A Model To Increase The Research Productivity Of University Academics Using Ict Adoption And Ict Training

Sujit Kumar Basak, Desmond Wesley Govender *

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. 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 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.

Keywords: Research productivity, ICT adoption, ICT training, university academics.

INTRODUCTION

Higher educations were created for various professions, including legal, medical and religious (Montesions et al., 2008). 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). “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” (Altbach, 2008).

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).

According to Iqbal (2011:189), “Research Productivity is combination of two words “Research” and “Productivity”. “Research” means very careful, observant, and vigilant study or investigation of phenomena, particularly to search and find out new particulars, information and facts. While “Productivity” means production or output, produced in duration of time. Both the words means different to different people. With reference to higher education, research productivity means, publications of papers in professional journals, in shape of books or presentation or research papers in conference proceedings”.

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). 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). 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.

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).

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 Norway, a survey conducted in 2001 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). 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, 2011).
Commission, 2005). 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. According to Okiki and Iyabo (2013), the research productivity of the academic staff in Nigerian federal universities was lower in textbook publications, monographs, patents and certified inventions. In a study by Russell and Hong (2004) states that scientists in developing countries have been slower to adopt ICTs because of the lack of telecommunications, power, and institutional infrastructure.

Aim, Objectives and Research Questions

The aim of this study is to design a research productivity model for university academics using ICT adoption and ICT training.

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

- To analyse the impact of ICT adoption and ICT training on the research productivity by university academics;
- To design a model on ICT adoption and training for the increase of research productivity.

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

- What is the impact of ICT adoption and ICT training on research productivity by university academics?
- How can the ICT adoption and ICT training model increase the research productivity?

Literature Review

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”. 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. 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 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 research effective in higher institutions. Jensen and Folley (2011) conducted a study 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 results showed that ICT enhanced teaching, research, and learning.

Effect of technology training on various software for the work performance

Turnitin. According to Batane (2010), Turnitin is web-based software and it 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. Cheach and Bretag (2008, cited in Literature Review:
show that using Turnitin as a teaching tool resulted in fewer cases of plagiarism and increased students’ understanding of academic integrity 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.”

**Analysis of Moment Structure (AMOS).**

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. 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)”.

**NVivo**

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

**Using NVivo Software Literature Review.**

“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). 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.

**Using NVivo Software Qualitative Data Analysis (e.g., interview, audio, and video).** In a study by Hoover and Koerber (2011) indicated that qualitative data analysis NVivo software enhances research in terms of efficiency, multiplicity, and transparency. Another study by Azeem and Salfi (2012) indicated that 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”. Castleberry (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, LinkedIn, 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”.

**SPSS (Statistical Package for the Social Sciences).** SPSS software is now called PASW Statistics and it 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 (1997a, b) suggested that the use of technology helps to automate many routine operations which, in turn, facilitate the learning process. 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).

**EndNote.** According to Harrison et al. (2005), 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).

**Methodology**

This section provides the instrument design, target population, sample, data collection, training, and data analysis. 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 this section 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.

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 21.0. 50% of the staff from the largest university, 30% from the second largest university, and 10% from each of the two smallest universities. On the other hand, for the 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, although only 103 respondents actually participated in the survey.

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 (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training on research productivity; using a manual system (without using research software/tools and training) on research productivity. 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, 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 1, below), although these participants varied due to their availability.

<table>
<thead>
<tr>
<th>Name of the Software</th>
<th>Initially expected total no. of participants for all the three categories</th>
<th>Total no. of participants participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPSS</td>
<td>15*3=45</td>
<td>45</td>
</tr>
<tr>
<td>Turnitin</td>
<td>15*3=45</td>
<td>41</td>
</tr>
<tr>
<td>EndNote</td>
<td>15*3=45</td>
<td>40</td>
</tr>
<tr>
<td>AMOS</td>
<td>15*3=45</td>
<td>44</td>
</tr>
<tr>
<td>NVivo for data analysis</td>
<td>15*3=45</td>
<td>41</td>
</tr>
<tr>
<td>NVivo for literature review</td>
<td>15*3=45</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>270</td>
<td>250</td>
</tr>
</tbody>
</table>

Results

Research Productivity or Output for the Year of 2011

The above figure 1 shows that among four universities academic staff members publishing research papers with a percentage of 1.21%, followed by internal publication 0.46%, masters graduated 0.25%, funds and grants 0.23%, books and book chapters 0.19%, visiting professor 0.17%, volume edited 0.15%, awards 0.15%, book
ICT Adoption

This section investigates the impact that ICT adoption has on research productivity. From Figure 2, 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 high impact on the research productivity. These items are followed by 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 Figure 2.

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)

Table (2) represents 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). ICT using with training model values for the Average path coefficient (APC), Average R-squared (ARS), Average adjusted R-squared (AARS) is higher than ICT use without training and everything manually. On the other hand, Goodness of Fit, Sympon’s paradox ratio, R-squared contribution ratio values are higher than ICT use without training and everything manually.
Table (2)
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)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average path coefficient (APC)</td>
<td>0.293</td>
<td>Good if P=0.002</td>
<td>0.447 Good of P&lt;0.001</td>
</tr>
<tr>
<td>Average R-squared (ARS)</td>
<td>0.945</td>
<td>Good if P&lt;0.001</td>
<td>0.891 Good if P&lt;0.001</td>
</tr>
<tr>
<td>Average adjusted R-squared (AARS)</td>
<td>0.904</td>
<td>Good if P&lt;0.001</td>
<td>0.809 Good if P&lt;0.001</td>
</tr>
<tr>
<td>Average block VIF (AVIF)</td>
<td>2.130</td>
<td>Acceptable if &lt;=5, ideally &lt;=3.3</td>
<td>1.642 Acceptable if &lt;=5, ideally &lt;=3.3</td>
</tr>
<tr>
<td>Average full collinearity VIF (AFVIF)</td>
<td>26.788</td>
<td>Acceptable if &lt;=5, ideally &lt;=3.3</td>
<td>16.559 Acceptable if &lt;=5, ideally &lt;=3.3</td>
</tr>
<tr>
<td>Goodness of Fit (GoF)</td>
<td>0.618</td>
<td>Small &gt;=0.1, medium &gt;=0.25, large &gt;=0.36</td>
<td>0.587 Small &gt;=0.1, medium &gt;=0.25, large &gt;=0.36</td>
</tr>
<tr>
<td>Sympson’s paradox ratio (SPR)</td>
<td>1.000</td>
<td>Acceptable if &gt;=0.7, ideally =1</td>
<td>1.000 Acceptable if &gt;=0.9, ideally=1</td>
</tr>
<tr>
<td>R-squared contribution ratio (RSCR)</td>
<td>1.000</td>
<td>Acceptable if &gt;=0.9, ideally =1</td>
<td>1.000 Acceptable if &gt;=0.9, ideally=1</td>
</tr>
<tr>
<td>Statistical suppression ratio (SSR)</td>
<td>0.833</td>
<td>Acceptable if &gt;=0.7</td>
<td>0.667 Acceptable if &gt;=0.7</td>
</tr>
<tr>
<td>Nonlinear bivariate causality direction ration (NLBCDR)</td>
<td>0.833</td>
<td>Acceptable if &gt;=0.7</td>
<td>0.750 Acceptable if&gt;=0.7</td>
</tr>
</tbody>
</table>
Table (3)

Mean and Standard Deviation of Research Productivity, ICT Adoption and ICT Training

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT Adoption</td>
<td>4.64</td>
<td>0.74</td>
<td>Research Productivity</td>
<td>172.92</td>
<td>11.02</td>
</tr>
<tr>
<td>ICT Training</td>
<td>5.73</td>
<td>0.30</td>
<td>Research Productivity</td>
<td>172.92</td>
<td>11.02</td>
</tr>
</tbody>
</table>

Table (3) represents the mean and standard deviation of research productivity of ICT adoption and ICT training. Table 3 shows that although the mean for ICT adoption and training are different but the mean for the research productivity is the same.

Proposed Model
Figure (3): A Proposed Model on ICT Adoption and Training for the Increase of Research Productivity

The proposed model (Figure 3) 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 $p<0.01$. However, after combining the values of ICT adoption and ICT training, they show that they will have a higher significance on the research productivity.

Model Graphs

Figure (4): ICT Adoption and Research Productivity
Figure (4) 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. Using ICT adoption for research productivity, the mean is 4.64 and the standard deviation is 0.74 (see Table 3). Finally, it shows that there is a significant relationship that ICT adoption has an impact on the research productivity.

![Best-fitting curve and data points for bivariate relationship (standardized scales)](image)

**Figure (5): ICT Training and Research Productivity**

Figure (5) 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. Using ICT with training for research productivity, the mean is 5.73 and the standard deviation is 0.30 (see Table 3). Finally, it shows that there is a significant relationship that ICT with training has an impact on the research productivity.

**Discussion And Conclusion**

The originality of this study is the fact that ICT adoption and ICT (SPSS, AMOS, Turnitin, EndNote and NVivo) with training increases research productivity for university academics. The final results of this study show that ICT with training leads to increase research productivity. However, this study have used two different types of methodologies for the increase of the research productivity for university academics namely for the experiment a training needs’ assessment model (Barbazette, 2006), and for the analysis of the data a questionnaire designed based on TAM (Technology Acceptance Model) (Davis, 1989).

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. 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), and Shariatmadari 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. This study however, will help to know researchers that ICT adoption and ICT with training increases research productivity by university academics.

REFERENCES


A Model To …

Sujit Kumar Basak, Desmond Wesley Govender

نموذج لزيادة إنتاجية البحوث في جامعة الأكاديميين باستخدام تكنولوجيا المعلومات والاتصالات والتدريب

اعتماد تكنولوجيا المعلومات والاتصالات

سوبرس كومار، ديزوند ويسلي جوفرد

ملخص

إنتاجية البحوث هي واحدة من المهام الأساسية للجامعة وأنه يلعب دورًا حاسمًا للأمة لتطوير وتقديج مكانها في العالم العالمي. تناولت هذه الدراسة أثر تطبيق تكنولوجيا المعلومات والاتصالات والتدريب على إنتاجية البحث الأكاديمي في الجامعة. وقد أجريت هذه الدراسة في أربع جامعات في كازولاو ناتال، جنوب أفريقيا، في حين أجريت كجزء من الدراست على تدريب تكنولوجيا المعلومات والاتصالات في جامعة واحدة من الجامعات الأربع. وقد أجريت هذه الدراسة على حد سواء في شكل دراسة استقصائية من 103 الجامعيين وسائل نسج تقنية المعلومات والاتصالات (الحالية، SPSS، AMOS، NVivo، WPS) مع التدريب للبحث، واستخدام تكنولوجيا المعلومات والاتصالات (الحالية، SPSS، AMOS، NVivo) مع التدريب المتزامن (SPSS، AMOS، NVivo، WPS) مع التدريب. حيث تم استخدام تقنية المعلومات والاتصالات في بدون تدريب للبحث، وآخراً، حيث تم استخدام النظام البيدي (اللأداءات والتدريب/الأدوات والتدريب) للأبحاث. كشفت النتائج النهائية أن استخدام أدوات تكنولوجيا المعلومات والاتصالات (الحالية، SPSS، AMOS، NVivo، WPS) مع التدريب وتزامن مع إنتاجية البحث بالمقارنة مع استخدام أدوات تكنولوجيا المعلومات والاتصالات من دون تدريب، و/أو استخدام نظام بيدي (اللأداءات والتدريب/الأدوات والتدريب). ينص نموذج ثبت إحصائياً بزيادة إنتاجية البحث الأكاديمي.

الكلمات الدالة: إنتاجية البحوث، واعتماد تكنولوجيا المعلومات والاتصالات والتدريب تكنولوجيا المعلومات والاتصالات، والأكاديميين الجامعيين.

* قسم تكنولوجيا المعلومات، جامعة ديربان للتكنولوجيا، جامعة كازولاو ناتال، جنوب أفريقيا.