Advances in Mathematical & Computational Sciences Journal,
Vol.6 No.4, December 2018

Article Citation Format
Osang, F.B. & Ndunagu, J. N. (2018): Towards an Integrated Information Systems Adoption, Usage and Performance Theory – A Review.
Journal of Advances in Mathematical & Computational Sciences
Vol. 6, No. 4. Pp 1-10

Article Progress Time Stamps

Article Type: Research Article
Manuscript Received 17th August. 2018
Review Type: Blind
Final Acceptance: 7th December, 2018
Article DOI: dx.doi.org/10.22624/AIMS/MATHS/V6N4P1

Towards an Integrated Information Systems Adoption, Usage and Performance Theory – A Review

Osang, Francis Bukie and Ndunagu, J. N.
Computer Science Department
National Open University of Nigeria
Abuja, Nigeria
E-mail: bukie3osang@yahoo.com

ABSTRACT

The search for a suitable theoretical framework that explains the impacts of information systems in workplaces has been on for over three decades now. Prominent information system researchers have built and tested several models aimed at understanding these underlying interactions. Unfortunately, the dynamic nature of information systems and the different contextual backgrounds continues to throw-up deficiencies with the existing models while calls for a 'cumulative tradition' in information systems (IS) research continue to increase. Through a methodological literature review process, previous related works on the various relationships proposed by the technology utilization, satisfaction and performance model (TUSPEM) were extracted from some renowned online databases. This study therefor reports the review of researches on these relationships thereby expanding the body of knowledge on the TUSPEM model by with a view to contributing to theory in information systems research.

Keywords – Information systems, technology acceptance model, performance impacts, performance model,
technology utilization-satisfaction.

1. INTRODUCTION

Institutions and organizations globally invest in information systems basically with the expectation that it will contribute to organizational performance and productivity. The challenge of assessing the impacts and interactions that determines the return on investment remains central in information system research. Consequently, information systems researchers have spent much effort in creating models and re-examining these interactions with a view to providing sustainable frameworks and theories guiding information systems. Since the call by [59] for a 'cumulative tradition' in information systems (IS) research that requires IS

researchers to 'build on each other's work,' attention have been paid to theory development in IS research since three decades ago.
Consequently, several behavioural models have not only facilitated the identification of the barriers that can interfere with end-user adoption and usage of technology, they have also guided the approaches or solutions that have been designed to overcome them. In their work, [47] opined that prominent instances of successful theory development in information system include: the technology acceptance model (TAM) [15], the DeLone and McLean information systems success model [4], the unified theory of acceptance and use of technology (UTAUT) [26], Task-technology fit (TTF) theory [3] among others.

The evaluation of factors determining technology adoption, usage and the corresponding performance outcomes have either been investigated with either intention to adopt, actual system usage, satisfaction or performance impacts as dependable variables. While pointing out the deficiencies of the existing models/theories and presenting the TUSPEM model [51], noted the following deficiencies: (a) some of these existing theories either focuses on intention to use information systems only, usage or performance. (b) None of these theories included the construct satisfaction from the post-usage dimension. (c) None of the models used constructs such as computer self-efficacy and technology acceptance model (TAM)'s external constructs as precursors of utilization. (d) The high level of unexplained variance associated with the current models.

Although parts of the TUSPEM model have been investigated by the works of [53 and 55] which focused on investigating the task technology fit dimension and the pre-utilization dimensions separately and respectively, there is no known work that has investigated the hybridized TUSPEM model in a single study. This work therefore x-rayed the existing models as earlier reported by [51] and expands the body of knowledge by reviewing related literatures that presented consistent supports for and against these relationships.

1.1 Existing Information System Theories and Models

Broadly speaking, researchers have classified IS success models and constructs into researches that make use of information systems usage, performance and satisfaction as dependent variables. The earlier work of [51] also supported this categorization.

A. Technology Utilization Models

System use refers to the degree System use is the degree to which system users utilize the system to improve their individual performance. Understanding individuals' IT usage has become a major research topic in the field of information systems IS [22, 23]. As stated by [61], measuring system use may include amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use. According to [3], utilization can be affected by several factors including system characteristics, task characteristics, individual characteristics, or the method of interaction between the system and the user [24]. Prominent theories in IS utilization includes the Theory of Reasoned Action (TRA) [7], Technology Acceptance model [15], the unified theory of acceptance and use of technology and the computer self-efficacy model.

Theory of Reasoned Action (TRA): TRA posits that individual behaviour is driven by behavioural intentions where behavioural intentions are a function of an individual's attitude toward the behaviour and subjective norms surrounding the performance of the behaviour. Attitude toward the behaviour is defined

as the individual's positive or negative feelings about performing behaviour. It is determined through an assessment of one's beliefs regarding the consequences arising from behaviour and an evaluation of the desirability of these consequences.

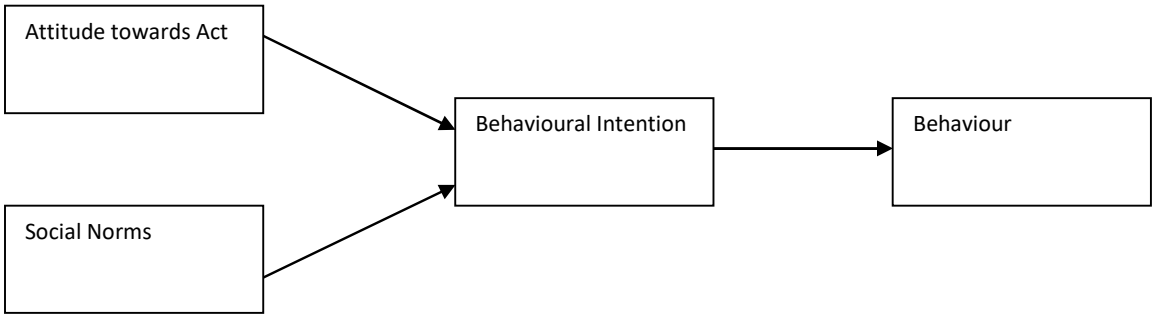

Fig. 1: Theory of Reasoned Action (TRA)
Source: [27]

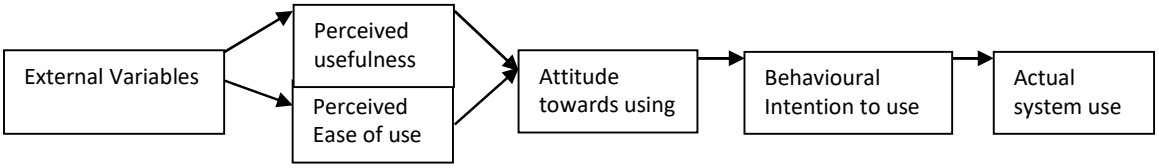

Fig. 2: Technology Acceptance Model
Source: [15]

The basic principle behind the theory is that human behaviours are controlled by conscious actions. TRA also suggests that a person's attitudes are a function of their individual beliefs [7]. As explained by [24], TRA as utilized by [27] is designed to assist researchers in order to address the connections between individuals' attitudes, beliefs and their behaviours. [24] utilized TRA to examine the specific area of technology utilization.

Technology Acceptance Model (TAM): Developed by [15], the aim of technology acceptance model was to assist explain technology users' behaviour. Technology acceptance refers to a user's willingness, agreement, acceptance and continuous use of information technology. It can be categorised into attitude acceptance and behaviour acceptance [36]. Attitude toward using, intention to use and actual use in TAM are indicators of technology acceptance. Ease of use and perceived usefulness are regarded as external variables. According to [15], perceived usefulness is the level to which a person feels that the use of a particular technology would enhance his or her performance. Additionally, perceived ease of use is the level to which a person feels that the use of a particular technology is free of effort. It was found that perceived ease of use was less significant in determining actual usage than was perceived usefulness. The level of difficulty involved in using a technology was only a secondary consideration for users.

These findings suggest that technology users are willing to tolerate a certain level of difficulty if the technology is capable of performing necessary functions. However, ease of use of a technology does not make up for those technologies that do not provide the user with the desired applications. These variables have influence over users' attitudes, intentions to use, and actual usage. Below is the diagram showing TAM constructs and their relationships:
TAM is different from many previous IS models because it does not include subjective norms as one of its constructs in determining actual technology usage. The research of [12] shows how TAM differs from its predecessors. However, because of its widespread usage and popularity among researchers TAM is often used in research as support for many acceptance theories.

Unified theory of acceptance and use of technology (UTAUT): Developed by [26], UTAUT model was formed from the review of eight models proposed by earlier researchers attempting to explain IS usage behaviour. These models include: the theory of reasoned action, technology acceptance model, and motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of PC utilization, innovation diffusion theory, and social cognitive theory. According to the theory, four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) determine usage intention and behaviour ([26]). It was posited that Gender, age, experience, and voluntariness of use are moderators of the impact of the four key constructs on usage intention and behaviour [26]. The relationship between the constructs in the model is represented by the UTAUT model in diagram 4 below:

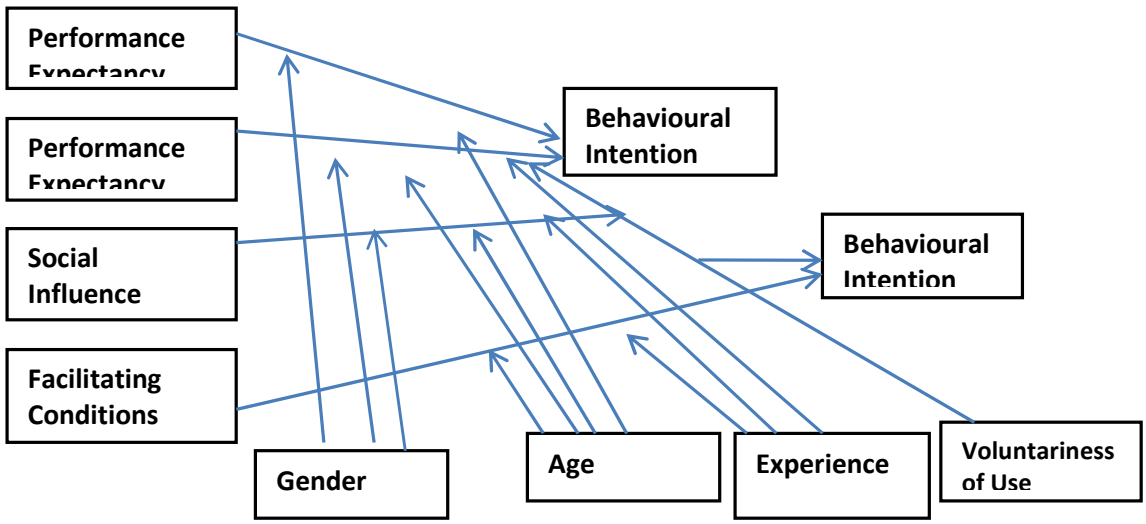

Fig. 3: Unified theory of acceptance and use of technology (UTAUT)
Source: (26).

Computer Self-Efficacy (CSE): Computer self-efficacy has been identified as having a major impact on an individual's expectations towards using computers ([1]. [1] stated that self-efficacy is an important individual trait that directly correlates to an individual's decision to use computers. [32] stated that the focus is not on

the actual skills, but on the judgments one has of what one can do with whatever skills one possesses. Consequently, people who did not see themselves as competent with the computer tend not to use computer.

Perceived computer self-efficacy has been shown to impact on behaviours and outcomes such as a negative effect on computer anxiety and positive impact on performance outcome expectations, personal outcome expectations, and actual systems usage [1].

Studies conducted at the work force [33, 34] found that computer self-efficacy increases performance and reduces computer induced anxiety. [31] has also noted that teachers' computer self-efficacy is a significant factor determining their patterns of computer use. [16] examined the computer self-efficacy among pre-service teachers at a teachers training institute in Singapore. It was found that the proliferation of computer and web-based technologies has generally improved teachers' confidence with using Basic Computer Skills (BCS), Media-Related Skills (MRS), and Web-Based Skills (WBS) technologies in Singapore. Also a comparison of alternative models revealed that the correlated three-factor and second-order (three-factor) models had the best fits; and were adequate representations of pre-service teachers' computer self-efficacy.

B. User Satisfaction Models

Satisfaction refers to users' feelings about an IS either before, during and after use of such an IS. We would examine the following models: DeLone and McLean IS success model, Yield Shift Theory of Satisfaction and Cognitive dissonance theory.

DeLone and McLean's Model of IS Success: In order to provide a general and comprehensive definition of IS success that covers different perspectives of evaluating information systems, DeLone and McLean reviewed the existing definitions of information system success and their corresponding measures, and classified them into six major categories. Thus, they created a multidimensional measuring model with interdependencies between the different success categories ([4]). The concept of the updated model consists of six interrelated dimensions of IS success: information, system and service quality, (intention to) use, user satisfaction, and net benefits [4]. The model can be interpreted as follows: A system can be evaluated in terms of information, system, and service quality; these characteristics affect the subsequent use or intention to use and user satisfaction. As a result of using the system, certain benefits will be achieved. The net benefits will (positively or negatively) influence user satisfaction and the further use of the information system. Satisfaction with an information system is commonly measured as an indicator of information systems success [37] and has been identified as a precursor of performance impacts in [4] model of IS success.

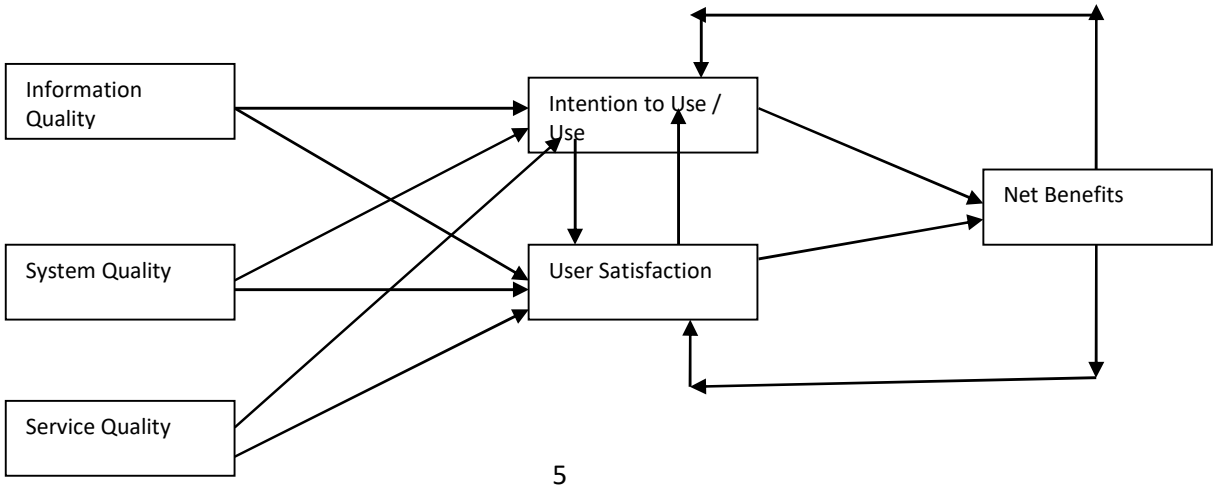

Fig. 4: DeLone and McLean IS Success model (DMLSM)
Source: [4]

In assessing the validity of [4] and [19] information system success models, [35] found that IS user satisfaction impacts IS use: a higher level of satisfaction creates greater user dependence on the system. [4], identified six studies out of the sixteen empirical studies that tested the IS success model with a confirmation of a positive and significant relationship between end-user satisfaction and individual performance.

Cognitive dissonance theory: This theory is concerned with the relationships among cognitions. According to cognitive dissonance theory, there is a tendency for individuals to seek consistency among their cognitions (i.e., beliefs, opinions). When there is an inconsistency between attitudes or behaviours (dissonance), something must change to eliminate the dissonance. In the case of a discrepancy between attitudes and behaviour, it is most likely that the attitude will change to accommodate the behaviour. Two factors affect the strength of the dissonance: the number of dissonant beliefs, and the importance attached to each belief.
The main variables of this theory are: User satisfaction, performance, perception, behaviour, usage while the independent variables include: expectations, disconfirmation, attitude, belief.

Yield Shift Theory of Satisfaction: Individuals may hold many goals, ranging from fundamental goals like drawing breath to esoteric goals like scientific discovery or self-actualization. Human cognitive resources are limited, and so cannot assess all of an individual's goals simultaneously. The set of goals currently being processed by the subconscious is called the activity goal set. Yield Shift Theory draws on five assumptions and two propositions to argue that satisfaction responses are a function of perceived shifts in yield for the active goal set. For the logic by which the propositions of Yield Shift Theory were derived, see [38]. Proposition 1: Perceived Yield. At a given moment, the Yield an individual subconsciously perceives for a given goal is a multiplicative function of the utility ascribed to the goal and the assessed likelihood of attaining it. Proposition 2: Satisfaction Response as a Function of Yield Shift. The magnitude of the satisfaction response is a curvilinear function with a positive but decreasing slope of the absolute value of a yield shift for the active goal set. Yield Shift Theory provides explanations for many satisfaction phenomena that manifest in the IS domain.

1.2 Satisfaction Phenomena Explained by Yield Shift Theory:

Goal attainment effect: Individuals feel satisfied on attainment of a desired state or outcome. They feel dissatisfied when the desired state or outcome is thwarted. Confirmation effect: Individuals feel satisfied when outcomes match expectations or desires, and feel dissatisfied when outcomes are less than expectations or desires. Disconfirmation effect: Individuals feel neutral when outcomes match expectations or desires. They feel satisfied when outcomes exceed expectations or desires; they feel dissatisfied when outcomes are lower than expectations or desires. Anticipation effect: Individuals feel satisfied or dissatisfied when thinking of future goal attainment, even though goals have not yet been attained or thwarted. Nostalgia effect: Individuals feel satisfied or dissatisfied when thinking about past goal attainment or past

failure to attain goals. Differential effect: Multiple individuals manifest differing levels of satisfaction upon the attainment of goals to which they ascribe similar utility. Hygiene effect: Individuals feel only neutral or negative about an IT/IS artefact, but never positive. Mentor effect: Individuals feel more satisfied or dissatisfied after discussions with a trusted advisor, even though current conditions have not changed. Mixed Feelings: Individuals experience both satisfaction and dissatisfaction with the same IS/IT artefact. Attenuation effect: Individuals' satisfaction responses diminish over time.

C. Performance Impacts Models

Performance is the accomplishment of a portfolio of tasks by an individual. Performance impact has to do with how well the work is performed or how much value is added/created as a result of using the system. [3] assert that performance impact is a joint function of system utilization and Task Technology Fit (TTF).
The Technology- to- Performance Chain Model (TPC): There is a connection between information technology and user performance. [3] conceptualized the task-to-performance chain (TPC) in order to investigate this link. The framework was based on two separate research angles: (a) the user acceptance and adoption research perspective which investigates user beliefs and attitudes to predict the utilization of information systems [7, 15]; and (b) the fit angle which focuses on the impact of appropriateness of the technologies used by individual IT users in the performance of their tasks [39]. Central to this framework was the task-technology fit construct ([3]).

Task-technology fit (TTF) theory holds that IT is more likely to have a positive impact on individual performance and would be used if the capabilities of the IT match the tasks that the user must perform ([3]). [3] developed a measure of task-technology fit that consists of 8 factors: quality, locatability, authorization, compatibility, ease of use/training, production timeliness, systems reliability, and relationship with users. Each factor is measured using between two and ten questions with responses on a seven point scale ranging from strongly disagree to strongly agree.

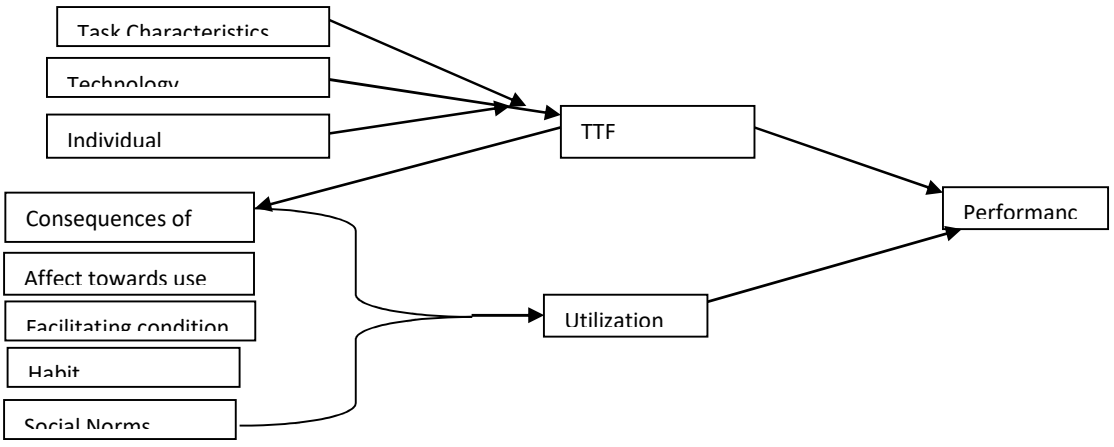

Fig. 5: Technology-to-Performance
Source: [3]

According to the diagram above, task-technology fit was predicted to influence the 'precursors of utilization' and also impact on the performance of the technology user. The conceptualized precursors of utilization (including expected consequences of use, affect towards using, social norms, habit and facilitating conditions) in turn impacted on technology utilization, which in turn affected user performance ([3]). TTF is seen to be higher when the functionality of a technology and the user's requirements are similar. Additionally, TTF is lower if the functionality of the technology is less adequate in meeting the needs of the user or when the demands of a task are increased. Individuals have a greater tendency to utilize technology if the capabilities of the technology fit the needs of the individual. Therefore, TTF can be a good predictor of technology utilization.

The basis of the TTF model is that when given more than one option technology users will use the technology that provides them with the most benefits. [3], [18] explained that it is important to note that when the construct of utilization is required, it is not necessary to consider it in the TTF model as all users will show the same outcome for this variable. As argued by [3], system utilization is more a function of how jobs are designed than the quality or fit of the systems or the attitude of users towards using them. On the contrary, it was discovered that studies focusing on fit alone do not give sufficient attention to the fact that systems must be utilized before they can deliver performance impacts. Hence, the introduction of the technology-to-performance chain [3]. But does the TPC model sufficiently estimate the relationship between the factors playing out in such an open and distance learning (ODL) compulsory usage environment? Several empirical studies have validated different aspects of the model [3, 19, 21, 30,].

1.3 Weaknesses of the Existing Information Systems

The discussions organized principally into intention-usage based model, satisfaction based models and performance based models. The major aim is to assess the weaknesses of the earlier discussed models and the need for new models.

A. Intention-Usage-based Models

In spite of the popularity and significant contributions of the perception-intention-usage models such as TRA, TAM and UTAUT, there is a growing concern that these traditional perception-intention-usage models are deficient in a number of important respects [39, 41]. Firstly, the framework is concentrated on behavioural intention rather than on usage [42]. This situation has resulted to a good number of IS researchers focusing on behavioural intention with comparatively little attention to technology usage and its accompanying outcomes [23, 42, 43]. Secondly, TAM is a good predictor of technology acceptance only when the users willingly choose to use the technology. In a situation where the user is provided with only one option or usage is compulsory, then TAM is not a good indicator of acceptance [13].

Thirdly, TAM offers some insights into the antecedents of user-perceived usefulness and ease of use, but they are not particularly concerned with the extent to which technology meets task-related requirements [14]. Finally, the theory was able to explain % of usage [23, 43]. Despite the key role technology usage play in information system, it has relatively been insufficiently explained [43]. In the application of models to usage of emails, word perfect, Lotus 1-2-3, and Harvard graphics, [46] framework was able to explain 15%, 4%, 35% and 30% respectively.

While calling for the formulation of new theories in investing technology usage, [25] asserted, that the fact that at least 70% of the variance of usage is unexplained suggest the deficiency of the traditional method and the need for new theories on which more robust research model can be built. While investigating personal

computing acceptance factors in small firms, 25% of the variance in usage was explained in [50] framework. In using a large number of precursors of usage in their framework, [23] was able to explain 30% of usage. While suggesting the need for new models, [44] considered actual usage instead of the traditional perception-intention-usage framework. In his work, [25] showed that on the average, the traditional framework may only explain as low as 14% of the variance on usage.

B. Satisfaction based Models

Prominent among the three models selected in this group is the DeLone and McLean IS success model. While the yield shifts theory of satisfaction stated the statement of assumptions regarding satisfaction without establishing the statistical relationships between these assumptions. The cognitive dissonance theory on the other hand focuses mainly on the user behaviour without much recourse to the assessment of the quality or fit of the technology being used. According to [3], for better performance by IT users, the technology must not only fit the task, it must be used. Several researchers using the [4] model of IS success as a framework have pointed out that utilization may not be influenced by system quality and information quality [45]. The emphasis on system, information and service quality without much attention to the fundamental precursors of utilization such as habit, social norms, competence of the users etc as they affect usage and performance calls for concern ([3,19]. In addition, further identification of other factors necessary to explain constructs like satisfaction is necessary. For instance, in Perez-Mira dissertation on validating the DMIS at organizational level of analysis, the variability of satisfaction, technology use and net benefits were found to be 1%, 18% and 60% respectively. Hence, the deficiencies need to be close up in order to formulate models with higher predictive power.

C. Performance based Models

The TPC model proposed in 1995 is prominent. However, the none inclusion of satisfaction as a key predictor of utilization and performance in the technology-to-performance model especially in the e-learning domain has been identified as a deficiency associated with this model [6, 26]. In examining the influence of satisfaction, a model exists that support the investigation of the impact of satisfaction from the pre-usage dimension [26]. However, there is a deficiency among the existing known information system models that analyses satisfaction from the post usage experiences of the end users. Another deficiency with the TPC model is its predictive power. In the original TPC model, 16% of performance impact was explained by TTF and utilization [3]. 31% of learning management system performance was explained by TTF and utilization in [6] studies. Similarly, 58% of performance impact was explained in [19] studies in mandatory usage environment. The absence of emerging construct such as computer self-efficacy has also been identified by [13].

D. The hybridization of IS Usage and Performance Models

Integration of models and constructs has been canvassed by several researchers in order to help users understand the factors that affect ICT usage and performance. [47] noted that prominent instances of successful theory development in the field of information systems include the [4] information systems success model, the technology acceptance model (TAM) [15], the unified theory of acceptance and use of technology (UTAUT) [26], the historical task-technology fit (TTF) theory [3, 47]) and the computer self-efficacy construct ([1]. As noted by [13], TAM and TTF by themselves are good predictors of technology

adoption. However, the combination of the two models showed a better result than either TAM or TTF alone. The analyses showed that the extended model explained more variance than either TAM or TTF alone [13]. Utilization variance explained were 36% with TAM, 41% with TTF, 51% with TAM/TTF [13]. Again, in an extended TPC-related model, computer self-efficacy was added to the model which showed improved explanatory power of the original TPC model [13]. In their separate studies of the consumer e-commerce as a technology adoption process, [48]; evaluated the suitability of both TAM and TTF to understand how and why people participate in electronic commerce. To better understand online shopping activity, this study tested a modified TAM model through a web-based survey of 263 undergraduate students [48].

The results confirmed that a TTF construct was a valuable addition to the TAM model because the extended model explained more variance in the dependent variable. [18] equally combined some constructs of TAM and TTF to determine and quantify the factors that impact hotel guests' intentions to seek and utilize guest empowerment technologies. Other combined models and constructs includes: TTF and Ease of Use (17), TTF and Computer Self-efficacy ([13, 49]), TTF and two (2) constructs [29], TTF and TAM [18, 48]), TTF and Satisfaction [6]). This work therefore proposes a hybrid model that combines constructs such as ease of use and perceived usefulness from TAM, satisfaction from [4] which is considered critical in influencing usage and performance [6] and computer self-efficacy from [1], [28]; [2]). The combination of these constructs with some constructs from the TPC model as showed in figure 7 below would be used to investigate fit, IT usage, satisfaction and performance outcomes in a mandatory usage environment.

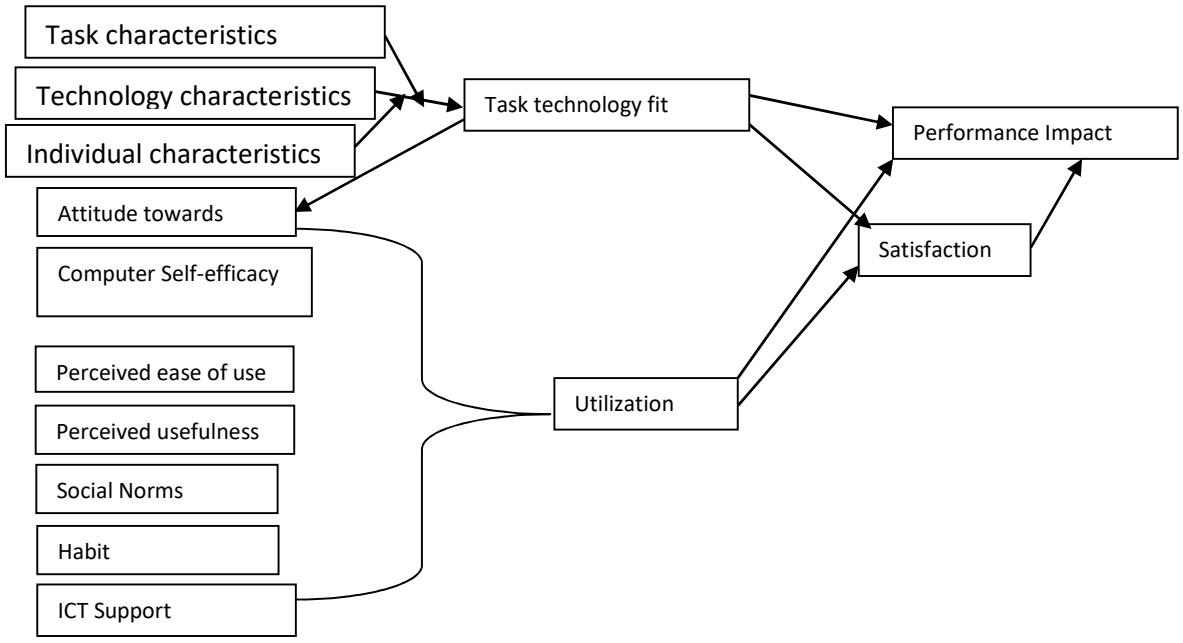

Fig.6: The Technology-Utilization-Satisfaction And Performance Model (TUSPEM)

Source: [51]

2. METHODOLOGY

In order to find published research that examined the relationships in the TUSPEM model, full-text searches
in the following databases were carried out: EBSCO compendium, Google scholar, African Journal of Information Systems since. As one of the criteria for the search, identified papers were published in the time period 1990 to 2017. A strategy that involved searching across multiple databases using search terms was adopted. Most literatures were located in the following categories: Social sciences (S), Information technology (T), and Behaviour/Organization (B), IS Theories (T). The search was intended to provide focus on only studies that focused on models and theories being applied in the field of information systems.

Independent searches were made using the titles, abstracts and keywords for the phrases ('models in information system usage", "models in user satisfaction", or "IT performance models" etc. As not all the database supported boolean phrases in the same way, the search was adapted as required to obtain equivalent results. Additionally, to expand the literature review, well-cited papers (greater than 200) from online databases where included. Papers were manually checked and those not reporting empirical results were eliminated. Literature reviews where not restricted to a specific information system type or context whether mandatory / voluntary or organizational or individual.

3. LITERATURE ANALYSIS

3.1 Hypothesis Development

3.1.1 TTF and Performance

The fit concept is evident in a variety of theories in information systems (IS) research. In particular, task-technology fit (TTF) theory is recognised as an important development in IS theory. In fact, the task technology fit concept introduced by [3] has been identified as a key determinant in investigating information system's utilization and performance. The impact of TTF on performance has been attributed to the variance in the degree to which the various information systems are suited for performing the various tasks portfolios. The evaluation of how well a specific technology is suited for the performance of a given task has motivational effects on the users [28].

The direct link between TTF and performance has been investigated with mixed findings. For example, [3] supported the relationship in their study of 25 different technologies in two organizations. While calling for further conceptual and empirical investigations into whether there is a link or not, and under what condition

the relationship is strong or weak, [3] maintained that such investigations would further give credence to the full understanding of the interactions surrounding performance using information systems (p.128). In a related study, [19] found a strong support for the impacts of TTF on performance while testing the use of spreadsheet in a mandatory usage environment. Other related work that confirmed this relationship includes [6]. In a related work, [49] found moderate support for the linkage between TTF and employer performance. Hence, it is hypothesized as follows:

H_1: TTF will positively influence information systems performance impacts for users.

3.1.2 TTF and User Satisfaction

The relationship between task technology fit and user satisfaction has been studied with mixed outcomes. This relationship presupposes that If the TTF of an information system is high, users would be satisfied using an IS and would continue to use such an information system. According to [3], user satisfaction is a fit between personal needs and the benefits of using a system and would be measured by an assessment of how a user feels about a system. Unfortunately, the technology-performance model never investigated this link. Contrarily, [52] found employee satisfaction as not being consistently related with task-technology fit.

H_2: TTF would be positively correlated with user satisfaction

3.1.3 TTF and Attitude towards Use

The suitability of a specific information system for a given task has great influence on users' attitude towards usage of such system. This relationship exist due to the fact that the better the fit, the more the tendency for users to develop a positive attitude towards the system. The work of [3] only assumed the existence of the relationship but failed to investigate the link. Instead, the direct link between TTF and utilization was tested and confirmed to have a significant relationship. On the other hand, several other findings have investigated TTF and system usage through the precursors of utilization. For example, (19, 49] found a positive relationship between the task technology fit of an IS and users attitude towards usage. Hence, the hypothesis:

H_3: TTF will positively influence users affect towards use of an information system.

3.1.4 Attitude towards usage and Utilization

The link between users' attitude towards usage of an information system has been identified as one of the major precursors of information system utilization. This link has been studied with mixed findings. For example, the work of [23] while investigating four organizations associated with entertainment, telecommunications, banking and public administration concluded that attitude towards using an information system does not influence usage in a mandatory environment. Similarly, while investigating the precursors of learning management system utilization in Nigeria [53] did not find a significant relationship between lecturers' attitude towards IS usage and actual usage. In another survey conducted to investigate if there would be any increase in students' attitude towards using supplementary technological devices to support face-to-face instructions, [16] concluded that attitude of students were improved following their exposure to technological devices. Thus, the hypothesis is framed as follows:

H_4: Users attitude towards usage of an information system positively influences utilization

3.1.5 Computer Self-efficacy and System Utilization

The concept of computer self-efficacy has found its relevance in IS research. According to [54], personal experience, continuous learning, goal setting and hands-on the task improves self-efficacy and enhances usage of technology. [55] investigated the connection between teachers' self-efficacy and their commitment towards usage of IS for their instructions. Results showed that the more the teachers value an information system, the greater the amount of time and energy they would invest in the use of such an information system. The result also showed that teachers who devoted most time and effort to using an information system had more positive beliefs in their ability to use it than those who spend less time and energy using the IS. Similarly, [54] opined that professional development and hands-on tasks were the main strategies mentioned for enhancing teachers self-efficacy associated with utilizing the Internet for instruction.
Hence the hypothesis:

H_5: Users computer self-efficacy influences system utilization

3.1.6 Social Norms and System Utilization

Social norms deal with users' belief on people's expectations regarding their capacity to perform certain behaviour or task. In every organization, several tasks are assigned to specific people believed to have the capacity to accomplish the task. Management at the different levels expects tasks to be accomplished by their subordinates. In a mandatory usage environment, where one expects social norms to be critical in determining usage, [12] did not find any relationship between the social norms of users and their intention to use technology.

On the other hand, there was a significant relationship between social norms and technology utilization as reported by [19, 56]. Hence the hypothesis is presented as follows:

H_6: Social norms influences users utilization of an information system

3.1.7 Users Habit and System Utilization

Users' habit plays a crucial role in the utilization and continued usage of information systems (IS). Information system researchers have been investigating how users adopt information systems. As argued by [11], information systems that fail to meets the user's needs are discontinued even after being adopted. The relationship between users habit and utilization of information systems was also assumed to exist but was not tested by both [3] and [19] while testing the TPC model. However, [53] tested the relationship while examining lecturers' usage of learning management system in an open and distance learning institution in Nigeria. [16] conducted a survey research on 442 pre-service teachers at the teacher training institute of Singapore using the Technology Acceptance Model (TAM) as the theoretical framework. The study indicated that attitudes did not significantly impact the participants" intent to use technology.

H_7: Users individual habit positively influences system utilization

3.1.8 Perceived Usefulness and Utilization

As conceptualized by [15], perceived usefulness is the level to which a person feels that the use of a

particular information system would enhance his or her performance. The construct was considered critical in information system research as it has a significant effect on intention to use and eventual usage [15]. The findings from several studies have revealed contradictory results regarding this link. For example, while [47] found perceived usefulness to positively influence system utilization, [53] did not find a significant relationship between users perceived usefulness of information systems in a mandatory usage environment. Hence, the hypothesis was framed as follows:

H_8: Users perceived usefulness of an information system has a positive influence on its utilization

3.1.9 Perceived Ease of Use and System Utilization

Findings of studies carried out by different researchers have turned out mixed results. For example, [60], while employing TAM as a theoretical framework in determining the success of an e-shopping system, using structural equation modeling (SEM), showed that perceived ease of use does not have a significant influence on system use. On the other hand, [57] also confirms that while perceived ease of use seems to be the most widely used surrogate measure for system use or intention to use. Thus an over-emphasis of PEOU as an indicator of system quality may not be advisable, particularly at the cost of other factors such as functionality, reliability, etc. Hence the hypothesis was stated below:

H_9: Perceived ease of use of an information system has a positive influence on utilization

3.1.10 Utilization and Satisfaction

Research on the relationship between system utilization and end-user satisfaction has been viewed from different perspectives and with mixed findings. [3] referred to satisfaction as affect towards using a technology that should serve as a precursor of usage. The work of Lee, [43] also found that system utilization is positively related to end-user IS satisfaction. On the contrary, technology utilization had a non-significant relationship with user satisfaction [55]. Hence, the hypothesis was framed as follows:

H_{10}: Actual utilization of an information systems influences users' satisfaction with the system.

3.1.11 System Utilization and Performance Outcomes

Utilization of information systems plays a significant and positive effect on individual performance [50]. An investigation of the link between system utilization and individual performance was confirmed by the work of [3, 4, 19, 49]. In the educational sector, [6] noted that there has been very little research on lecturers' use of technologies and their resultant outcomes. Hence, a hypothesis was framed thus:

H_{11}: Utilization will positively influence information systems performance impacts for users.

3.1.12 Satisfaction and Performance Outcome

In [4] work, six out of the sixteen studies that tested and confirmed the positive and significant relationship between end-user satisfaction and individual performance were identified. In the TPC model, [3] did not find the satisfaction construct as key in determining users' performance. Other researchers like [6] have

continued to emphasize the need for research into the relationship between users' satisfaction and performance. While investigating the link, [55] found that users' satisfaction has a positive and significant relationship with individual performance. Hence, the hypothesis is included as follows:

H_{12}: Satisfaction will positively influence performance impacts for users.

4. CONCLUSION

In an attempt to support theory development in information system research, several attempts have been made in the past in providing workable and sustainable theories and models. A review of the existing models on IS usage and performance, shows some identified deficiencies. For example, studies that focus on intention-usage based models or framework have been identified as models that focus on intention to use IT rather than actually assisting researchers fully understand usage and its outcomes. While evaluation and re-evaluation of existing models have shown deficiencies with changing contexts, the TUSPEM model is one of such hybrid model that integrates intention to use, actual usage, post-usage satisfaction and performance impacts. The literature reporting on the existing relationships among both dependent and independent variables in the TUSPEM model were selected. While most literatures reviewed had support for these relationships, others did not show any significant support for the relationships.

5. RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should test the proposed model with for validity and reliability measures using appropriate statistical and quantitative tools in terms of the models predictive power, path coefficients and item loadings. Research would also be needed to investigate in these relationships with empirical data in different context: mandatory and non-mandatory usage environment both at individual and organizations levels of analysis.

REFERENCES

[1] Compeau, D. R., and Higgins, C. A. (1995). Application of social cognitive theory to training for computer Skills, Information Systems Research, 6(2): 118-143.

[2] Aguirre-Urreta, Miguel I. (2011). The Internal-External Efficacy Model: Towards the Integration of Computer Self-Efficacy and Task Technology Fit into a Comprehensive View", SIGHCI 2011 Proceedings. Paper 4. http://aisel.aisnet.org/sighci2011/4 [Retrieved October 13, 2016]

[3] Goodhue, D., and Thompson, R.. (1995). Task technology fit and individual performance. MIS Quarterly, 19 (2), 213-236.

[4] DeLone, W., and McLean, E., (1992). Information systems success: The quest for the dependent variable, Information Systems Research, 60-95.
[5] Roca, J.C,Chiub, C. Martıneza, F.J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. Int. J. Human-Computer Studies, 64 (3), 683–696.
[6] McGill, T. Klobas, J., and Renzi, S. (2008). The Relationship between LMS Use and Teacher Performance: The Role of Task-Technology Fit, ACIS Proceedings. P.82.
[7] Fishbein, M. and Ajzen, I. (1975). Belief, attitude, intention, and behaviour : An introduction to theory and research. Reading, Mass. ; Don Mills, Ontario: Addison-Wesley Pub. Co.
[8] Larsen, K. R., Allen, G., Vance, A., Eargle, D. (2014). Theories Used in IS Research Wiki. [Retrieved On the October 12, 2014 from http://istheory.byu.edu].
[9] Bhattacherjee, A. and Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: a theoretical model and longitudinal test," MIS Quarterly, 28(2), 229-254.
[10] Briggs, Robert O.; Reinig, Bruce A., and de Vreede, Gert-Jan (2008). The Yield Shift Theory of Satisfaction and Its Application to the IS/IT Domain. Journal of the Association for Information Systems, 9(5), 267-293.
[11] Limayenm, M. Hirt, S.G. and Cheung, C.K. (2003). Habit in the Context of IS Continuance: Theory Extension and Scale Development" 2003 Proceedings. Paper 90. http://aisel.aisnet.org/ecis2003/90 [Retrieved October 19, 2017].
[12] Dishaw M.T. and Strong, D. M. (1999). Extending the technology acceptance model with task-technology constructs. Information & Management 36, 9-21.
[13] Dishaw, M. Strong, D. and Bandy, D. B. (2004). The Impact of Task-Technology Fit in Technology Acceptance and Utilization Models, AMCIS 2004 Proceedings, Paper 416.
[14] Tai-Kuei, Y. and Tai-Yi, Y. (2010). Modeling the factors that affect individuals' utilization of online learning systems: An empirical study combining the task technology fit model with the theory of planned behavior, British Journal of Educational Technology 41(6), 1003-1017.
[15] Davis, F.D., Bagozzi, R.P., and Warshaw, P.R, (1989). User acceptance of computer technology: a comparison of two theoretical models, Management Science, 35(8), 982-1003.
[16] Teo T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. Australasian Journal of Educational Technology 24(4), 413-424.
[17] Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. Information Systems Research, 2 (3), 173–191.
[18] Schrier, T. (2009). The Utilization of a hybrid task technology fit-technology acceptance model for the evaluation of hotel Guest Empowerment Technologies usage UNLV Theses/Dissertations/Professional Papers/Capstones, Paper 45.
[19] Staples, D.S., and Seddon, P. (2004). Testing the Technology-to-Performance Chain Model, Journal of Organizational and End User Computing 16(4), 17-36.
[20] Averweg, R.U (2008). Information Technology Acceptance in South Africa: An Investigation of Perceived Usefulness, Perceived Ease of Use, and Actual System Use Constructs, The African Journal of Information Systems, 1 (1) Article 4.
[21] Jarupathirum, S. and Zahedi, F. (2007). Exploring the Influence of Perceptual Factors in the Success of Web-Based Spatial DSS, Decision Support Systems, 43 (3), 933-951.

[22] Kukafka, R., Stephen, B., Allison, L., and John, P. (2003). Grounding a new information technology implementation framework in behavioral science: a systematic analysis of the literature on IT use, Journal of Biomedical Informatics 36 (2), 218-227.
[23] Straub, D. W., and Burton-Jones (2007). Breaking the TAM Logjam," Journal of the Association of Information Systems 8(4), 223-229.
[24] Trice, A.W, Treacy, M.E. (1988). Utilization as a dependent variable in MIS research, Data Base 19(3/4), 33-41.
[25] Wu, J., Du, H. (2010). A New Theory of Technology Usage, Proceedings > Proceedings of JAIS Theory Development Workshop . Sprouts: Working Papers on Information System.
[26] Venkatesh, V., Morris, M.G., Davis, G.B., and Davis, F.D. (2003). User acceptance of information technology: Toward a unified view. Mis Quarterly, 27(3), 425-478.
[27] Ajzen, I., and Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior, NJ, Englewood Cliffs: Prentice-Hall.
[28] Eden, D., Ganzach, Y., Granat-Flomin, R., and Zigman, T. (2010). Augmenting Means Efficacy to Improve Performance: Two Field Experiments, Journal of Management, 36(3), 687-713.
[29] Assefa, S. and Prybutok, V. (2006). Towards a comprehensive model to predict perceived performance impact of wireless/mobile computing in a mandatory environment AMCIS 2006 Proceedings, Paper 324. http://aisel.aisnet. org/amcis2006/324 [Retrieved September 04, 2017].
[30] Fuller, R.M., and Dennis, A.R. (2009). Does fit matter? the impact of task-technology fit and appropriation on team performance in repeated tasks, Information Systems Research 20(1), 217.
[31] Albion, P., & Ertmer, P. A. (2002). Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology. TechTrends, 46(5), 34–38.
[32] Bandura, A. (1997). Self-efficacy: Toward a unifying theory of behavioral change", Psychological Review, 84, 191-215.
[33] Burkhardt, M.E. and Brass, D.J. (1990). Changing patterns or patterns of change: The effects of a change in technology on social network structure and power, Administrative Science Quarterly, 35(1), 104-127.
[34] Harrison, A.W. & Rainer, R.R. (1997). Testing the self-efficacy-performance linkage of social-cognitive theory, Journal of Social Psychology, 137(1), 79-87.
[35] Rai, A., Lang, S.S., Welker, R.B. (2002). Assessing the validity of IS success models: an empirical test and theoretical analysis. Information Systems Research, 13 (1), 50–69.
[36] Arning, K., Ziefle, M. (2007). Understanding differences in PDA acceptance and performance, Computers in Human Behaviour 23(6), 2904–2927.
[37] Hwang and Thorn (1999). The effect of user engagement on system success: a meta-analytical integration of research findings, Journal of Information and Management 35(4), 229-336.
[38] Briggs, R.O., Reinig, B.A., and Vreede, G. (2001). The Yield Shift Theory of Satisfaction and Its Application to the IS/IT Domain. Journal of the Association for Information Systems, 9(5), 267-293.
[39] Benbasat, I., Barki, H, and Quo, V. (2007). TAM? Journal of the Association for Information Systems 8(4), 211-218.
[40] Vessey, I. (1991). Cognitive fit: A theory-based analysis of the graphs versus tables literature. Decision Sciences, 22(2), 219-240.
[41] Bagozzi, R. P. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift, Journal of the Association for Information Systems (8:4), 244-254.
[42] Taylor, S. and Todd, P.A. (1995). Understanding Information Technology Usage: A Test of Competing Models, Information Systems Research 6(2), 144-176.

[43] Lee, Y., K. A. Kozar, K.A. and Larsen, K. R. T. (2003). The Technology Acceptance Model: Past, Present, and Future, Communications of the Association for Information Systems 12(2), 752-780.
[44] King, W. R., and He, J. (2006). A Meta-Analysis of the Technology Acceptance Model, Information and Management 43(6), 740-755.
[45] Landrum, H.T., Prybutok, V.R., Strutton, D., and Zhang, X., (2008). Examining the Merits of Usefulness Versus Use in an Information Service Quality and Information System Success Web-Based Model," Information Resources Management Journal 21(2), 1-17.
[46] Adams, D. A., Nelson, R. R., and Todd, P. A. (1992). Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication, MIS Quarterly 16(2), 227-247.
[47] Evermann, J. and Tate, M. (2009). Constructs in the Mist: The Lost World of the IT Artifact," Proceedings of JAIS Theory Development Workshop Sprouts: Working Papers on Information Systems, 9(42). http://sprouts.aisnet.org/9-42 [Retrieved September 14, 2017]
[48] Klopping, I. M., and McKinney, E. (2004). Extending the technology acceptance model and the task-technology fit model to consumer E-commerce, Information Technology, Learning, and Performance Journal, 22(1), 35-48.
[49] Luarn, P and Huang, K. (2009). Factors Influencing Government Employee Performance via Information Systems Use: an Empirical Study, Electronic Journal of e-Government, 7(3), 227 - 240, available online at www.ejeg.com [Retrived Semptember 14, 2017].

[50] Igbaria, M, Guimaraes, T., and Davis, G. (1995). Testing the determinant of microcomputer usage via structural equation model. Journal of Management Information System, 11 (4), 87-114
[51] Osang, F., Abinwi, N. and Tsuma, C. (2015). Reviewing Information Systems Usage and Performanc Models, International Journal of Computer Science and Information Technologies, (IJCSIT) 6 (1), 476-484.
[52] Baas, P. (2010). An MSc Business Administration, Business Information Management Dissertation, Rotterdam School of Management, Erasmus University. https://www.erim.eur.nl/fileadmin/default/content/ erim/research/ centres/sbni/projects/nwow/about/who_are_we/st2008/baas%20(2010)%20-%20task-technology%20fit%20in%20the%20workplace%20-%20aff.pdf [Retrieved July 15, 2017]
[53] Osang, F.B. and Galadima M. B. (2015). Determining Technology Utilization: the Technology Utilization, Satisfaction and Performance Model (TUSPEM) Perspective. International Conference on Computer Science, Engineering and Innovations (ICCSEI, 2015) London, United Kingdom.
[54] Mackay, J., & Parkinson, J. (2010). Gender, self-efficacy, and achievement among South African technology teacher trainees, Gender & Education, 22(1), 87-103.
[55] Osang, F.B. (2015). Task Technology Fit and Lecturers Performance Impacts: The Technology Utilization, Satisfaction and Performance (TUSPEM) Dimension, International Journal of Computer Science Issues 12(3), 'IJCSI-2015-12-3-10405.
[56] Venkatesh, V., and Goyal, S. (2010). Expectation disconfirmation and technology adoption: Polynomial modeling and response surface analysis, MIS Quarterly, 34(2), 281–303.
[57] Kwon, O., and Wen, Y. (2010). An Empirical Study of the Factors Affecting Social Network Service Use, Computers in human behavior 26(2), 254-263.
[58] Liu, D and Weistroffer, H.R (2017). Is System Quality Irrelevant to System Use? A Literature Review of the Relationship Between System Quality and System Use, Twenty-third Americas Conference on Information Systems, Boston.
[59] Keen, P. (1980). MIS research: reference disciplines and a cumulative tradition, Proceedings of the First International Conference on Information Systems, Philadelphia, Pa, 9–18

[60]Ha, S., and Stoel, L. (2009). Consumer E-Shopping Acceptance: Antecedents in a Technology Acceptance Model, Journal of Business Research 62(5), 565-571.

[61] Petter, S., DeLone, W., and McLean, E. R. (2012). The Past, Present, and Future of Is Success, Journal of the Association for Information Systems 13(5), 341-356.