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ANALYSIS OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES ADOPTION BY SMALL AND MEDIUM-SIZED ENTERPRISES IN KOGI STATE

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ABSTRACT

This study focused on Information and Communications Technologies (ICT) adoption by Small and Medium-sized Enterprises in Kogi State. The study determined the constraints against the adoption of ICT by SMEs in Kogi State. This study used survey research design. The population of the study comprised of 2027 SMEs. Multi-stage sampling technique was used to choose the required sample size of 323. Descriptive statistics and Binary Logit Regression were used for analysis. Findings show that excessive reliance on foreign technology, unreliability of e-commerce systems, high costs of ICT equipment, insecurity and legal and regulatory issues has significant influence on the adoption of ICT by SMEs in Kogi State. The study concluded that despite the benefits of ICT, some constraints detract its adoption by SME owners in Kogi State. The study recommended that SME owners should have positive perception of the usefulness of ICT, find alternative way of using ICT, source for adequate fund and acquire better ICT knowledge to have better chance of ICT adoption in Kogi State.

Contribution/ Originality: This used new method for analysis. It contributes significantly to literature and theories. The study is the first to be carried out in the study area.

1. INTRODUCTION

It is no doubt that technology has changed the phase of business environment and particularly how things are done today. In fact, the business environment of Kogi state is thus more of network of relationship between firms in the same industry, customers and other parts of the world. Firm owners find themselves in this kind of environment where change in technology is irresistible (Skoko, Ceric, & Huang, 2008). It is observed that competitiveness among firms is characterized by the ability to adopt sophisticated technology in business operation in Kogi State. According to AL

Rahbi (2017) the need to "incorporate Information and Communications Technologies (ICTs)" become very high. Studies such as Olawale and Garwe (2010) and Oliveira and Martins (2011) opine that the adoption of ICTs is necessary to support the firms' economic activities because the role of technology in information flow today has become pivot in business competition.

The adoption level of ICT by SMEs in Kogi State is still very low. The adoption behaviour does not follow the report of previous studies that the utilization of ICT has significant influence on improved SMEs performance (Olise, Anigbogu, Edoko, & Okoli, 2014). A number of studies (Apulu & Latham, 2011; Kuteyi, 2009) had earlier reported that SMEs are still found wanting in the adoption of ICT. There are observed constraints to the very low adoption of ICT. Some of the constraints may be lack of knowledge, skills and capabilities. In their own view, Mohammed and Moruf (2008) opined that 'lack of information about suitable ICT solutions and implementation' are the prime constraints in adoption of ICT. Booz (2010) added that 'lack of strategic resources, infrastructural inadequacy, transient funding and oversight are other constraints in ICT adoption. Mohammed and Moruf (2008) believed that large firms have sufficient resources to adopt ICT compared to SMEs which are more constrained by financial and human resources. There are more other likely constraints in the adoption of ICT by SMEs in Kogi State. Thus, this study investigated the constraints against the adoption of ICT by SMEs in Kogi State.

2. LITERATURE REVIEW

2.1. Concept of ICT

The interconnectedness or network of relationship in the business environment of today is facilitated by ICT. The relationship appears to be consequent upon survival and growth among firms. The need to utilize ICT becomes highly imperative for firms regardless of its size or scope. According to Apulu (2012) "the increase use of Information and Communication Technology (ICT) among firms has significantly changed the manner in which those firms operate and communicate".

There have been series of attempt by scholars to give a holistic conceptual clarification on ICT. Studies such as Akinsuyi (2010) and Anigbogu, Edoko, Okoli, and Olise (2014) viewed ICT as 'an umbrella term that covers all technical means for processing and communicating information'. They might have used the term 'umbrella' because ICT is information inclined and is electronically processed or transmitted from a particular originator or sender to his/her target for specific purpose. There are more to ICT which appears to be silent in different studies. Jegede (2015) expressed that "ICT can be described as any tool that facilitates communication process and transmit information and shared knowledge through electronic means". Mohammed and Moruf (2008) also expressed that ICT involves a 'broad range of computerized technologies'. In an attempt to broaden understanding of this definition, Apulu and Ige (2011) referred ICT as any technology which enhance and promote communication and the transfer or processing of information through electronic means. These technologies include products and services such as desktop computers, laptops, handheld devices, wired or wireless intranet, business productivity software such as text editor and spread sheet, enterprise software, data storage and security, network security and so on Mohammed and Moruf (2008). The electronic payment medium and marketing are also essential arms of ICT. In fact, all electronic transactions between parties in a business environment are product of digital technology. Oluwatayo (2014) expressed that ICT includes mobile telephony, electronic application (such as e-banking, e-marketing and e-commerce), digital media and broadband technology. Haseena (2014) stressed that "opportunities created by e-commerce and its predecessor technologies is that ICTs can create digital market places to manage supply chains and automate transaction, increasing efficiency and opening previously closed markets to firms. In their understanding, Olise et al. (2014) opined that 'any technology that facilitates communication and assist in capturing, processing and transmitting information electronically' is ICT base.

2.2. Constraints against SMEs' ICT Adoption

Factually, there is an observed increase in the usage of ICT by firms of all kinds and sizes across the globe. The knowledge behind the usage is driven by the zeal to minimize cost, minimize stress, promote relationship, improving efficiency and effectiveness, provide improved customer services, and achieve corporate goals with ease. Suleiman (2016) added that ICT has forestalled

opportunities for SMEs to market and sell their products online to a global audience, and has enabled employees and other stakeholders to work and access information anywhere in the world.

There is often gap in the availability of skilled ICT personnel in the context of SMEs in Kogi State. Argument has been established by previous studies (Hashim, 2007; Ongori, 2009) that some SME owners do not have adequate skills and expertise needed to take advantage of the benefits of ICT. Other SME owners who have awarneness regarding the benefits of ICT often solicit the aid of experts to overcome the 'ICT capability gap' (Carcary, Doherty, & Conway, 2014; Hashim, 2007; Kannabiran & Dharmalingam, 2012). It is noteworthy according to AL Rahbi (2017) that 'SMEs may receive non-professional support' and this is likely to result into 'poor ICT strategy' (Chibelushi, 2008). If the factors are favourable, SME owners are likely to sharpen their behaviour towards actual adoption of ICT (Adamkolo, Salleh, & Sarina, 2018).

Making a case for SMEs in Kogi State, there are observed constraints against ICT adoption by SMEs. AL Rahbi (2017) noted that the constraints against ICT adoption by SMEs are a global phenomenon, and these constraints affecting the 'ICT adoption process by SMEs' are both internal and external. These constraints may have accounted for the low rate of ICT adoption by SMEs in Kogi State. Virtually, previous studies (such as Cesaroni and Consoli (2015); Hashim (2007); Tarutė and Gatautis (2014)) reported that the big cleavage between large enterprises and SMEs is the ICT rate of adoption and the capability to take advantage of new technologies. Thus, SMEs in Kogi State are faced with capacity constraint (in the form of finance and technical know-how). Bharati and Chaudhury (2015) also argued that SMEs are more likely to avoid risk of ICT adoption based on their limited capacity. Scholars and researchers (Durkin, McGowan, & McKeown, 2013; Haller & Siedschlag, 2011; Kannabiran & Dharmalingam, 2012) as cited in AL Rahbi (2017) added that "they are prone to a lack of resources, mainly money, expertise and technical experience, all of which make it difficult for SMEs to formulate ICT adoption plans and establish their needs and goals with regards to ICT use". Resources (such as money and key labours), plan and structure for ICT adoption are believed to be internal constraining factors where deficient or insufficient.

The adoption of ICT (of whatever kind) required not only the awareness of SME owners, but the possession of relevant skills. Past studies (such as Ongori (2009); Kannabiran and Dharmalingam (2012); Yeboah-Boateng and Essandoh (2014)) have provided empirical evidence that some SME owners are deficiencies in IT skills and relevant in-house expertise. Dyerson, Harindranath, and Barnes (2009) also expressed that most SMEs are still backward in the adoption of ICT (both operationally and strategically) because of lack of relevant IT skills. Ibe (2015) stressed that since SME owners are responsible for creating, shaping and developing their enterprises, the adoption and implementation of ICT will still suffer set back as a result of inadequate IT skills. It is believed that taking advantage of ICT is an extraction from the brain. Lack of skills is expected to lead to fire-brigade approach or trial and error. Other constraints against ICT adoption are lack of proper guidance (Ibe, 2015; Sharma, Mukherjee, Kumar, & Dillon, 2005) unsuitability to their business operations, high cost of ICT adoption (Folorunso, Awe, Sharma, & Jeff, 2006) unreliable service providers to facilitate e-commerce activities (Ibe, 2015) lack of security and trust (Organisation for Economic Co-Operation and Development, 2004) inadequate government support (Apulu & Latham, 2009; Baro, 2011) lack of legal framework (Henry & Migiro, 2010) and inadequate power supply (Agyeman, 2007).

3. METHODOLOGY

This study adopted survey research design. This method gave the respondents the chance to express their opinions on the variables under investigation (Essien, 2014; Gado, 2015; Omenka, 2013). The population of this study comprised of 2027 SMEs. The population cut across many SMEs in different sectors, ranging from service, manufacturing and agriculture. The study focused on SME owner/managers who make top managerial decision regarding ICT. The study used multi-stage sampling technique to choose sample size. The study determined the sample size (of 323) through Salant and Dillman (1994) sampling method as demonstrated below:

$$N_s = \frac{N_p\,(p)(1-p)}{\left(N_p - 1\right)\left(\frac{B}{C}\right)^2 + (p)(1-p)}$$

Where:
Ns= completed sample size required.
Np= Sample population.
P= proportion expected to answer in a certain way (50% or 0.5 is most conservative).
B= acceptable level of sampling error (0.05 = ±5%; 0.03 = ± 3%).
C= Z statistic associated with the confidence interval (1.645=90% confidence level; 1.960=95% confidence level; 2.576=99% confidence level).

To ensure the validity of the research instrument, extensive literature review relating to the topic which satisfied theoretical validity was focused on. The content validity of the instrument was established by senior academics that have experiences and are professionals. This study adopted Cronbach's Alpha to determine the reliability of the instrument. The results (in Table 1a & 1b) show that the constructs of the instrument are reliable given that they are above 70%. Data were analysed using descriptive statistics and Binary Logit Regression.

Table-1a. Reliability for determinants of ICT adoption.

S/N	Constructs	Cronbach's alpha	No of items
1	Ease of use	.846	
2	Nature of technology	874	
3	Technical strategy	.816	
4	Perceived usefulness	.906	
5	Technology in use	.863	
6	Availability of skilled ICT personnel	.897	
7	Reasonable budget	.941	

Source: Field survey, 2019.

Table-1b. Reliability for Rate/Degree of ICT adoption.

S/N	Construct	Cronbach's alpha	No of items
1	ICT adoption in my enterprise	.800	2

Source: Field survey, 2019.

4. DATA ANALYSIS AND RESULTS

Table-2. Questionnaire administration.

Questionnaire	Frequency	Percentage
Administered	323	100.00
Returned	283	87.62
Unreturned	40	12.38

Source: Field Survey (2019).

Table 2 indicates that 323 questionnaires (100%) were administered; 283 questionnaires (87.62%) were returned while 40 questionnaires (12.38%) were not returned. Based on the result, the study analyzed data on the returned questionnaires.

Table-3. Showing the business capital range of respondents.

Response		Frequency	Valid percent	Cumulative percent
Valid	Less than N1 million	105	37.1	37.1
	N1 million to less than 40 million	123	43.5	80.6
	N40 million to less than N200 million	55	19.4	100.0
	Total	283	100.0	

Source: Field survey, 2019.

The Table 3 shows the business capital range of respondents. It is observed that 105 respondents (37.1%) have the business capital of less than N1 million; 123 respondents (43.5%) have the business capital of N1 million to 40 million; and 55 respondents (19.4%) have the business

capital of N40 million to N200 million. The majority of respondents in the study area have the business capital of N1 million to N40 million of business capital. This implies that the respondents may have difficulty in purchasing sophisticated technology for their enterprises.

Table-4. Showing descriptive statistics for benefits of ICT.

Benefits	N	Mean	Std. dev.
ICT is used for conducting its commercial transactions	283	2.2756	1.14932
ICT is used for communicating with online customers	283	2.2544	1.32312
ICT is used for guaranteeing trust and reliability	283	2.3640	1.24842
ICT is used for rendering speedy services	283	2.3428	1.27962
ICT is used for protecting its online privacy	283	2.4806	1.25286
ICT is used for conducting customer services	283	2.3216	1.17259
ICT is used for boosting competence to run business in the market	283	2.1625	1.14006
ICT is used for conducting market research/surveys	283	2.1943	1.22953
ICT is used for managing costs of web-based operations	283	2.3534	1.30556
ICT is used for products manufacturing/processing	283	2.2686	1.26265
ICT is used for products promotion/advertising	283	2.3039	1.32068
ICT is used for employee/staff management.	283	2.5406	1.34254
Valid N (listwise)	283		

Source: Field survey, 2019.

Table 4 shows descriptive statistics for the benefits of ICT. The table shows that ICT is used in some enterprises for conducting commercial transactions (mean= 2.2756; standard deviation=1.14932), ICT is used for communicating with online customers (mean= 2.2544; standard deviation=1.32312), ICT is used for guaranteeing trust and reliability (mean= 2.3640; standard deviation= 1.24842), ICT is used for rendering speedy services (mean= 2.3428; standard deviation= 1.27962), ICT is used for protecting online privacy (mean= 2.4806; standard deviation= 1.25286), ICT is used for conducting customer services (mean= 2.3216; standard deviation= 1.17259), ICT is used for boosting competence to run business in the market (mean= 2.1625; standard deviation= 1.14006), ICT is used in this enterprise in conducting its market research/surveys (mean= 2.1943; standard deviation= 1.22953), ICT is used for managing costs of web-based operations (mean= 2.3534; standard deviation= 1.30556), ICT is used for products manufacturing/processing (mean= 2.2686; standard deviation= 1.26265), ICT is used for products promotion/advertising (mean= 2.3039; standard deviation= 1.26265), and ICT is used for employee/staff management (mean= 2.5406; standard deviation= 1.34254).

Table-5. Showing descriptive statistics of constraints against ICT adoption.

Constraints	Mean	Std. deviation	Analysis N
Insufficient knowledge	1.4629	.49950	283
Low government support	1.4099	.49269	283
Unsuitability of ICT for the type of business	1.4806	.50051	283
Weaknesses in ICT implementation	1.3958	.48988	283
Excessive reliance on foreign technology	1.4488	.49825	283
Unreliability of e-commerce systems	1.3640	.48199	283
Insecurity	1.4488	.49825	283
Uncertainty of payment methods due to fraud	1.3604	.48097	283
Lack of strategic resources	1.3640	.48199	283
Infrastructural inadequacy	1.3746	.48487	283
Size of the enterprise	1.4134	.49332	283
High costs of ICT equipment	1.3463	.47663	283
Incompetent government regulations for e-commerce	1.4523	.49860	283
Legal and regulatory issues	1.4134	.49332	283
Weak ICT strategies	1.4064	.49202	283
Lack of research and development	1.3251	.46924	283

Source: Field survey, 2019.

Table 5 shows the constraints against ICT Adoption of SMEs. Insufficient knowledge (mean= 1.4629; standard deviation= 0.49950), low government support (mean= 1.4099; standard deviation= 0.49269), unsuitability of ICT for the type of business (mean= 1.4806; standard deviation= 0.50051), weaknesses in ICT implementation (mean= 1.3958; standard deviation= 0.48988), excessive reliance on foreign technology (mean= 1.4488; standard deviation= 0.49825), unreliability of e-commerce systems (mean= 1.3640; standard deviation= 0.48199), insecurity (mean= 1.4488; standard deviation= 0.49825), uncertainty of payment methods due to fraud (mean= 1.3604; standard deviation= 0.48097), lack of strategic resources (mean= 1.3640; standard deviation= 0.48199), infrastructural inadequacy (mean= 1.3746; standard deviation= 0.48487), size of the enterprise (mean= 1.4134; standard deviation= 0.49332), high costs of ICT equipment (mean= 1.3463; standard deviation= 0.47663), incomplete government regulations for e-commerce (mean= 1.4523; standard deviation= 0.49860), legal and regulatory issues (mean= 1.4134; standard deviation= 0.49332), weak ICT strategies (mean= 1.4064; standard deviation= 0.49202), and lack of research and development (mean= 1.3251; standard deviation= 0.46924) are proven to be various constraints against ICT Adoption by SME owners. The mean scores for the constraints prove to be strong and the standard deviations show high divergence. However, the standard deviations results show that the data spread more around the means. Unsuitability of ICT for the type of business appears to be the strongest constraints with the highest divergence.

Table-6. Logit regression of constraints against the adoption of ICT.

Variables	Estimated coefficients	Standard error	P>|z|
Insufficient knowledge	-.005	.046	.989
Low government support	-.124	.346	.880
Unsuitability of ICT for the type of business	.000	.016	.989
Weaknesses in ICT implementation	.045	.187	.945
Excessive reliance on foreign technology	1.231	.705	.049
Unreliability of e-commerce systems	.492	.024	.000
Insecurity	.201	.009	.000
Uncertainty of payment methods due to fraud	-.101	.481	.834
Lack of strategic resources	-.415	.482	.477
Infrastructural inadequacy	.004	.112	.999
Size of the enterprise	-.216	.282	.557
High costs of ICT equipment	-1.125	.313	.000
Incomplete government regulations for e-commerce	.016	.101	.873
Legal and regulatory issues	.319	.015	.000
Weak ICT strategies	-.022	.356	.950
Lack of research and development	-.101	.236	.834
Insufficient knowledge	-.005	.046	.989

Source: Field survey, 2019.
Number of Obs= 283
PR chi² = 314.993
Prob > chi² = 0.000
Pseudo R-Square:
Cox and Snell= 0.671
Nagelkerke= 0.708
McFadden= 0.375
NB: Figures in the column of z-values* symbolize significance respectively.

The Table 6 shows the constraints against the adoption of ICT by SMEs in Kogi State. The constraints are insufficient knowledge, low government support, unsuitability of ICT for the type of business, weaknesses in ICT implementation, excessive reliance on foreign technology,

unreliability of e-commerce systems, insecurity, uncertainty of payment methods due to fraud, lack of strategic resources, infrastructural inadequacy, size of the enterprise, high costs of ICT equipment, incomplete government regulations for e-commerce, legal and regulatory issues, weak ICT strategies, lack of research and development and insufficient knowledge.

From the result of the Binary Logit Regression on the Table 6, the PR chi² is 314.993. The Pearson goodness-of-fit chi-square statistic tests the null hypothesis that the model adequately fits the data. The significance value of the test is equal to 0.01; therefore, the model does adequately fit the data. It is thus appropriate to say that the data do not violate the model assumptions. Prob > chi² = 0.000 which implies that 100% of the changes in the adoption of ICT by SMEs in Kogi State were explained by the variables in the model. Nagelkerke is chosen for the R^2 value. Nagelkerke's R^2 value appears to be the highest compared to the Cox and Snell's R^2 value of 0.671 and the McFadden's R^2 value of 0.375. The R^2 value of 0.708 shows that about 70.8% of the adoption of ICT by SMEs in Kogi State is explained by significant factors (such as excessive reliance on foreign technology, unreliability of e-commerce systems, insecurity, high costs of ICT equipment and legal and regulatory issues). Meanwhile, excessive reliance on foreign technology (with β= 1.231; p-value= 0.05), unreliability of e-commerce systems (with β= .492; p-value= 0.01), insecurity (with β= .201; p-value= 0.01) and legal and regulatory issues (with β= .319; p-value= 0.01) have significant positive influence on the adoption of ICT by SMEs in Kogi State; while high costs of ICT equipment (with β= .201; p-value= 0.01) has significant negative influence on the adoption of ICT by SMEs in Kogi State. Constraints such as insufficient knowledge, low government support, unsuitability of ICT for the type of business, weaknesses in ICT implementation, uncertainty of payment methods due to fraud, lack of strategic resources, infrastructural inadequacy, size of the enterprise, incomplete government regulations for e-commerce, weak ICT strategies, lack of research and development and insufficient knowledge do not have significant influence on the adoption of ICT by SMEs in Kogi State.

5. DISCUSSION OF FINDINGS

Results show that ICT has in stock some benefits for SMEs in Kogi State. for instance, ICT is used in some enterprises for conducting commercial transactions, communicating with online customers, guaranteeing trust and reliability, rendering speedy services, protecting online privacy, conducting customer services, boosting competence to run business in the market, conducting market research/surveys, managing costs of web-based operations, products manufacturing/processing, products promotion/advertising, employee/staff management. It was verified statistically that these benefits are not fully derived by SME owners. This may be as a result of some adoption backdrops. However, Barrett (1999) asserted that ICT improves communications that expanded to a broader market.

Factors such as insufficient knowledge, low government support, unsuitability of ICT for the type of business, weaknesses in ICT implementation, excessive reliance on foreign technology, unreliability of e-commerce systems, insecurity, uncertainty of payment methods due to fraud, lack of strategic resources, infrastructural inadequacy, size of the enterprise, high costs of ICT equipment, incomplete government regulations for e-commerce, legal and regulatory issues, weak ICT strategies, and lack of research and development were statistically investigated as varying constraints against ICT Adoption by SME owners in Kogi State. The constraints are found impeding on the ICT Adoption by SME owners in Kogi State. Unsuitability of ICT for the type of business was found as the most impeding constraints with the highest divergence. However, the finding of this study proves the assertion of Seyal and Rahim (2006) and Alam and Noor (2009) that cost, knowledge, external pressure and government support prevent the adoption and implementation of ICT by SME owners.

The result of the study shows that about 70.8% of the adoption of ICT by SMEs in Kogi State is explained by significant factors (such as excessive reliance on foreign technology, unreliability of e-commerce systems, insecurity, high costs of ICT equipment and legal and regulatory issues). Excessive reliance on foreign technology, unreliability of e-commerce systems, insecurity and legal and regulatory issues have significant positive influence on the adoption of ICT by SMEs in Kogi State; while high costs of ICT equipment has significant negative influence on the adoption of ICT

by SMEs in Kogi State. Constraints such as insufficient knowledge, low government support, unsuitability of ICT for the type of business, weaknesses in ICT implementation, uncertainty of payment methods due to fraud, lack of strategic resources, infrastructural inadequacy, size of the enterprise, incomplete government regulations for e-commerce, weak ICT strategies, lack of research and development and insufficient knowledge were found insignificant influence on the adoption of ICT by SMEs in Kogi State.

6. CONCLUSION AND RECOMMENDATION

The benefits of ICT for SMEs in Kogi State cannot be overemphasized. ICT provides opportunity for conducting commercial transactions, communicating with online customers, guaranteeing trust and reliability, rendering speedy services, protecting online privacy, conducting customer services, boosting competence to run business in the market, conducting market research/surveys, managing costs of web-based operations, products manufacturing/processing, products promotion/advertising, employee/staff management. Despite these benefits, some constraints detract the adoption of ICT by SME owners in Kogi State.

Though excessive reliance on foreign technology, unreliability of e-commerce systems, insecurity and legal and regulatory issues were empirically proven to have significant positive influence on the adoption of ICT by SMEs in Kogi State, but high costs of ICT equipment has significant negative influence on the adoption of ICT by SMEs in Kogi State. Meanwhile, insufficient knowledge, low government support, unsuitability of ICT for the type of business, weaknesses in ICT implementation, uncertainty of payment methods due to fraud, lack of strategic resources, infrastructural inadequacy, size of the enterprise, incomplete government regulations for e-commerce, weak ICT strategies, lack of research and development and insufficient knowledge have no significant influence on the adoption of ICT by SMEs in Kogi State. Thus, not all factors are constraints. Some factors impede the adoption of ICT while others led to the increased adoption level of ICT in Kogi State.

Based on the findings of the study, it is recommended that SME owners should have positive perception of the usefulness of ICT, find alternative way of using ICT, source for adequate fund and acquire better ICT knowledge to have better chance of ICT adoption in Kogi State.

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