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Implementation of the UTAUT Model to Understand the Technology Adoption of MOOC at Public Universities

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Abstract. MOOC is a national agenda in the institutions as it is addressed in the 11th Malaysian Plan, the National Economic Model, Economic Transformation Programme and the Malaysian Education Blueprint. Recently, have witnessed the development of massive open online courses (MOOCs) as a learning trend in the field of open distance education and online learning. As it is considering new technology for us, a research towards its acceptance is essential. This study examines the adoption of MOOC deployment among students at Universiti Kebangsaan Malaysia (UKM). The survey was used in this research where data were collected from 400 respondents and then analysed using Structural Equation Modelling (PLS-SEM). The findings were obtained based on Unified Theory of Acceptance and Use of Technology (UTAUT) model. The result shows that performance expectancy, effort expectancy, social influence and facilitating condition have influenced the respondents to use MOOC in their learning. This research exposed that the UTAUT factors implemented in this study have a significant effect to behavioural intention in order students use MOOC technology. It illustrates the positive impact of these technologies and beneficial to understand the MOOC adoption for all students, especially at public universities and in the area of online learning perspective.

Keywords: MOOC, Technology Adoption, UTAUT, PLS-SEM, Online Learning

1. Introduction

A Massive Open Online Course (MOOC) has been frequently a free course that can facilitate learning material which can be accessed through a web site. The course contains all related material such as text in presentation slide and video content which user can download it on their own. It also contains a task such as quizzes and assignments which to assess the student's ability during the courses as well as social interaction through online forum. MOOCs are accessible to people who plan to take a course or to be schooled in a particular subject area [1]. Nowadays, online learning has become one of the main channels for online teaching and learning between lecturers and students, especially in colleges and universities. MOOC is the course provided to learners in the way of at distance. These scenarios have viewed the appearance of MOOC as learning trends in the field of open distance education. It is an emerging trend practice in e-learning. The culture of teaching and learning is often challenging and changing by the passage of time. MOOC is an e-learning concept that is open for any interested participants attended and access courses with materials that are free of charge. It brings thousands of participants to register for MOOC courses every day. Although these concepts of learning are still growing, it is important to inspect the technology adoption of MOOC especially at a higher level of the institution. The Malaysian government is very supportive of the use of MOOC and sees it as a platform to integrate learning technology, lifelong learning and concurrently lead the way towards a new direction in teaching methodologies for undergraduate programmes [2]. In addition, the Malaysia MOOCs program which is

based in Open Learning platform entails more than one million participants in more than 100 courses offered [3]. In order to make MOOC beneficial to use for a long journey ahead, the acceptance of these technologies is crucial. Effective implementation of any information technology (IT) or information system (IS) depends on user acceptance [4]. Thus, the objective of this research is to observe and understand the technology adoption of MOOC by using a Theory of Acceptance or UTAUT at selected public university. By using a survey method, the result illustrates the positive impact of MOOC adoption among students where all variables of UTAUT have a significant effect to behavioural intentions to use MOOC technology in their teaching and learning.

2. MOOC

Currently, MOOCs adoption in Malaysia is developing in a cycle with a few important plans, which is 11th Malaysia Plan (2016-2020), the National Economic Model, Economic Transformation Programme and the anticipated Malaysian Education Blueprint for Higher Education. The last of which has specifically addressed MOOCs in its preliminary discussion document. Online learning, as an essential component of the delivery mechanism in MOOCs, is also addressed in the soon-to-be-released Blueprint [5]. MOOCs in Malaysia are likely to see various developments in the next several years, as we can anticipate greater involvement from higher education institutions in response to the Malaysian government's recent statements that have revealed several national objectives for MOOCs in the next few years [6]. In addition to the apparent advantage of broader access to potentially high-quality instruction and instructional material, some believe a MOOC can help revolutionise higher education pedagogy [7]. Nevertheless, the effectiveness of MOOC whether it can facilitate bottomless and significant to learning environment for students was still arise. Abeer and Miri [8] asserted that the more autonomous, diverse and open the MOOC is, the more the potential for students' learning to be limited by the lack of structure, support, and moderation which are normally associated with a regular course.

MOOCs popularity is growing rapidly despite its novelty and age. Large numbers of participants are enrolling continuously in massive number of courses. MOOCs attracted attention quickly and acquired the interest of academics [9]. If the Malaysian Government and local higher education institutions intend to adopt MOOCs on a large scale, this will inevitably have significant repercussions on the entire national higher education landscape, especially if they are made a part of the delivery approach in higher education institutions (as currently explored by public universities), as a means for branding and internationalisation, or even as part of the advancement of online learning and ODL [5]. Surprisingly, even though MOOC was new at Higher Learning Institution, especially Malaysia, several scholars found that there are an issue and challenges that came across for MOOC as global. This learning system attracts many diverse learners, so there is need to tailor the course instruction to meet the students' individual needs [10].

In general, MOOC can be divided into two categories. cMOOCs and the xMOOCs are two different types of MOOCs [11]. The cMOOC (CCK08 course) was created based on the learning theory of Connectivism, a concept that has principles developed by George Siemens [1] . Meanwhile the second category was xMOOCs. xMOOCs are online versions of traditional learning formats applying a knowledge transmission model using video recordings of classroom lectures or custom-produced mini-lectures [12]. Its look alike the structure of courses at MOOC, will fully setup by the lecturer or instructor. Besides, the xMOOCs comes with a clearly specifies syllabus of recorded lectures and self-test problems. They also employ the original elements of MOOC, but it affects the branded IT platforms which offer content distribution partnerships to institutions [13]. Thus, xMOOCs was a course designed by instructor like a traditional classroom converted into online class [14].

2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

Previous studies have found that there are many acceptance studies that apply the UTAUT model in various fields. However, studies applying the UTAUT model in Education in Malaysia are limited [15]. It is because the use of Information Communication and Technology (ICT) in the Malaysian education system is relatively modest [16]. Thus, research on individual acceptance and use of information technology (IT) is one of the most established and mature streams of information systems (IS) research [17]. The UTAUT model which aims to explain technology acceptance, is based on eight technology acceptance theories or model [18]. In particular, the UTAUT draws on the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behaviour (TPB), the combined TAM and TPB, the model of Personal Computer Utilization, the Innovation Diffusion Theory and the Social Cognitive Theory [16]. Figure 1 illustrate the UTAUT Model.
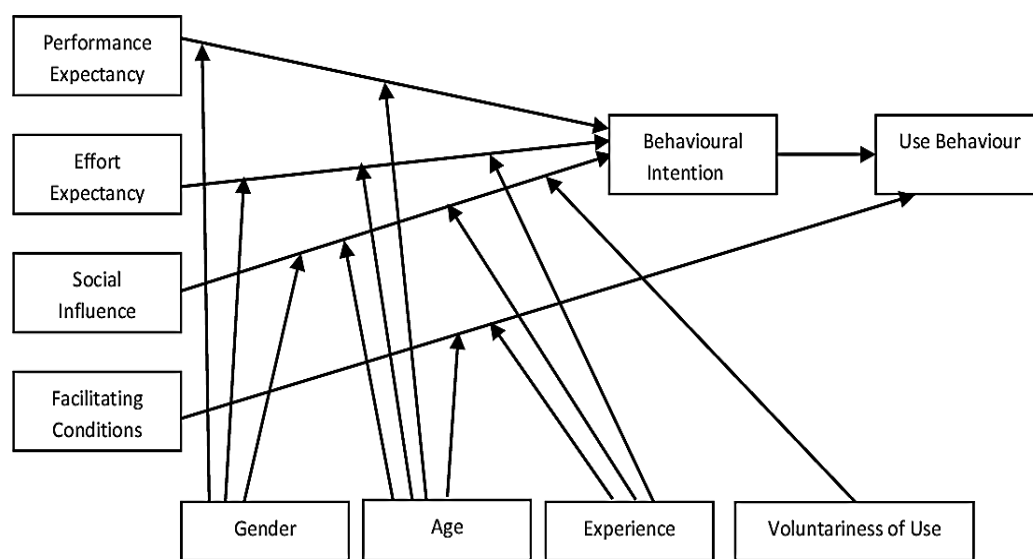

Figure 1. UTAUT model (Venkatesh et al. 2003)

The Unified Theory of Acceptance and Use of Technology (UTAUT) as illustrated in Figure 1 was developed by Venkatesh, Morris, Davis and Davis in 2003 to address the limitations of the Technology Acceptance Model (TAM) and other popular models used in the study of information systems adoption [1]. According to Venkatesh et al. [19] the variance in intention to use explained by the contributing models ranged from 17 to 53%. The UTAUT model was found to perform better in terms of variance in intention to use compared to any of the other eight models. Table 1 below describes the main construct and variables used in this model.

Table 1: Four main variables of UTAUT

Construct/Variable	Description
Performance Expectancy	Performance expectancy is the degree to which an individual trust that using the system will help him or her in the work performed.
Effort Expectancy	Effort expectancy is the level of convenience associated with the use of the system.
Social Influence	Social influence is the degree to which an individual sees the significance of others believes he or she should practice the new system.
Facilitating Condition	Facilitating condition is the amount to which individuals believe that organisational and technical infrastructure occurs to support the use of the system.

Previous research that using the UTAUT model has shown that all four constructs have significant effects on behavioural intention to use e-learning systems. As in this study, MOOC is also one of the e-learning systems. Therefore, the hypothesis of this research is stated as follows:

Hypothesis 1: *Performance expectancy has a significant effect on students' Behavioural Intention to use MOOC.*

Performance expectancy: Performance expectancy is the degree to which an individual trust that using the system will help him or her in work performed.

Hypothesis 2: *Effort expectancy has a significant effect on students' Behavioural Intention to use MOOC.*

Effort expectancy: Effort expectancy is the level of convenience associated with the use of the system.

Hypothesis 3: *Social influence has a significant effect on students' Behavioural Intention to use MOOC.*

Social influence: Social influence is the degree to which an individual sees the significance of others believes he or she should practice the new system.

Hypothesis 4: *Facilitating condition has a significant effect on students' Behavioural Intention to use MOOC.*

Facilitating condition: Facilitating condition is the amount to which individuals believe that organisational and technical infrastructure occurs to support the use of the system.

Hypothesis 5: *Behavioural Intention has a significant effect on students' Usage Behaviour.*

Behavioural Intention and **Use Behaviour**: Behavioural Intention refers to the pre-determined decision (*antecedent*) of a student to use the MOOC soon. Behavioural intention is theorised to result in Use Behaviour. A few concepts and models have suggested a direct impact of behavioural Intention on Use Behaviour, such as Technology Acceptance Model (TAM), Theory Plan Behaviour (TPB), UTAUT and UTAUT2.

3. Methodology

The quantitative method was conducted during the research period where online questionnaires have been distributed to students. This is in line with the majority of UTAUT studies that have used survey research method [20]. The respondents were students at Universiti Kebangsaan Malaysia (UKM) who had involved in one or more MOOC courses. After cleansing, a total of 400 usable responses were obtained. Since MOOC has been deployed at the university starting 2014, the MOOC was implemented as a blended learning where the method of face-to-face combined with the online material setup by instructor or lecturer. The theory of acceptance or UTAUT is used in this research where a few variables act as independent variables and dependent variables [17]. Thus, the performance expectancy, effort expectancy, social influence and facilitating condition as independent variables and behavioural intention and use behaviour as dependent variables. The framework of this study take place as follow:
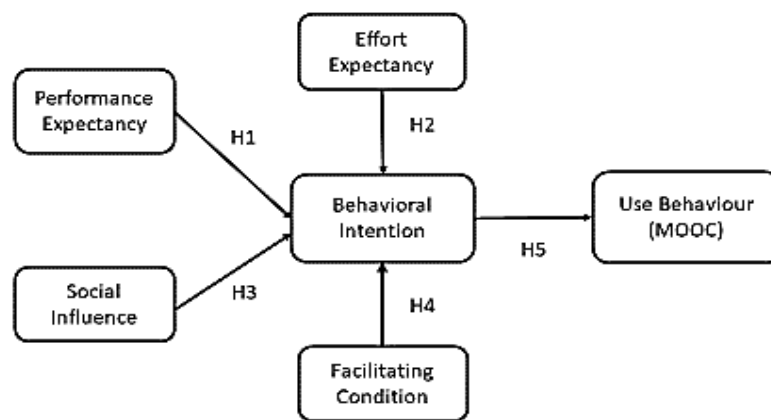
Figure 2. Research framework

4. Results and Discussion

The partial least squares approach which is structural equation modelling (PLS-SEM) on Smart PLS version 3 was carried out to analyse the collected data. Structural equation modelling is a second-generation statistical technique that enables researchers to examine causal relationships between latent variables [1]. The results are discussed according to the UTAUT factors which is all four-construct act as the independent variables. Meanwhile behavioural intention as antecedent and use behaviour as dependent variable. Figure 3 illustrated the diagram of the structural model or paths between the variables in the research framework. This was done using Smart PLS software as well as to evaluate the reliability and validity of the construct in this study. The measurement model was assessed based on reliability, discriminant validity and convergent validity. Reliability of the constructs was assessed using Alpha Cronbach. Table 2 illustrated that the value of Alpha Cronbach is in the range of 0.7 until 0.9. It can be determined that the measurement model shows the good reliability of the construct used in the study.

Table 2: Composite and reliability statistics

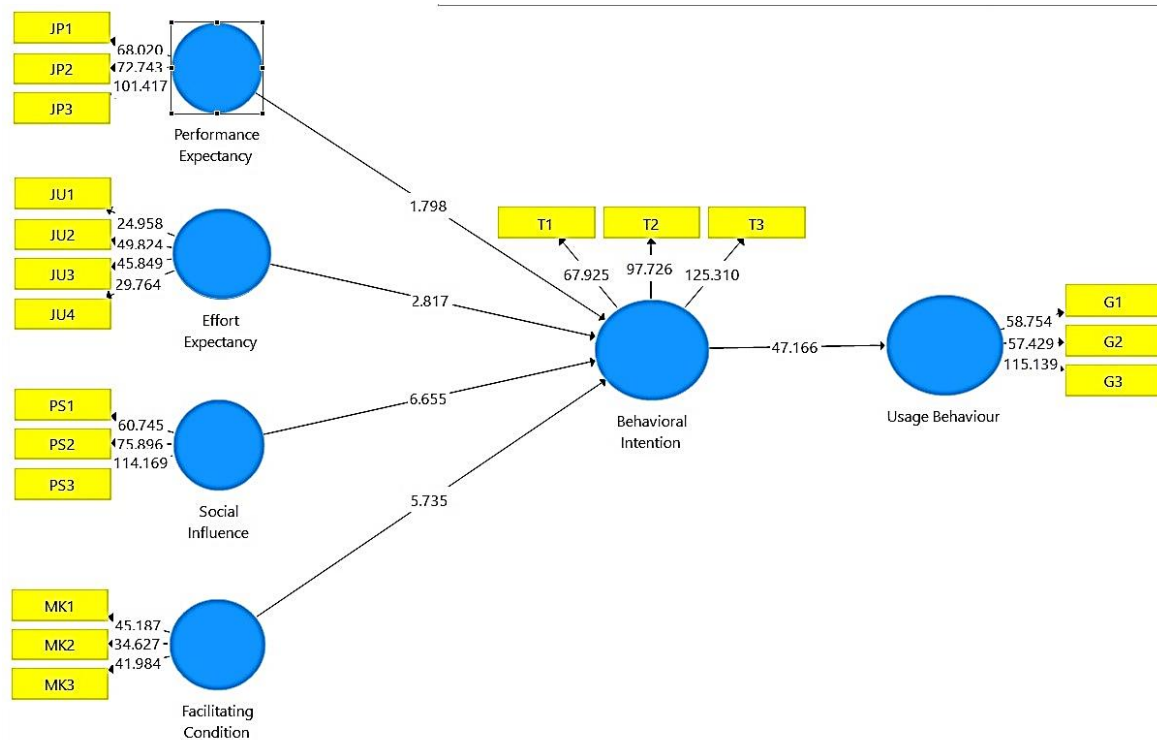| Construct	Number of Item	Composite Reliability	Alpha Cronbach
Performance Expectancy	3	0.942	0.907
Effort Expectancy	4	0.905	0.860
Social Influence	3	0.936	0.809
Facilitating Condition	3	0.892	0.818
Behavioral Intention	3	0.944	0.910
Usage Behaviour (MOOC)	3	0.933	0.902

Figure 3. Measurement model

Convergent validity of the measurement model was also assessed based on recommendations by Henseler et al. [21] that the average variance extracted (AVE) for each latent construct should be greater than 0.5. Table 3 shows that the AVE values for all constructs are higher than the 0.5 thresholds. Meanwhile, the Fornell-Larker criterion was used in order to assess a discriminant validity. The method states that the AVE of each latent construct should be greater than the highest squared correlations between any other construct. Thus, it can also be seen from Table 3 that the square root of the AVEs for each construct is greater than the cross-correlation with other constructs. From the results, it shows that the measurement model exposes good validity of the construct developed.

Table 3. Discriminant validity using Fornell-Larker Criterion

Construct	AVE	EE	FC	BI	PE	SI	UB
Effort Expectancy	0.703	*0.839*					
Facilitating Condition	0.703	0.720	*0.856*				
Behavioral Intention	0.848	0.738	0.734	*0.921*			
Performance Expectancy	0.843	0.786	0.668	0.719	*0.685*		
Social Influence	0.830	0.757	0.683	0.785	0.743	*0.911*	
Usage Behavior	0.837	0.743	0.713	0.847	0.706	0.784	*0.915*

Note: Square roots of average variances extracted (AVEs) shown on diagonal in italic.

After that, the structural model was measured which is to confirm the validity and reliability of the measurement model. The structural model was measured based on the sign, magnitude, and significance of path coefficients of each hypothesised path. The bootstrapping technique was conducted to determine the significance of each estimated path. Then, the coefficient of determination which is R^2 was assessed to determine the detailed description of the research model. In other words, the assessment was to predict the endogenous constructs that used in the model. Table 4 shows the detailed results of assessment**.**

Table 4: Hypothesis Testing

Hypothesis Path	Path Coefficient (B)	T Statistics	P Values	Results
Behavioral Intention → Usage Behaviour	0.847	46.498	0.000	Supported
Effort Expectancy → Behavioral Intention	0.161	2.897	0.002	Supported
Facilitating Condition → Behavioral Intention	0.303	5.617	0.000	Supported
Performance Expectancy → Behavioral Intention	0.120	1.815	0.035	Supported
Social Influence → Behavioral Intention	0.363	6.608	0.000	Supported
R square (Behavioral Intention) = 0.720				
R square (Usage Behaviour) = 0.717				

The first variable which is Effort expectancy was found to have a significant effect on behavioural intention where (β = 0.161, p = 0.002). It has provided support for H1. The second variable which is performance expectancy also was found to have a significant effect on behavioural intention. It is because the value of (β = 0.120, p = 0.035). It has also provided support for H2. And also facilitating condition was found to have a significant effect on behavioural intention where (β = 0.303, p = 0.000). Again, it has also provided support for H3. Furthermore, social influence was found to have a significant effect on behavioural intention (β = 0.363, p = 0.000). It has also provided support for H4. As estimated, behavioural intention was found to have a significant effect on usage behaviour where (β = 0.847, p = 0.000). Thus, it has also provided support for H5. Generally, the suggested research framework accounted for 71.7% of the variance in usage behaviour, and 72% of the variance in behavioural intention (R^2 of 0.720 and 0.717 respectively).

5. Conclusion

This research framework and data collection have appointed to explore on technology adoption of MOOC using the UTAUT model. From our point of view, the findings of our study show that the behavioural intention to use MOOC is influenced by four variables or constructs suggested in the research framework. The constructs were performance and effort expectancy, social influence and facilitating condition. All five hypotheses identified were sustained, which, to a huge scope supports the exploration of the study. The study hypothesised the impact of variables or construct used in the acceptance model which is consistent with UTAUT. From this finding, it indicates that the main construct of UTAUT Model was in-line with the literature where social influence is found to be the most prominent predictor. Another three predictor or factors were also found to be significant in term of MOOC adoption.

Facilitating conditions were found to be the second prominence in this study, possibly due to individuals believe that appropriate technical infrastructure in the organization takes place to provide students at the university in term of MOOC technology. Furthermore, the respondents believed that those related to the technology are essential to sustenance the usage of MOOC in learning due to the relationship between these factors. Availability of resources such as good internet bandwidth and appropriate devices to access MOOC can't be taken for granted for all potential users of MOOC. Thus, it would be a determining factor for MOOC adoption. Performance and effort expectancy were also found to have an influencing role in the adoption of MOOC. Even though, the value of T corresponding of these two factors considers lower than other prominence, this finding indicates that learners expect a good point of effortlessness related with the use of MOOC. They were also trust that using the system will help him or her in work performed.

The constraint of the study is that the research conducted at selected public university only. For further research it could apply to all the public universities in Malaysia in order to understand the MOOC adoption and their usage as well. Furthermore, the UTAUT also can be extended with other variables or construct in order to provide a better understanding of MOOC continuance in teaching and learning.

Therefore, improvement and solution can be proposed for the long-term benefit of the technology used especially in the Industrial Revolution 4.0 era.

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