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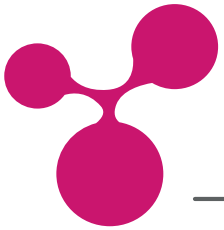

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E.2 Does community matter? Social and cultural influences on acceptance and use of collaborative educational technologies.

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Abstract

The recent advances in information and communication technologies (ICTs) over the past two decades have influenced many aspects of live ([19] and [7]). These advances make the issue of acceptance of ICTs a topic of increasing importance, particularly in educational research and practice [18]. Many studies have been conducted to understand, explain, and predict the issue of acceptance and use of new technologies. Fortunately, these studies have resulted in several serious theoretical developments [9]. Overall understanding of the role of culture and social norms in influencing acceptance and use of education technologies, particularly collaborative and interactive technologies such as the internet, can facilitate the successful implementation and use of these technologies in the educational context. This study concentrates on providing insight into the influence of culture and social processes on staff members' acceptance and use of educational technology, namely the internet at Khartoum state universities (KSUs). Specifically, the study aims to identify the influential role of these factors on acceptance and the use of the internet as a helpful collaborative educational technology. To achieve this aim, the study adopts technology acceptance model (TAM), which is modified (i.e. extended) with Hofstede's cultural dimensions (mainly uncertainty avoidance and masculinity). With the help of a structural equation model (SEM), the data assessment demonstrates the validity of the model and proves that social influence process and cultural factors have significant (direct and moderate) influence on staff members' acceptance and use of internet technology for teaching and academic activities – i.e. the authors are able to assert that community matters in the adoption of these new ICTs. The article concludes by offering important implications and recommendations for both research and practice.

Keywords: Technology Acceptance Model (TAM), internet, culture, Khartoum state universities (KSUs).

1 Introduction

The increased use of new educational technologies such as computers and the internet in Higher Educational Institutions (HEIs) has made user acceptance an increasingly critical issue. However, universities in developing countries seem to face great difficulties, challenges, and problems in expanding ICTs acceptance among academic, particularly staff members. In studying ICTs for higher education in Sudan, [29] mentions that despite the high tide of expansion in the field of ICTs and growing concern about the issue of ICTs' acceptance, the benefits of putting ICTs to use are not evenly realized in developing countries especially in Africa. In Sudan, ICTs are used to a very limited degree and acceptance in education and traditional methods of teaching has yet to change. Teaching through verbal instruction is still the dominant method and the teachers are restricted in terms of exploring other methodological possibilities. Thus, modeling factors that influence staff members' use of ICTs is important to explain the patterns of adoption in the chosen Sudanese context as well as to enhance its uses in Sudan HEIs. Fortunately, many theoretical models dealing with factors that influence acceptance of ICTs were developed and can be found in recent scientific publications. Among these models, the technology acceptance model (TAM) [5] and specifically TAM2 [33] were selected and modified for the purpose of this study, as the TAM and TMA2 only marginally address cultural aspects and therefore their applicability to the Sudanese context was not clear.

After an extensive review of related literature, the studies' conceptual framework was developed based on a combination of the original TAM [6], TAM2 [32], and incorporating situational factors from the social influence model of technology use [11] with Hofstede's cultural dimension [13].

2 Technology acceptance model and cultural dimensions

TAM and TAM2 both posit that an individual's intention to use a system is determined by two primary belief factors: perceived usefulness (PU) and perceived ease of use (PEU). TAM2, however, incorporates two additional theoretical constructs: cognitive instrumental processes and social influence processes. The model was selected for this study primarily because it is a widely-applied model, originally developed and designed for explaining and predict user acceptance of information systems (namely computer and related technology usage behavior). The model has been implemented and validated across a wide range of areas including the educational context. The model constructs have been well tested and proven to be quite reliable. In short, in addition to the previously mentioned advantages of TAM, the model was selected because it fits well with the objectives of this study. Despite the fact that recent developments have led to the establishment of a unified theory of acceptance and use theory UTAUT [32], TAM2 was selected because it is a complex theory that contains

many predictors and moderators [4]. Moreover, UTAUT is less parsimonious than TAM2 in terms of multi-indicator constructs [25]. Furthermore, the study did not seek to test the moderating factors that UTAUT uses.

To our knowledge, there is no or only little empirical and deductive research that investigates the factors associated with the use and acceptance of ICTs by Arab academic staff, especially staff members of Sudanese HEIs. Generally, Sudan was reported to have a poor internet penetration rate of 19% and studies show that even at Sudanese HEIs ICTs penetration is very limited and efforts to increase its use are hampered by a lack of funds and ICTs facilities [17] and [30]. The aspect of community — independent of whether it is face-to-face or virtual — is addressed by social norms and cultural aspects that are critical gaps in TAM and have not been considered by previous researchers [4]. Since the effect of community influence needs to be investigated in more detail, this study attempts to fill this gap. Among many potential cultural theories, Hofstede's cultural dimensions were selected, as he adopted a quantitative methodology that can easily be operationalized [3]. [13] develops and identifies four cultural dimensions: Power Distance, Uncertainty Avoidance, Individualism-Collectivism, and Masculinity/Femininity, which have been widely used and investigated as direct predictors and moderators in IT literature [1]. In this study, only two of Hofstede's cultural dimensions — Uncertainty Avoidance and Masculinity/Femininity — are used to explore the impact of social and cultural beliefs on internet acceptance by staff members in KSUs. According to [13], Uncertainty Avoidance determines the degree to which individuals feel threatened and try to avoid ambiguous situations by establishing formal rules and rejecting unusual ideas and behaviors. [14] illustrates that the Masculinity/Femininity dimension is defined as the level that strong values such as assertiveness, performance, success, and competition, prevail over more soft values like quality of life, maintaining warm personal relationships, service, care for the weak, and solidarity. The main objective of this study is to investigate the use and acceptance of ICTs (internet) from staff members' perspective and to examine factors that influence their acceptance and use of the internet. Specifically, the study aims to investigate whether community aspects like social norms, cultural, and situational factors may influence acceptance and use of ICTs by staff members in KSUs for academic and teaching activities. Furthermore, the study examines whether key factors that influence acceptance can be identified. Based on the above objectives, the research hypotheses were developed as follows:

I. The social influence process has a positive effect on staff members' behavioral intention to use and the PU of the internet. Staff members' perceived image (IM) of internet use has a positive effect on their PU of the internet.

II. Cultural factors have a positive (direct and moderating) influence on staff members' PU, PEU, behavioral intention, and actual use of the internet. Based on our research objectives, we propose that previous theoretical models and a review of the literature on the topic will lead to the development of an extended conceptual framework.

3 Methodology

The type of questions this study addresses clearly requires an empirical, quantitative research design. An English TAM-questionnaire was adopted and adapted to the local context of Sudan. It was translated into Arabic under the consultancy of a professional translator to ensure clarity and proper language structure by eliminating any kind of ambiguity. Although most of the TAM Scales or indicators have been validated and tested for reliability, those procedures were nevertheless completed again to ensure a more reliable and valid research instrument. The survey was then administrated by distributing the questionnaire among 787 randomly-selected staff members at 14 (7 public and 7 private) universities located in Khartoum state. The sample was proportionally distributed according to the staff size at each university. Due to the unavailability of a full list of staff members, the random selection was confined to the list available for each faculty. The random process was performed using systematic random sampling. In total, a suitable sample size was chosen and deemed adequate for the application of SEM and to address the research objectives [8]. After clarifying the study's objectives and other ethical issues, staff members were voluntarily requested to participate and complete the questionnaire. The response rate was 67%; 527 self-reported responses were coded and entered into SPSS program version 18.0. The study's measurement items or questions were adopted and operationalized using validated items from TAM and relevant prior studies. For example, main TAM variables (e.g. actual use and behavioral intentions, items of PU and PEOU) were adapted from [6] and [16]; all cultural factors were derived from [13] and social norms from [32] facilitating factors [34]. Most of these items were measured based on a 5-point Likert scale ranging from strongly agree (1) to strongly disagree (5). All of this study's variables are multi-items constructs; the main dependent variable was the actual use of ICTs and behavioral intention, along with other factors, represent the predictor variables. The study used smart PLS for the assessment of measurement and structural model and hypothesis testing, as recommended by [21], [12] and [15].

4 Results of the study

4.1 Assessment of measurement and the structural model (culture as main direct construct)

Results from the assessment of the measurement models proved the research instrument's validity (convergent and discriminant) and reliability (Cornbach alpha and composite reliability) and the ability to assess the structural model. With regard to SEM, the study's findings reveal that all original TAM relations are significant and supported. Fig. 1 depicts the causal relationship between the constructs and the standardized path coefficients R^2. The model of internet explains $R^2 = 35.9$ % of variance in actual use and $R^2 = 63.3$ % of variance in behavioral intentions to use the internet. Concerning the result of external factors, as expected and in line with [11], situational factors have both negative and positive effects. Whereas facilitating factors are found to have a direct positive significant effect on the actual use of the internet, while constraints are found to have the reverse effect (see Fig1). Social norms are found to have a positive significant effect on staff members' behavioral intentions to use the internet in KSUs. In accordance with TAM2 and many subsequent studies, perceived image is found to have a positive effect on staff members' PU of the internet.

To assess the affect of culture on ICTs acceptance, Hofstede's dimension was incorporated to serve as a measure of primary external constructs. The results reveal that both cultural dimensions have a positive significant relationship with PEU (routed through PEU) and a negative insignificant relationship with PU. The results of hypotheses testing shows that among 13 tested hypotheses comprising the main path of the proposed conceptual framework, 9 are supported and 4 are rejected. All tested relationships of TAM and TAM2 are significant. However, contrary to [33], the effect of social norms on PU was found to be insignificant and was therefore rejected. The hypothesized effect of cultural factors on staff members' PU was also rejected. Perceived constraints were found to have negative but insignificant effect on accrual use. Among highly supported positive significant relations are those between facilitating factors and actual use and between cultural factors and PEU.

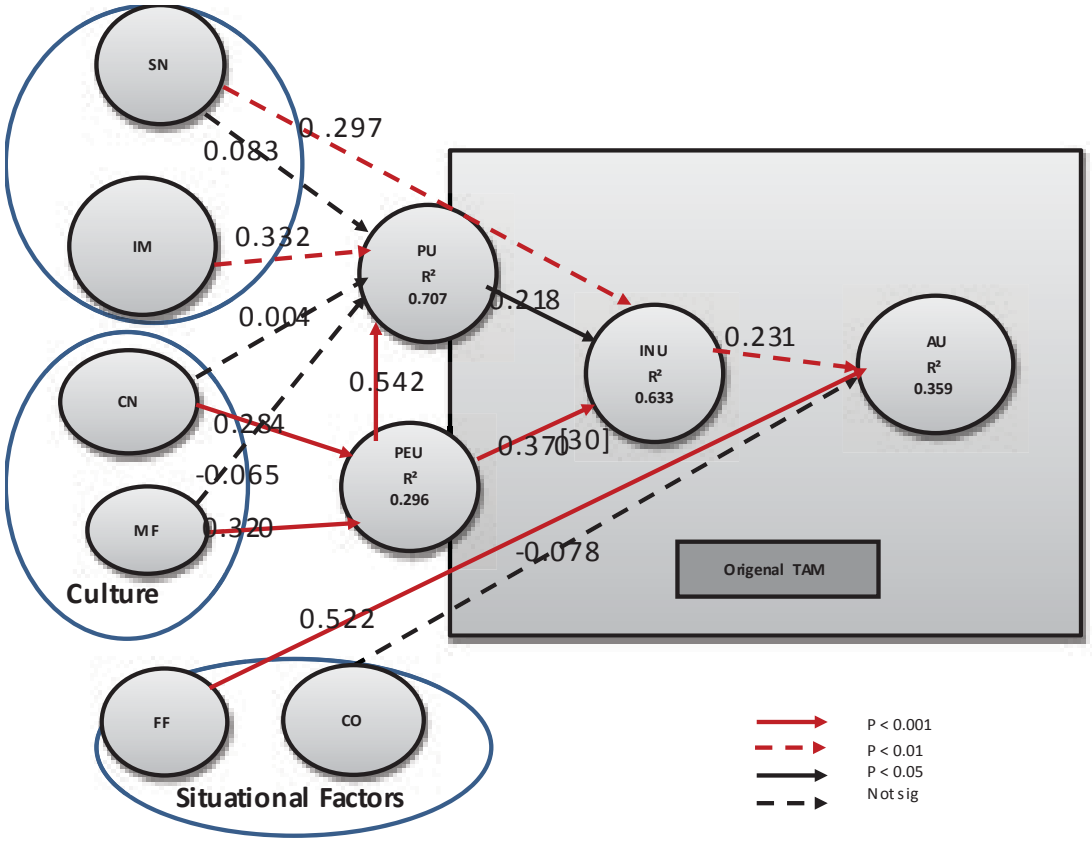

Figure 1: Structural model of internet adoption

Where the following abbreviations represent SN = social norm, IM =perceived image, FF = facilitating factor, CO = constraints, PU = Perceived usefulness, PEU= Perceived ease of use, INU = behavioral intention to use; and ACU = Actual use.

4.2 Assessment of measurement and the structural model (culture as a moderating variable)

To assess the model using culture as a moderating variable within the group level required splitting the data according to (high and low) Uncertainty Avoidance or Masculinity/Femininity dimensions. Consistent with prior studies, we employed this approach to this study and initially the sample was split into desired groups using the median split method (subsample e.g. high n = 421 and low n = 106 for Uncertainty Avoidance, and masculine n = 264 and feminine n = 263 for the Masculinity/ Femininity dimension).

Although each model is considered acceptable in terms of validity (discriminant and convergent), reliability (Cronbach α and composite), a new assessment of each of the measurement models was required for each case. The results of the assessment model

for using Uncertainty Avoidance and Masculinity/Femininity index show a weakness in some indicators and constructs' reliability and validity. In general, however, good reliability and validity of the model constructs were obtained. Thus, the results allowed us to proceed to the following assessment step of the structural model. In the second step, the bootstrap method was applied (900 times) and a re-sampling of 520 cases was performed in order to obtain the standard error of the structural paths in the subsamples under consideration. The statistical interaction method and Multiple Group Analysis (MGA) are two methods that are able to test the moderating effects[10]; the first is suitable for measuring the continuous moderator, while the latter is suitable for categorical or a discrete construct [1]. In the third and final step, the significance between the two groups was assessed by performing a t-test using the MGA. The non-parametric version of the Smith-Satterthwaite test was selected to identify the significant differences between two groups. The presence of a significant difference between the groups, uncovered during the test, suggests that the moderator does have an effect on the path strength and direction.

Results of using Uncertainty Avoidance as a moderator of the model's structural relation show that there is a significant difference between the two subsample groups in three paths: social norms, behavioral intention to use; PEU, behavioral intention to use; and behavioral intention to use in terms of actual use identified by non-parametric Smith-Satterthwaite test. These results confirm that Uncertainty Avoidance is indeed a moderating effect in PU. Uncertainty Avoidance is, therefore, a strong moderating factor that affects staff members' acceptance and use of internet in Khartoum universities. The results of using the Masculinity/Femininity dimensions as a moderating factor of the model structural relation shows significant difference between the two groups with regard to most structural relations and prove that Masculinity/Femininity is a strong moderating factor for most model relations (paths) except the social norms (behavioral intention to use) and the behavioral intention to use in terms of actual use relations.

5 Discussion, implication and conclusions

This study examines the validity of TAM in Sudan's HEIs. The results prove the capability and validity of TAM to predict acceptance and use of ICTs by staff members in KSUs. The influence of social norms seems to be a direct compliance effect on staff members' intention to accept internet which is confirmed by several studies (e.g. [2], [32], [9] and [33]). These results are also consistent with studies conducted in developing countries about the effect of social norms ([3] and [23]) but contradictory to those who focus on the educational context such as ([1] and [22]), which found that social norms have an insignificant effect on behavioral intention to use the internet. From a cultural perspective, the finding that social norms have a positive effect on

behavioral intention to use internet in the Sudanese HEIs context is expected given the collectivist nature of Sudanese culture. In a collectivistic (non-Western) culture, one would expect the opinions of others to have more impact on the individual because of group conformity; furthermore, a higher power distance could invoke a more influential role for peers [26]. Researchers concluded that a more feminine culture, when compared to a more masculine culture, is associated with a higher influence of social norms on behavioral intention to use the internet as these cultures tend to more suited to agreeable desires, and maintaining social relationships and interaction. As such, the concern with the well-being of others has a greater interdependence [27] and [1]. Furthermore, the relationship between social norms and behavioral intention to use the internet will be positive and strong for individuals in a high power distance culture, but low in an individualistic culture (in comparison to high collectivism), in a more feminine culture, and would also be high in an Uncertainty Avoidance culture [31]. As all of these criteria are present in Sudanese culture, the significant effect of social norms on behavioral intention to use is justifiable in this context and is consistent with what [31] proposed. The positive significant effect of IM on PU proves that staff members see acceptance and use of the internet as a matter that enhances their evaluation status and prestige, which are clearly expressed in the reported average responses. The perception that ICTs use improves one's status will positively affect staff members' PU of the internet. In general, the finding that social norms have a positive strong effect and IM strengthens and supports the influence of the social process on staff members' acceptance and use of the internet. With regard to situational factors, facilitating factors were found to have positive significant effects, while constraints were found to have a negative insignificant effect. Therefore, the hypotheses concerning situational factors was partially confirmed by our results and hints to the importance of resource facilitating factors, technology facilitating factors, and self-efficiency in influencing the actual use of the internet.

Studying the effect of the culture as the main construct that influences PU and PEU, shows that the Masculinity/Femininity dimension has positive significance on PEU. This result is consistent with [27] who emphasizes that a more feminine culture such as American culture will be more concerned with the PEU of a technology, whereas a more masculine culture such Chinese culture will be more concerned with PU. It is therefore expected that under the influence of a low masculinity culture, the Masculinity/Femininity effect is channeled through (or correlated with) PEU rather than PU. Additionally, as [28] argues, the higher the degree of masculinity, the higher the effect of PU on information technology adoption, the lower the degree of masculinity, and the higher the effect of PEU on information technology adoption. This study's findings demonstrate the profound effect of PEU (over PU) on ICTs acceptance and illustrates that the cultural factor (low masculinity) is positively correlated with

PEU and negatively correlated with PU. The positive strong relationship between Uncertainty Avoidance constructs and staff members' PEU may be supported by [20] who assert that individuals who have high Uncertainty Avoidance seek simplicity, clearness in procedure, or rely on rules. Thus, high Uncertainty Avoidance among staff members in KSUs make them culturally rely more on the internet through the construct of PEU rather than PU.

Analysis of cultural dimensions as moderating factors proves that Uncertainty Avoidance and Masculinity/Femininity were strong cultural moderating factors for structural relations. This means that cultural factors exercise significant influence on technology use and acceptance among staff members by affecting the model relation and their directions. Culture proves to be an important determinant factor for internet acceptance among staff members in KSUs, both as a direct factor and as moderating factors, which support [10] findings. As such, one important addition of this study to previous knowledge is that TAM is valid and applicable to Sudan's HEIs context since all the main relations of TAM are supported. This result is supported by [24], who illustrate a similar finding for Arab countries and is also in accordance with [33]. Furthermore, it also backed the results of [5], who study the cultural impact of IT in Saudi Arabia using TAM2 and found that social norms and image are significant in terms of the acceptance of computers among knowledge workers.

The proposed model is powerful and valid and can be used to understand and predict internet acceptance by staff members and the factors that influence it. The results of this study offer important theoretical and practical insights and implications. Theoretically, the study adds to the body of knowledge about technology acceptance models. It also adds to the limited theoretical literature on the role of cultural dimensions and social influence processes [31] in internet acceptance research. Moreover, it contributes to the literature on technology acceptance in Sudanese HEIs.

This study provides several practical implications. The implication of using the proposed modified model (with and without the impact of cultural moderating effects) is expected to provide an understanding about the relationship between the main factors that affect internet acceptance and will help to promote and improve internet usage and acceptance within private and public KSUs. Understanding these factors, will help top-management in HEIs and decision-makers to design appropriate methods of intervention (e.g. training programs to enhance PEU, group training and experience sharing, administrative support, alleviate uncertainty avoidance, simplifications that make internet technology easy to use, provide resource-facilitating factors, and consider the effect of cultural and social factors, to consider and target staff that are less inclined to use the internet due to traditional or cultural beliefs, rewards

users, etc. All these consideration could lead to better acceptance of the internet in this study's setting. Furthermore, it is expected that the findings of the study help to increase internet acceptance and usage in Sudanese HEIs as a method of collaborative education technology. Findings of the current study highlight the considerable importance of social influence processes (social norms and perceived image), cultural and situational factors (particularly facilitating factors) in acceptance, and the use of the internet by staff members. In order to increase internet acceptance and use among staff members in KSUs, consideration and attention should be given to cultural and social factors, primarily because this study's findings prove that community either directly or indirectly affects the acceptance and use of collaborative education technologies.

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