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ABSTRACT

This paper synthesised the literature on the adoption of Information and Communication Technology within Africa. The purpose was to determine factors (reported by the literature) determining technology adoption and use, in Africa. The paper used the systematic literature review. The study analysed the factors descriptively. Based on the analysis, the following are the main five factors reported to affect the adoption and use of Information Technology in Africa: Lack of ICT knowledge, unreliable infrastructure, high cost of adoption, the perceived usefulness of ICT, and the perceived ease of use. The government and technology implementing organisation has the key role to ensure the adoption and use becomes successful.

Keywords
ICT, Adoption, Information Systems, Africa, Literature Review

INTRODUCTION

Information and Communication Technology (ICT) provides powerful instruments for efficiency and effective business operations. Because of their importance, organisations and individuals invest effort for their adoption (Johnston & N. Jali, 2015). According to the World Bank (2020), mobile phone subscription in SubSaharan Africa represents 93.5% of the whole population, if each subscription was to stand for one person. This percent of ownership is large, and can significantly change the fortune of an individuals or organisations, if used properly (Kayisire & Wei, 2016). This is supported by Moreton (2013) who said that the rapid development of ICT has changed the conventional way of conducting business in many organisations, where used carefully.

Like in many places around the world, Africa is equally embracing ICT. Its scholars are equally dedicating their time to ensure that the most relevant information about ICT adoption, is available for its users. These users may be individuals or those with corporate status. Generally, research studies in the area of technology adoption are important so as to ensure the identification and use of key findings in different areas of relevance (Ayim, Tekinerdogan, Addison, & Kassahun, 2022). In addition, they

assist in the process of building theories necessary to guide practises. Furthermore, the study by Crow, Broussard and Geisler (2012) suggested that research findings are critical because they aid the process of decision making by individuals or the organisations. The process of decision making is enhanced because individuals become aware of what works better to their environment (Gono, Harindranath, & Özcan, 2010; Johnston & Jali, 2015).

In addition, it is true that most African countries share a common regional block and similar economic characteristics. Therefore, a common point of reference to factors affecting things such as the adoption of ICT, would assist many users within the continent. Unfortunately, available studies on the subject focuses on individual countries; they fail to present the issue of adoption in a big picture as recommended by Ayim, Tekinerdogan, Addison and Kassahun (2022). The current study addresses the problem by synthesising different studies to form a common point of reference on the topic of ICT adoption. This is the reason why the current study is of great value to users of ICT within Africa, especially to late adopters (Johnston & Jali, 2015). Overall, this study is designed to synthesis findings of research studies on the adoption of Information and Communication Technologies in Africa.

THE SIGNIFICANCE OF THIS SYNTHESIS

This synthesis is of great importance because it focuses on the African continent, where more effort is required to meet international standards on technology adoption and use (International Standard Organisation, 2013). The analysis report will inform decision makers on factors that enhances the adoption and use of Information and Communication Technology in the African context. Moreover, it will equip users to understand best ways for technology adoption and use. In the context of policy making, the analysis will provide the knowledge relevant for policies in the area of technology adoption and use, within Africa.

THEORIES ON INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION AND USE

The literature has a lot of theories debating on the adoption and use of technology. In this part, the discussion focuses on two theories mostly discussed in last two decades: The Technology Acceptancy Model and the Unified Theory of Acceptancy and Use of Technology (Venkatesh & Bala, 2008; Venkatesh, Thong, & Xu, 2016). A focus to the Technology Acceptancy Model shows that in 2008, the latest version of the model was released. The model is abbreviated as TAM 3, suggesting the third version of the Technology Acceptancy Model series. Principally, the model suggests three key variables determining the adoption and use of Information Technologies, regardless of the context (Venkatesh & Bala, 2008). The key determinants are the subjective norms, the perceived technology usefulness, and the perceived ease of use.

On the other hand, the Unified Theory Acceptance and Use of Technology is another model that dominated academic discussions of technology adoption in last two decades. The Unified Theory of Acceptancy and Use of Technology has four key variables determining the adoption and use of Information Technologies. Based on the paper published by Venkatesh, Thong and Xu (2016), the variables are the

performance expectancy, effort expectancy, social influence and facilitating conditions. All these variables determine the intention to use the technology and the rate of use. Collectively, they facilitate the adoption process (Kyobe, 2011).

When compared to the Technology Acceptancy Model, the variable known as effort expectancy of the Unified Theory of Acceptancy and Use of Technology carries the meaning similar to the variable known as the ease of use. This is how simple it is for the new user to adopt and use the technology (Johnston & Jali, 2015). The assumption is that, if the technology is not ease to use, it will be difficult to adopt. Also, the variable known as the technology usefulness as observed at the Technology Acceptancy Model shares the meaning with the variable known as performance expectancy of the Unified Theory of Acceptancy and Technology Use. The meaning behind these two variables is that the new technology must be useful to the user in solving practical problems (Kayisire & Wei, 2016). In addition, it must offer a better performance when compared to previous technologies. In the case where the new technology fails to solve existing problems (or underperforms), it will be dropped by users (Kayisire & Wei, 2016; Ayim, Tekinerdogan, Addison, & Kassahun, 2022).

Moreover, the Technology Acceptancy Model introduced subjective norms as the third variable for the adoption and use of technology. Within Unified Theory of Acceptancy and Use of Technology, this variable is similar to the variable known as social influence. Social parameters are identified to have a significant impact on the decision of users to adopt and use the technology (Kyobe, 2011; Lubua, 2014). Where the technology is not supported by social parameters the adoption and use processes become difficult.

In addition, the Unified Theory of Acceptancy and Use of Technology provides facilitating conditions as another variable. Although the variable is not directly replicated on the Technology Acceptancy Model, there are several inputs which acknowledges it importance (Venkatesh & Bala, 2008). Some of the facilitating conditions include management support, basic education etc. Given these two models, theoretically, the adoption and use of Information Technologies embraces identified variables.

WHY THE ANALYSIS?

The analysis of studies on the adoption of Information and Communication Technologies is important because of a number of reasons. First, it synthesises results of studies conducted by different people and context. The synthesis will consolidate factors for the adoption and use. Arguably, findings of this analysis will benefit people who need a reference on such studies, within Africa. Also, it will provide a general point of reference from future studies in this area. The main question in this paper seek to know factors for the adoption and use of Information Technology reported in the literature based in Africa.

METHODOLOGY

This study is a quantitative study. A quantitative study will enable the generalisation of findings (Xiao & Watson, 2019). On the other hand, the study uses the descriptive

research design. In order to use the descriptive research design, a number of procedures will be followed. First, the study established the question that requires answers; this is also known as the research question. The question is in section 4.0.

In order to meet the information requirement of this paper, the study by Kraus, Breier and Dasí-Rodríguez (2019) recommended the establishment of the literature search procedure and criteria. The following elements are important in the literature search process: First, the search activity was on google, and was based on academic papers conducted within Africa. These papers were from peer reviewed journals, conferences, book chapters or reports. Qualified journals were published on quarterly, bi-annual or annual basis. Only papers on the adoption and use of technology were included in the study.

Only papers meeting the criteria above are included. For analysis, themes from these papers which are similar to those of the research questions were identified and categorised together. This was followed by establishing the frequency to which an item was reported. In addition, explanations supporting such themes were provided based on how they were reported in respective papers. In addition, a discussion included other literature around the world, in support or against current revelations. In order to ensure the validity of data, only papers meeting criteria identified above, and those whose methodology is coherent, are included in the analysis. In total, 55 papers on the adoption and use of Information Technology met specified criteria; therefore, they were used in the analysis process. These papers are in Appendix 1.

RESULTS

This section presents results of the analysis. It responds to the question that require to determine factors affecting the adoption and use of Information Technologies in Africa. The literature reports numerous factors to affect the adoption and use of Information Technologies within Africa. The current study found the following factors as reported by the literature: The availability of reliable infrastructure, high cost of adoption and use, perceived usefulness of ICT, perceived ease of use, poor management support, lack of ICT knowledge and skills, lack of government support and policies, lack of maintenance and technical support, inadequate security and the peer pressure. Table 1 provides the summary of the analysis.

Table 1: Factors affecting the adoption of Information Technologies based on the literature from Africa

Factor for adoption	Frequency	Percent	Factor Ranking
High cost of adoption	35	13.5	3
Lack or poor management support	19	7.5	5
Lack of ICT knowledge	54	20.7	1
The perceived usefulness of ICT	25	9.6	4
The perceived ease of use	20	7.6	5
The availability of reliable infrastructure	40	15.3	2
Inadequate government support	17	6.5	7
Lack of technical support	19	7.3	6

Security fear	9	3.5	9
Pressure to adopt	10	3.8	8
Corruption and fraud	2	0.8	10
Negative attitude	5	1.9	9
Self-efficacy	2	0.8	10
Resistance to change	2	0.8	10
Compatibility	1	0.4	11
Total	*260*	*100*	

Source: (Research Own data, 2022)

Based on Table 1, there were 260 counts where factors affecting the adoption of Information Systems featured. According to results of the analysis presented in the same table, the lack of knowledge is the most reported factor affecting technology adoption and use. The factor had 54 counts, which amounted to 20.7%. The study by Gono, Harindranath and Özcan (2010) considers the lack of knowledge on the value of technology as the factor, while the study by Johnston and Jali (2015) considers the lack of knowledge by users on how to use the technology and associated value.

On the other hand, the availability of a reliable infrastructure is reported as the second highly impacting factor. It reported 40 counts of frequencies and 15.3%. The study by Kayisire and Wei (2016) accounts this to factors such as frauds in projects and poor technical support. Moreover, the analysis reports the high cost of adoption and use as another factor affecting the adoption. The factor reported 35 counts, equivalent to 13.5% of all. To normal users the cost is basically due to the lack of a strong regulatory system by the government (Gono, Harindranath, & Özcan, 2010). Moreover, corporations face difficulties in the adoption process because of fraud, which in turn increases the cost of adoption (Ayim, Tekinerdogan, Addison, & Kassahun, 2022).

Accordingly, the perceived usefulness of the Information Technology is another factor reported to have the percent equivalent to 10 (that is 9.6%). According Kyobe (2011) the technology will be dropped if it does not solve the problem of the user, with efficiency. Other factors affecting the adoption and use of technology, together with their reported percent are as follows: the perceived ease of use (7.6), the lack of technical support (7.3%), in adequate government support (6.5%), the pressure to adopt (3.5), and the fear of security (3.5%). Negative attitude had 1.9%, while fraud, self-efficacy, and resistance for change had 0.8%, for each. The last factor was the technology compatibility, with 0.4%.

CONCLUSION

Based on section 6.0, the following are the five factors mostly affecting the adoption and use of Information Technologies in Africa: Lack of ICT knowledge, unreliable infrastructure, high cost of adoption, the perceived usefulness of ICT, and the perceived ease of use. From this perspective, the largest responsibility for Information Technology adoption rests upon the government and the implementing organisation, rather than users. Therefore, they must address these challenges for a smooth adoption.

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APPENDIX 1: LIST OF REVIEWED PAPERS

S/N	Title And Authors	Year	Journal/Publisher	Country
1	Factors influencing the adoption and use of ICT by Small and Medium Sized Enterprises in Tanzania: A case study of Kilosa District ICT (*Camilius Sanga, Jonas Buzingo*)	2012	ICT For Development	Tanzania
02	Factors Influencing the Adoption of Clinical Informatics Tools among Medical Doctors (*Kehinde Aboyami Owolabi1, Aderibigbe, Nurudeen Adeniyi*)	2019	University of Dar es Salaam Library Journal	South Africa
03	Factors contributing to adoption and use of Information and Communication Technologies within research collaborations in Kenya (*Petronilla Muriithi, David Horner & Lyn Pemberton*)	2016	Information Technology for Development	Kenya

04	Factors affecting adoption and implementation of E-Commerce by SMEs in Tanzania (*Mlay, Evans Eddy*)	2020	Uongozi Journal	Tanzania
05	Factors influencing e-Government adoption in selected District ICTs of Tanzania (*Mercy Mlay Komba*)	2014	University Of South Africa	Tanzania
06	Factors Influencing ICT adoption and usage by Small and Medium Sized Enterprises: The Case Of Nairobi Based SMEs (*Andrew Paul Otieno*)	2015	United States International University Africa	Kenya
07	ICT adoption in SMEs in Tanzania: An Evaluation (*Wahid B. Hamad*)	2017	International Journal Of Advanced Engineering And Management Research	Tanzania
08	Factors influencing the adoption of ICTs in extension service delivery among extension agents in North-East, Nigeria (*Saadu Mustapha, Norsida Man, Jasmin Arif Shah, Nitty Hirawaty Kamarulzaman And Ahmadu Abubakar Tafida*)	2021	Official Journal of the University of Agriculture, Peshawar, Pakistan	Nigeria

09	Factors influencing teachers' adoption and integration of Information and Communication Technology into teaching *(Charles Buabeng-Andoh)*	2012	International Jo urnal Education of and Development Using Information and Communication Technology	Ghana
10	Factors affecting the adoption of data management as a service (Dmaas) in Small and Medium Enterprises *(Olwethuzide, Osdenjokonya)*	2022	Sciencedirect	South Africa
11	The impact of external factors on ICT usage practices at unesco world heritage sites (*Thereza Mugobi, Shogo Mlozi*)	2021	Journal Of Tourism, Heritage & Services Marketing	Tanzania
12	Factors affecting the adoption of ICT for health service delivery in Namibia (Blessing M. Maumbe, Meke I. Shivute, Vesper T. Owei)	2011	IGI Global	Namibia
13	Factors affecting the adoption of ICT by administrators in the university for development studies *(Alhassan Ibrahim, Mavis Adu-Gyamf, Bawa Abdallah Kassim)*	2018	International Journal Of Sustainability Management and Information Technologies	Ghana

14	Factors influencing the adoption of open access scholarly communication in Tanzanian Public Universities *(F.W. Dulle, M.K. Minish-Majanja, L.M. Cloete3)*	2010	76th World Library And Information Congress: Ifla General Conference And Assembly	Tanzania
15	<u>Factors Affecting The Use Of Social Media In The Learning Process</u> *(Edison W Lubua, Adam Semlambo, Philip D Pretorius)*	2017	South African Journal Of Information Management	South Africa
16	factors influencing ICT adoption and usage by small and medium sized enterprises (Andrew Otieno)	2015	Nairobi University	Kenya

17	Factors affecting the intention to adopt egovernment services in Malawi and the role played by donors (Patrick W Ziba)	2020	Journal of Information Development	Malawi
18				
19	ICT adoption and use in Tanzania SMEs *(Cuthbert A. Msuya1, Emanuel A. M. Mjema, Beatus A. T. Kundi)*	2017	Tanzania Journal Of Engineering And Technology	Tanzania
20	Constraints hindering adoption of ICT in government secondary schools in Tanzania *(Kunda Humphrey Kweka, Placidius Ndibalema)*	2018	International Journal Of Educational Technology And Learning	Tanzania
21	Factors affecting the adoption of emerging ICT technologies in public institutions in Kenya *(Ndichu, J. N; Mwalili, T)*	2019	The Journal of Business and Change Mnaagement	Kenya
22	Factors affecting the adoption of ICT by administrators in the University for development studies tamale *(Ibrahim Alhassan, Mavis AduGyamfi, Bawa Abdallah Kassim, Bawa Abdallah)*	2018	International Journal Of Sustainability Management And Information Technologies	Ghana
23	Adoption of ICT innovations in the agriculture sector in Africa: a review of the literature *(Bedir Tekinerdogan; Chris Addison)*	2022	Journal of Agriculture and Food Security	Africa

24	Factors influencing adoption and use of ICT among nurses in selected hospitals in Ibadan *(Iyanuoluwa O Ojo, Oluwatumininu Benardette)*	2021	Journal of Health Informatics in Developing Countries	Nigeria
25	Factors affecting ICT adoption in tertiary institutions in Ghana *(Kwabena Obiri-Yeboah. Kwame Owusu Kwarteng & Roderick*	2013	Information And Knowledge Management	Ghana

	Kyere-Djan)			
26	Factors influencing ICT Adoption in some selected secondary schools (Opeyemi Paul Ogundile, Sheila A. Bishop, Hilary I. Okagbue, Peter O. Ogunniyi & Anuoluwapo M Olanrewaju)	2019	International Journal Of Emerging Technologies In Learning	Nigeria
27	Factors affecting students' adoption of ICT tools in higher education institutions *(Salini Rosaline & Reeves Wesley)*	2017	IGI global	Zimbabwe
28	Investigating the key factors influencing ICT adoption in South Africa *(Michael Kyobe)*	2011	Journal Of Systems And Information Technology	South Africa
29	Electronic learning benefits and challenges in Malawi's higher education: A literature review *(Gama, L.C., Chipeta, G.T. & Chawinga, W.D)*	2022	*Education Information Technology*	Malawi
30	Factors Influencing the Adoption of Clinical Informatics Tools among Medical Doctors in South Africa	2015	University of Dar es Salaam Library Journal	South Africa
31	On The Factors Affecting The Adoption Of ICT For The Teaching Of Word Problems *(K. M. Cassim, S. D. Eyono Obono)*	2011	Proceedings Of The World Congress On Engineering And Computer Scienc	
32	Factors affecting the adoption of ICT on project planning in the Nigerian food and beverage industry *(Sunday Akintelu, Isaac Irefin & Joshua Akarakiri)*	2016	Journal Of Management And Sustainability	Nigeria

33	Factors affecting the effective utilisation and adoption of sophisticated ICT solutions *(Idisemi Apulu, Ann Lathamand, Robert Moreton)*	2011	International Journal Of Management Practice	Nigeria
34	Examining the factors affecting the use of ICT in teaching *(Yaser Hasan Salem Al-Mamary)*	2022	College Of Business Administration	Tanzania
35	Factors that affect information and communication technology adoption by small businesses *(Jie Xiong, Sajda Qureshi, Lotfollah Najjar)*	2013	International Journal Of Management Practice	Nigeria
36	Factors Influencing ICT Adoption in Some Selected Secondary Schools in Ogun State *(Opeyemi Paul Ogundile, Hilary I. Okagbue)*	2019	Journal of Emerging Technologies in Learning	Nigeria
37	Factors Affecting the Adoption of ICT for Health Service Delivery in Namibia *(Blessing M. Maumbe, Meke I. Shivute)*	2011	IGI Global	Namibia
38	Analysis of the Adoption and Use of ICT for e-Government Services: The Case of Mozambique	2019	2019 IST-Africa Week Conference	Mozambique
39	Factors affecting ICT adoption in tertiary institutions in Ghana *(K. Obiri-Yeboah, Kwame Owusu Kwarteng, Roderick Kyere-Djan)*	2013	Journal of Information and Knowledge Management	Ghana
40	ICT for universal access to agricultural information: The case of Malawian farmers *(Emily Kang'ombe Kwatani)*	2017	2017 Seventeenth International Conference on Advances in ICT for Emerging Regions	Malawi

41	A synthesis of research on ICT adoption and use by medical professionals in Sub-Saharan Africa *(J. Crow; Ramona Broussard)*	2012	IHI Proceedings	Sub-Saharan Africa
42	An exploration of factors influencing the adoption of ICT enabled entrepreneurship applications in Namibian Rural Communities *(Elizabeth Ujarura Kamutuezu, Heike WinschiersTheophilus, Anicia Peters)*	2022	Cornel University	Namibia
43	Factors influencing the adoption of Information Communication Technology *(Agegnehu Menen, Lemi Kenenisa, Mulatu Firew)*	2019	Journal Of Process Management And New Technologies	Ethiopia
44	ICT possession and usage among Congolese small and medium-sized enterprises	2018	International Journal Of Academic Research In Economics And Management Sciences	DRC
45	Technological and Economic Factors Determining ICT Level: Evidence from Rural MicroBusinesses in Democratic Republic of Congo *(Raquel Perez-Estebanez)*	2017	Journal of International Development	DRC
46	Adoption of Financial NICTs in the SMEs of Bukavu in the DR Congo: What Perspective?	2022	Open Journal of Business and Management	DRC
47	Factors influencing adoption of ICT by small and medium enterprises in the hospitality industry in Kenya *(Elena Mwai)*	2016	Journal Of Mobile Computing & Application	Kenya

48	Information and Communication Technology in Small and Medium Enterprises: Factors Affecting The adoption and use of ICT in Nigeria *(Ladokun I. O, Osunwole O.O, Olaoye B.O)*	2013	International Journal Of Academic Research In Economics And Management Sciences	Nigeria
49	The E-Government in Sudan: Challenges, Barriers and Prospects *(Elhadi Osman Abdalla)*	2014	International Conference on Global Economy, Commerce and Service Science	South Sudan
50	Determinants of Information and Communication Technologies adoption *(Adel Ben Khalifa)*	2016	Journal Of Innovation Economics & Management	Tunisia
51	Factors Influencing the Adoption of Clinical Informatics Tools among Medical Doctors *(Kehinde Aboyami Owolabi1, Aderibigbe, Nurudeen Adeniyi)*	2019	University of Dar es Salaam Library Journal	South Africa
52	Factors influencing the adoption of Information Communication Technology *(Agegnehu Menen, Lemi Kenenisa, Mulatu Firew)*	2019	Journal Of Process Management And New Technologies	Sudan
53	Factors influencing the adoption of Information Communication Technology *(Agegnehu Menen, Lemi Kenenisa, Mulatu Firew)*	2019	Journal Of Process Management And New Technologies	Ethiopia
54	Factors Influencing ICT Adoption in Some Selected Secondary Schools in Ogun State *(Opeyemi Paul Ogundile, Hilary I. Okagbue)*	2019	Journal of Emerging Technologies in Learning	Nigeria
55	Factors affecting ICT adoption in tertiary institutions in Ghana *(Kwabena Obiri-Yeboah. Kwame Owusu Kwarteng & Roderick Kyere-Djan)*	2013	Information And Knowledge Management	Ghana