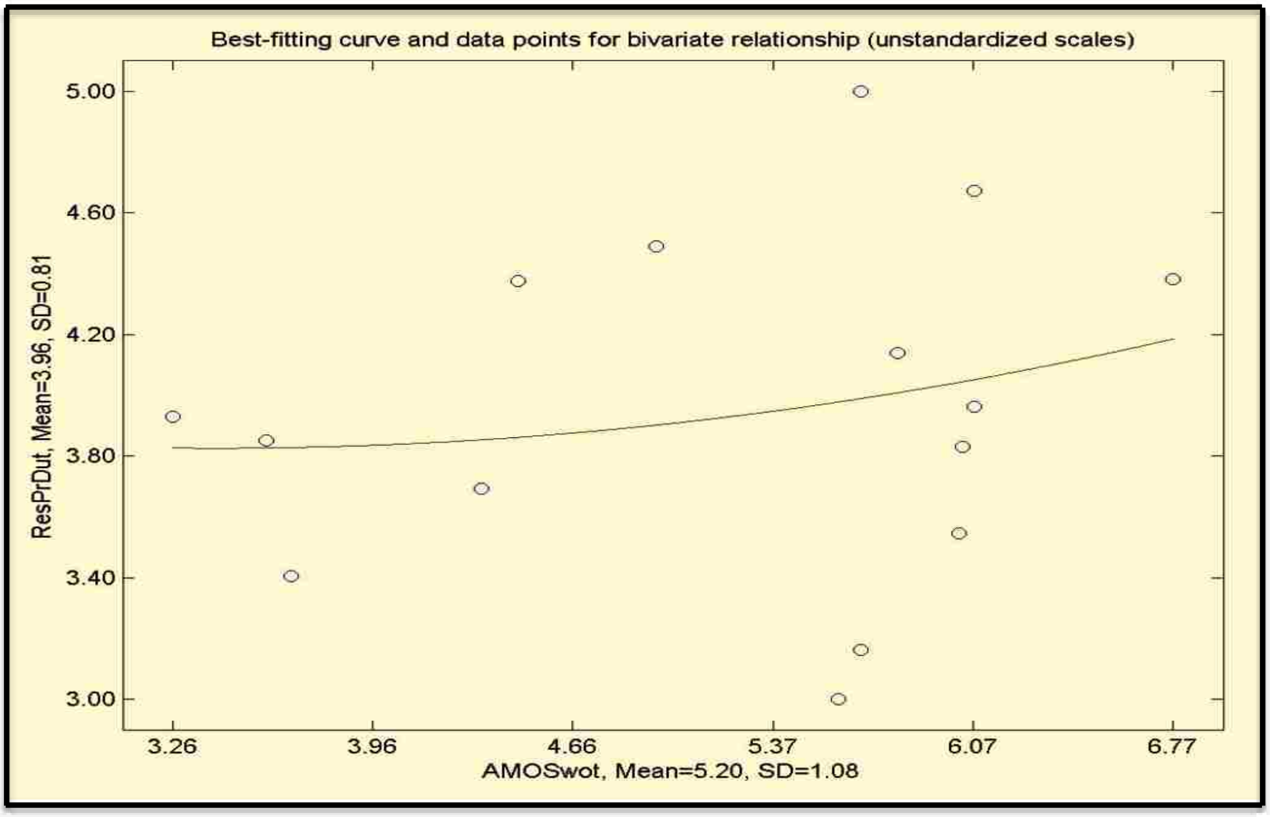


Figure D2: Graphical Representation of the *AMOS* Software without Training (Unstandardized scales)

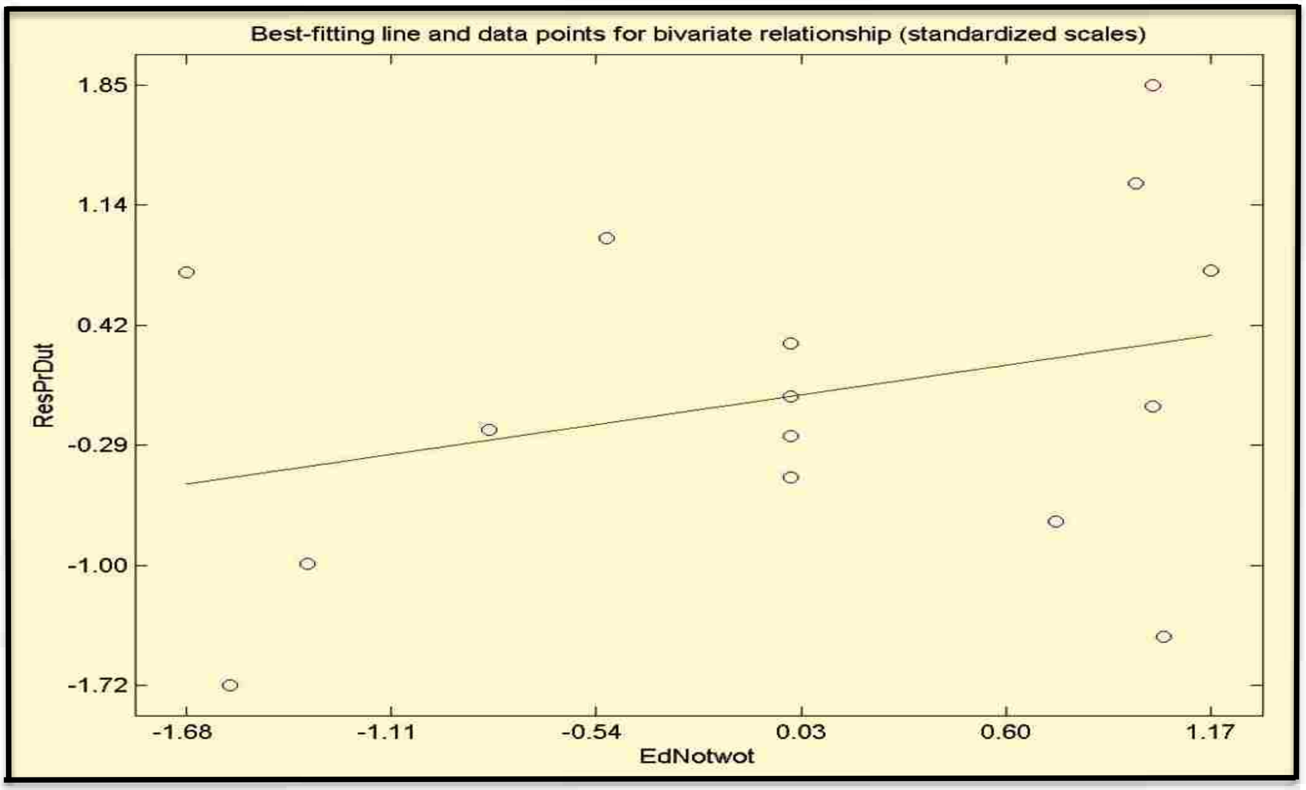


Figure D3: Graphical Representation of the *EndNote* Software without Training (Standardized scales)

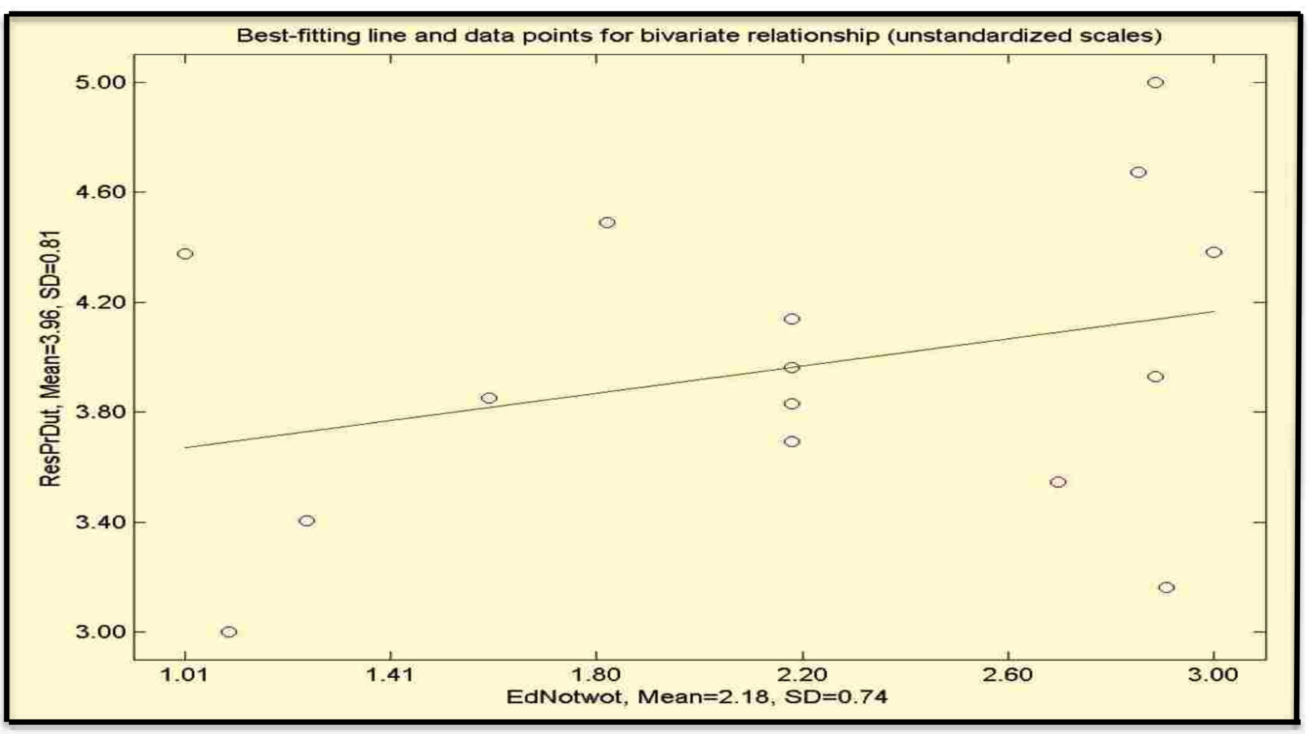


Figure D4: Graphical Representation of the *EndNote* Software without Training (Unstandardized scales)

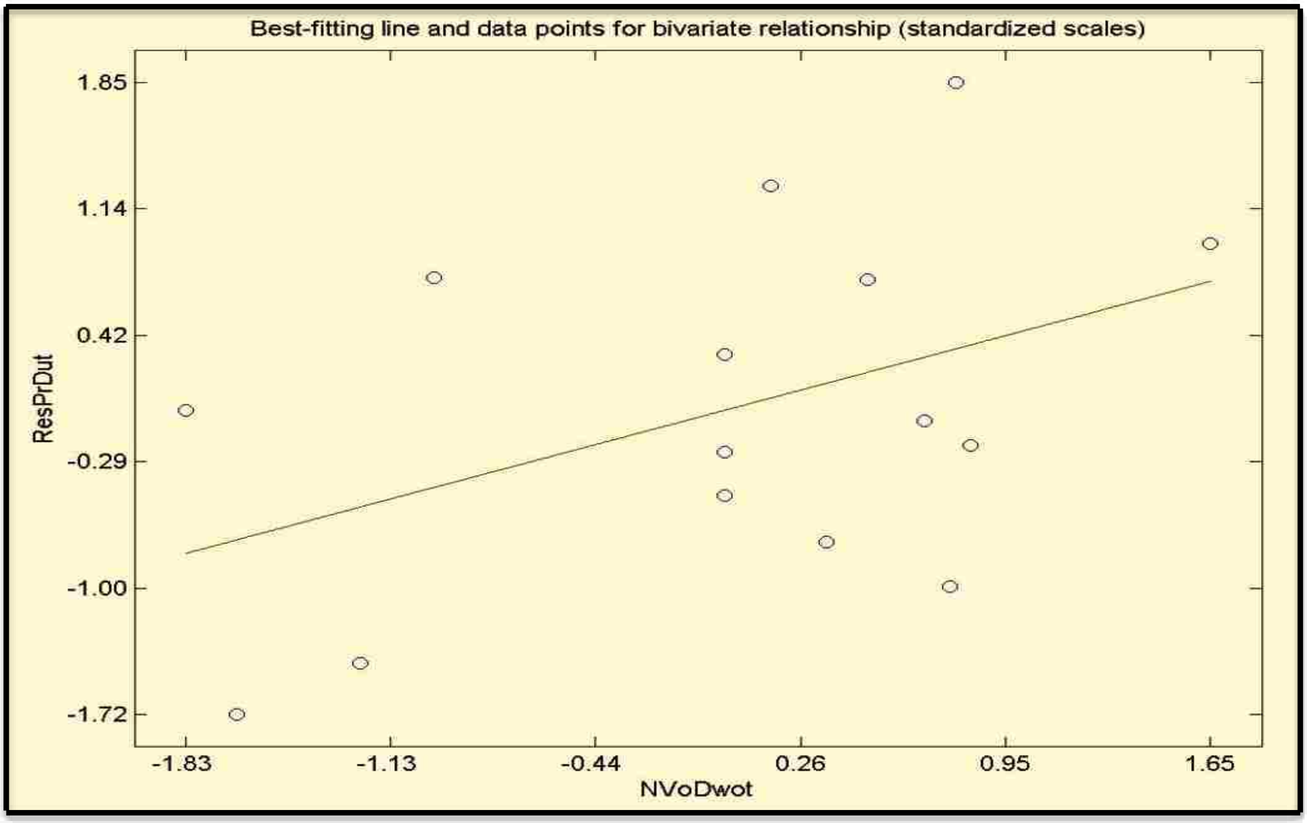


Figure D5: Graphical Representation of the *NVivo* Software for Data Analysis without Training (Standardized scales)

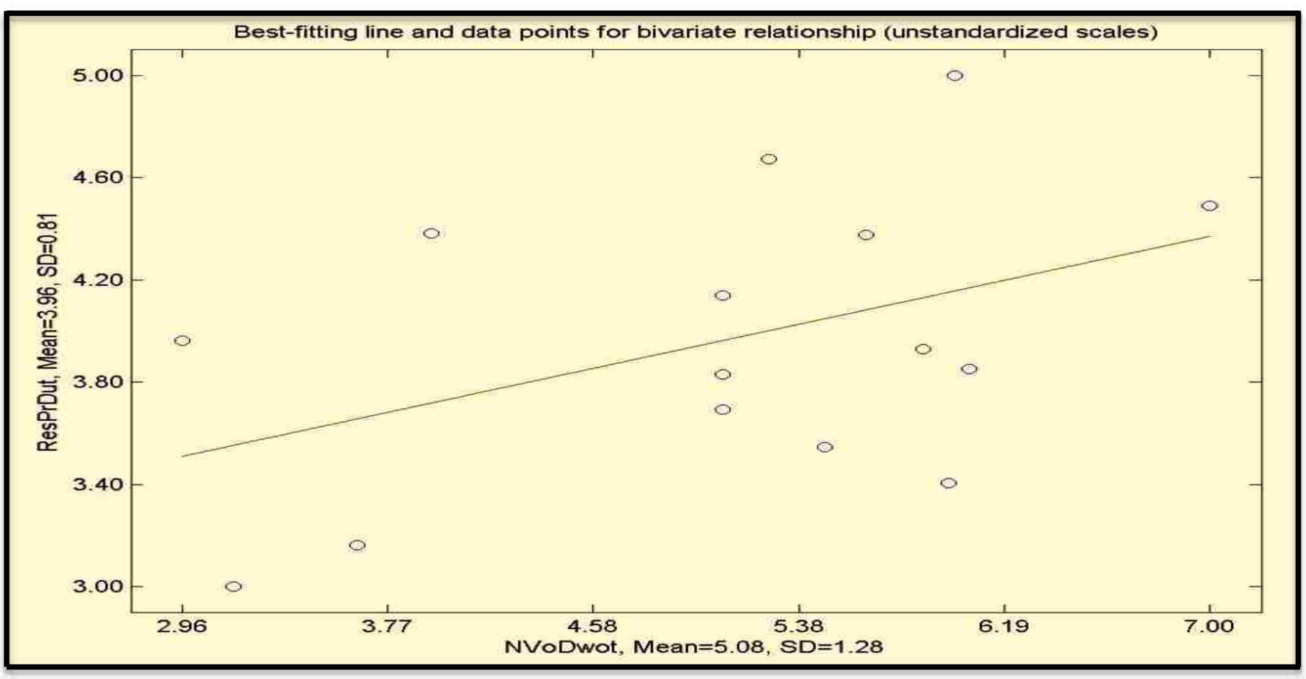


Figure D6: Graphical Representation of the *NVivo* Software for Data Analysis without Training (Unstandardized scales)

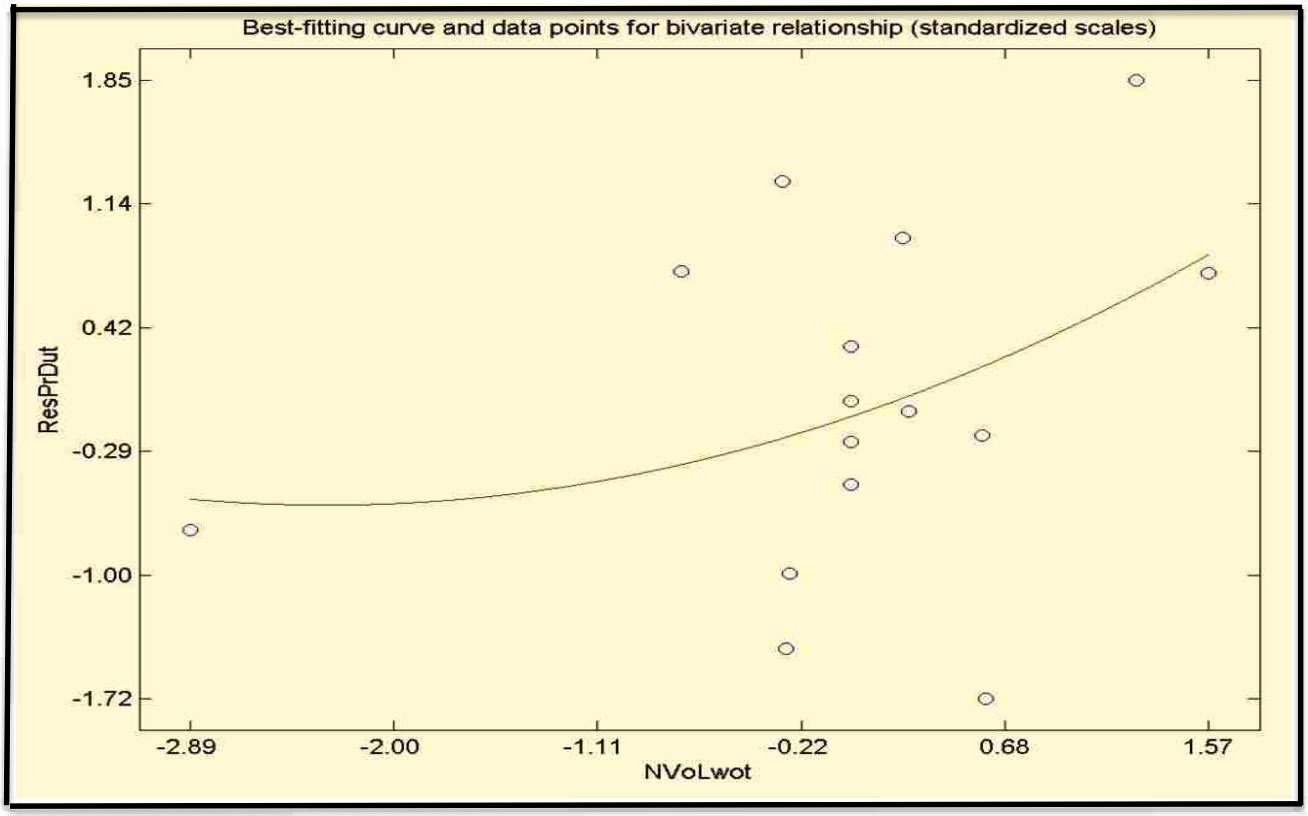


Figure D7: Graphical Representation of the *NVivo* Software for Literature Review without Training (Standardized scales)

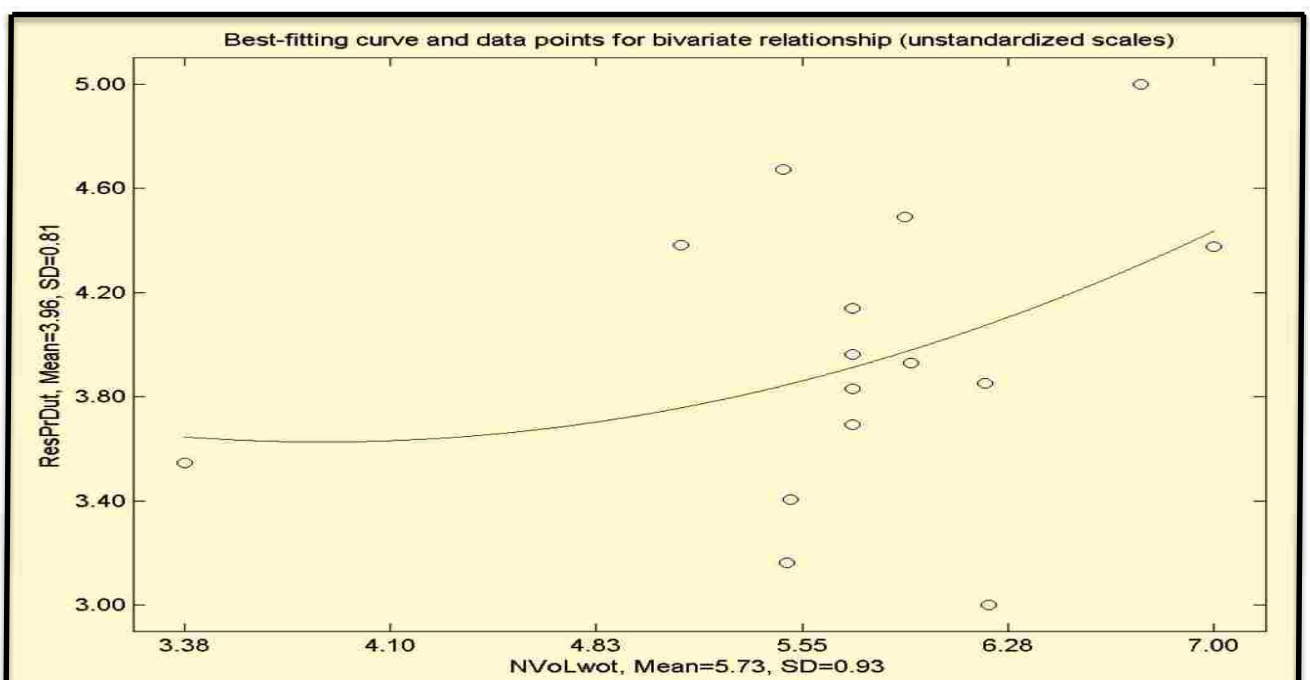


Figure D8: Graphical Representation of the *NVivo* Software for Literature Review without Training (Unstandardized scales)

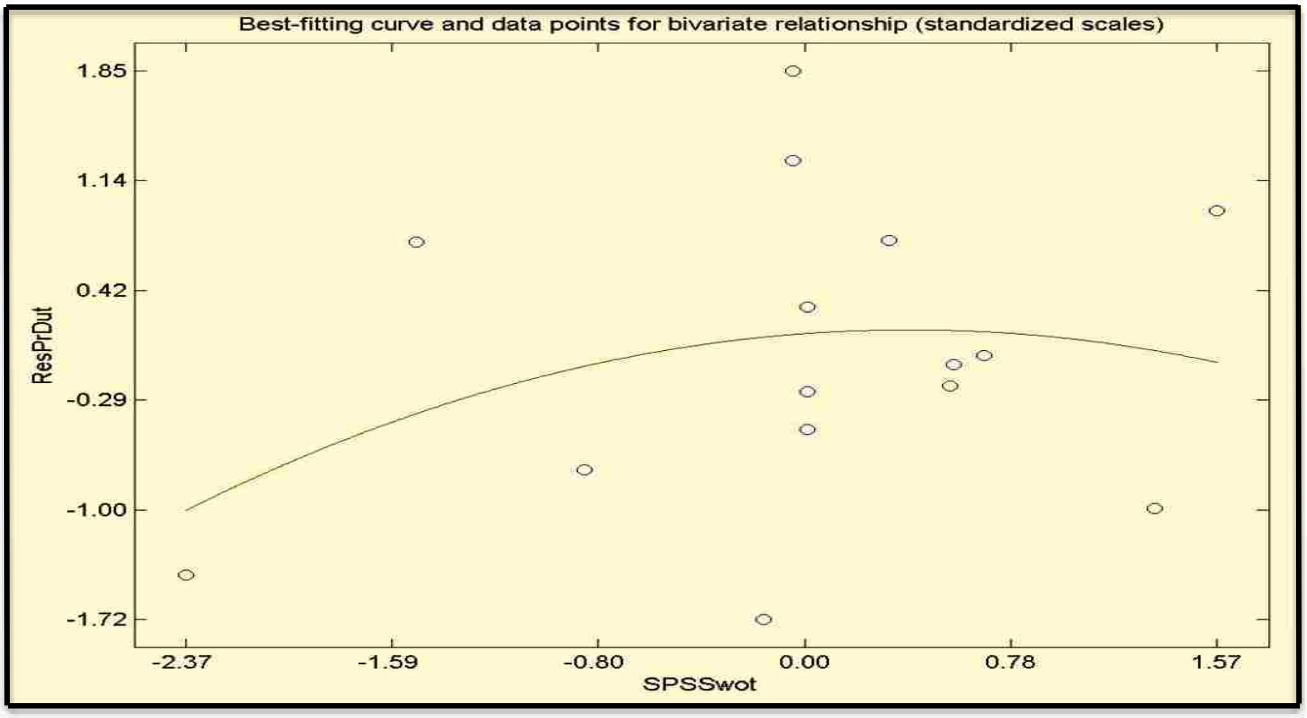


Figure D9: Graphical Representation of the *SPSS* Software for Quantitative Data Analysis without Training (Standardized scales)

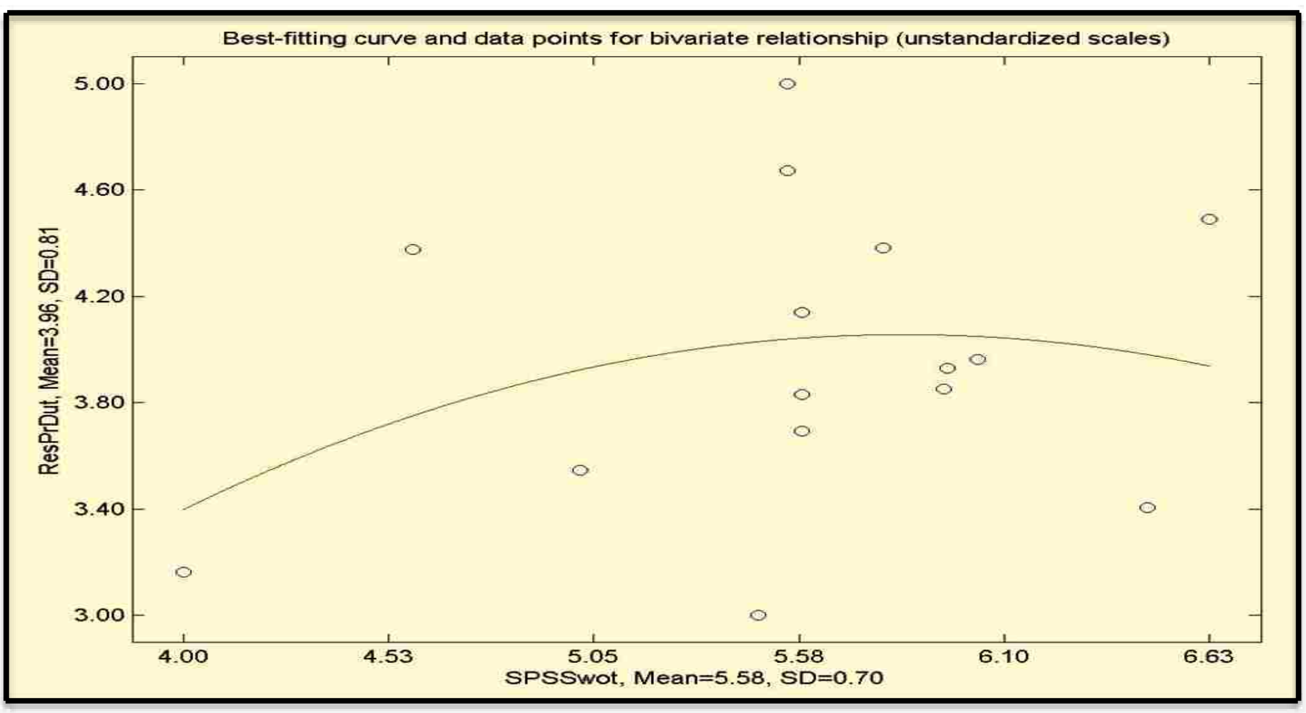


Figure D10: Graphical Representation of the *SPSS* Software for Quantitative Data Analysis without Training (Unstandardized scales)

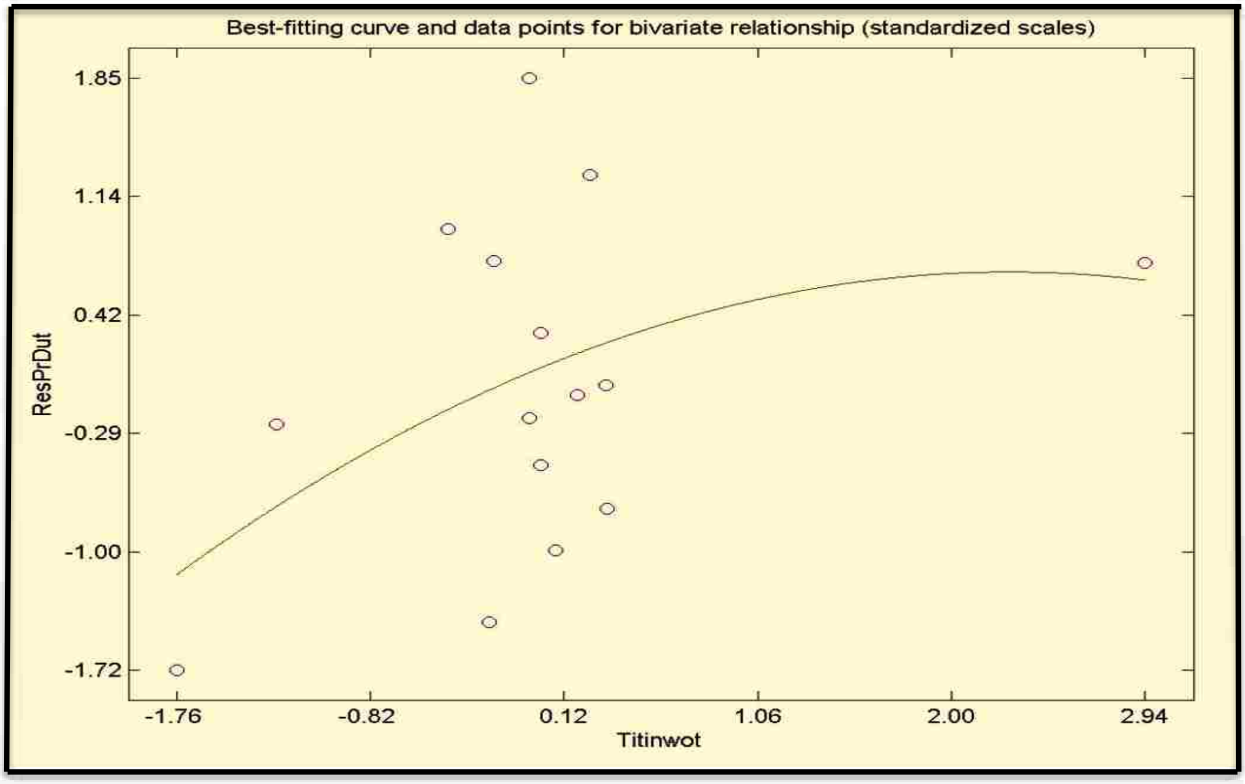


Figure D11: Graphical Representation of the *Turnitin* Software without Training (Standardized scales)

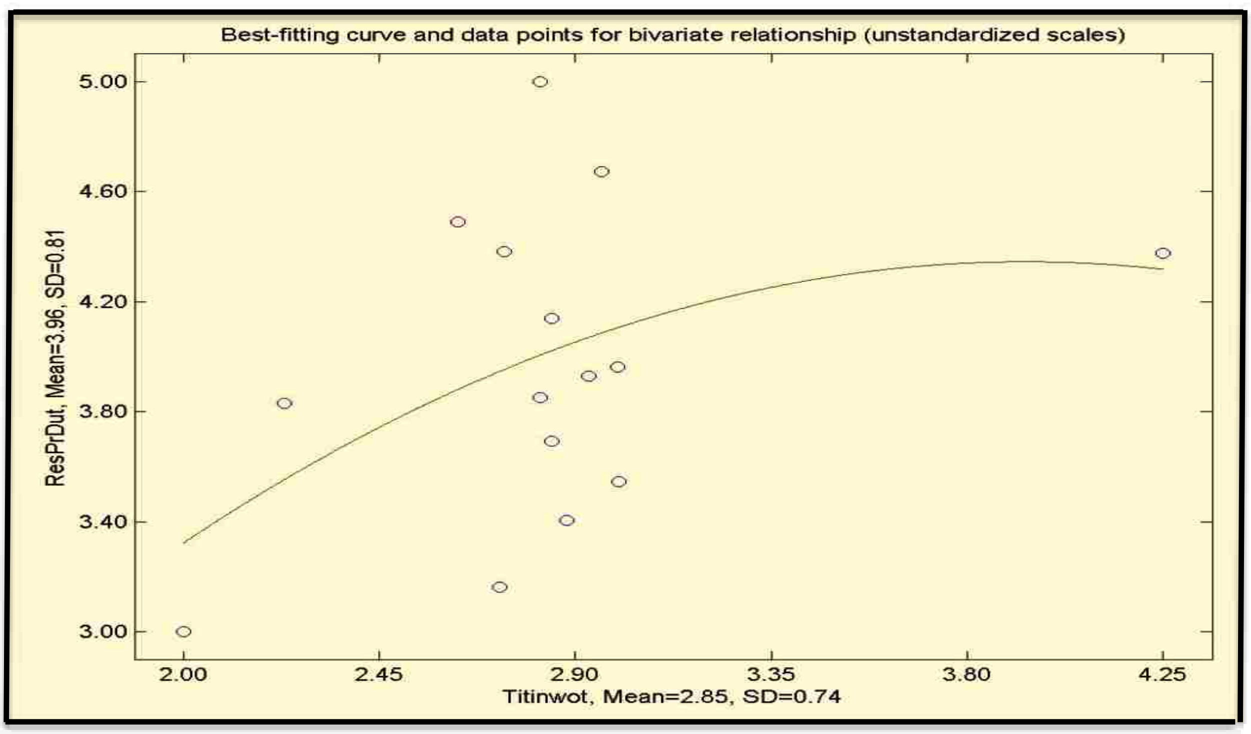


Figure D12: Graphical Representation of the *Turnitin* Software without Training (Unstandardized scales)

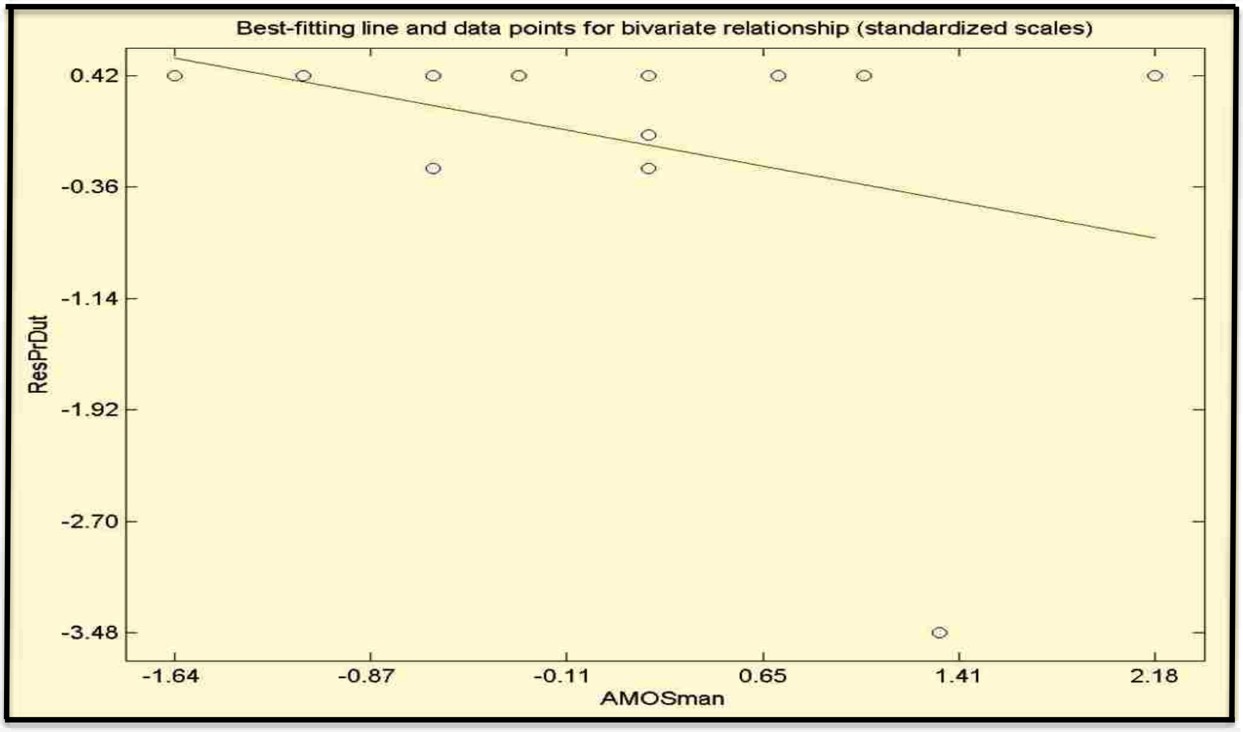


Figure D13: Graphical Representation of the *AMOS* Software Using a Manual System (without using research software/tools and training) (Standardized scales)

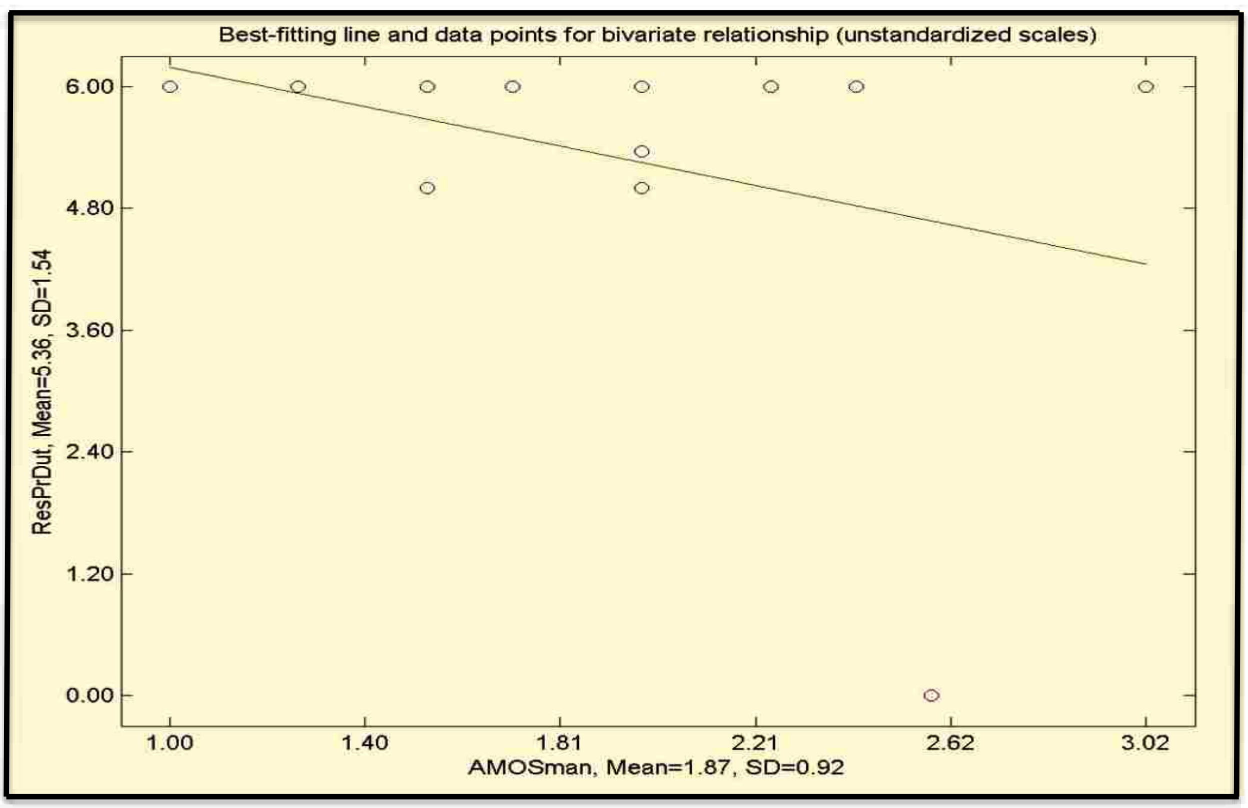


Figure D14: Graphical Representation of the *AMOS* Software Using a Manual System (without using research software/tools and training) (Unstandardized scales)

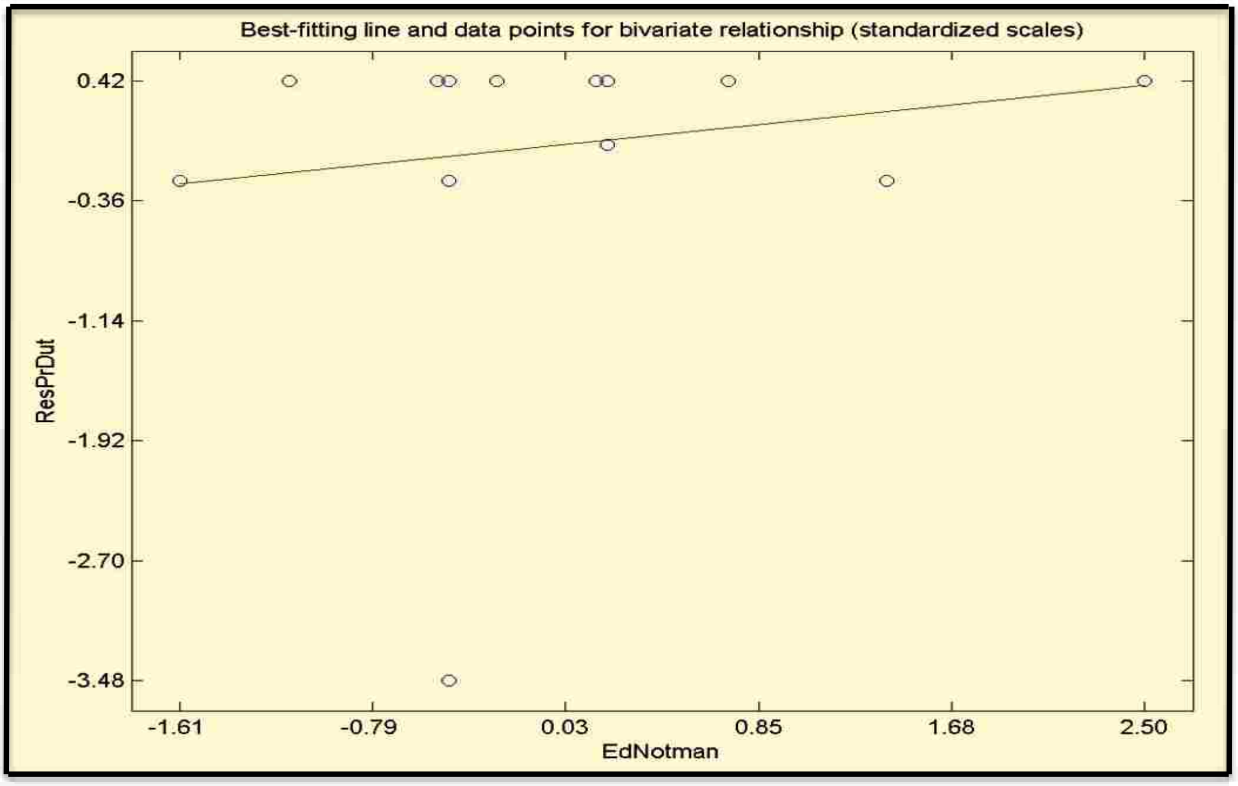


Figure D15: Graphical representation of the *EndNote* software Using a Manual System (without using research software/tools and training) (Standardized scales)

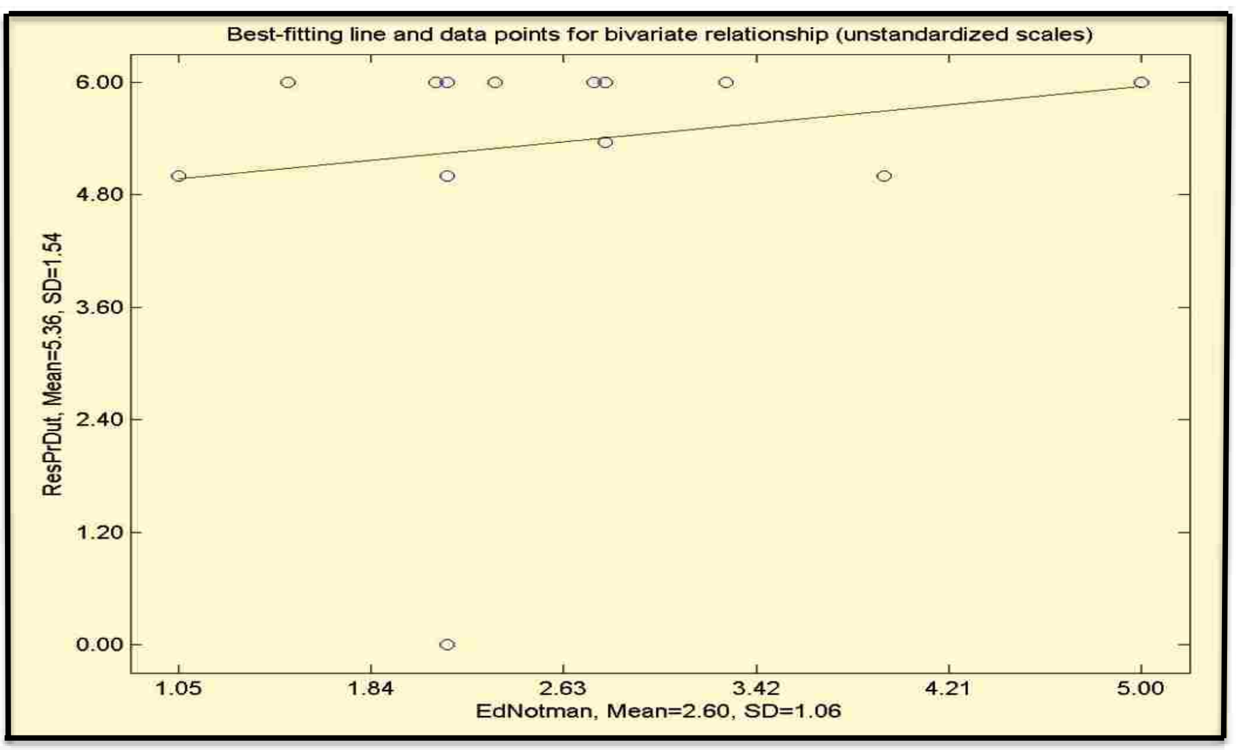


Figure D16: Graphical representation of the *EndNote* software Using a Manual System (without using research software/tools and training) (Unstandardized scales)

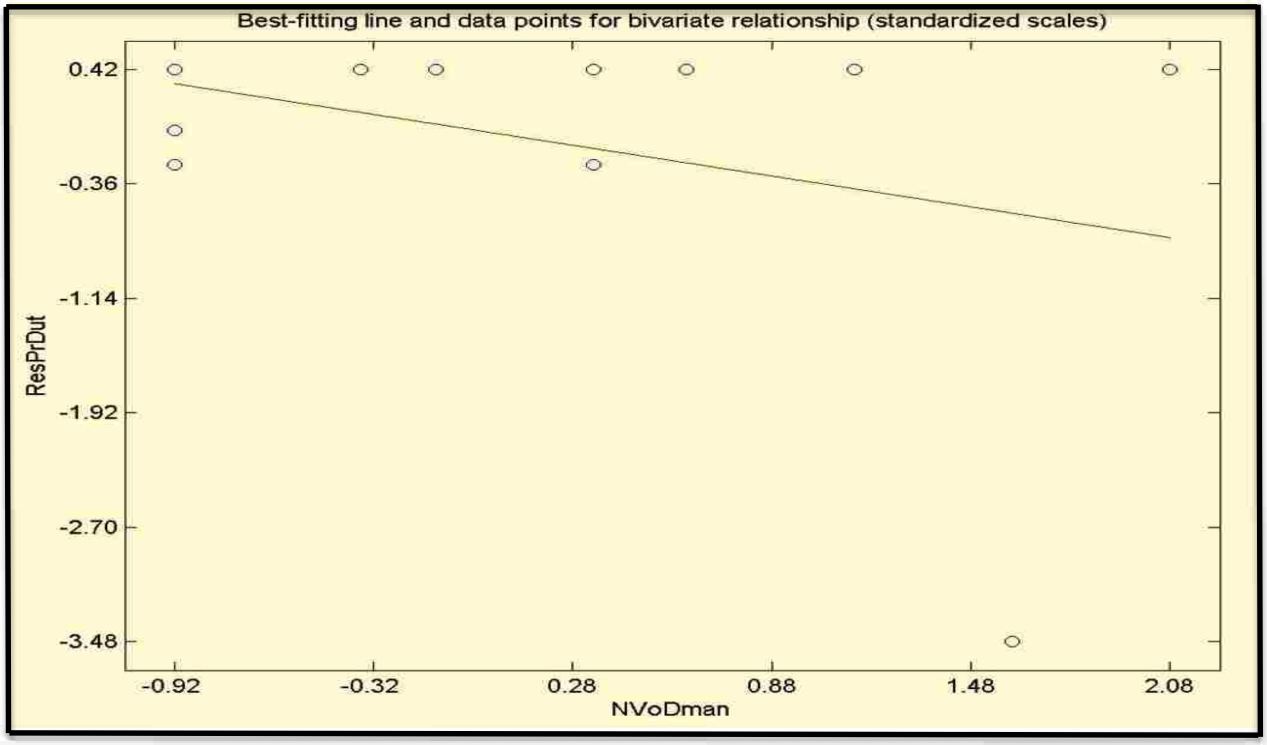


Figure D17: Graphical Representation of the *NVivo* for Data Analysis Software Using a Manual System (without using research software/tools and training) (Standardized scales)

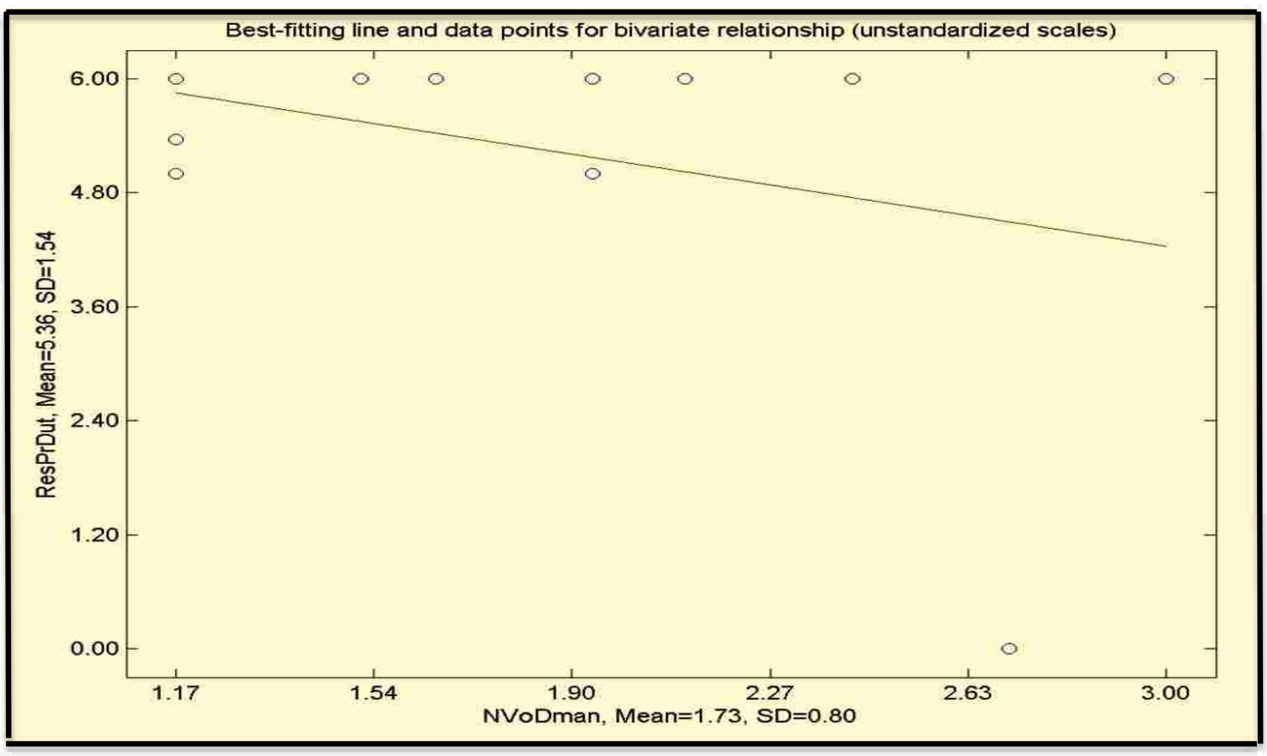


Figure D18: Graphical Representation of the *NVivo* for Data Analysis Software Using a Manual System (without using research software/tools and training) (Unstandardized scales)

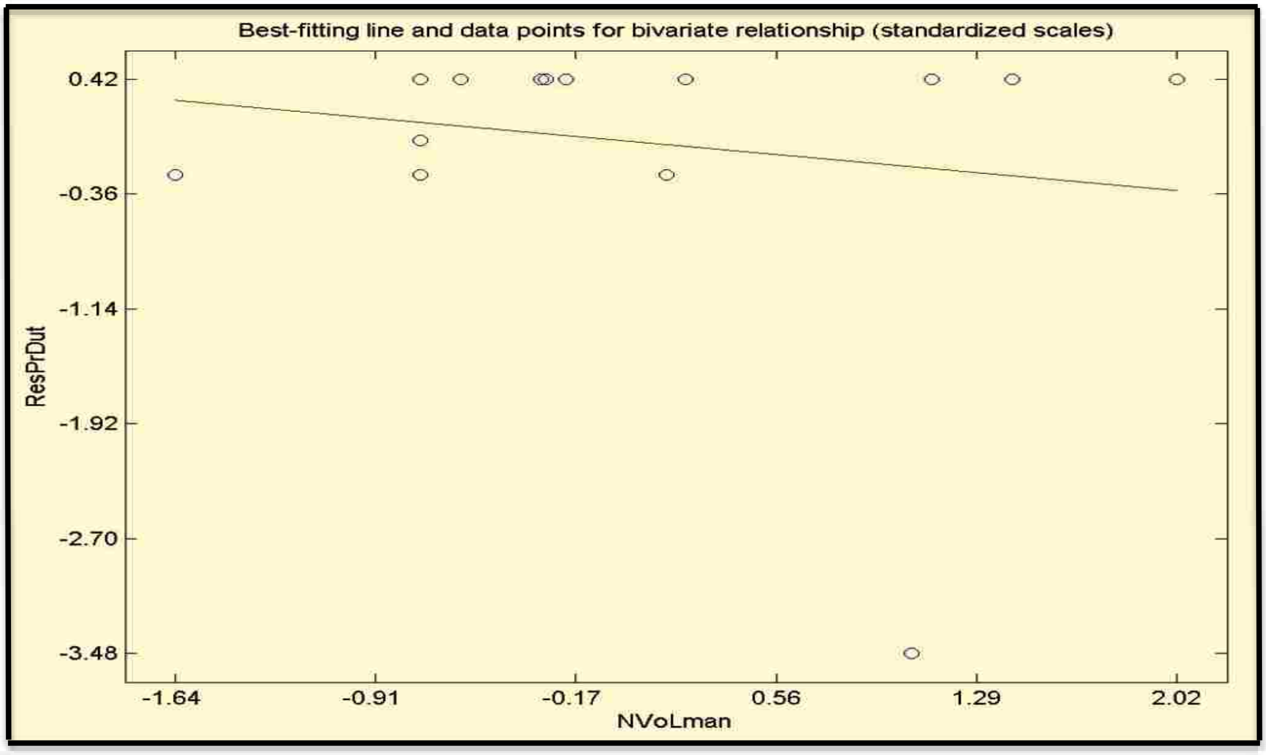


Figure D19: Graphical Representation of the *NVivo* Software for Literature Review Using a Manual System (without using research software/tools and training) (Standardized scales)

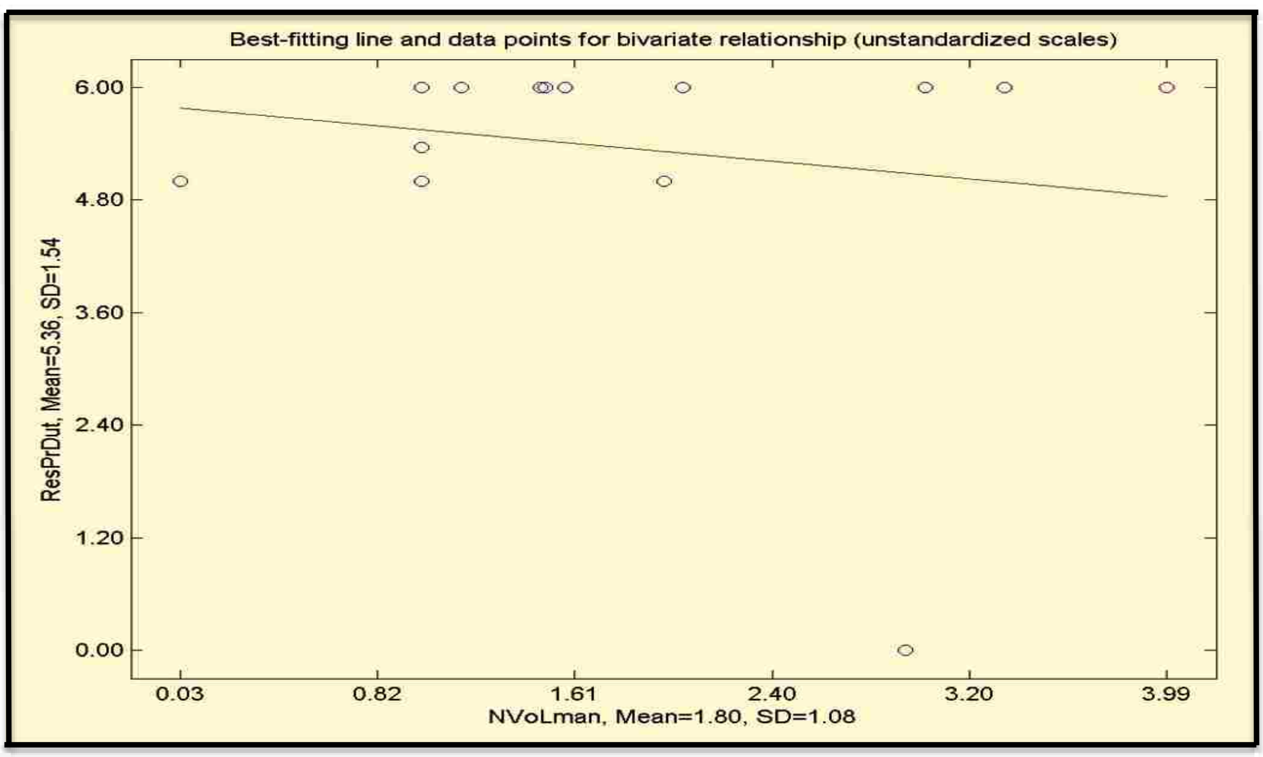


Figure D20: Graphical Representation of the *NVivo* Software for Literature Review Using a Manual System (without using research software/tools and training) (Unstandardized scales)

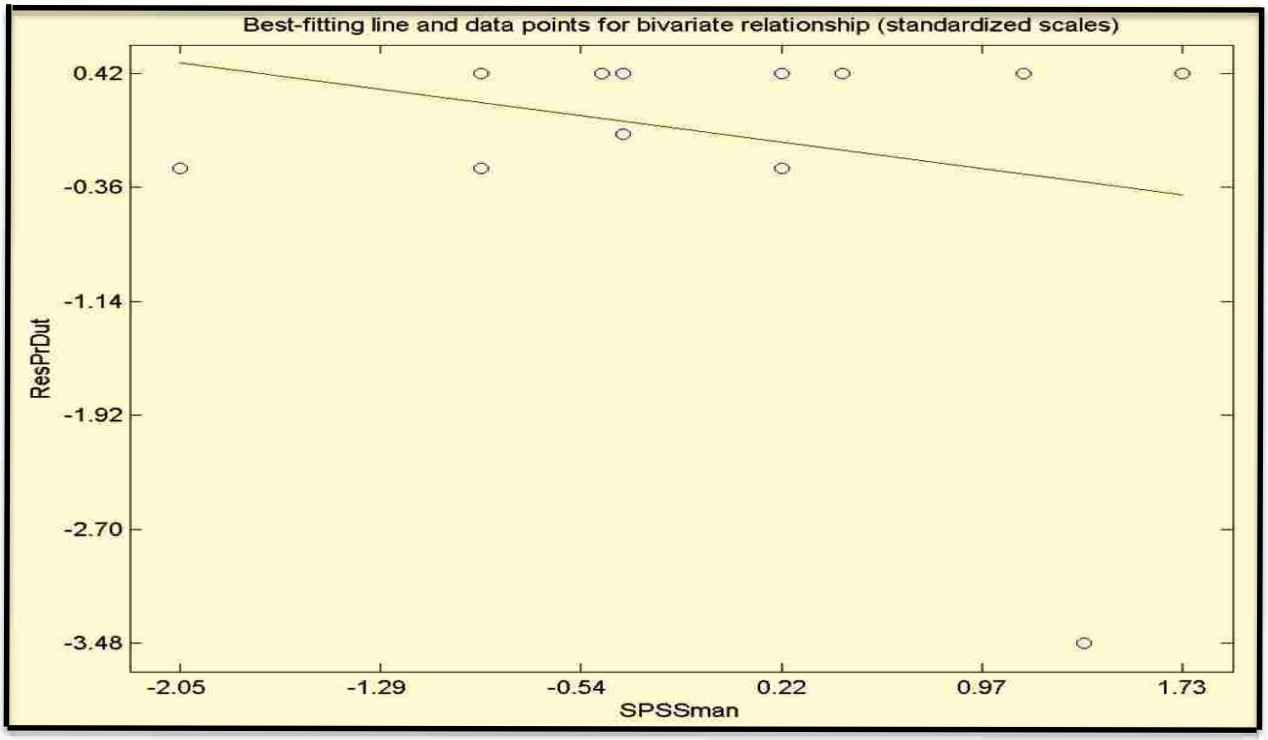


Figure D21: Graphical Representation of the *SPSS* software for Data Analysis Using a Manual System (without using research software/tools and training) (Standardized scales)

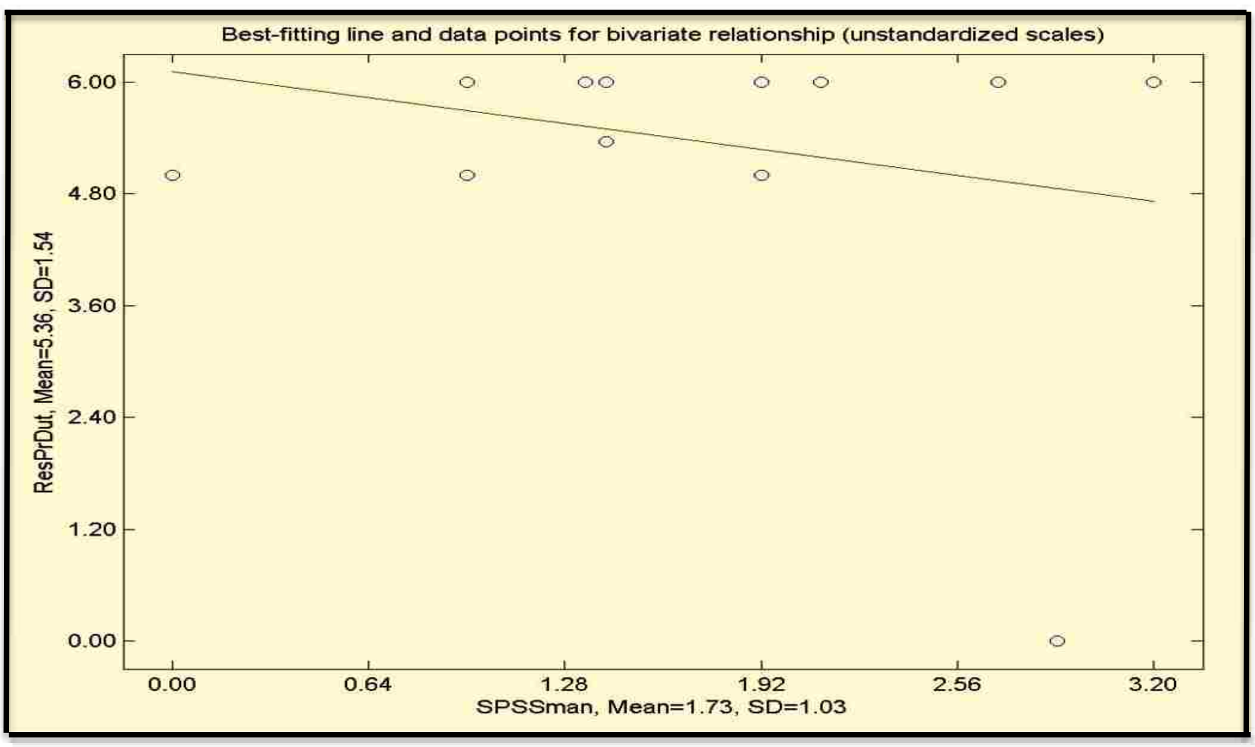


Figure D22: Graphical Representation of the *SPSS* software for Data Analysis Using a Manual System (without using research software/tools and training) (Unstandardized scales)

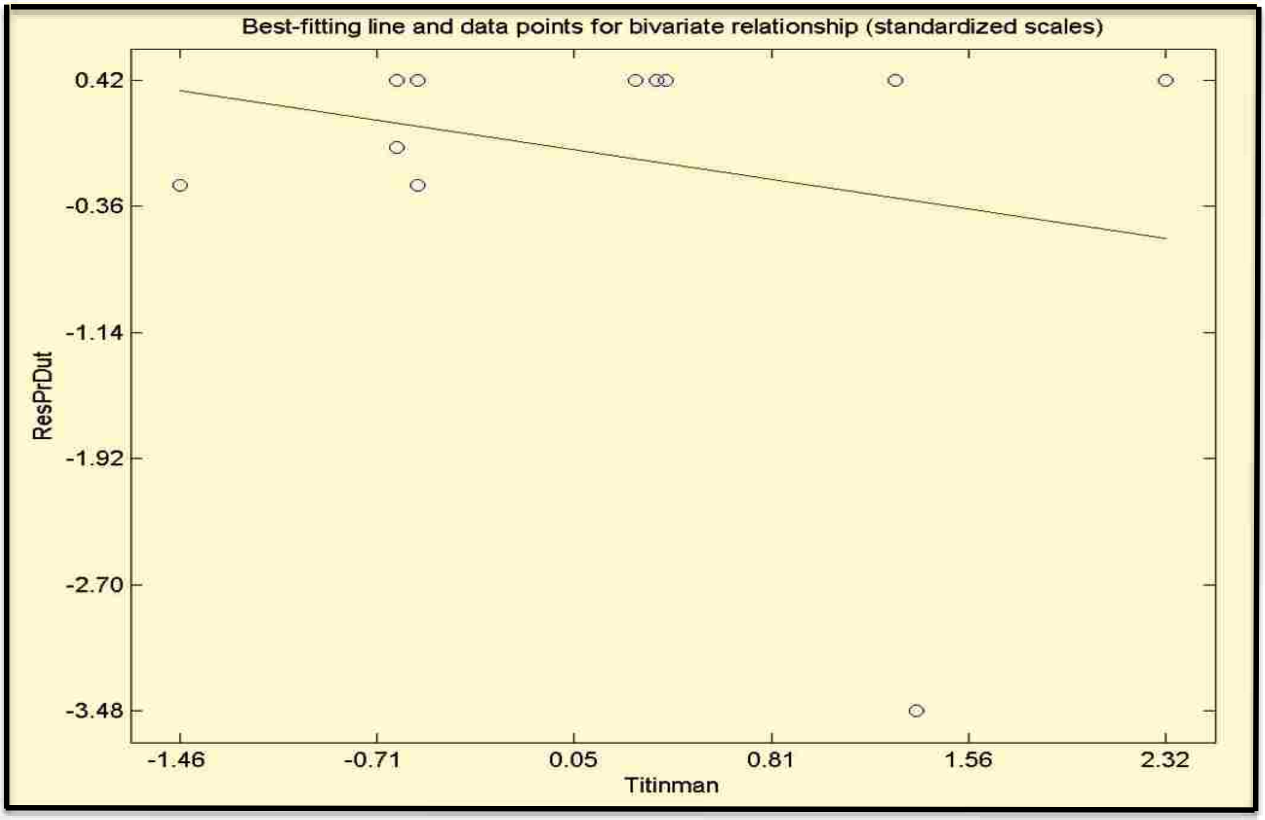


Figure D23: Graphical Representation of the Turnitin Software Using a Manual System (without using research software/tools and training) (Standardized scales)

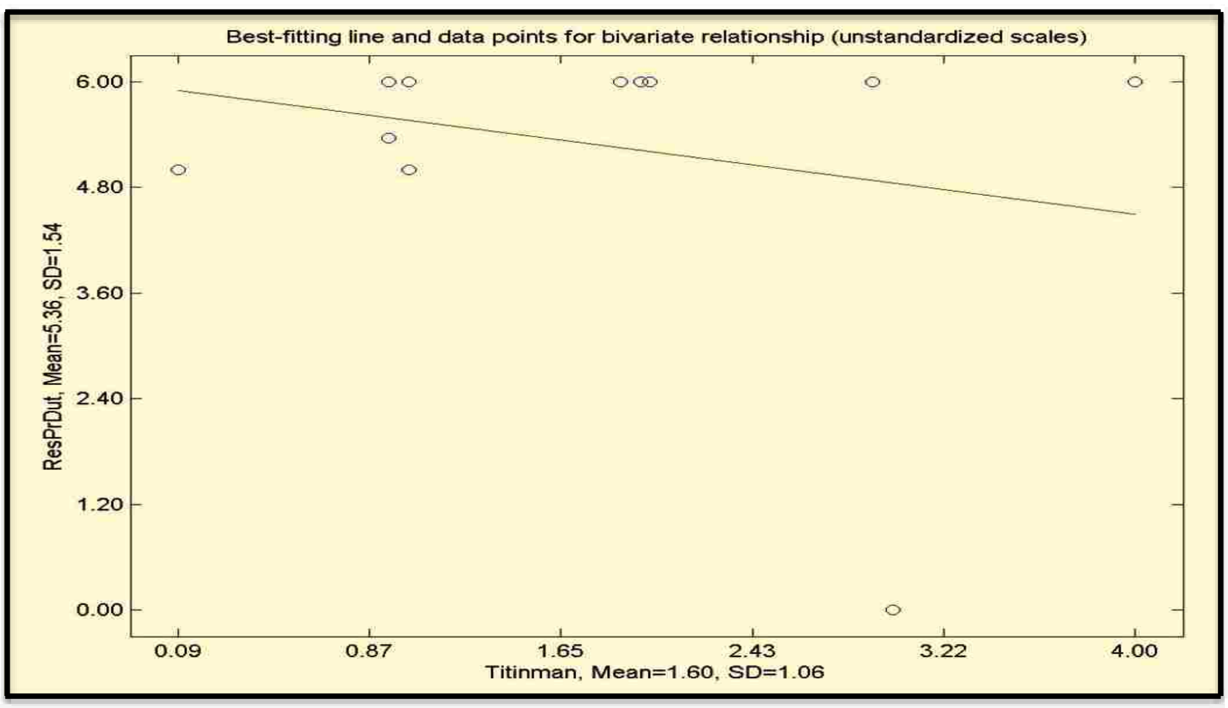


Figure D24: Graphical Representation of the Turnitin Software Using a Manual System (without using research software/tools and training) (Unstandardized scales)

Graphical Representation

Appendix E

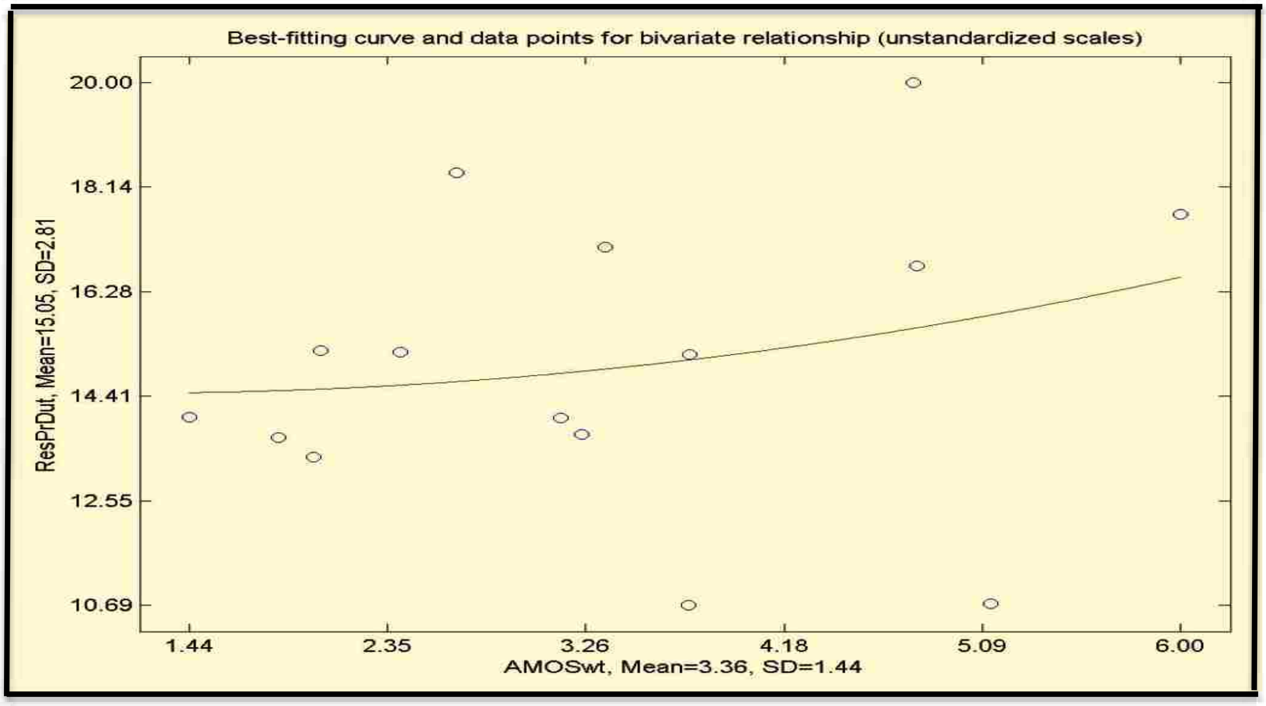


Figure E1: Graphical Representation of the AMOS Software with Training for Modelling (Unstandardized scales)

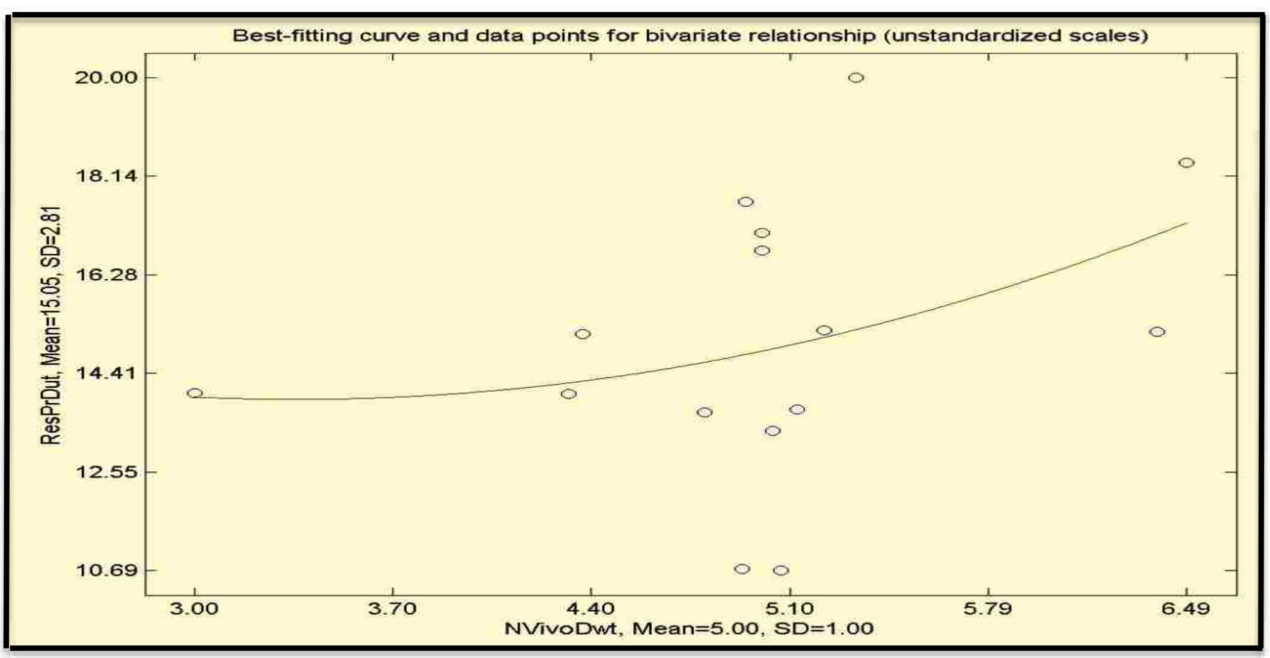


Figure E2: Graphical Representation of the NVivo Software with Training for Qualitative Data Analysis (Unstandardized scales)

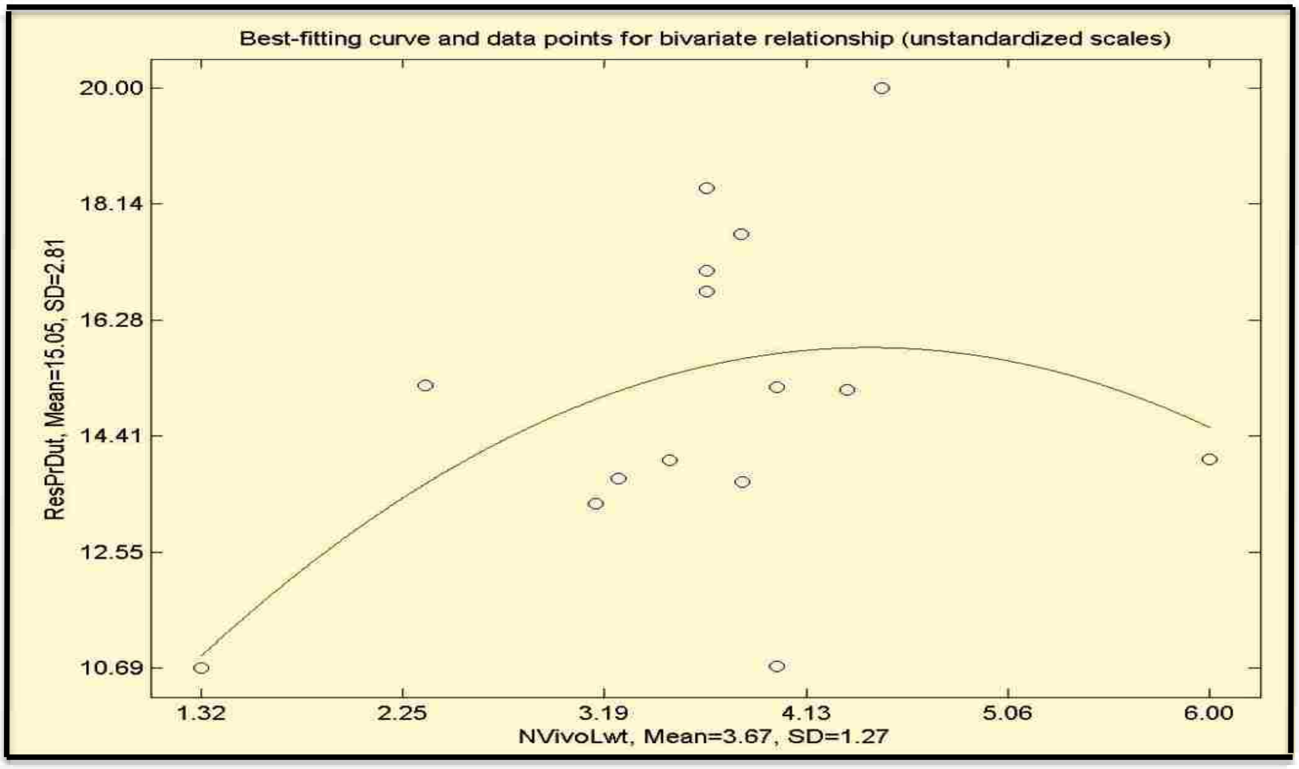


Figure E3: Graphical Representation of the NVivo Software with Training for Literature Review Analysis (Unstandardized scales)

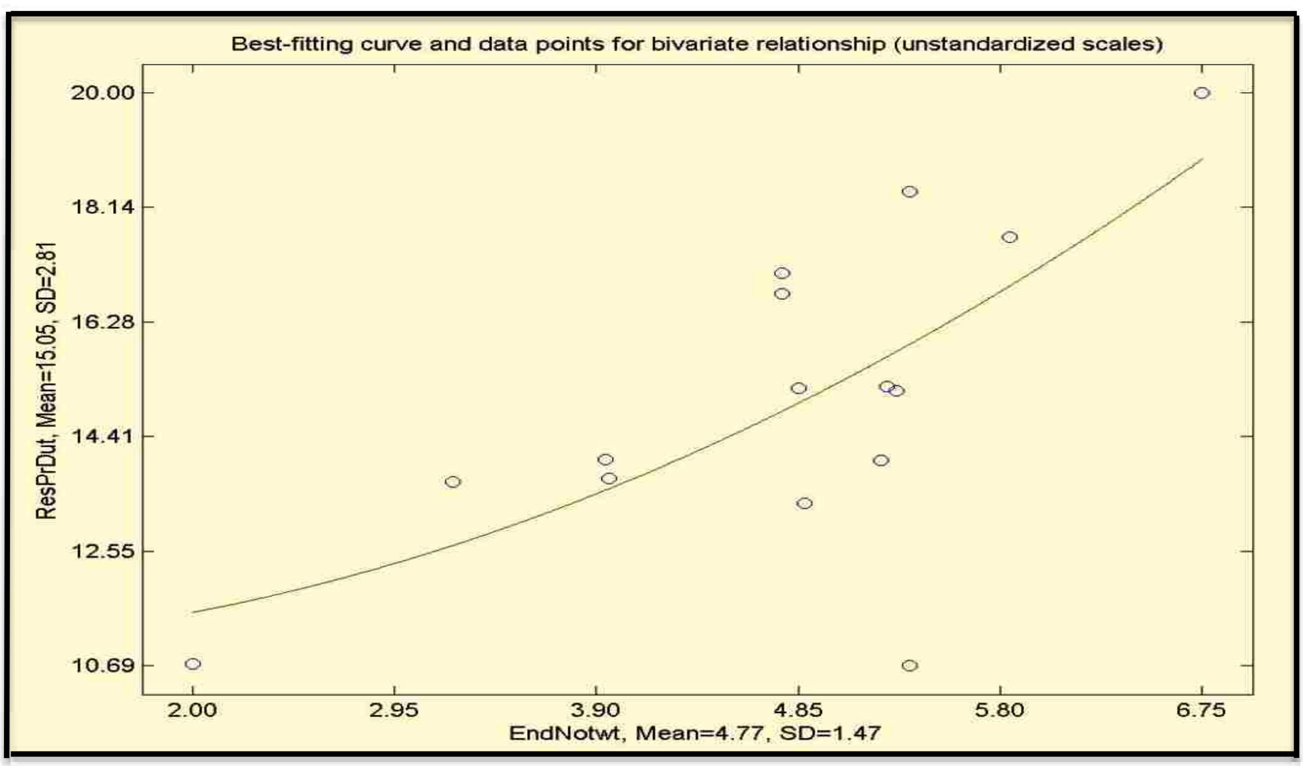


Figure E4: Graphical Representation of the EndNote Software with Training for Referencing (Unstandardized scales)

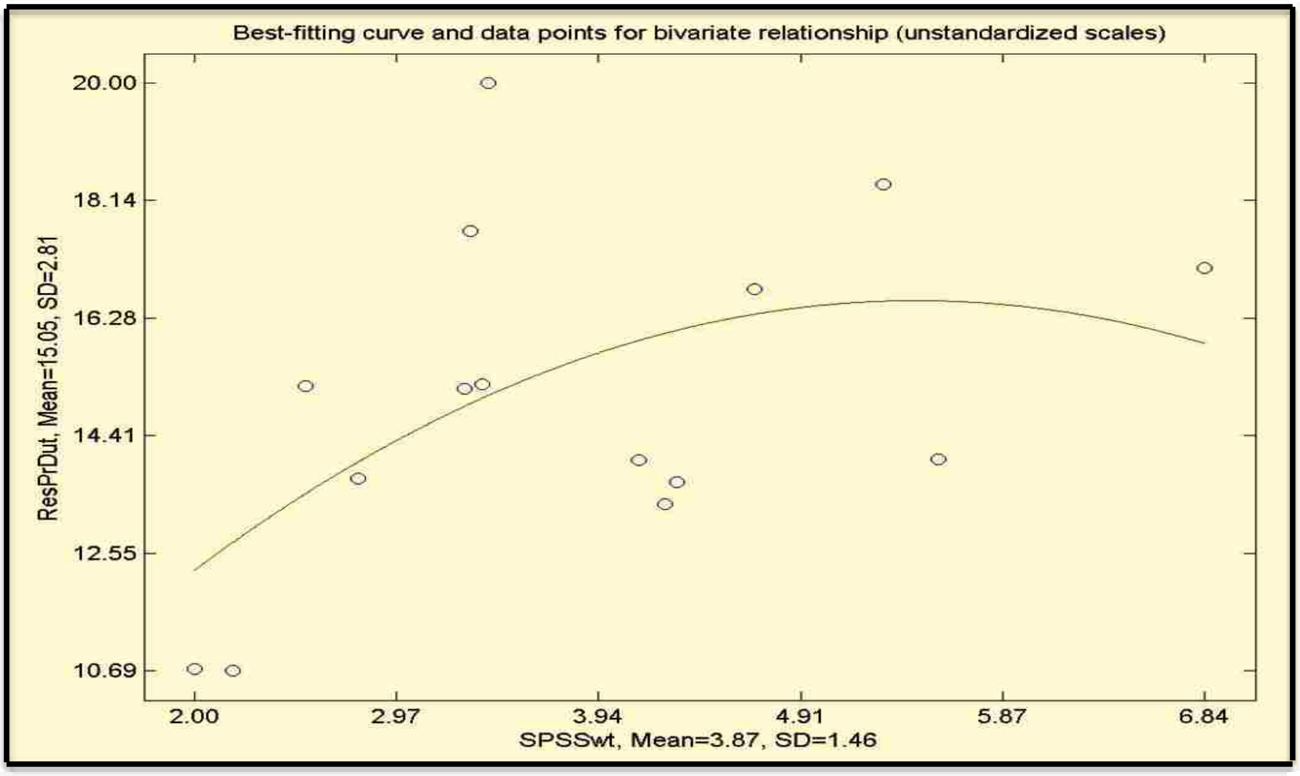


Figure E5: Graphical Representation of the SPSS Software with Training for Quantitative Data Analysis (Unstandardized scales)

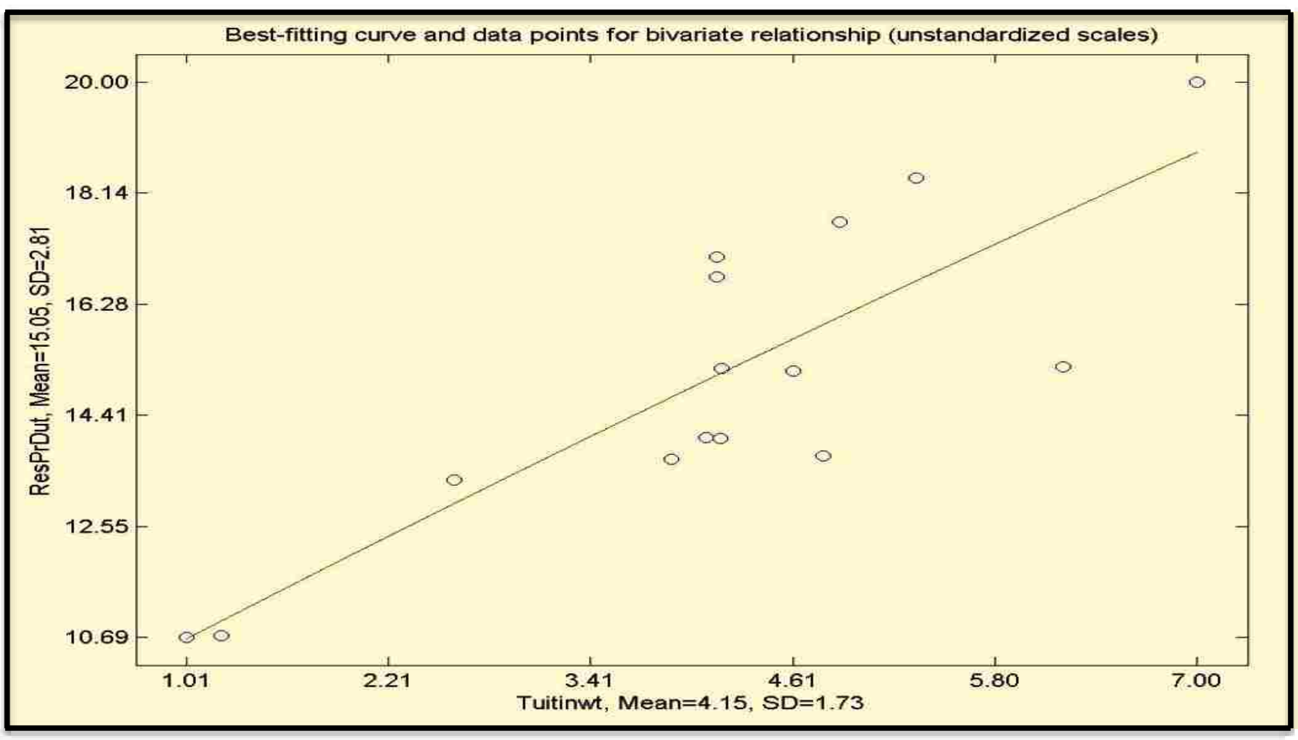


Figure E6: Graphical Representation of the Turnitin Software with Training for Plagiarism

Appendix F

Osmoz Consulting
Research & Training

Empower your research project

Mob.078 780 3795 /078 269 3365; Email: osmozconsulting@gmail.com
35, 5th Avenue, Florida, Johannesburg, South-Africa

TAX INVOICE

September, 09, 2014

Invoice No: OCI161322

TO: Sujit Kumar Basak

Facilitators: Emile Saker/Paul Issock

NB. Please note that the client is requested to pay half the amount due after agreement.

DESCRIPTION	Unit	Rate/ session	AMOUNT (Rand)
Special training Amos, SPSS, Nvivo (basics)	1	8000	8000
Questionnaire auditing			500
Total Due	R8500 (eight thousand five hundred rand)		

FNB
Account Number: 62300884394
Account Name: Emile Saker Nkwei
Branch code: 250655

Thank you for your business!

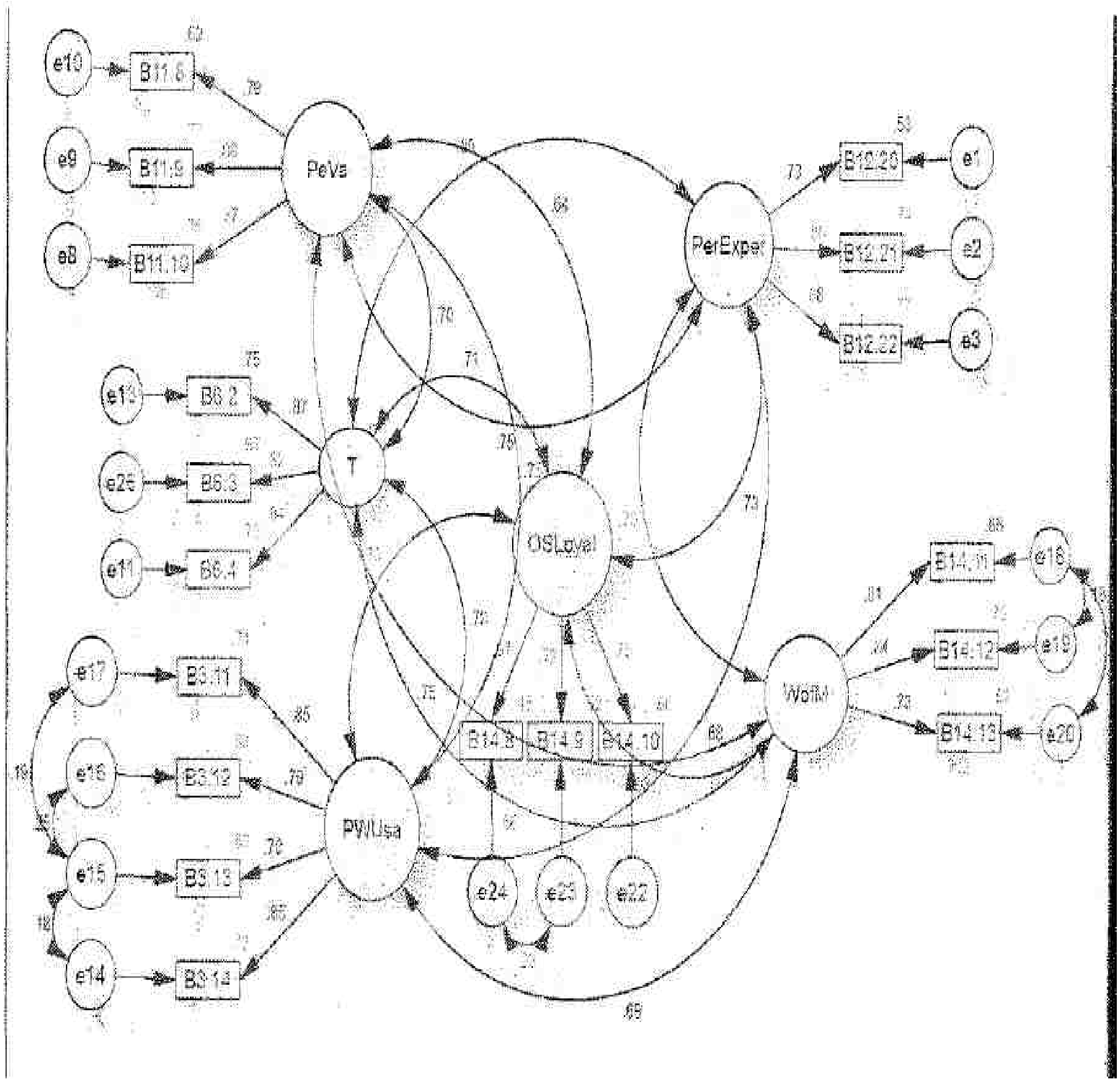
Training Sessions Pictures **Appendix G**

AMOS and NVivo (for data analysis) Training Session

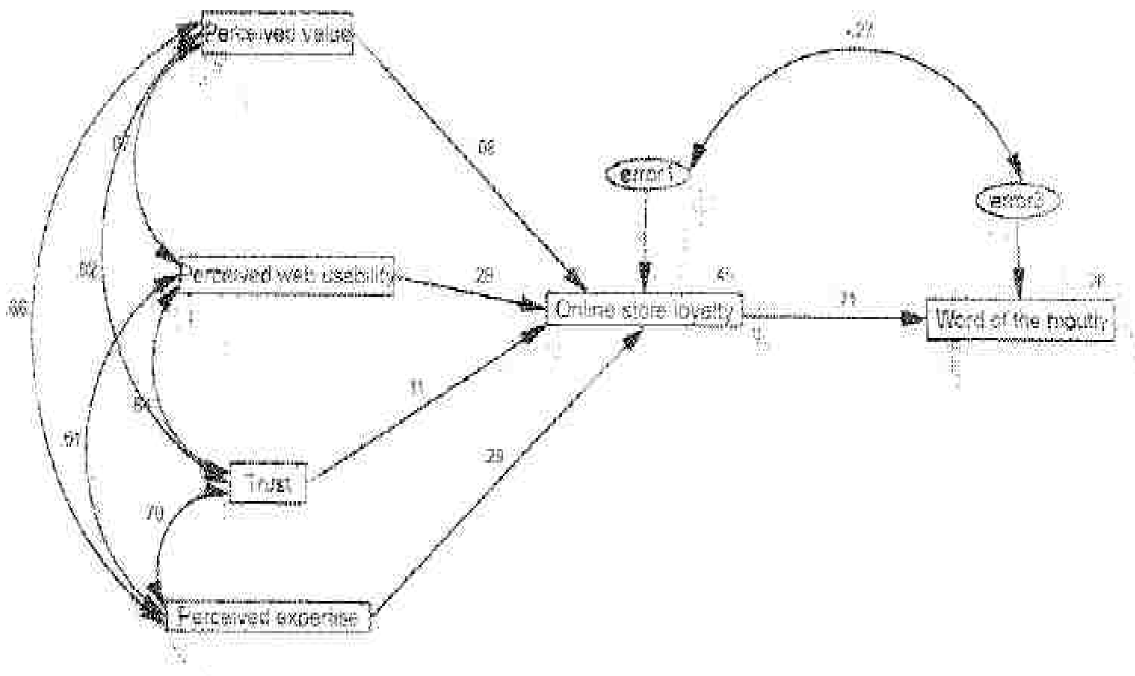
SPSS Training Session

EndNote and Turnitin Training Session

Measurement model



Structural model



Exercises:

Creating a Nvivo file, importing sources, creating nodes, coding in a node, running queries (text search and world frequency), visualising graph, reporting the results.

Ackoff (1967) pointed out one of the fundamental myths of information systems, namely that users did not need to know how their system works. Kenway and Langmead (1998) have argued that the dramatic increase in workloads and expectations have led to a divided academe among those who are identified as 'knowledge workers' and 'traditionalists'. Crawford et al. (1998) found mathematics students' tertiary entrance rankings not to be associated with a deep approach, using factor analytic procedures, but found a relationship using hierarchical cluster analysis. The research emphasising the importance of collaboration in the development of a credible workload model (Burgess et al., 2003; Houston et al., 2006; Vardi, 2009) was illustrated in the case study, by the key role of the staff representatives. To achieve faculty acceptance WPS has to be transparent and has to assure equity of workload allocation (Burgess et al., 2003). Other solutions would include establishing a measure of inversion and the degree to which it exists, using models to reduce the inversion by adjusting faculty salaries in each discipline, and evaluating the performance of the faculty and the models (Jennings and McLauglin, 1997).

	A. Getting Started11	B: Proxy Document11
1: Basak, Jayanta Kumar; Titumir, Rashed Al Mahmud: Dey,	The literature on faculty research performance is reviewed, with a focus Gill research by individual faculty members. The literature on the sociology of science and data-based results from sociological studies are emphasized. Attention is directed to measures of performance, the explanations and specific correlates	Faculty Research Performance: Lessons from the Sciences and the Social Sciences John W. Creswell ASHE-ERIC Higher Education Report No. 4, 1985
2: Basak, Sujit K; (2014) – 8	Blackburn and Lawrence (1995) epitomize this perspective in their model of faculty productivity. Their model places the greatest emphasis on self-knowledge, which includes personal interest, commitment, efficacy, psychological characteristics, satisfaction, and morale. Less important according to Blackburn and Lwrence is social knowledge, which includes social support, perceived institutional performance, and institutional values (e.g., rewards). Environmental influences	Other authors also have emphasized the psychological and behavioural implications of faculty experiences. Bess (1978), Clark (1987), and Clark and Corcoran (1986) claim that experiences during graduate school help shape the future faculty member's attitudes and behaviour. Alpert (1985), Baldwin and Blackburn (1981), Boice (1992), and Reynolds (1992) claim that the experiences during the early part of the faculty member's career also affect psychological development and orientation,

	have a tertiary role in their model.	and thereby influence behaviour.
3: Basak, Sujit K; Obono, Seraphin Desire Eyono; (2013) – 6	INGENIO (CSIC-UPV), Institute of Innovation and Knowledge Management. Ciudad Politécnica de la Innovación, Edificio 8E-4[a] planta-Camino de Vera s/n, 46022 Valencia, Spain.	This paper evaluates wheter university-industry relationships (UIR) and academic research activites have complementary effects on the scientific production of university lectureers. The analysis is based on a case study of two Spanish universities. We find that the effects of R&D contracts with industry.
4: Basak, Sujit K; Obono, Seraphin Desire Eyono; (2013) - 7	Definition), (2) scientific edu- cation (supply-based definition), and (3) scientific occupation (demand-based definition). In studies of sex differences in research productivity, a supply-based definition is implicit in many studies that draw samples from recipients of doctoral degrees in science (Clemente 1973; Cole and Zuckerman 1984; Long 1992; Reskin	based and demand-based criteria and define scientists as individuals with doctoral de- grees who occupy faculty positions in scie- ence at academic institutions. This is a conservative strategy, as it removes a significant source of heterogeneity (job setting) between the sexes.
5: Burgess, TF;Lewis, HA;Mobbs, T; (2003) – 12	Purpose: A study was conducted at two merged South African higher education institutions to	Value of research: Findings provide direction on the differences in managing research active and research

	determine which management factors, as identified in a literature study as well as through a factor analysis of survey data, were predictive of the dependent variable "research output".	non-active academics. Findings could influence institutional research management practices and policies.
6: Comm, Clare L;Mathaisel, Dennis FX; (2003) – 2		
7: Houston, Don;Meyer, Luanna H;Paewai, Shelley; (2006)	The goal of robust methods is to provide estimation procedures that are robust in the sense that estimation results are not overly influenced by the presence of extreme observations, while retaining efficiency properties in the case when the data is not excessively characterized by outlying obseervations (e.g. in the case of a Gaussian error distribution). The overall robustness of an estimator can be characterized by the so-called breakdown point which is defined as the share of extreme observations up to which the influence of such observations on the estimates remains bounded.	The intuition behind the estimator defined in (7) and (8) is clear: instead fo considering squared residuals when minimizing the sum of deviations from the regression plane, easch residual under-goes a transformation ρ(·) such that the influence of large residuals is dampened (depending on the constant k).
8: Mehboob, Farhan; (2006) –	This study integrates two	Subjective nrm is the

5	infamous behaviour theores, namely, theory of planned behaviour (Azjen, 1991) and technology acceptance model (Davies, 1989). The objective is to examine the antecedent of internet purchasing behaviour and intention amongst Malaysian consumers. The teroretical underpinning of the two theories is discussed next.	perceived social pressure to engage or not to engage in a behaviour. It si assumed that subjective norm is determined by the total set of accessible normative belief concerning the expectations of important referents (Ajzen, 1991). Chai and Pavlou (2002) found subjective norms to be significantly related to intention in both countries US and Greece. However, subjective norm was not related to internet pubchasing (George, 2002).
9: Soliman, Izabel;Soliman, Hani; (1997) – 1	The International Scientific Committee has the pleasure of inviting you as oral presenter delegate to the ICAPBS 2014: XII International Conference on Applied Psychology and Behavioral Sciences to be held in Cape Town, South Africa on November, 6-7, 2014.	Your are strongly urged to submit your proof of payment document to conference registration secretariat as soon as October, 10, 2014 as the very latest 1 : 147,378-278,506