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УТАУТ И НЕЈЗИНАТА ПРИМЕНА ВО ОБРАЗОВНА СРЕДИНА: ПРЕГЛЕД НА СОСТОЈБАТА

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Апстракт. Информатичките и комуникациските технологии (ИКТ) имаат потенцијал да ги подобрат сите аспекти на нашиот општествен, економски и културен живот. Воведувањето на ИКТ во универзитетите како високообразовни установи, јасно го менува начинот на кој образованието се спроведува. Но, колку што е важно воведувањето, толку е важно и прифаќањето на новите ИКТ. За таа цел ќе ја употребиме унифицираната теорија за прифаќање и употреба на технологијата (УТАУТ) со која ќе се објасни намерата на корисникот да користи информациони системи и последователно да го следи однесувањето од нивното користење.
Во трудов е опишан моделот УТАУТ и факторите кои влијаат на него, како и неговата модификација со текот на времето. Понатаму се дадени примери за примената на УТАУТ во различни средини. И на крај, во заклучокот наведуваме зошто прифаќањето на ИКТ е задолжително и што треба да се преземе за да се прифати една нова технологија.

Клучни зборови: *УТАУТ, клучни фактори, технологија.*

UTAUT AND ITS APPLICATION IN AN EDUCATIONAL ENVIRONMENT: STATE-OF-THE-ART

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Abstract. Information and communication technologies (ICT) have the potential to improve all aspects of our social, economic and cultural life. The introduction of ICT in universities as institutions of higher education is clearly changing the way in which education is conducted. But, as much as important its introduction is, the more important is the acceptance of new technologies. For that purpose, we shall use a unified theory of acceptance and use of technology (UTAUT) which will explain the user’s intention to apply information systems and subsequently to monitor the behavior of their usage.
This paper describes the UTAUT model and the factors that affect it, and its modification over time. Furthermore, examples are given for the application of UTAUT in different environments. Lastly, in the conclusion we note why the uptake of ICT is mandatory and what should be undertaken in order to accept a new technology.

Keywords: *UTAUT, key factors, technology.*

1. Introduction

The presence of communication and information technologies in organizations today has dramatically increased. Some studies suggest that, by 1980, about 50 percent of all new capital investments in organizations had been in information technology (Westland and Clark 2000). However, the technologies for improved productivity must be accepted and used by employees in organizations.

The explanation of customer acceptance of new technology is often described as one of the most researched areas in modern literature information systems (IS) (Hu et al. 1999). Studies in this area have resulted in several theoretical models, with roots in information systems, psychology and sociology (Davis et al. 1989; Taylor and Todd 1995b; Venkatesh and Davis 2000).

Figure 1. Basic Concept Underlying User Acceptance Models (Venkatesh et al. 2003)

Figure 1 presents the basic conceptual framework underlying class of models, explaining the individual acceptance of information technology that is the basis of this research (Venkatesh et al. 2003).

In this paper we describe the UTAUT theory created by Venkatesh in 2003, as well as its modified versions from 2008 and 2012 respectively, along with the factors that affect them. In the version of UTAUT of 2008 there are some changes in the schedule of the factors affecting the acceptance of new technologies and new three key factors, while the model of 2012 was extended and was intended for the consumer sector. Further, examples are given of the application of UTAUT in university environment where the surveys were conducted on university academics and their results are shown respectively in Table 2, Table 3 and Table 4, given below in part 5. Finally, in conclusion we note why the acceptance of ICT should be mandatory and which obligations should be undertaken to accept one new technology and to be used in a university environment.

2. Synthesis of various models and creating a unified view of user acceptance

Information technology (IT) accepts researches that gave many competing models for acceptance and use of information and communication technologies, each model with different acceptance of determinants. Each theory or model has been widely tested to predict user acceptance (Venkatesh and Davis, 2000; Thompson et al., 1991). However, no comprehensive instrument to measure the variety of perceptions of information technology innovations had existed until Venkatesh et al. (2003) attempted to review and compare the existing user acceptance models with an ultimate goal to develop a unified theory of technology acceptance by integrating every major parallel aspect of user acceptance determinants from those models.

The eight original models and theories of individual acceptance that are synthesized by Venkatesh et al. (2003) are: the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT). Constructs of each models and theories, including the UTAUT model, are represented in Table 1.

Table 1: Models and Theories of Individual Acceptance (Oye et al. 2011)

Models and Theories	Constructs
Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975) derives from psychology to measure behavioral intention and performance.	Attitude Subjective norm
Technology Acceptance Model (TAM) by Davis (1989) develops new scale with two specific variables to determine user acceptance of technology. Technology Acceptance Model 2 (TAM2) by Venkatesh and Davis (2000) is adapted from TAM and includes more variables.	Perceived Usefulness Perceived Ease of Use Subjective Norm* Experience* Voluntariness* Image* Job Relevance* Output Quality* Result Demonstrability* * indicates TAM2 only

Motivational Model (MM) also stems from psychology to explain behavior. Davis et al. (1992) applies this model to the technology adoption and use.	Extrinsic Motivation Intrinsic Motivation
Theory of Planned Behavior (TPB) by Ajzen (1991) extends TRA by including one more variable to determine intention and behavior.	Attitude Subjective norm Perceived Behavioral Control
Combined TAM and TPB (C-TAM-TPB) by Taylor and Todd (1995).	Perceived Usefulness Perceived Ease of Use Attitude Subjective norm Perceived Behavioral Control
Model of PC Utilization (MPCU) by Thompson et al. (1991) is adjusted from the theory of attitudes and behavior by Triandis (1980) to predict PC usage behavior.	Social Factors Affect Perceived Consequences (Complexity, Job-Fit, Long-Term Consequences of Use) Facilitating Conditions Habits
Innovation Diffusion Theory (IDT) by Rogers (1962) is adapted to information systems innovations by Moore and Benbasat (1991). Five attributes from Rogers' model and two additional constructs are identified.	Relative Advantage* Compatibility* Complexity* Observability* Trialability* Image Voluntariness of Use * indicates Roger's constructs.
Social Cognitive Theory (SCT) by Bandura (1986) is applied to information systems by Compeau and Higgins (1995) to determine the usage.	Encouragement by Others Others' Use Support Self-Efficacy Performance Outcome Expectations Personal Outcome Expectations Affect Anxiety
Unified Theory of Acceptance and Use of Technology Model (UTAUT) by Venkatesh et al. (2003) integrates above theories and models to measure user intention and usage on technology	Performance Expectancy Effort Expectancy Attitude toward Using Technology Social Influence Facilitating Conditions Self-Efficacy Anxiety

Researchers are faced with a choice among variety of models and know that they have to "choose" factors across models, or to choose "favorite model" and to ignore the contributions of alternative models. Thus, there is a need to review and synthesize in order to progress towards a unified view of user acceptance.

Based on the conceptual and empirical similarities across models, a single model is formulated and now a unified theory of acceptance and use of technology (UTAUT) is often used.

UTAUT was tested by using the original data and overcoming the eight individual models, and in that way it was founded. UTAUT has become a useful tool that managers need to apply in order to evaluate the probability of success while introducing a new technology and helps to understand the factors for its acceptance, in order to undertake more active interventions (such as training or marketing) targeted at users who may be less prone to adopt and use new systems (Venkatesh et al. 2003).

3. What is the UTAUT

UTAUT aims to explain user intention to use information systems and subsequently to monitor the behavior of their use. The theory considers that four key factors (performance expectancy, effort expectancy, social influence and facilitating conditions) are direct determinants of intention and usage behavior. Gender, age, experience and voluntary use are set to mediate between the impacts of the four key factors of the intention to use and the behavior (Venkatesh et al., 2003, Figure 2).

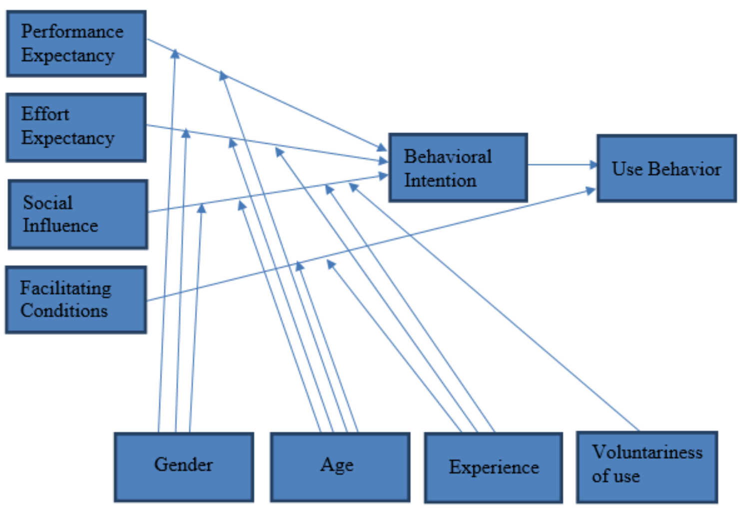
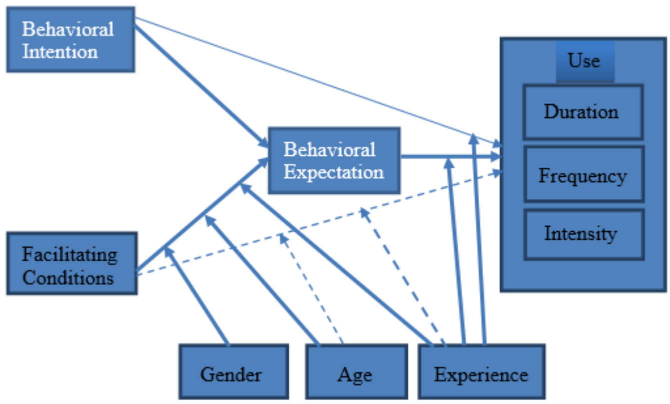


Figure 2. Diagram of UTAUT theory (Venkatesh et al. 2003)

4. Modifications of UTAUT

In 2008, Venkatesh made modification on UTAUT (Figure 3) and the new model used the behavioral intention, facilitating conditions, and behavioral expectations as predictors of the three key factors of a system that we use. The three key factors of the system here are duration, frequency and intensity. Each of these three predictors play different roles in predicting each of the three factors of the system we are using.

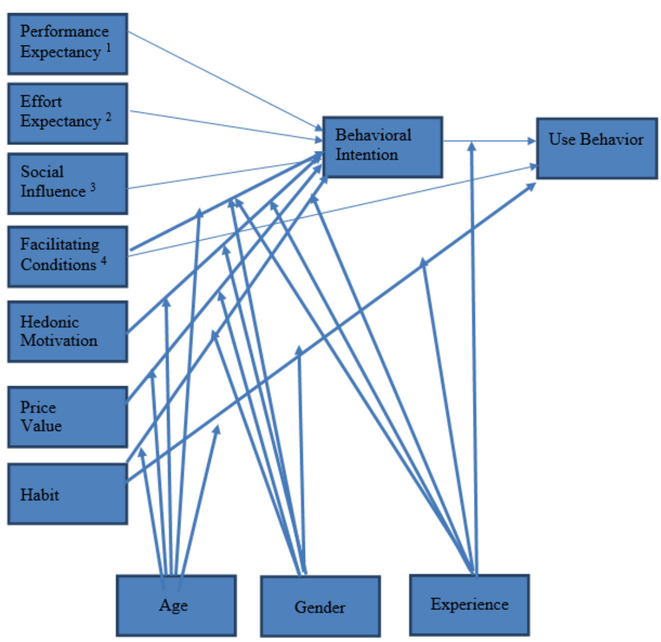


- - - Relationship hypothesized as significant in UTAUT (Venkatesh et al. 2003), but nonsignificant here

UTAUT (Venkatesh et al. 2003) or TAM2 (Venkatesh and Davis 2000) relationships
New relationships

Figure 3. Diagram of UTAUT theory (Venkatesh et al. 2008)

In 2012 there was an expanding of the scope of unified theory of acceptance and use of technology (UTAUT) for acceptance and use of technology in the consumer context (Venkatesh et al.). This theory was called UTAUT 2.



1. Moderated by age and gender.
2. Moderated by age, gender and experience.
3. Moderated by age, gender and experience.
4. Effect on use behavior is moderated by age and experience.
5. New relationships are shown as darker lines.

Figure 4. Diagram of UTAUT 2 theory (Venkatesh et al. 2012)

UTAUT 2 included three new constructions in the previous model of UTAUT: hedonistic motivation, price value and habit. Individual differences – age, gender, and experience - were hypotheses for moderating effects of these constructs on the behavioral intention and the use of technology. Compared with the UTAUT, the proposed extensions in UTAUT 2 produced significant progress in explaining the variance in the behavioral intention (from 56 percent to 74 percent) and the use of technology (from 40 percent to 52 percent).

5. Application of the UTAUT

At the University of Jos Plateau, Nigeria, a pilot – study was conducted which contained 23 UTAUT survey questions and 9 demographic statements in the total amount of 32 questions (Oye et al. 2011). Respondents were university academics. The survey showed that, 57% of respondents were male and 43% were female. By using the pilot study questionnaire part of the demographic statements, they were able to give answer to the following questions (a) Was ICT mandatory or voluntary in their institution? (b) What were the greatest barriers for using ICT for academics? The following results were obtained: the majority of the full-time lecturers (89%) responded that ICT was mandatory. Question which talked about barriers of using ICT, had the majority of the respondents (42%) which said that their problem was the time; on the other hand (31%) said that the problem was the training. Others respondents (4%) said that the cost was their problem, another group (20%) said that they needed the compensation and the final group (3%) said that, it did not fit their programs. This implies that the university ICT made task more easily accomplished, thereby making them more productive. Hence result from the survey showed that 86.5% agreed with that. Therefore this determined the level of expected adoption of ICT by the respondents. Among the four UTAUT constructs, performance expectancy exerted the strongest effect. Therefore Performance expectancy was the most influential factor for the acceptance and use of ICT by the respondents.

Recommendations that were made were that, all employed teachers in Federal, State and Private universities should undertake mandatory training and retraining on ICT programs. This study used the models TAM and UTAUT to understand the teacher's behavioral intention on the acceptance and use of the technology.

Table 2. Results from the study in Nigeria (with UTAUT constructs of reliability of above 0.70.)

Results from the study in Nigeria (Number of respondents N = 100)		
Gender	Male	57%
	Female	43%
Use	Mandatory	89%
	Voluntary	11%
Barriers for using ICT	Time	42%
	Training	31%
	Cost	4%
	Compensation	20%
	Do not fit with the job	3%

Another survey was conducted in a large public university in the Midwest area. The revised questionnaires were distributed to 394 undergraduate students in a business administration course. There were 294 returned responses, for an overall response rate of 74.62 percent. The demographic data of respondents were also collected. Table 2 demonstrates sample characteristics.

The subject of the questionnaire was the assessment of the students' intention to use Blackboard (named MyGateway at the survey institution) which is a Web-based software system used to support flexible teaching and learning in face-to-face and distance courses. Blackboard is an educational innovation that provides tools and facilities for the online course management, content management and sharing, assessment management, and online collaboration and communication between faculty and students or among students themselves.

Table 3. Sample Characteristics from the study in Midwest area (p-value <= .01)

Sample Characteristics	Results
Academic Year	Freshman 30.38 % Sophomore 15.00 % Junior 40.77 % Senior 13.08 % Other 0.77 %
Gender	Male 50.38 % Female 49.62 %
Age	Mean 22.12 S.D. 5.19
Application Experience	None 50.77 % 1-2 Semester 30.77 % More than 2 Semester 18.46 %
Application Training	None 82.31 % 1-5 Hours 16.92 % More than 5 Hours 0.77 %
Voluntariness	Yes 50.00 % No 50.00 %

The last study attempted to understand factors that affected university students' usage intention of library apps in university libraries. The survey was administered in Taiwan in the context of adopting library apps in university libraries; the subjects selected were distributed across various departments, and undergraduate and graduate students in eastern Taiwan from each department and school were fairly evenly distributed to ensure valid comparison.

All subjects participated in the study voluntarily. There were a total of 363 Participants, 168 males and 195 females. Within the sample population: 277 (76.3 percent) were undergraduate students and 86 (23.7 percent) were graduate students. The age of the participants ranged from 18 to 28 years. Most of the participants (69 percent) stated they were familiar with the term library APP before the survey.

Table 4. Results from the study in Taiwan (p-value <= 0.05; 0.01; 0.001)

Results from the study in Taiwan (Number of respondents N = 363)		
Gender	Male	168
	Female	195
Population	undergraduate students	277
	graduate students	86

6. Conclusion

Today the majority of researches in IS are focused on adoption and use of various technologies. Hence the application of UTAUT is of great importance for them, because this theory helps us to get real result in real time, based on opinion of the respondents.

According to various studies that have been implemented in many universities that use the UTAUT, we conclude that the use of ICT is almost everywhere mandatory, but we are still working on an adoption and use of new technologies by academic staff.

However, we know that by using new technologies we improve the quality of work, if they are accepted and used by employees. The faster a technology is accepted by all employees, the faster the effectiveness and efficiency of operations will improve. For a technology to be accepted by the employees, mandatory training, time, and above all perseverance and desire to learn something new are required.

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