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The Influence of Technology Applications Use on the Research Competence of Lecturers of Kyambogo University

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Abstract: *This study examined the influence of technology applications use on the research competence of lecturers of Kyambogo University. Using a correlational research design, data was collected from 192 teaching staff. The data were for descriptive statistics and structural equation modelling. Descriptive results revealed that technology applications use among lecturers was high. Findings also revealed that perceived ease of technology applications use had a positive and significant influence on research competence of lecturers, behavioural intention had a positive but insignificant influence on research competence of lecturers. Perceived use of technology applications had a negative and insignificant influence on research competence. The three constructs of technology applications use explained 50.5% of the variation in research competence of lecturers. Therefore, technology applications use is crucial in enhancing research competence of lecturers. University managers should engage the teaching staff in capacity building programmes in technology applications use most especially in research activities.*

Keywords: Kyambogo university, research competence, technology applications, technology applications use

INTRODUCTION

Research competence is increasingly becoming important worldwide due to the ever-changing research landscape that is driven by technological advancements, globalization, and new research methodologies (Niemczyk, 2018). Research competence enables professionals and researchers to plan independent research activities that are logical, integrating cognitive activity, objective, and oriented toward

problem-solving (Prosekov, et al., 2020). Nonetheless, in the developing countries of Africa, the research output of lecturers remains low as well as their overall scientific discourse (Nakijoba & Awobamise, 2023). In a study that engaged 38 scholars from 17 countries in the Global South and Global North on the required research competence among scholars in education, it was reported that the research competences of many scholars were still inadequate (Niemczyk, 2018). In a study done in private institutions in South Africa, Davids (2022) reported that 71.7 per cent of academic staff considered themselves emerging researchers who needed research competence boosters such as capacity-building sessions and mentorship for them to develop the desired competency in research.

In this study based on Marrs et al., (2022), research competence referred to research content knowledge, review skills, methodological skills, reflective ability, and communication skills. Technology Applications Use, scholarly refers to the utilization of technological applications for various activities such as academic writing, collaborations, utilisation of bigger datasets and their management, statistical testing, plagiarism check, presentation and dissemination of findings (Verma, 2019). This study was hinged on Davis' Technology Acceptance Model (TAM) of 1986 (Marangunić & Granić, 2015). TAM postulates that the motivation to adopt technology depends on the perceived usefulness (USE) and its perceived ease of use (EAS) which in turn affect the behavioural intention (BIN) to use technology, and the subsequent actual use (Bonfanti, et al., 2023).

According to National Council for Higher Education (NCHE) in Uganda, competent lecturers contribute greatly to the quality of research output (NCHE Report, 2020). However, the research capacity of lecturers in Uganda is still low (Nakijoba & Awobamise, 2023). It has been reported that only Makerere University in Uganda, however, came close to achieving the goal established for Global South academic staff, which was 5 per cent permanent personnel in 10 years, with 2 per cent of the permanent academic staff publishing in scholarly journals per staff member (Arinaitwe, et al., 2021). Developing such research competences may be facilitated by technology applications use.

In a study at Kyambogo University, low research effectiveness was reported particularly in aspects of publishing books and book chapters (Kasule et al., 2023). The Kyambogo University research policy clearly spells out the importance of research as one of the trifocal functions of the university (Kyambogo University, 2014). Kyambogo University has units, departments, and strategies to facilitate research activities, for example, it established the Directorate of Graduate Training, institutional research repository, competitive research grants and several memoranda with other institutions across the world to enable collaborative research, training and mentorship. Despite the strategies in place, the research productivity and effectiveness of lecturers at Kyambogo University have remained low (Kanaabi, et al., 2022), yet research skills are perfect predictors of research productivity (Rwakijuma, et al., 2023). In addition, lecturers

have limited capacity to attract and win research projects and to publish their research work (Kasule, et al., 2022). Turyahikayo et al. (2023), reported similar findings among lecturers of Busitema and Kyambogo Universities indicating low publication capability and ability to secure funding for research projects. The above contextual evidence indicated well-established research structures, yet low research productivity among lecturers. This study therefore examined how TAM aspects, namely PU, PEU and BI influenced research competence of lecturers. It was hypothesized that technology applications use has a significant positive influence on the research competence of lecturers.

LITERATURE REVIEW

Research competence

Research competence is defined as a set of proficiencies that portray successful mastery of research activity and development in this direction (Marushkevych et al., 2022). Ismuratova et al. (2018) contend that research competence is an integral quality of a person expressed in their willingness to solve creative problems independently and the possession of technical knowledge in research, skills and the readiness to apply them in professional activities. Caingcoy (2020) expounds that research competence refers to one's potential to undertake high-quality studies or the ability to identify a problem, collect data using selected and appropriate instruments, identifying an appropriate method of manipulating data, testing of significance, and interpreting the findings.

Jamieson and Saunders (2020) in their 8 years retrospective qualitative assessment of teaching both soft and technical skills in a research class at Indiana University, posit that the students in both undergraduate and post-graduate classes attained distinct research competences which included superior judgment, problem-solving, writing skills, statistical abilities, and effective dissemination of research findings. In a descriptive survey at a university in Philippines, Alejandro et al. (2022) found that the students perceived their cognitive component of research competences to be high. They were able to follow the right format for writing a research paper, through various processes to the presentation of results. In a study in Virginia involving 456 junior lecturers, Marrs et al. (2022) categorised the attributes of research competence as content knowledge, review skills, reflective ability, and communication skills. These competences were pointed out by another study in a Pedagogical University in Uzbekistan (Nazarova, 2019). Nazarova's findings indicated that for students to acquire research methodological skills, reflective thinking, and general skills in project work, modular training and recognition of contribution to research should be considered.

Technology Applications Use

Technology Acceptance Model (TAM) proposes three variables, namely perceived use (PU), perceived ease of use (PEU) and behavioural intention (BI) all of which influence

an intricate relationship between exterior variables and possible systems. PU is concerned with the degree to which people believe that the use of a technology application or tool will enhance performance or enable them to achieve their goals while PEU is concerned with the people's belief that using a technology application was straightforward and effortless (Burgess & Worthington, 2021). Both PU and PEU influence the continued behaviour to consistently use technology in day today activities. TAM has taken a principal role in elucidating users' behaviour toward technology and providing explanations of the determinants of technology acceptance across a broad range user population such as teachers, students, in telemedicine and other sphere both in their private and professional lives (Burgess, & Worthington, 2021). TAM provides a basis for predicting human behaviour towards their potential acceptance or rejection of technology (Marangunić and Granić, 2015). The theory identifies variables namely perceived use, perceived ease of use and behavioural intention which was studied in relation to research competences of lecturers. Therefore, it is important to note that while TAM provides such subconstructs, it does not apply them to research skills which this study has set out to do.

In their narrative review paper, Murshed and Alasali (2020) assessed faculty cadres' reliance on technology to plan and implement research investigations. The review revealed that research activities are simplified by technology applications whereby everything is done at the click of a finger to access academic journals, academic writing, gathering data, analysis, presentations, and publishing research work in international peer-reviewed journals. Therefore, technologies use enhances research competence. However, since their findings were based on a review, it portrays an methodological gap whereby the current study considered original data.

In a study conducted in three institutions of Higher Education in Ukraine, Mosiienko et al. (2023) showed that the use of technology applications and research methods approach to teach distance learners had a high effect on their level of research competence. However, since this study involved institutions from a developed country, the study was carried out in the context of a developing country to verify the findings. A study at Bu Ali Sina University in Iran indicated that the level of use of technological applications positively influenced the research self-efficacy of graduate students (Seraji et al., 2017). A survey done in Ghana among students of the University of Cape Coast and the University of Ghana revealed that a greater number of students often accessed technological amenities such as applications for communication, bibliography, data management, and those for sharing research output but their use for those particular purposes was low (Ankamah, 2019). Therefore, technology use did not improve their research competences of students. Thus, this study raised a knowledge gap because it focused on the use of technology in research rather than whether technology use could influence research competence, besides, it was a student-cantered study.

METHODS

Study design and sample size

A correlational research design was adopted for this study. It was found best suited for this study because of its capacity to examine the association between a number of variables in a single group without manipulating any of them and the potential to provide a correlation coefficient, an indication of the direction and strength of the relationship (Devi, 2023). The study employed a quantitative research method which deployed a self-administered questionnaire. The study population constituted of 405 teaching staff of Kyambogo University (KyU Human Resource Teaching Staff list, 2023). The lecturers included the professors, associate professors, senior lecturers, lecturers, assistant lecturers and teaching assistants were best sued for this study because one of their cardinal roles is to conduct research. The sample size was determined using Krejcie and Morgan table for a known population (Krejcie, & Morgan,1970) and then proportionate samples were as follows: School of education 22 lectures out of 45 lecturers, faculty of art and design; 7 out of 14 lecturers, School of Management and Entrepreneurship; 18 out of 36 lecturers, School of Built Environment; 9 out of 18 lecturers, School of Computing and Information Science; 6 out of 12, School of Vocational Studies; 6 out of 13, Faculty of Engineering; 16 out of 33, Faculty of Science; 39 out of 79, Faculty of Agriculture; 8 out 16, Faculty of Special Needs and Rehabilitation; 15 out of 30, Faculty of Arts and Humanities; 30 out of 61, and from the Faculty of Social Sciences, 24 out of 48 lecturers were sampled. This is lead to a total sample size of 200 lecturers. These were selected from others using simple random sampling technique to allow every faculty member an equal chance of being selected for the study.

Validity and Reliability of data

Using SmartPLS 4.0, confirmatory factor analysis (CFA) for both convergent validity and discriminant validity were determined. Convergent validity was determined using average variance extracted (AVE) and constructs with values above 0.5 were retained while discriminant validity was determined in consideration of Heterotrait-Monotrait ratio of correlations (HTMT) below 0.90 (Kamis et al., 2020). Reliability was determined to ensure the consistency, repeatability, precision, and trustworthiness of the indicators measuring different constructs (Mohajan, 2017). In this study, Cronbach's alpha (α) and composite reliability (CR) were used to determine the internal consistency of final data. The values ranging from 0.7 to 0.9 were considered satisfactory.

Data Management and ethical considerations

The data collected was coded, entered in the computer using SPSS Version 30.0. It was screened to detect errors, treated for missing data and outliers. The data was analyzed

using both descriptive and inferential analyses. Descriptive analysis involved calculating frequencies, percentages, means and standard deviations with the use of SPSS. However, SmartPLS 4.0. was used to carry out inferential data analysis particularly the analysis of hypothesis (Technology applications use has a significant positive influence on the research competence of lecturers). The path analysis models were also done and presented indicating the relationship, the strength of the relationship and the direction of the relationship. Ethical clearance was obtained from the Directorate of Research and Graduate Training of Kyambogo University. The researcher ensured ethical standards during data collection. The respondents were informed of the purpose of the study, their written informed consent to participate in the study was sought. Thereafter, they were assured of privacy, anonymity, confidentiality, honesty in reporting, and dissemination of findings.

FINDINGS

The anticipated sample size for this study was 200 lecturers of Kyambogo University but the actual number of respondents were 192 (96%). According to Pielsticker and Hiebl (2020), a sample size of 50% or more is deemed sufficient in humanities studies, making the sample of 192 respondents a reliable representation of the study population.

Background Characteristics of respondents

This section of the study provides findings on the background information of the respondents including their age range, gender, highest level of education, designation at Kyambogo university and work experience. The results are presented in Table 1.

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	105	54.7
	Female	87	45.3
	Total	192	100
Age range	29 and below	14	7.3
	30 to 39	50	26.0
	40 to 49	81	42.2
	50 and above	47	24.5
	Total	192	100
Education level	Bachelor	10	5.2
	Masters	65	33.9
	PhD	117	60.9
	Total	192	100
Designation	Professor	1	0.5
	Associate Professor	7	3.6
	Senior Lecturer	4	2.1

	Lecturer	105	54.7
	Assistant Lecturer	65	33.9
	Teaching Assistant	10	5.2
	Total	192	100
Experience	Less than 3 years	15	7.8
	3 to five years	53	27.6
	6 to 10 years	75	39.1
	More than 10 years	49	25.5
	Total	192	100

Table 1: *Background Characteristics of Respondents*

The results in Table 1 indicate that the majority of lecturers who participated in the study were male (54.7%), while the females were 45.3%. despite the males being more represented, the percentage of females was considerable, an indication that the results are representative of both gender groups. The results on age range of lecturers indicated that the greater proportion were 40 to 49 years of age (42.2%) followed by those age 30 to 39 (26.0%), then 50 years and above (24.5%), and those aged 29 and below (7.3%). These results indicated that lecturers below 29 years are generally few compared to those above 30 years. They also revealed that the larger majority of lecturers above 30 years of age are generally less divergent in their various age groups an indication that the results were representative of the lecturers' age groups. The results on the lecturers' highest level of education indicated that the majority percentage (60.9%) were PhD holders while 33.9% were masters' degree holders and 5.2% had bachelor's degree. The fact that the majority percentage of lecturers were PhD holders gives a clear indication of representativeness of data.

The results on designation indicated that the larger proportion (54.7%) were appointed as lecturers, followed by assistant lecturers (33.9%), teaching assistant (5.2%), associate professors (3.6%), senior lecturers (2.1%), and professors (0.5%) respectively. These results portray that lecturers and assistant lecturers are not highly divergent and so are the professors, associate professors, senior lecturers and teaching assistants. The results on teaching experience indicated that the majority percentage (39.1%) had been teaching for 6 to10 years, these were followed those who had been teaching for 3 to five years (27.6%), then those who had been teaching for more than 10 years (25.5%) and then those who had taught less than 3 years (7.8%). These results indicate relatively equal proportion of participants per category of teaching experience which shows representativeness of participants.

Perceived Use of Technology Applications

Perceived use was conceived as the first element of technology applications use and was studied using eight indicators. The results follow in Table 2.

Perceived use of technology applications		SD	D	MA	A	SA	Mean
I find computer and internet applications such as google forms, monkey survey and other useful in collecting data for my research	F	6	10	57	84	35	3.69
	%	3.1	5.2	29.7	43.8	18.2	
I find computer applications such as Excel, Epi Info and others useful in questionnaire design, data entry and validation, data analysis, mapping and graphing and creation of reports	F	4	13	29	84	62	3.97
	%	2.1	6.8	15.1	43.8	32.3	
I find computer and internet applications useful in the applying for ethical approval to a Scientific Institutional Review Board or Research Ethics Committee	F	00	13	22	71	86	4.20
	%	0.0	6.8	11.5	37.0	44.8	
I find computer applications such a Access, Integral and others useful in storing data	F	00	14	31	79	68	4.05
	%	0.0	7.3	16.1	41.1	35.4	
Computer applications such as SAS, SPSS, STATA, SmartPLS, EViews, NVivo, Atlas Ti, and others are useful to me when analyzing data	F	3	8	65	56	60	3.84
	%	1.6	4.2	33.9	29.2	31.3	
Computer applications such as Zotero, Mendeley, Endnote and others useful to me to carry out citation and referencing	F	1	11	26	79	75	4.12
	%	0.5	5.7	13.5	41.1	39.1	
I find online e-resources such as online journals and publishers' websites useful in giving clear guidance to manuscript writing and dissemination of results	F	00	7	19	92	74	4.21
	%	0.0	3.6	9.9	47.9	38.5	
Online databases such as Academia, ResearchGate, and others useful in keeping and updating research profile of my published articles, books and book chapters in terms of reads, citations and the h-impact	F	11	8	23	71	79	4.04
	%	5.7	4.2	12.0	37.0	41.1	

Table 2. *Descriptive Statistics for Perceived Use of Technology Applications on Research Competence*

The results in Table 2 on whether the computer and internet applications such as google forms, monkey survey and other useful in collecting data for research cumulatively showed that the larger percentage (62%) agreed while 29.7% moderately agreed and 8.3% disagreed. The high mean of 3.69 is close 4 and corresponds with agree on the five-point Likert scale used in the study. Therefore, lecturers indicated that they were using computer and internet applications such as google forms, monkey survey and

other useful in collecting data for their various research studies. As to whether lecturers find computer applications such as Excel, Epi Info and others useful in questionnaire design, data entry and validation, data analysis, mapping and graphing and creation of reports, the majority (76.1%) agreed while 15.1% moderately agreed and 8.9% disagreed. The high mean of 3.97 suggested that lecturers acknowledged the usefulness of computer applications specifically such as Excel, Epi Info and others in questionnaire design, data entry and validation, data analysis, mapping and graphing and creation of reports.

Regarding to whether the computer and internet applications were useful in the application for ethical approval to Scientific Institutional Review Board or Research Ethics Committees, the larger percentage (81.8%) agreed, 11.5% moderately agreed and 6.8% disagreed respectively. The high mean of 4.02 suggested that lecturers considered computer and internet applications useful in the process of applying for ethical approval to the Scientific Institutional Review Boards or Research Ethics Committees. Regarding whether the usefulness of computer applications such a Access, Integral and others in storing data, the larger percentage (76.5%) agreed while 16.1% moderately agreed and 7.3% disagreed. The high mean of 4.05 suggested that the lectures considered computer applications majorly Access, Integral and others useful in storing data.

Concerning the use of technology applications such as SAS, SPSS, STATA, SmartPLS, EViews, NVivo, Atlas Ti, and others in data analysis, the majority percentage (60.5%) agreed while 33.9% moderately agreed and 5.8% disagreed. The high mean of 3.84 meant that lecturers considered technology applications such as SAS, SPSS, STATA, SmartPLS, EViews, NVivo, Atlas Ti, and others in data analysis to be useful in data analysis. Regarding the use of technology applications such as Zotero, Mendeley, Endnote and others in citation and referencing, the majority percentage (80.2%) agreed while 13.5% moderately agreed and 6.2% disagreed. The high mean of 4.12 meant that lecturers considered technology applications such as Zotero, Mendeley, Endnote and others useful in citation and referencing. As to whether lecturers perceive the online e-resources such as online journals and publishers' websites useful in giving clear guidance to manuscript writing and dissemination of research results, the majority percentage (86.4%) agreed while 9.9% moderately agreed and 3.6% disagreed. The high mean of 4.21 meant that lecturers considered technology applications such as Zotero, Mendeley, Endnote and others useful in citation and referencing. With regard to whether lecturers found online databases such as Academia, ResearchGate, and others useful in keeping and updating research profile of the published articles, books and book chapters in terms of reads, citations and the h-impact, the majority percentage (78.1%) agreed while 12.0% moderately agreed and 9.9% disagreed. The high mean of 4.04 meant that lecturers considered online databases such as Academia, ResearchGate, and others to be useful in keeping and updating research profile of my published articles, books and book chapters in terms of reads, citations and the h-impact.

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Perceived Ease of Use of Technology Applications

Perceived ease of use of technology applications was conceived as the second element of technology applications use and was studied using eleven indicators. The results follow in Table 3.

Perceived ease of use of technology applications		SD	D	MA	A	SA	Mean
I find computer and internet applications such as Grammarly, quill bot, google forms and plagiarism checker very easy to use during my research	F %	2 1.0	5 2.6	67 34.9	86 44.8	32 16.7	3.73
I can easily use computer and technology application such as Scopus, African Journals Online, Google Scholar, Science Direct, PubMed, Embase, PsycINFO and others in carrying out extensive literature review	F %	6 3.1	7 3.6	60 31.3	95 49.5	24 12.5	3.65
I can effectively use computer and internet applications such as google forms, monkey survey and others in collecting data for my research	F %	15 7.8	19 9.9	32 16.7	51 26.6	75 39.1	3.79
I effectively use computer applications such as Excel, Epi Info and others in questionnaire design, data entry and validation, data analysis, mapping and graphing	F %	12 6.3	18 9.4	42 21.9	57 29.7	63 32.8	3.73
I effectively use computer and internet applications to apply for ethical approval to a Research Ethics Committee	F %	2 1.0	16 8.3	21 10.9	80 41.7	73 38.0	4.07
I effectively use computer applications such as Paradox, Oracle, Informix, Integral and others to store data.	F %	16 8.3	17 8.9	67 34.9	72 37.5	20 10.4	3.33
I effectively use computer applications such as SAS, SPSS, STATA, SmartPLS, EViews and others when analyzing data	F %	10 5.2	9 4.7	34 17.7	86 44.8	53 27.6	3.85
I effectively use Computer applications such as NVivo, Atlas Ti, and others in the management and analysis of qualitative data	F %	6 3.1	20 10.4	45 23.4	65 33.9	56 29.2	3.76

I effectively use computer applications such as Zotero, Mendeley, Endnote and others to carry out citation and referencing	F %	1 0.5	17 8.9	17 8.9	91 47.4	66 34.4	4.06
I effectively use computer and internet applications to identify credible journals and publishers and to seek guidance in manuscript writing	F %	3 1.6	8 4.2	60 31.3	61 31.8	60 31.3	3.87
I effectively use online databases such as Academia, ResearchGate, and others to create my research profile of my published articles, books and book chapters	F %	4 2.1	10 5.2	20 10.4	90 46.9	68 35.4	4.08

Table 3: *Descriptive Statistics for Perceived Ease of Use of Technology Applications*

The results in Table 3 on whether lecturers perceived the use computer and internet applications such as Grammarly, quill bot, google forms and plagiarism checker during research to be very easy, cumulatively showed that the larger percentage (61.5%) agreed while 34.9% moderately agreed and 3.6% disagreed. The high mean of 3.73 which is close 4 on the five-point Likert scale used in the study corresponded to agreed. Therefore, lecturers perceived the use of computer and internet applications such as Grammarly, quill bot, google forms and plagiarism checker in the research process to be very easy. As to whether lecturers could easily use computer and technology application such as Scopus, African Journals Online, Google Scholar, Science Direct, PubMed, Embase, PsycINFO and others to carry out extensive literature review, the majority (62%) agreed while 31.3% moderately agreed and 6.7% disagreed. The high mean of 3.65 suggested that lecturers could easily use computer and technology application such as Scopus, African Journals Online, Google Scholar, Science Direct, PubMed, Embase, PsycINFO and others to carry out extensive literature review. Concerning whether lecturers could effectively use computer and internet applications such as google forms, monkey survey and others in collecting data, the larger percentage (65.7%) agreed, 16.7% moderately agreed and 17.7% disagreed respectively. The high mean of 3.79 suggested that could effectively use computer and internet applications such as google forms, monkey survey and others to collecting data for their research. Regarding to whether lecturers could effectively computer applications such as Excel, Epi Info and others in questionnaire design, data entry and validation, data analysis, mapping and graphing and creation of reports, the larger percentage (62.5%) agreed while 21.9% moderately agreed and 15.7% disagreed. The high mean of 3.73 implied that lecturers could effectively use computer applications such as Excel, Epi Info and others in questionnaire design, data entry and validation, data analysis, mapping and graphing and generally creation of research reports.

With regards to whether lecturers perceived the use of computer and internet applications to apply for ethical approval to a specific Research Ethics Committee

(REC) to be easy and effective, the larger percentage (79.7%) agreed while 10.9% moderately agreed and 9.3% disagreed. The high mean of 4.07 suggested that lecturers perceived themselves to be effective in the use computer and internet applications to apply for ethical approval to a Research Ethics Committee. Concerning whether lecturers perceived themselves to be effective users of computer applications such as Paradox, Oracle, Informix, Integral and others to store research data, the majority percentage (47.9%) agreed while 34.9% moderately agreed and 17.2% disagreed. The moderate mean of 3.33 meant that lecturers neither agreed nor disagreed to the effective use of computer applications such as Paradox, Oracle, Informix, Integral and others to store their research data. With regard to whether lecturers perceived the use of computer applications such as SAS, SPSS, STATA, SmartPLS, EViews and others to be effective and easy when analyzing data, the majority percentage (72.4%) agreed while 17.7% moderately agreed and 9.9% disagreed. The high mean of 3.85 meant that the lecturers perceived the use computer applications such as SAS, SPSS, STATA, SmartPLS, EViews and others to be easy and effective when analyzing data.

As to whether lecturers perceived the use of computer applications such as NVivo, Atlas Ti, and others in the management and analysis of qualitative data to be easy, the majority percentage (63.1%) agreed while 23.4% moderately agreed and 13.5% disagreed. The high mean of 3.76 meant that lecturers perceived the use of computer applications such as NVivo, Atlas Ti, and others to be very easy and effective in the management and analysis of qualitative data. With regard to whether lecturers perceived the use of computer applications such as Zotero, Mendeley, Endnote and others to be effective and easy in the citation and referencing process, the majority percentage (81.8%) agreed while 8.9% moderately agreed and 9.4% disagreed. The high mean of 4.06 meant that lecturers perceived the use computer applications such as Zotero, Mendeley, Endnote and others to be easy and effective in citation and referencing.

As to whether lecturers perceived the use of computer and internet applications to identify credible journals and publishers and to seek guidance in manuscript writing to be easy and effective, the majority (63.1%) agreed while 33.1% moderately agreed and 5.8% disagreed. The high mean of 3.87 suggested that lecturers perceived the use of computer and internet applications to identify credible journals and publishers to be easy and effective. Concerning whether lecturers could easily and effectively use online databases such as Academia, ResearchGate, and others to create research profile of for their published articles, books and book chapters, the larger percentage (82.3%) agreed, 10.4% moderately agreed and 7.3% disagreed respectively. The high mean of 4.08 suggested that could effectively use online databases such as Academia, ResearchGate, and others to create my research profile for their published articles, books and book chapters.

Behavioural Intention to Use Technology Applications

Behavioural Intention to use technology applications was conceived as the third element of technology applications use and was studied using eleven indicators. The results follow in Table 4.

Behavioural Intentions to Use Technology Applications		SD	D	MA	A	SA	Mean
I often use technology applications such as Grammarly, quill bot, and plagiarism checker in my research	F %	4 2.1	8 4.2	30 15.6	100 52.1	50 26.0	3.96
I often use technology applications such as advanced searches to carry out extensive literature review	F %	2 1.0	8 4.2	68 35.4	54 29.2	58 30.2	3.83
I often use technology applications such as google forms, monkey survey and others in collecting data	F %	7 3.6	32 16.7	48 25.0	58 30.2	47 24.5	3.55
I often use technology applications such as Excel, Epi Info and others in questionnaire design, data entry and validation, mapping and graphing	F %	11 5.7	8 4.2	40 20.8	75 39.1	58 30.2	3.84
I often use technology applications to apply for ethical approval to a specific Research Ethics Committee	F %	5 2.6	8 4.2	18 9.4	77 40.1	84 43.8	4.18
I often use technology applications such as Paradox, Oracle, Informix, Integral and others to store data	F %	9 4.7	16 8.3	17 8.9	82 42.7	68 35.4	3.96
I often use computer applications such as SAS, SPSS, STATA, SmartPLS, EViews and others to analyze data	F %	3 1.6	11 5.7	31 16.1	64 33.3	83 43.2	4.11
I often use technology applications such as NVivo, Atlas Ti, and others in the management and analysis of qualitative data	F %	9 4.7	11 5.7	45 23.4	64 33.3	63 32.8	3.84
I often use computer applications such as Zotero, Mendeley, Endnote and others to carry out citation and referencing	F %	7 3.6	6 3.1	11 5.7	87 45.3	81 42.2	4.19
I often use computer and internet applications to identify credible journals and publishers and to seek guidance in manuscript writing	F %	2 1.0	8 4.2	23 12.0	88 45.8	71 37.0	4.14
I often update my online databases such as Academia, ResearchGate, and others to share my publish articles, books and book chapters	F %	6 3.1	5 2.6	55 28.6	74 38.5	52 27.1	3.84

Table 4: *Descriptive Statistics for Behavioural Intentions to Use Technology Applications*

The results in Table 4 on whether lectures often used technology applications such as Grammarly, quill bot, google forms and plagiarism checker in their research,

cumulatively showed that the larger percentage (78.1%) agreed while 15.6% moderately agreed and 6.3% disagreed. The high mean of 3.96 is close to 4 which on the five-point Likert scale used in the study corresponded to agreed. Therefore, lecturers often used technology applications such as Grammarly, quill bot, google forms and plagiarism checker in their research studies. As to whether lecturers often used technology applications such as advanced searches to carry out extensive literature review, the majority (59.4%) agreed while 35.4% moderately agreed and 5.2% disagreed. The high mean of 3.83 suggested that lecturers often used technology applications such as advanced searches to carry out extensive literature review. Concerning whether lecturers often used technology applications such as google forms, monkey survey and others in collecting data, the larger percentage (54.7%) agreed, 25.0% moderately agreed and 20.3% disagreed respectively. The high mean of 3.55 suggested that lecturers often used technology applications such as google forms, monkey survey and others in collecting data for their research studies. With respect to whether often used technology applications such as Excel, Epi Info and others in questionnaire design, data entry and validation, data analysis, mapping and graphing, the larger percentage (69.3%) agreed while 20.8% moderately agreed and 9.9% disagreed. The high mean of 3.84 implied that lecturers often used technology applications such as Excel, Epi Info and others in questionnaire design, data entry and validation, data analysis, mapping and graphing.

Regarding whether often used technology applications to apply for ethical approval to a specific Research Ethics Committee, the larger percentage (83.9%) agreed while 9.4% moderately agreed and 6.8% disagreed. The high mean of 4.18 suggested that the lecturers often used technology applications to apply for ethical approval to a specific Research Ethics Committee. With regard to whether lecturers often used technology applications such as Paradox, Oracle, Informix, Integral and others to store data, the majority percentage (78.1%) agreed while 8.9% moderately agreed and 13% disagreed. The high mean of 3.96 meant that lecturers often used technology applications such as Paradox, Oracle, Informix, Integral and others to store their research data. Regarding to whether lecturers often use computer applications such as SAS, SPSS, STATA, SmartPLS, EViews and others to analyze data, the majority percentage (76.5%) agreed while 16.1% moderately agreed and 7.3% disagreed. The high mean of 4.11 meant that lecturers often used computer applications such as SAS, SPSS, STATA, SmartPLS, EViews and others to analyze their data.

With regard to whether lecturers often used technology applications such as NVivo, Atlas Ti, and others in the management and analysis of qualitative data, the majority percentage (66.1%) agreed while 23.4% moderately agreed and 10.4% disagreed. The high mean of 3.84 meant that lecturers often used technology applications such as NVivo, Atlas Ti, and others in the management and analysis of qualitative data. Concerning whether lecturers often use technology applications such as Zotero, Mendeley, Endnote and others to carry out citation and referencing, the majority percentage (87.7%) agreed while 5.7% moderately agreed and 6.7% disagreed. The

high mean of 4.19 meant that lecturers often used technology applications such as Zotero, Mendeley, Endnote and others to carry out citation and referencing. As to whether lecturers often used computer and internet applications to identify credible journals and publishers and sought guidance of manuscript writing, the majority percentage (82.8%) agreed while 12.0% moderately agreed and 5.2% disagreed. The high mean of 4.14 meant that lecturers often used computer and internet applications to identify credible journals and publishers and sought guidance in manuscript writing. With regard to whether lecturers often update their online databases such as Academia, ResearchGate, and others and shared their published articles, books and book chapters, the majority percentage (65.6%) agreed while 28.6% moderately agreed and 5.7% disagreed. The high mean of 3.84 meant that lecturers often utilized online databases such as Academia, ResearchGate, and others to share their published articles, books and book chapters.

Technology Applications Use

To find out how overall lecturers rated technology applications use in the research studies, an average index was calculated for the indicators of three constructs measuring the variable. The histogram (Figure 1) presents the overall mean and shows the normality of the results.

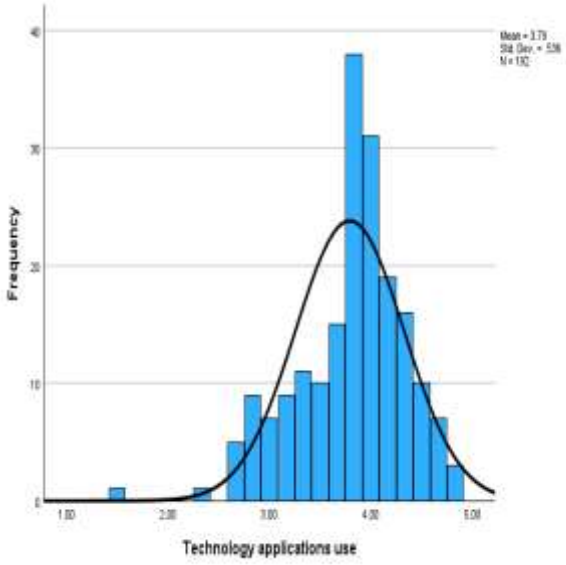

Figure 1. Histogram for Technology Applications Use

The values in Figure 1 indicate a mean of 3.79 and standard deviation = 0.536 which confirmed the normality of the results. The high mean meant the lecturers rated technology applications use in research as being good while low standard deviation indicated normality of the results. Such values confirmed the parametric condition of normality hence the data was appropriate for linear analysis which was the basis for developing the structural model for technology applications use.

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Technology Applications Use Structural Model

To establish the measures of technology applications, use, a structural equation model was developed. Figure 2 shows the appropriate indicators of the constructs measuring the variable.

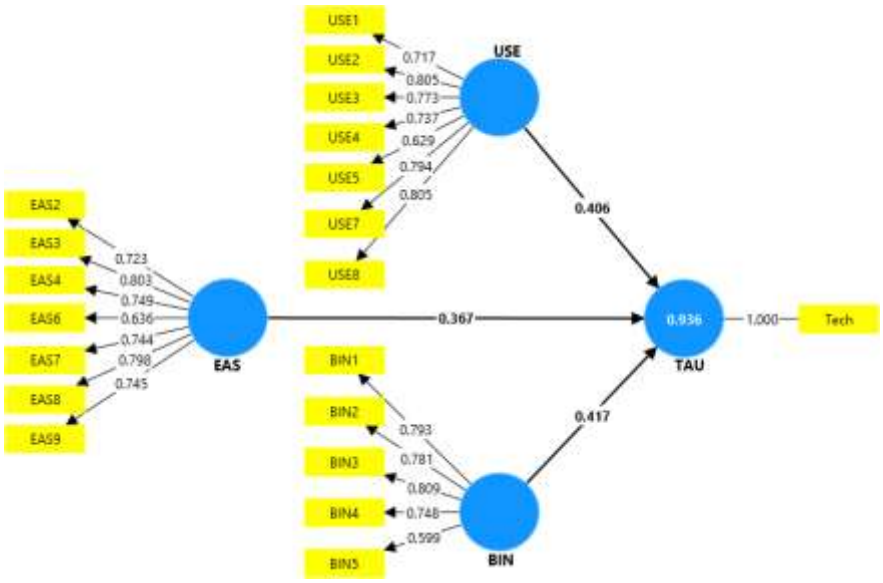

Figure 2. Technology Applications Use Structural Equation Model

The results in Figure 2 show that technology applications use covered perceived use, ease of use and behavioural intention to use technology applications. Factor loadings show that for perceived use, all the eight indicators were retained (USE1 to-USE8). For perceived ease of use of technology applications, seven indicators (EAS2, EAS3, EAS4, EAS6, EAS7, EAS8, and EAS9) were retained out of eleven indicators were retained with 4 indicators (EAS1, EAS5, EAS10 and EAS 11) dropped. For behavioral intention to use technology applications, five indicators (BIN1, BIN2, BIN3, BIN4, and BIN5) were retained out of the eleven indicators with 6 of the indicators (BIN6 to BIN11) dropped. All the indicators retained had factor loadings of above 0.50 which is the lowest accepted level (Cheung et al., 2024). Therefore, the retained indicators for the three dimensions in the model were their valid measures.

Structural Equation Model for Technology Applications Use and Research Competence

To assess the influence of technology applications, use on the research competence, a structural equation model was developed. The structural equation model (Figure 3) displays the influence of technology applications use on the research competence of lecturers of Kyambogo University.

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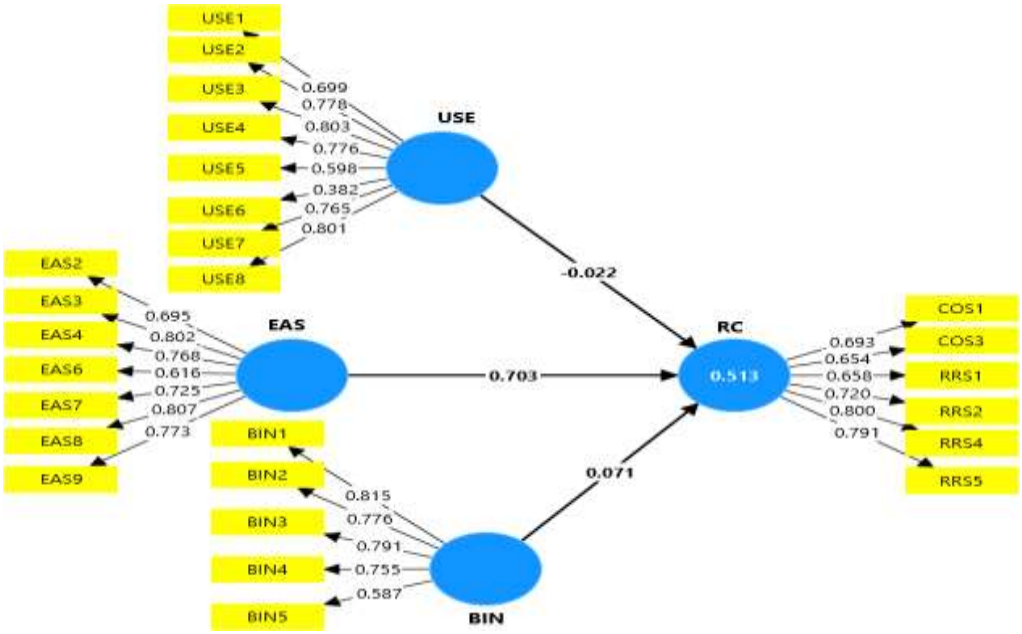

Figure 3. Technology Applications Use and Research Competence Structural Equation Model

The structural equation model (Figure 3) for technology applications use and lecturers' research competence reveals that in the model technology applications use comprised three measures that are perceived use, perceived ease of use and behavioural intention while research competence comprised two components, namely communication skills and research review skills with the measures of knowledge of research content, and reflective ability dropped. The model results (Table 6) include beta coefficients (βs), coefficients of determination (R^2 and adjusted R^2), t statistics and the p-values. The coefficients of determination reveal the predictive power of technology applications use on research competence. Three hypotheses to the effect that behavioural intention (H_1), perceived ease of use (H_2), and perceived use (H_3) have a significant influence on research competence were examined. The path estimates for the structural equation model are presented in Table 5.

Table 5: *Technology Applications Use and Research Competence Path Estimates*

	β	T	p
BIN → RC	0.071	1.416	0.157
EAS → RC	0.703	5.046	0.000
USE → RC	-0.022	0.141	0.888
R^2 = 0.513			
R^2 Adjusted = 0.505			

The structural equation model estimates (Table 5) indicate that behavioural intention (β = 0.071, t = 1.416, p = 0.157 > 0.05) had a positive but insignificant influence on research competence of lecturers. Perceived ease of use (β = 0.703, t = 5.046, p = 0.000

< 0.05) had a positive and significant influence on research competence of lecturers. Perceived use of technology applications (β = -0.022, t = 0.141, p = 0.888 > 0.05) had a negative and insignificant influence on research competence. Adjusted R_2 showed that the three constructs of technology applications use, explained 50.5% (adjusted R^2 = 0.505) of the variation in research competence of lecturers. The magnitude of respective betas showed that the perceived ease of use of technology applications had a more significant influence on research competence of lecturers compared to behavioural intention and perceived use respectively. Therefore, hypothesis test showed that technology applications use particularly the perceived ease of use (H_2) had a positive and significant influence on research competence of lecturers while behavioural intentions (H_1) had limited and insignificant influence on research competence of lecturers and perceived use (H_3) had a negative and insignificant influence on research competences of lecturer. Therefore, H_2 is accepted whereas H_1 and H_3 are rejected.

DISCUSSION

the study assessed the influence of technology applications use on the research competence of lecturers of Kyambogo University. The hypothesis derived from this objective was to the effect that technology applications use has a significant positive influence on the research competence of lecturers. The hypothesis test results showed that technology applications use particularly the perceived ease of use had a positive and significant influence on research competence of lecturers whereas behavioural intention had limited and insignificant influence on research competence of lecturers and perceived use had a negative and insignificant influence on research competence of lecturers. This finding partially concurred with the Technology Acceptance Model (TAM) by Davis (1989) which suggests that technology acceptance is determined by the perceived usefulness, perceived ease of use which eventually influences behavioural intentions to use technology. The slight difference in the findings of this study and TAM is evidently due to difference in conceptualization whereby TAM focuses on how perceived usefulness will enhance perceived ease of use and eventually yield into behavioural intention to use technology. This study particularly focused on the influence of measurements of TAM on research competence rather than how each construct in TAM influences one another. The results of this study imply that the perceived use of technology applications may not necessarily instigate research competence unless lecturers perceive them as easy to use and actually used them.

The study findings agree with Tahar, et al., (2020)'s study which indicated that technology use is determined by numerous factors but majorly on how and when they were used. It emphasizes the aspect of readiness (ease of use) and eventual effect on the intention to use it (behavioural intention). Therefore, if lecturers are effective in using a certain technology in research, they are more likely to use it consistently. However, perceiving it as useful without the ability to use it will not influence competence of its use in various research activities. The finding of the study also

concurred with other scholars such as (Tubaishat, 2018) who reported that perceived ease of use was affected by prior experiences in use of computers. Whereas findings of this study indicated lower beta value for perceived use compared to perceived ease of use and behavioural intentions, Hamid, et al., (2016) reported different results where perceived usefulness of technologies had a more positive and significant effect compared to perceived ease of use. This difference could be as a result of contextual differences in the study whereby this study focused on how technology use influenced research competence more so among lecturers while the discussed study focused on technology use in e-government sector, a system whose users are likely to receive prior training before it is used. Overall, a number of studies agree with the findings of this study. This generally implies that lecturers may have high level of research competence even when their perception of technology use is negative. However, lecturers who perceive technology application as easy to use enhance their research competence further.

CONCLUSIONS AND RECOMMENDATIONS

Technology applications use is very crucial in enhancing research competence of lecturers but even lecturers who may not embrace technology applications have the capacity to conduct research competently. This is because when lecturers are able to use technology applications to conduct research, make presentations at conferences well as share their publications, it is merely a demonstration of technology applications use but not an indication of high level of competence in research. However, when technology applications such as ChatGPT, advanced search applications, and IBM SPSS are applied in the research process, the lecturers' research capacities are enhanced. Lecturers should take extra steps beyond perceiving technology applications as useful in research but use them in research activities. This can be achieved by engaging in capacity building programmes in technology applications use in the domains of knowledge of research content, research review skills, methodological skills, reflective ability and communication skills tailored to research.

FUTURE RESEARCH

Also, further studies should examine other factors other than those considered in this model such as individual factors of lecturers. Also, among others constructs of technology applications use should be "use" rather than "perceived use" which this study considered. This is because perceived use did not cover whether lecturers used the technology applications or not and this was not sufficient to explain the effect of that part of technology applications use on research competence of lecturers.

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Availability of data and data materials for transparency: Data will be made available as soon as requested.

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