

Effectiveness of Telecentre using a Model of Unified Theory of Acceptance and Use of Technology (UTAUT): Structural Equation Modeling Approach

¹Abdulwahab, L, ²Zulkhairi Md Dahalin

Graduate School of Information Technology College of Art and Sciences Universiti Utara Malaysia
06010 UUM Sintok, Kedah, Malaysia

¹abd_wahhb@yahoo.com, ²zul@uum.edu.my

¹Corresponding Author

ABSTRACT

In most of the developing countries, Telecentres' have been set up in some unserved and underserved areas. The purpose of this initiative is to provide an avenue for communal access to reduce the effect of digital divide. Even though, Governments, NGOs' and International Organizations are promoting these initiatives', its acceptance and effectiveness are minimal. Therefore, this paper investigates the main determinants of user acceptance through a survey by gathering empirical evidence based on the revised Unified Theory of Acceptance and the Use of Technology (UTAUT). Data collected from 182 respondents in Nigeria were tested against the research model using the structural equation modeling approach. The proposed model fits the data well. Results show that, User acceptance of Telecentre was demonstrated by performance expectancy; social influence, management effectiveness, program effectiveness and facilitating conditions. The findings of this research provide implications for the research and practice of Telecentre development and implementation in developing countries.

Keywords— *ICTs, Digital divide, Developing countries, Disadvantage communities, User acceptance*

1. INTRODUCTION

Information and communication technologies (ICT) play a crucial role in socio-economic development in developing countries [40]. Governments, Non-government organizations and International Telecommunication Union (ITU) are sponsoring Telecentres in most of the developing countries [38] [50] [11]. Telecentre are being implemented to offer public access to computers and related ICTs with the intention of facilitating local community development [22] [56]. The International Telecommunication Union report has shown that only 26.6% of the world population has internet access on home basis, with most of this access in developed world [11]. Recent finding by [11] has shown that public access to computer and internet through Telecentre platform has become popular over the last two decades. Obviously shared access serve the opportunities of extending ICTs to the generality of inhabitants of the world who might have been at disadvantage due to lack of access.

Whilst the word Telecentre is often used in this study, the concept of this term is too wide it has been given a variety of names both in developed and developing countries. The notable names are: Information Kiosk, Telecottage, Multipurpose Community Telecentre and Virtual Village Hall [27]. Primarily Telecentre are meant to promote digital literacy, alleviate digital divide, poverty alleviation, employment generation as well as an improvement in e-governance and e-commerce initiatives [40]. However, despite the aforementioned benefits of Telecentre highlighted in contrast to other shared access platform such as Cybercafé. Telecentres researches have

received little academic attention specifically on the determinants of its user acceptance and use [53] [44]. Previous studies identified determinants of potential users' acceptance of Information kiosks in developing countries using a revised version of the unified theory of acceptance and use of technology (UTAUT) [52][53]. The research described in this paper is an attempt to extend those findings and identified other factors that could exert influence of Telecentre acceptance [1]. The dearth of empirical studies on the determinants of User acceptance in relation to on-going implementation of Telecentre has necessitated the needs of identifying those factors. Hence, this research provides useful insights into motivations underlying the intention and acceptance of Telecentre in a developing country like Nigeria.

2. LITERATURE REVIEW

Researchers from both developed and developing nations often relate the effectiveness of Telecentres to empirical measurement of the number of people benefitted from training and number of facilities available including jobs created to the generality of employees [15][21][22][25][34][54]. However, other researchers have extended the description of effectiveness beyond this aforementioned typical measurement to include the human development and well being of the users. Some researchers reported on self sustaining infrastructure that add value to the community as a whole [19] [36]. A number of researchers deliberated on the sustainability of Telecentre [25] [28] [23]. Research has shown that government sponsored Telecentre are less effective when compared to the skill private entrepreneur operated shared

access like Cybercafés [25]. This lack of success is often attributed to ineffectiveness on both the planning and implementation stage by the implementors [29]. Effectiveness in a literal sense is a degree to which an organization realized its goals. According to [8], the closer the output meets the goal of organization the more effective the organization. Studies that list achievement of Telecentres implementation exist in the literature [29] [28], but few of them address the issue of effectiveness of Telecentres. An extensive study on effectiveness of Telecentre from the demand side (users) using the two levels of effectiveness management and program effectiveness as forwarded by [5] is limited.

An empirical research was conducted to compare the eight competing models of technology acceptance models [45]. The Models were integrated in terms of their conceptual differences as well as empirical resemblances [55]. The idea behind the amalgamation of these Models/Theorems is to arrive at the unified view of user acceptance of IT [45]. The eight models that described the constructs in UTAUT include: The theory of reasoned action (TRA) [16]. Technology adoption model (TAM) [13]. Theory of planned behavior (TPB) [2] and the combined TAM and TPB (C-TAM-TPB) [45]. Diffusion of innovation theory (DOI) [35], Social cognitive theory (SCT) [6]. Other model are Motivational model (MM) [14] and the model of PC utilization (MPCU) [46]. Base on the constructs from the enumerated models, the UTAUT posited that four core determinants of intention and usage are: performance expectancy, effort expectancy, social influence, and facilitating conditions. Four variables moderate the key relationships of: age, gender, experience, and voluntariness of use. Empirical results of the UTAUT model revealed that it was able to account for 70% of variance in usage intention [45] [35]. This result to a large extent performed better than any of the original eight models/theories and their extensions [45]. The next section presents the proposed research model and hypotheses.

Research model and hypotheses

The research model under study has basis from the unified theory of acceptance and use of technology (UTAUT) and competing value approach (CVA) originated by [45] [32]. An empirical support to show that IT acceptance can be explained by UTAUT model was presented by [45]. The UTAUT model can also be applied to the challenges of implementing Telecentre. Consequently, we adapted UTAUT [45] as a theoretical framework to examine Users' acceptance of Telecentre. An over view of Telecentre context revealed a slight departure from the traditional IT context. Thus, UTAUTs' fundamental constructs may not completely reveal the specific influences of Telecentre context factors that may alter user acceptance. The effects of performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC) may change if other antecedents (e.g. Management effectiveness (MEF) and Program effectiveness (PEF) are incorporated to the model

[31]. Hence, this study hypothesizes positive linkage as follows:

Performance Expectancy (PE)

Performance expectancy is defined as “the degree to which a user believes that using the information system would enhance him or her job performance” [45]. The construct that depict performance expectancy has foundation from: perceived usefulness (TAM/TAM2 and C-TAM-TAB), job-fit (MPCU), extrinsic motivation (MM), outcome expectations (SCT) and relative advantage (DOI) [35]. Performance expectancy was found to have positively influenced behavioral intention to use information technology platform [45] [3] [51]. An empirical research was conducted to identify the determinants of User acceptance of Information kiosk by [53]. The findings show that performance expectancy is one of the most important determinants of its acceptance. Adapting performance expectancy in context of this study implied that users will think Telecentre is useful because it enables them to accomplish surfing activities more quickly and flexibly, or access to information more effectively. Therefore we posited that:

H1: Performance expectancy will have a positive influence on behavioral intention to User acceptance of Telecentre.

Effort expectancy (EE)

Effort expectancy is defined as “the degree of ease user feel with respect to the use of an information system” [45]. This construct has theoretical foundation from the three constructs base on different models that relate to effort expectancy, these are perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (DOI) [35]. In most of studies conducted using UTAUT model, effort expectancy was found to positively influence behavioral intention to use information system [52] [30] [51] [26]. Effort expectancy was found to influence the acceptance of Information kiosk [53]. However, in a latter research effort expectancy was found not to have direct influenced on behavioral intention [3]. In the context of this study individual acceptance of Telecentre depends on ease of use of the facilities. Hence, we propose the following hypothesis:

H2: Effort expectancy will have a positive influence on behavioral intention to User acceptance of Telecentre.

Social Influence (SI)

Social influence is defined as “the degree to which an individual user perceives that important other believe he or she should use information system” (Venkatesh et al., 2003). Three constructs from the six models capture the concept of social influence (Venkatesh et al., 2003). The construct are: social factors (MPCU), subjective norm (TRA, TAM2, TPB and C-TAM-TPB) and image (DOI). Social influence was suggested as a

significant factor in influencing individual behavioral intention to use new information system platform [45] [35]. Based on UTAUT model, we consider that social influence is a significant determinant of behavioral intention to use Telecentre. Therefore, we hypothesises the following linkage:

H3: Social influence will have a positive influence on behavioral intention to User acceptance of Telecentre.

Management Effectiveness (MEF)

Management effectiveness refers to characteristics that deal with organizational issues and management actions on the staff within organizations [5]. Measure of management encompasses variables that tap capacity (structure and process) as well as those represent the outcomes of these management systems and activities [45]. This construct has basis from (CVA) theory [32]. Thus, we hypothesize the following linkage:

H4: Management effectiveness will have a positive influence on behavioral intention to User acceptance of Telecentre.

Program Effectiveness (PEF)

Program is defined as the specific service or intervention provide by the organization [45]. Going by this definition Telecentre as an intervention to underserved folks, has suitably fits into this definition. Further, [45] argued that program has a variables that relate to the capacity (structure and process) as well as outcomes created by the intervention. Program effectiveness construct has the same theoretical support from CVA [32]. Thus, following hypothesis will be determined:

H5: Program effectiveness will have a positive influence on behavioral intention to User acceptance of Telecentre.

Facilitating Conditions (FC)

Facilitating conditions is defined as “the degree in which a user believes that an organizational and technical infrastructure exist to support the use of new information system” [45]. The theoretical foundation of facilitating condition is derived from four theories/models used by [45]. The constructs are perceived behavioral control (TPB/DTPB, C-TAM-TPB) and the initial facilitating condition (MPCU) by [46]. Facilitating conditions was found to have positively influenced usage of information technology platform [45] [52]. Research by [53] shows that facilitating conditions is one of the important determinants of Information Kiosk acceptance. Hence, we test the following hypothesis:

H6: Facilitating conditions will have a positive influence on behavioral intention to User acceptance of Telecentre.

Behavioral Intention (BI)

The Behavioral intention construct originated from the theory of reasoned action (TRA) by [16]. The

construct is defined as “a measure of the strength of one’s intention to perform a specified behavior” [2]. Behavioral intention was identified as extremely important construct in the technology acceptance studies, due to its importance it was referred to “as a key criterion in User acceptance research” [45]. Research has shown that behavioral intention has a direct impact upon the individuals’ actual use of a given technology [45] [30] [26]. Therefore, we test the following hypothesis:

H7. Behavioral intentions will have a positive effect on User acceptance of Telecentre.

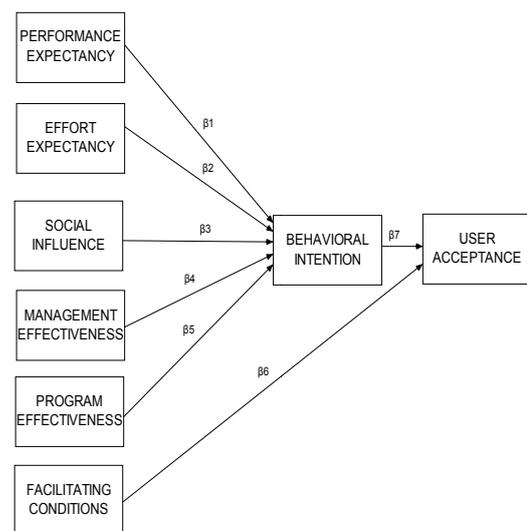


Figure 1: Research model

3. RESEARCH METHODOLOGY

Measures of the constructs

To confirm the content validity of the measurement scales, [53] suggested that the items chosen must correspond to the concept about which the generalizations are to be made. The items used to measure the constructs of performance expectancy; effort expectancy, social influence, facilitating conditions and behavioral intention were adapted from [45], while the items measuring management effectiveness and program effectiveness concept originated from [5] to make them relevant in the context of Telecentre. Four items were adapted from [53] to measure the User acceptance. Likert scales (1-7) with choice from ‘strongly disagree’ to ‘strongly agree’ were used to measure all the items, except for items measuring User acceptance. The list of measurement items is shown in the appendix. The Users of Telecentres were selected as sample using simple random sampling methods. Two hundred and fifty three questionnaires were distributed and 182 questionnaires were found to be valid for conducting multivariate analysis. This number represents 72%. The research model was tested using structural equation modeling techniques using AMOS 7.0 computer software.

5. RESULTS

The standardized path coefficient in the hypothesized model is shown in Fig. 3. The effect of performance expectancy, social influence, management effectiveness and program effectiveness were found to have a significant influence on behavioral intention to User acceptance of Telecentre ($\beta_1 = 0.241$, $p < 0.05$; $\beta_3 = 0.497$, $p < 0.01$; $\beta_4 = -0.314$, $p < 0.05$ and $\beta_5 = 0.269$, $p < 0.05$ respectively). Thus, H1, H3, H4 and H5 were supported. However, effort expectancy is found to have non-significant influence on behavioral intention ($\beta_2 = 0.029$ respectively). Consequently, the path between effort expectancy, and behavioral intention towards User acceptance of Telecentre were not supported; hence H2 is rejected. The hypothesis H6, H7 test the effect of facilitating conditions on Users' acceptance of Telecentre and the effect of behavioral intentions on Users' acceptance of Telecentre, respectively. Facilitating conditions and behavioral intentions both have a positive effect on User acceptance of Telecentre ($\beta_6 = 0.152$, $p < 0.10$ and $\beta_7 = 0.486$, $p < 0.01$, respectively). The results of casual paths (standardized path coefficients (β), standard error, p-value, C.R and hypotheses results) are shown in Table 5.

6. DISCUSSION

The findings has shown that acceptance of Telecentre can be demonstrated by performance expectancy; social influence, management effectiveness and program effectiveness. The findings further highlighted the suitability of using the revised UTAUT model in understanding User behavioral intention and facilitating conditions in relation to Telecentre acceptance. In the perspective of this study, social influence is the most significant determinant of behavioral intention. These findings are inconsistent with most prior research in technology acceptance [53] [30] [26]. Thus, the implication of social influences as the most important antecedent of behavioral intention in the context of Telecentre shows that the stake holders should utilize the advantage of important others (i.e., peer groups) in propagating the acceptance and use of Telecentre. Effort expectancy has no any impact with behavioral intention on User acceptance of IS platform. These findings are inconformity with the report by [3] in their studies of knowledge workers using desktop application. The significance influence of management effectiveness and program effectiveness to the intent of users could be attributed to the perception that only motivated staffs could translate organizational goals in to a meaningful output. More so in non-profit organization like Telecentres where researches have shown that it is facing sustainability challenges [23] [25] [28].

7. CONCLUSIONS & RECOMMENDATIONS

An empirical research was performed with the purpose of investigating the determinants of User

acceptance of Telecentre in Nigeria. All the seven factors explored in this study with the exception of effort expectancy (i.e., performance expectancy, effort expectancy, social influence, management effectiveness, program effectiveness, facilitating conditions and behavioral intention) were found to have significant effect on User acceptance of Telecentre. The findings suggest that these could be the key success factors for User acceptance of Telecentre in Nigeria. The main strength of this study is the reliance on factors base on previous models and empirical researches by focusing on those factors that have the most significant effect in technology acceptance research. The present study does not include moderating variables of age; gender, experience and voluntariness. Future research should be conducted on the effects of those moderating variables on the determinants of User acceptance of Telecentre. The study could also be extended to other developing countries operating in similar conditions to see if comparable results could be established.

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Appendix A. Original survey items used in the study

Performance Expectancy

- PE1: Using telecentre enhances job performance
- PE2: Using telecentre help in accomplishment of job more quickly
- PE3: Using telecentre can increase my productivity
- PE4: Using telecentre enhances job efficiency
- PE5: My frequent use of telecentre, will earn me value as being competent

Effort Expectancy

- EE1: My interaction with telecentre will be clear and understandable
- EE2: I find using ICTs in Telecentre' easy.
- EE3: I find using ICTs in Telecentre to be flexible.
- EE4: Using ICTs in Telecentre frequently makes one easy to be skillful
- EE5: Overall, learning to operate facilities in Telecentre is easy for me

Social Influence

- S11: Important people in my community think I should use telecentre
- S12: People who are important to me will want me to use telecentre
- S13: People in my community that use telecentre have more prestige
- S14: Using telecentre has enhances my knowledge about environment
- S15: In general, my community has supported the use of Telecentre.

Management Effectiveness

- MEF1: My expectation of this Telecentre is that it will be long-lasting
- MEF2: The management receives assistance to render efficient service
- MEF3: The management & staff of this telecentre are accommodative
- MEF4: I observed team spirit and motivated staff within the Telecentre staff

MEF5: Capable hands are available to impart knowledge in the Telecentre

Program Effectiveness

- PEF1: Using Telecentre help in socio-economic development of my community
- PEF2: ICTs Facilities in Telecentre are always accessible within the operation hours
- PEF3: Telecentre staffs are competent enough in discharging their work.
- PEF4: There is mutual cooperation between Telecentre staff and the users.
- PEF5: Over all, the likelihood of replicating this program in our neighboring community is clear.

Facilitating Conditions

- FC1: I have the resources necessary to use ICTs facilities in Telecentre.
- FC2: I have the knowledge necessary to use ICTs facilities in Telecentre.
- FC3: Detail instruction about Telecentre use is available to me
- FC4: There is sufficient Electricity and Internet service to use ICTs facilities' in Telecentre
- FC5: A central support is available to help with technical problems
- FC6: A specified person (or group) is available in case of difficulty

Behavioral Intention

- BI1: I intend to use ICTs facilities in Telecentre in the future.
- BI2: I predict I would use ICTs facilities in Telecentre in the future.
- BI3: I plan to use ICTs facilities Telecentre in the future
- BI4: I perceive using Telecentre as voluntary

Describe User acceptance

(a) How many times do you use Telecentre during a Month?

- About once [1] 2 or 3 times [2] 4 or 5 times [3] Not at all [4] 6 or 7 times [5]

8 or 9 times [6] more than 9 times [7]

10-11 days [6] Greater than 11 days [7]

(b) How many hours do you use Telecentre **during a Month?**

Less than 1 hour [1] 1-2 hours [2] 2-3 hours [3] 3-4 hours [4] 4-5 hours [5] 5-6 hours [6] Greater than 7hours [7]

(c) How many days do you visit Telecentre **during a Month?**

Less than 1 day [1] 2-5 days [2] 6-7 days [3] Not at all [4] 8-9 days [5]

(d) How **frequent** do you use Telecentre?Very **irregular** [1] Fairly **irregular** [2] Slightly **irregular** [3] Neither [4] Slightly **regular** [5] fairly **regular** [6] Very **regular** [7]**Table 1: Characteristics of the respondents (N=182)**

<i>Characteristics</i>	<i>Number</i>	<i>Percentage</i>
1. Gender		
Male	116	63.7
Female	66	36.3
2. Age		
≤ 20	39	21.4
21-25	68	37.4
26-30	7	3.8
31-35	13	7.1
36-40	44	24.2
41-45	7	3.8
≥ 46	4	2.2
3. Educational Attainments		
Primary School	6	3.3
Secondary School	81	44.5
Diploma	36	19.8
Bachelor	45	24.7
Master/Doctorate	2	1.1
Others	12	6.3
4. Income		
Low Income	122	67.0
Middle Income	56	30.8
High Income	4	2.2

Table 2: Reliability and Factor loadings

Constructs	Factor Loadings	Composite Reliability
Performance Expectancy		0.727
PE1	0.721	
PE2	0.814	
PE4	0.505	
Effort Expectancy		0.715
EE2	0.737	
EE3	0.587	
EE5	0.696	
Social Influence		0.744
SI1	0.683	
SI3	0.582	
SI4	0.659	

SI5	0.669	
Management Effectiveness		0.730
MEF1	0.626	
MEF2	0.648	
MEF4	0.646	
MEF5	0.619	
Program Effectiveness		0.720
PEF1	0.817	
PEF2	0.555	
PEF4	0.655	
Facilitating Conditions		0.638
FC1	0.611	
FC2	0.763	
FC4	0.434	
Behavioral Intention		0.782
BI1	0.797	
BI2	0.777	
BI3	0.634	
User Acceptance		0.848
UA1	0.793	
UA2	0.849	
UA3	0.805	
UA4	0.590	

Table 3: Correlation matrix and roots of the AVEs (shown as diagonal elements)

Factors	1	2	3	4	5	6	7	8
1. Behavioral intention	0.740							
2. User acceptance	0.500	0.766						
3. Management effect.	0.115	0.069	0.635					
4. Facilitating conditions	0.223	0.256	0.304	0.617				
5. Program effectiveness	0.235	0.300	0.537	0.177	0.684			
6. Social influence	0.533	0.316	0.403	0.297	0.241	0.650		
7. Effort expectancy	0.303	0.161	0.398	0.425	0.356	0.441	0.676	
8. Performance expectancy	0.377	0.261	0.288	0.105	0.138	0.377	0.352	0.692

Of diagonal elements are the intercorrelations of the construct with other constructs to ensure discriminant validity,

Table 4: Fit indices for measurement and structural models

Quality-of-fit measure	Recommended value	Measurement model	Structural model
χ^2/df	≤ 3.00	1.221	1.225
AGFI	≥ 0.80	0.844	0.844
CFI	≥ 0.90	0.953	0.951
TLI	≥ 0.90	0.944	0.943
RMSEA	≤ 0.08	0.035	0.035

Df , degrees of freedom; AGFI, adjusted goodness-of-fit index; CFI, comparative fit index; TLI, Tucker Lewis fit index; RMSEA, root mean square estimate approximation.

Table 5: Results of hypotheses tests

Path	β	S.E	C.R	ρ	Results
H1 BI <--- PE	.241	.116	2.370	.018	Supported
H2 BI <--- EE	.029	.117	.250	.803	Not supported
H3 BI <--- SI	.497	.130	4.033	.000	Supported
H4 BI <--- MEF	-.314	.152	-2.350	.019	Supported
H5 BI <--- PEF	.269	.123	2.084	.037	Supported
H6 UA <--- FC	.152	.114	1.679	.093	Supported
H7 UA <--- BI	.152	.114	1.679	.000	Supported

Notes: Path = Relationship between independent variable on dependent variable; β = Standardized regression coefficient; C.R = Critical ration; S.E = Standard error; ρ = Level of significance