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The Influence of Values on the Intention and Usage of Mobile Phone Technology

A case of Tanzanian SMEs

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Abstract— Mobile phone technology has been relied upon in performing a number of activities in the SMEs. In less developed regions, computing infrastructures are very poor thereby depending highly on mobile phones. The improvement of technology in the mobile phones has seen more applications and services being accessed through them. This gives SMEs, especially in developing countries, a preferable alternative to desktop computing technology. However, to maximise the usability of mobile phone technology in SMEs context, key factors which influence users' perception on its acceptance need to be explained clearly. This study explains the factors influencing employees' intentions and use of mobile phone technology in SMEs, by extending the Technology Acceptance Model (TAM) with values. The analysis results show that the values of mobile phone technology in SMEs have an impact to the behaviour intention to use. This suggests that stakeholders specifically vendors, policy makers, managers and mobile network operators should take their part in handling the challenges and enforcing the benefits of mobile phones since they constitute to the overall intention and usage. This study uses SEM with 459 employees including managers and ordinary employees in different sectors which perform tourism activities in Tanzania. Data analysis was performed by using SEM through AMOS. Implications of the research and future studies are also highlighted in this paper.

Keywords— ICT, SMEs, mobile phone technology, SEM, AMOS and TAM

I. INTRODUCTION

Mobile phone technology has been a dependable technological option in Small and Medium Enterprises (SMEs). This is due to its operational relief as compared to desktop computing technology. For example, desktop computing technologies are perceived to be too expensive, difficult to maintain and have a high level of sophistication which demand

skilled labour (López-Nicolás *et al.*, 2008; Nah *et al.*, 2005).

Maugis *et al.* (Maugis *et al.*, 2005) assert that, under technology leapfrogging, developing countries need not to replicate an invest on the technological fixed infrastructure like their developed compatriots. Instead, they can rely on mobile technologies as a way of achieving their goals. The increasing popularity in the use of mobile technology in organisations can be attributed to the wide usage in applications such as mobile brokerage services (Looney *et al.*, 2004) as well as mobile payment and banking services (Mawona and Mpogole, 2013; Rumanyika, 2015).

The success of any technology can be influenced by its perception towards users (Onyango *et al.*, 2014; van Biljon and Kotzé, 2007). To effectively explain the adoption behaviour of technologies, several models have been proposed (Oliveira and Martins, 2011). These models highlight the factors which influence the intention and use of technologies and have been tested in several contextual properties. The example of the models which best explains individual adoption include the Theory of Reasonable Action (TRA), the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003) and Technology Adoption Model (TAM) (Davis, 1989). These models/theories can be applied to explain the intentions of using mobile phone technology by Tanzania tourism SMEs. This study extends TAM by adding another construct which explain the values of mobile phone technology in an attempt to evaluate its suitability on explaining the acceptance of mobile phone technology in SMEs perspective. The rest of this article is organised as follows: Section two discusses the Tanzanian SMEs followed by highlights of technology adoption model. Section four discusses the uses of mobile phones in the SMEs context, section five presents the values of

mobile phone in Tanzanian SMEs while section six discusses the hypotheses formulation. Research methodology is presented in section seven followed by results and discussions in section eight. Section nine is a conclusion for this research article.

II. TANZANIAN SMEs

SMEs are companies which are characterised by their staff numbers and financial resources (Hourali *et al.*, 2008; Makame *et al.*, 2014). In Tanzania, SMEs comprise of companies with head counts of up to 99 and financial resources of up to 444,000USD (URT, 2013). The Tanzania Small Industries Development Organisation (SIDO) uses the definition which is identified in the SME policy (see *table 1*) while pointing out that in case a company belong to more than one category, its financial investment will determine its position (URT, 2013). Another definition of SME is defined by the Tanzania Revenue Authority (TRA) in which they define them as enterprises whose taxable turnover is less than TZS 40 Million (USD 22,500). This study define SMEs as the businesses entities of one up to 99 employees and capital investment of zero up to 800 million (444,000 USD).

III. TECHNOLOGY ACCEPTANCE MODEL

The original TAM was intending to identify the factors that facilitate integration of technologies into an organisation and discover why users accept or reject a technology (Davis, 1989). Development of TAM was based on adopting the concepts of the theory of reasoned action (TRA) (Fishbein and Ajzen, 1975) which is a more generalised theory to be used to explain specific contexts (Lindsay *et al.*, 2011). In social psychology, TRA has been used to explain the why people performs a particular behaviour in situations of 'reasoned action' through identifications of causal relationships which exists between beliefs, attitudes, intentions and behaviour (Kwon and Chidambaram, 2000; Pedersen, 2005). Since then, TAM has been used to identify factors contributing towards acceptance of technologies. TAM theorises that when users are given a piece of technology, there are several factors which influence their decisions on how and when they will use such technology (Davis, 1989; Yueh *et al.*, 2015). TAM explains the acceptance of technology by two key perceived attributes or measures: perceived usefulness (PU) and perceived ease of use (PEU). According to Davis (1989), PU is whether the technology will enhance

the user's job performance whereas PEU relates to whether using the system will be free from effort. The integrity of the original TAM has been tested through a number of empirical research, which extends the model to different settings, providing consistency and good re-test reliability, confirming the its validity (Lindsay *et al.*, 2011; Venkatesh and Davis, 2000). In this regard, TAM is chosen to be the best model to provide a framework of exploring the issues which motivates the adoption of mobile phone technology in Tanzania tourism SMEs by extending it with the values.

IV. MOBILE PHONE USAGE IN SMEs

Mobile phone technology allows accessing the computing services and internet through the mobile devices in the wireless medium (López-Nicolás *et al.*, 2008; Mashenene, 2015). This mobility nature allows users to access computing services anywhere and at any time (Sun *et al.*, 2013). Mobile phone technology needs reliable telecommunications infrastructure which can support technologies such as Wireless Application Protocol (WAP), Bluetooth, 3G, and General Packet Radio Service (GPRS) as well as the devices which will act as a client on the user side such as mobile phones, Personal Digital Assistants (PDAs) etc. (Nah *et al.*, 2005; Sheng *et al.*, 2010). In the case of Tanzania, mobile technology is being used heavily by people in SMEs. A study conducted in 2014 shows that the main functionalities used by SMEs include making and receiving calls, mobile money services and SMS (Venkatakrishnan, 2014). The usage of internet and associated mobile apps for business purposes shows an increasing trend.

A key feature of the mobile sector in Tanzania is that mobile money services used in Tanzania uses text SMS to allow a mobile phone subscriber to send/receive funds, send/receive airtime balances, performing merchandise bill payments (like electricity, TV and water) to the respective companies as well as performing transactions of funds between the bank accounts and their mobile phone accounts (like M-pesa and Tigo Pesa). Vankatakrishnan (2014) summarise the mobile services in Tanzania as Person to Person (P2P) (remittances), Person to Business (P2B) (bill payments, loan repayments, etc.) and Person to Government (P2G) (tax payments).

TABLE 1: THE DESCRIPTION OF DEFINITION OF SMALL, MEDIUM AND LARGE ENTERPRISE IN A TANZANIAN CONTEXT (ADOPTED FROM TANZANIA SMEs POLICY (URT, 2013)

Type of Enterprise	Micro	Small	Medium	Large
No. of Employees	0-4	5-49	50-99	100 and above
Working Capital	0-2,777 USD	>2,777-111,100 USD	>111,100-444,400USD	>444,400USD

V. VALUES OF MOBILE PHONE TECHNOLOGY IN SMEs

This study extends TAM model with another construct which represent values of mobile phone technology in the SMEs context. These values have been explored by the use of Value-Focused Thinking (VFT) by Mushi *et al* (2016). In such an explorative study, the values are expressed in terms of perceptions of users concerning their wishes, concerns, problems and benefits encountered as they use mobile phones to perform their duties. These values are:

- Maximise Mobile Network Coverage and Quality
- Minimise Acquisition and Operational Costs
- Maximise Collaboration and Sharing of Information
- Maximise Security in Provision of Mobile Money Services
- Maximise Battery Life and Processing Capacity of Mobile Phones.

This study takes over from where Mushi *et al* (2016) left. The study of Mushi *et al* (2016) is an explorative study which reveals the values of mobile phones in the Tanzanian SMEs without showing how such values influences the behaviour intention and use of mobile phones. This study extends Mushi *et al* (2016) by conducting a survey involving managers and ordinary employees of SMEs by extending TAM with such values and test the statistical significance of the relationships of the factors.

VI. HYPOTHESES FORMULATION

Some of the studies have tested TAM in different context. In mobile phone acceptance, a number of studies have found that PU of the technology and PEU do directly influence the behaviour intention (BI) of users in attempts to

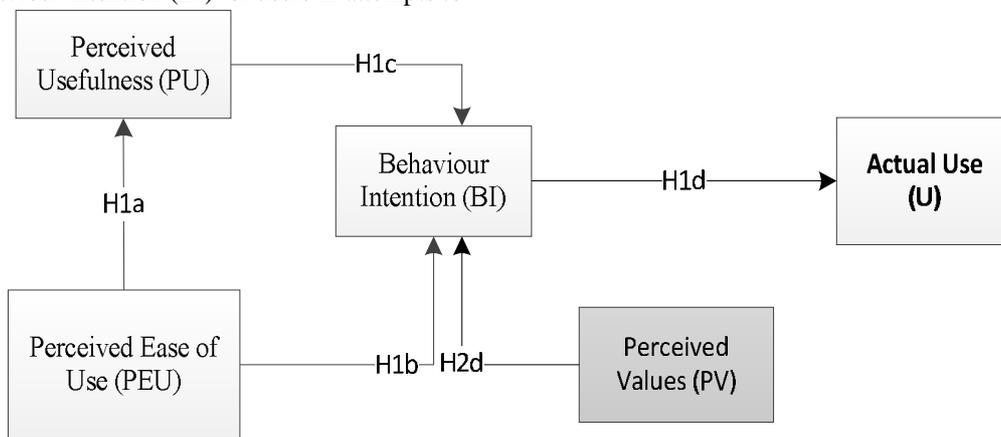


FIGURE 1: CONCEPTUAL FRAMEWORK

VII. RESEARCH METHODOLOGY

This study involves data collected from three regions in Tanzania: Dar es salaam, Zanzibar and Kilimanjaro which accounts to 459 respondents. Purposive sampling was used to select the districts and sectors of interests. The SME sectors were comprised of bars, safari and tours companies,

adopt a new technology (Kim, 2008; Tassabehji *et al.*, 2008; van Biljon and Kotzé, 2007). Also, most of empirical research have shown that PEU is the antecedent of PU while suggesting that, through PU, PEU indirectly tends to influence the intention to adopt technology and finally its usage (Gallego *et al.*, 2008; Peng *et al.*, 2012; van Biljon and Kotzé, 2007). Therefore the following hypothesis should be true for this study:

H1a: Perceived ease of use (PEU) of mobile phones in SMEs will positively influence the employees' perceived usefulness (PU)

H1b: Perceived ease of use (PEU) of mobile phones in SMEs will positively influence the employee' behaviour intention (BI)

H1c: Perceived usefulness (PU) of mobile phones in SMEs will positively influence the employee' behaviour intention (BI)

H1d: Employees behavioural Intention (BI) of using mobile phones will influence its actual usage (U)

This study assumes that if the perceived values are enhanced, the intention to use mobile phones by employees and managers will be enhanced. There the following hypothesis is suggested:

H2d: Perceived Values (PV) of mobile phone technology will positively influence Behavioural Intention (BI)

Based on hypotheses which are proposed in this study, the conceptual framework looks as seen in figure 1.

sports and recreational companies, studio and film production companies, restaurants, lodges and car rental companies. Structural Equation Modelling (SEM) was used employed to analyse the mobile phone technology acceptance model. SEM has been considered to be superior to the first multivariate generation methods because it takes care the measurement errors in the items (Astrachan *et al.*,

2014; Awang, 2015). This implies that, SEM produces the parameters which are error-free thereby enhancing clearer information to the decision makers. In addition, SEM evaluates all multi-level dependence relationships simultaneously in which dependent variable (DV) becomes independent variable (IV) forming a sub-relationship within the same analysis (Astrachan *et al.*, 2014).

In SEM, a model can be evaluated by using either partial least square (PLS-SEM) or covariance based (CB-SEM). PLS-SEM is mostly used in the exploratory studies (in which there are no pre-tested relationships) while CB-SEM is used in the confirmatory studies (which have pre-tested relationships) (Sarstedt *et al.*, 2014). Since there is a prior developed conceptual framework for this study, the need to confirm it would prefer to use CB-SEM. Furthermore, CB-SEM is considered to be stricter in testing the parameters than PLS (Hair Jr and Hult, 2013). In this case, the demand for clear generalizable end results favours the selection of CB-SEM to test the pre-defined hypotheses in this study.

The popular software which are normally used to perform analysis for CB-SEM are SAS, LISREL, MPLUS and AMOS (Awang, 2015). Byrne (2013) asserts that, among these popular software, AMOS is has the best graphic interface which allows easy modelling of constructs and the associated observed variables than the rest; which used commands. With AMOS graphic interface, data analysis is performed easily while results are more of error-free (Awang, 2015). This study, therefore, uses AMOS in the data analysis. Specifically, IBM AMOS version 22, which belong to the latest versions was used. Advanced features of this version include ability to perform computations and generate results quickly as well as being user friendly when compared to the older versions (Arbuckle, 2013).

VIII. RESULTS AND DISCUSSIONS

The assessment for completeness was performed for the 500 questionnaires which were distributed. Only 473 questionnaires were collected from respondents. 14 cases were missing more than 60% of the contents therefore they were discarded completely. 49 missing values from the 35 cases were assessed for any pattern for missing values by using Little's MCAR test. The Missing Value Analysis (MVA) show that the missing values are non-significant ($\chi^2(1751.944) = 1721, p = 0.332$), which means that the values are missing completely at random. Therefore, the replacement of the missing values was performed using Expectation Maximization (EM) algorithm to get a complete set of 459 cases.

The availability of multivariate outliers in this study was identified by squared mahalanobis distance (D^2). Since there were few signs of multivariate outliers, cooks distance was assessed to see the overall impact of the outliers. However, the magnitude of cooks distance was less than 1 showing there is no significant impact on outliers (Cook, 1977). The results show that all kurtosis values have values less than 3, which is a recommended threshold for a reasonable level of normality (West *et al.*, 1995).

The correlation is identified to be very high between perceived usefulness and perceived ease of use ($r = 0.583$). This shows that as employees perceive that the mobile phones are easy to use are likely to perceive that it is useful too. In another hand, the least correlation is between behavior intention and actual use. They also show that they have both influence each other but with less margin.

Multicollinearity refers to a situation where predictors or constructs appears to correlate highly with other predictors (Martz, 2013). The assessment of multicollinearity was performed. Each of the constructs have tolerance of more than 0.5 whereas the Variance Inflation Factor (VIF) is less than two. As for tolerance, a value of 0.10 is recommended as the minimum level (Tabachnick *et al.*, 2001). However, a value of 0.25 can be seen used in the literature (Huber and Stephens, 1993). Also, according to Hair *et al* (2008), VIF should not exceed 10. Therefore all the constructs in this analysis have not exceeded the collinearity requirements.

Reliability of the constructs was assessed by using cronbach's alpha where the minimum value was 0.72 which suggests that the model is reliable enough (Loewenthal, 1996; Malhotra, 2010).

Discriminant validity tests aims at checking whether answers from different individuals to the questionnaire items are either lightly correlated or not correlated at all with other latent variables (Chin, 2003). For a factor to achieve good discriminant validity, its value of Average Variance Extracted (AVE) should be larger than any of the correlation coefficients between such factor and each of the rest (Bernstein and Nunnally, 1994; Chin, 2003; Gefen *et al.*, 2000). It is asserted that if AVE appear to be less than a correlation coefficient with a certain another factor, the two factors are highly correlated and therefore do not measure well-separated latent concepts (Gefen *et al.*, 2000). However, the results in the SPSS have shown a number of correlation coefficients in the correlation matrix having values greater than the AVEs. This shows that there are factors which are highly correlated. This correlation situation can be caused by the following possibilities; Firstly, latent factors which compose one concept or phenomenon in the real world cannot be absolutely independent. In this study, this has become even more realized because of language barriers in which the items were collected in another (English) language followed by translating and then answered by another language (Swahili). Secondly, the ICT related vocabularies are mostly tending to be too technical for linguistic professional for them to translate to their most appropriate Swahili language so as to be understood by a Tanzanian layman.

Since the analysis process is handled by SEM, most of measurement errors re handled automatically, while there is also an opportunity of discarding/dropping off the items which causes trouble in the measurement model. In addition, SEM gives opportunity of identifying the error causative items through modification indices thereby pointing the possibilities of adjusting a fitness of the model. Therefore, in this study, discriminant validity was handled through

Modification Indices and monitoring the fit indices of the measurement model.

Hair et al (Hair *et al.*, 1998) asserts that whenever factor loadings associated with indicators for all respective latent variables are 0.5 or above the convergent validity of a measurement model is generally considered to be acceptable. On the other hand, Awang (2015) asserts that, for a model to achieve convergent validity its fitness indices should meet the required levels. Therefore, since there are no items which have less than 0.5 factors loading then the model have acceptable convergent validity status. As for the case of fitness indices, they are well within the threshold values in which the absolute fit, incremental fit as well as parsimonious fit have been reached as seen by having CFI=0.981 (should be >0.9), TLI=0.976 (should be .0.9), NFI=0.936(should be .0.9), RMSEA=0.029(should be ,0.08) and Chisq/df=1.379(should be <3.0)(Awang, 2015; Hooper et al., 2008).

In addition, the results were tested for common method variance (CMV). The method used was Hermans one factor method. The results show that, after loading only one factor, the maximum variance is 27.450%. Since this value is less than 50%, the results are not bounded to common method variance as per Eichhorn (2014) recommendations. The regression weight in the resulted model suggests the following significance relationships:

A) *Positive direct Influence of Perceived Ease of Use on Perceived Usefulness(H1a)*

This study hypothesized that perceived ease of use have direct influence to the perceived usefulness. This have been also supported by a number of studies in the context of acceptance of mobile phone technology (see(Gallego *et al.*, 2008; Kwon and Chidambaram, 2000)). Similarly the results of this study *support* this hypothesis. That means, the more the employee perceive that mobile phones are easy to use, they tend to perceive that it is useful to them.

One of the studies which did not find the relationship between perceived ease of use and perceived usefulness is the study which investigated the acceptance of integrating mobile commerce in into an organizational processes (Gribbins et al., 2003).

B) *Direct influence of Perceived Usefulness on behavior Intention (H1c)*

The relationship between perceived usefulness and behavior intention in the Tanzanian SMEs was *not supported*. This suggests that the perception on the usefulness of mobile phone technology in their activities does not influence their intention to use it in future. This observation is in line with a study on the employee acceptance of integrating mobile commerce in their workplaces in which perceived usefulness did not have significant influence on their behavior intention(Gribbins *et al.*, 2003). This is against of other findings which have shown that perceived usefulness have positive and significant relationship with behavior intention in other contexts of mobile phone usage (see (Gribbins *et al.*, 2003; Kim, 2008; Prieto *et al.*, 2015).

C) *Direct influence of Perceived Ease of Use on behavior Intention (H1b)*

This hypothesis was supported. This study is in line with the context of acceptance of smart phones (Chen *et al.*, 2009) and employees acceptance of mobile commerce (Gribbins *et al.*, 2003). This implies that as employees of SMEs perceive that its ease to use mobile phones then it will possibly be useful in their work.

D) *Direct influence of Perceived Values on Behavior Intention (H2d)*

The values of mobile phones in Tanzanian SMEs were introduced in this study. The SEM results show that PV *has a significant positive influence* on behavior intention. This implies that as if challenges on using mobile phones are resolved and benefits of using mobile phones are realized, then the employees are likely to intend to use mobile phones to perform their work obligations in the near future.

E) *Direct influence of behavior Intention on Actual Use (H1d)*

An intention to use a technology has shown to influence its actual usefulness in many contexts ((Davis, 1989b; Kwon and Chidambaram, 2000; Venkatesh and Davis, 2000) and (Byomire and Maiga, 2015)). This relationship was also tested to investigate whether the context of Tanzanian Tourism SMEs can support it. The results show that there is a statistically significant relationship between behavior intention and actual usage of mobile phone technology in SMEs. This implies that, as employees feel intending to use mobile phone in performing their SME obligations, they will actually use it.

IX. CONCLUSION

This article discusses the relationship between factors influencing employee intention and usage of mobile phone technology by extending TAM. Specifically, this study shows that the perceived values have a statistical significant effect on the intention to use a mobile phone in Tanzanian SMEs. This suggests that through solving the challenges and enhancing the benefits expressed by employees, their intentions will be enhanced. Therefore, this study suggests the stakeholders to act upon making sure that the values of mobile phone technology in the context of Tanzanian SMEs are well dealt with. In addition, this study has shown that the use of mobile phone technology by employees of SMEs does not directly influence the intentions to use. This suggest that, in order to promote the use of technology in Tanzanian SMEs, more emphasis should be put to making sure that it is easy to use as well as values are handled well since they are the key predictors of intention and usage. Further studies may involve extending a study and identify the strongest value among the existing ones as a way of setting up strategic decisions in handling them. Another study also could involve testing this model in other different contexts and see any meaningful information which can emerge on such study.

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