Impacts of TAM-based External Factors on Blackboard System Continuance Usage

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Abstract
Blackboard solutions have been deployed in most Saudi Arabia universities, but it appears that the students who use blackboard system were incapable to the imperative blackboard system. The main motives for this might be that students do not accept and usage the blackboard system suitably. This study will make involvement to the present body of TAM theory components and adding others external construct like "social learning, IT infrastructure & system excellence, and course quality". Author focus on blackboard system use in Taibah University; data gathered from online survey of students using blackboard system. Then, the proposed model was investigated and tested, for analysis smart PLS was used.
Keywords: Blackboard, technological acceptance model (TAM), partial least squares (PLS).

1. Introduction

Growing classroom technologies produce prospects for learning innovative pedagogies. Learning and teaching techniques need to change frequently different set of teaching skills to revise instructional materials, and to reconsider assessment these techniques. However, Literature proved the use of online instructional techniques has been generally affirmative and suggesting that instructional techniques may be valuable for improving student comprehensive and providing improved chances for student to faculty interactions, timely feedback, and classroom cooperation. This study joins the growing discussion on the use of blackboard systems in the classroom assignment, upload or download materials, quizzes, peer and self-assessment, and students' cooperation by explaining the ways in which the Blackboard system was used to enhance teaching and learning process. Specifically, it considers how creating a proper environment for students to adopt blackboard system tools to increase student-learning outcomes. Mathews and Herb (2013) concluded for expand acceptance blackboard system continuance usage; Universities require to investigate the aspects influence on students adoption.

Hence, applying technological acceptance model (TAM) as a one of the best broadly models employed in clarifying continuance usage and applying TAM will cultivate consideration of how impact on continuance usage on learning outcomes. A few studies investigate the students' adoption of blackboard systems by applying TAM theory. Also, a few studies have been showed TAM theory on blackboard system concern, particularly literature study students' behavior and intension. Consequently, this study reflects TAM theory as a solid base and adding external constructs to explore attitude of students towards accept usage and continuance blackboard system. This study emphasis to answer the study questions: what are the main constructs that are affecting student's intention to use and continuance blackboard system? . The proposed model is examined then analyzed using structural equation modeling-SEM- methodology. The rest of this study is ordered as follows: a literature review, blackboard acceptance model, methodology and hypotheses development, data analysis results and discussion, finally the conclusion and future work.

2. Literature review

There are studies that have employed a specific technology adoption model or an integration of various models to empirically investigate the success of e-learning systems. More specifically, Williams and Lahman (2011) found that blackboard system can increase critical thinking, student interactions, and student engagement both within and outside of the classroom. Blackboard comprise online discussion boards, the teaching and learning literature suggests that online discussion boards have the prospective to emerging explanatory, presentation, and other skills (William and Jacobs 2004). Bruess (2003) suggested the adoption of instructional technology that attitudes play a substantial role on prompting student's learning in the classroom. Wang and Wang (2009) study affirms that the intention and perception of using e-learning is influenced by students' attitude towards computer. Ducate and Lomicka (2008) designated blackboard system will promotes creativity; blackboard system enabled appearance in a comfortable situation and providing students a new insight into learning that their textbooks did not provide.

TAM theory make a foundation for outlining the main factors that influence on adoption, TAM proposes that two adoption "perceived usefulness (PERUSE) and perceived ease of use (PEREOU)" as a mainly significance for information system adoption. Both PERUSE and PEREOU confidently effect on students behavior to use or not a new technology (Davis et al., 1989). Davis (1989) concluded that PERUSE is the robust interpreter individual's intention to use technology. Wang and Wang (2007) developed item scale to measure e-

learning system success based mainly on the information system success model with an adding of system quality as more widespread methodology to judge on system quality. Goodwin and Robert (2006) summarized the process of building and assessing knowledge in creating a blackboard system permits students to involve in advanced order thinking and skills and emerging intelligence that students are a part of a learning community. Chen (2010) surveyed three scopes of success, namely, infrastructure and system quality, course and information quality, and this scope have been included in the current study.

3.   Research model and hypotheses

The below model was suggested reliant primarily on the TAM model. The proposed model (presented in Figure 1) suggested that there are five main determinants for blackboard continuance usage: infrastructure and system excellence, course and information quality, and social learning have been included the main TAM study model determinants "perceived usefulness and perceived ease of ".
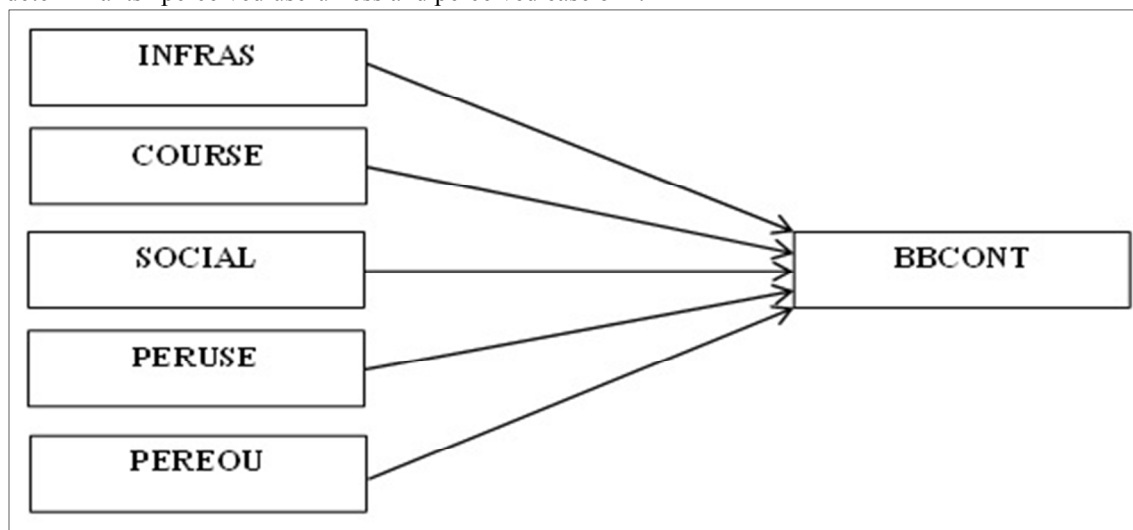

Fiqure1: Hypothesized model

3.1 Infrastructure and system excellence (INFRAS)

The critical success of blackboard system depends on the availability and system customization. Namisiko et al. (2014) explain technology involvement on increasing blackboard quality. (Hassanzadeh et al. (2012) accompanied a sequence of factors to govern the usefulness of e-learning system and precisely the role of multimedia, streaming data, and interactivity in enabling blackboard success. Schneiderman (1998) elaborated the vitality of human-computer interaction to create system excellence environment in stimulating user inspiration in a widespread kind of understandable options. Rhee et al. (2006) summarized the human-computer interaction of e-learning settings should be an important factor in e-learning adoption. The system excellence effects on system learnability and students readiness then task completion (Paas and Firssova, 2004). Thus the proposition of the hypothesis is H1: Infrastructure and system excellence (INFRAS) directly and significantly influences blackboard continuance usage.

3.2 Courses and information quality (COURSE)

Quality of course has effect on e-learning process. Since students discover these courses problematic, students' attention goes down (Pajares and Graham, 1999). Quality of course contents would aid students in educating their ability and analytical skills. It also benefits in the improved thoughtful of other technical subjects and most significantly improvements students work prospects. Backboard system allows students to enrich information which in turn expands the considerate of diverse courses (Weissglass and Curnmings, 1991). Uploading the course materials on blackboard will enable students to understand the subject is not only stimulating but also has significance in accumulated knowing and comprehend understanding. The instructor wants to make students recognize how course materials will be relevant online. Also, student would be capable to learn better if they accept as true blackboard well (Bandura, 1982). Thus the proposition of the hypothesis is H2: Courses and information quality directly and significantly influences blackboard continuance usage.

3.3 Social learning (SOCIAL)

Conte and Paolucci (2001) defined social learning "the progression of learning affected by individuals whom are positioned in a mutual environment, interact with each other, and learn from each other". Baird and Parasnis

(2011) consider social learning as a factor of e-learning success. Social learning environment students can learn from their social collaborations informally. Social learning is important techniques to enhance learning quality and empathetic instill peer to peer teamwork expansion (Powell and Kalina, 2009). Hajli et al. (2013) and Kreijns et al. (2003) consider social networking sites (SNSs) as an innovative way for social learning and communication via internet. Social learning platforms people have the capacity to generate content and contribute on internet events (Kshetri, 2007; Garrison and Cleveland, 2005). SNSs provide innovative openings to learn through collaboration individuals each other's for supporting and fulfilling learning goals. SNSs platforms generate new approaches for learning and teaching with features of social presence, collaboration, social networking, personalization and openness (Pavlou and Fygenson, 2006). Thus the proposition of the hypothesis is H3: Social learning directly and significantly influences blackboard continuance usage.

3.4 Perceived Usefulness (PERUSE)
One of the important components of TAM model is perceived usefulness which has been used by many information system researchers. Perceived usefulness can be well-defined as "the degree in which people considers that using an exact system will boost their (Davis, et al., 1989; Taylor and Todd, 1995). Ramayah and Ignatius (2005) associated perceived usefulness with "user-friendliness" of the internet. If the seller shows the advantage of purchasing through the internet, then probable buyers desire to purchase through online channels. That means, blackboard graphical user interface has an affirmative effect on the students' performance and more effective while using computer. The performance of students can be improved by blackboard. Thus the proposition of the hypothesis is H4: perceived usefulness directly and significantly influences blackboard continuance usage.

3.5 Perceived Ease of Use (PEREOU)
PEOU is defined as the degree to which a person believes that using a blackboard system would be free of effort (Davis, 1989; Taylor and Todd, 1995). Ramayah and Ignatius (2005) consider Internet user will fundamentally attempt to mound users perception of Internet shopping based on their experiences in attractive Internet shopping and the ease in which the mission were performed (i.e. perceived ease of use). That means, the student who desire adopt education online, it is expected that they are relaxed with the use of blackboard. Students are moderately responsive with blackboard because they often use it. It replicates the intention of students towards the usage of computer. Thus the proposition of the hypothesis is H5: Perceived ease of use directly and significantly influences blackboard continuance usage.

4.   Methodology
A quantitative approach was used in this study; factor analysis and a structural equation modeling technique were adopted to assess the proposed hypotheses in the conceptual model. The sample for this study was students in taibah universities-Yanbu branch. The tool for data collection was structured questionnaire. The data was collected from two major faculties' "faculty of business and faculty of computer sciences &engineering". The sampling method used was purposive sampling. More than one month asked students to contribute in the online survey. Author deleted answers with duplicate IP addresses from data sample to ensure the effectiveness as recommended by Wang and Wang (2009). A total of 260 questionnaires were filled online.

As acknowledged by Messick (1989), content validity and construct validity needs to be addressed for administering a questionnaire. Content validity states the amount by which a measure symbolizes all aspects of a certain paradigm. For establishing content validity, literature from the published work was used, the opinions obtained from the discussions with the instructors using blackboard were used to validate the items included in questionnaire. Factor analysis was used to ensure construct validity. To evaluate the reliability of the scale, Cronbach Alpha was used and fit-best results to be 0.91.

5.   Data analysis
Anderson and Gerbing (1988) advised two-step techniques to analyze gathering data, confirmatory factor analysis (CFA) and structural model. CFA used to test the measurement reliability and validity of overall model constructs fit, whereas the structural model used to observe the structural relationships amongst constructs. CFA result in this study showed that the measurement model constructs fit the data is fit (x2/df = 143/36; CFI = 0.961; GFI = 0.922; AGFI = 0.939; RMSEA = 0.076; SRMR = 0.036; NFI = 0.955; NNFI = 0.962; IFI = 0.974). To validate online survey, Author investigated its convergent and discriminant validity. According to Gefen et al. (2000) "convergent validity is assessed by reviewing the standardized path loading, Cronbach's Alpha, and average variance extracted (AVE)".This study valued the measurement scales resulting criteria: 1. Factor loadings and should be all indictors significant and exceed 0.5; (2) reliabilities of each construct and should exceed 0.8; and (3) each construct AVE should exceed 0.5.

As illustrated in Table 1, all the factor loadings ranged from 0.78 to 0.92 exceed 0.5 showing high

convergent validity. Moreover, the cronbach's α of the constructs ranged from 0.83 to 0.92 exceed the threshold value of 0.8 concerning to the suggested measurement by Fornell and Larcker (1981). The AVE, which ranged from 0.60 to 0.82, was greater than the variance due to measurement error. Consequently, all convergent validity criteria were match. Additionally, the discriminant validity is supported which the measures of two constructs are empirically distinct especially when the square root of each constructs AVE is larger than its correlations with other constructs as advised by Hair et al., (2015).

Table 1: Results of standardized loadings, Cronbach's a, AVE and AVE

Constructs	Standard loading range	Cronbach's a	AVE
INFRAS (1-3)	0.883-0.906	0.922	0.772
COURSE (1-4)	0.883-0.925	0.912	0.824
SOCIAL (1-4)	0.885-0.914	0.900	0.776
PERUSE(1-4)	0.826-0.883	0.897	0.703
PEREOU(1-4)	0.781-0.801	0.834	0.606

Smart PLS was used to test the structural model and the model fit indices (x2/df = 143/36; CFI = 0.961; GFI = 0.922; AGFI = 0.939; RMSEA = 0.076; SRMR = 0.036; NFI = 0.955; NNFI = 0.962; IFI = 0.974) indicate a good model constructs fit. As shown in Table 2, the maximum correlation between any constructs was 0.702 which was between the course quality (COURSE) and blackboard continuance usage (BBCONT). Whereas, Perceived ease of use (PEREOU) was the minimum square root of AVE among all constructs which was 0.845. Therefore, the square root of AVE for each construct exceeded the correlations between the given construct and others. Hence, discriminant validity of the survey was reinforced. As revealed in Fig. 2, the results demonstrated the standardized path coefficients are statistically significant supporting H2; H3; H4 proposed hypotheses and significant not supporting H1 and H5.

Table 2: Correlations between variables

Construct	INFRAS	COURSE	SOCIAL	PERUSE	PEREOU	BBCONT
INFRAS	**0.881**					
COURSE	0.482	**0.872**				
SOCIAL	0.293	0.503	**0.901**			
PERUSE	0.334	0.551	0.555	**0.855**		
PEREOU	0.453	0.653	0.504	0.534	**0.845**	
BBCONT	0.339	0.702	0.519	0.564	0.595	**0.865**

Fig. 2 illustrated structural model analysis outcomes and shown the standardized path coefficients for all hypothesized relationships. The relationships between blackboard infrastructure and systems excellence (H1) (path coefficient = -0.018, p< 0.001), perceive ease of use (H5) (path coefficient = -0.261, p< 0.001) and blackboard continuance usage were negative and not significant. Social learning (H3) (path coefficient = 0.208, p< 0.001), perceived usefulness (H4) (path coefficient = 0.437, p< 0.001), and course quality (H2) (path coefficient =0.768, p< 0.001) were positive and significant. Above constructs clarified 94% of the variance in blackboard continuance usage, with course quality (path coefficient =0.768) contributing the largest proportion.
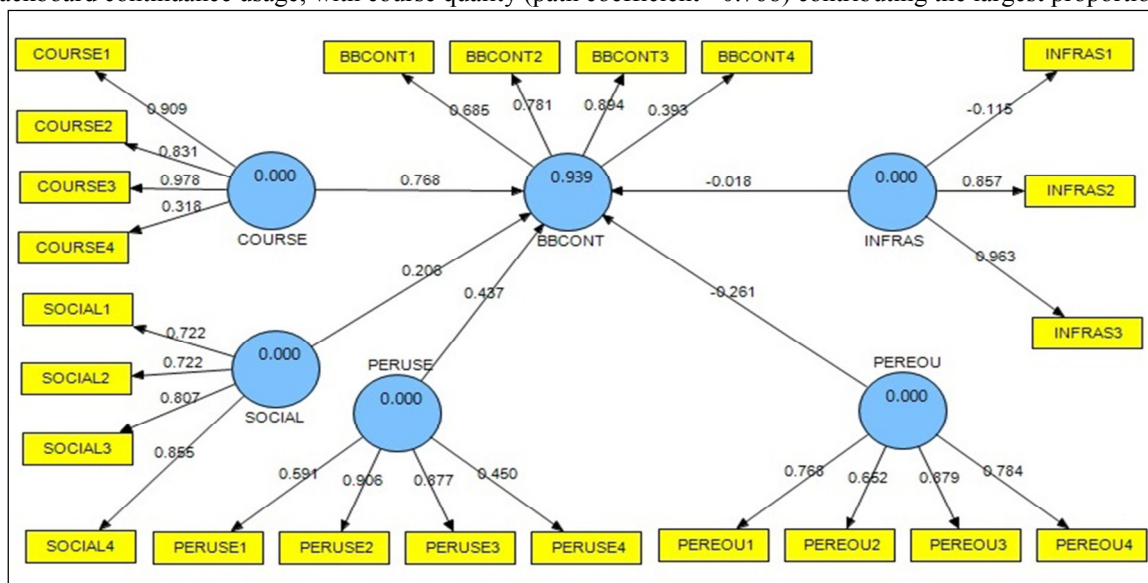

Figure 2: Model testing results

6. Discussions

The proposed model could be expanded to other arenas. TAM embodies a developed technology acceptance model theory that linked to beliefs and intention philosophy; Davis, 1993; Mathieson, 1991; Lee and Chang, 2011 concluded that perceive usefulness and perceived ease of use are the main influences factors that inspire people continuance usage. Course quality, social learning, and service excellence also argued to improve and extend blackboard usability. As presented in Fig. 2 three factors- quality of course (H2), perceived usefulness (H4) and social learning (H3)- have positive and significant effects on blackboard continuance usage, whereas two factors- infrastructure & system excellence (H1) and perceived ease of use (H5)- have not significant due to the shortage of labs numbers and not enough support for upgrading and maintaining PCs, also the students have difficulties in using blackboard systems due to lack of training and customization issues and still not comfortable with blackboard systems. Our findings consistent with principal constructs of TAM" perceived usefulness" on continuance usage which have been confirmed in previous studies such as (Cheong and Park, 2005; Wu, et al., 2012).

Also, this study finding was consistent with previous study according to the hypothesis (H4. Author generate new finding for TAM literature by adding social learning (H3); infrastructure (H1); and course quality (H2) the most vital construct, as it has been recognized in previous studies (Shen et al., 2010;Qin et al., 2011). This study finding revealed that perceived usefulness, social learning, and course quality have significant effects on blackboard usage which clarify the 94% variance. Further, we find the effect of course quality (path coefficient = 0.768) on blackboard usage is larger than other two factors- perceived usefulness (path coefficient = 0.437) and social learning (path coefficient = 0.208) which is consistent with previous studies (Lee and Suh, 2015; Pierce et al., 2003). Li et al. (2006) advised that people become more dedicated to the relationship when they spend resources. Accordingly, instructors can use incentives to achieve leaning outcomes and increase students' intention.

7. Conclusion

This study was conducted a new perception on increasing students' engagement on blackboard usage. This study aim to examine the effect of TAM constructs on blackboard continuance usage, and aim to identify the effects of integrating another constructs with TAM theory. Results support previous study on the TAM theory antecedents and outcomes, which designated perceived usefulness (PERUSE) have a substantial positive influence on increasing students' continuance blackboard system usage, this consistent with Kumar et al., (2013) study. Supplementary, this study confirmed that course quality significantly a largest effects on blackboard usage, which empowers an extension of TAM previous study by recognizing quality as a factor of TAM adoption, this consistent with Singh et al., (2017); Zhao et al., (2016). More, social learning, has a significant influence on increasing students' continuance blackboard system usage, this consistent with Singh et al., (2017); Zhao et al., (2016) study which concluded that for the better learning of courses, students are required to involve themselves in self-study and peer-learning. Author finds that IT infrastructure; and perceived ease of use not supported. The general framework as illustrated in this study model and established on the findings as shown in Figure 2 suggest that as in statistical findings of the hypotheses and the adjusted model, Taibah Univesity-Yanbu branch should focus on deploy an IT infrastructure based on flexibility, scalability, and reliability environment.

Also, decision makers' should consider the importance of students and instructors training blackboard usage intensively. The findings of this study are to deliver a perception for academician on enhancing students' participation on backboard system. Though this study has found expressive outcomes, like others study, there are limitations to this study. First, the study model analyzed and tested empirically considered in only one adoption framework (Taibah university-yanbu branch). Accordingly, the generalize outcomes of this study is not recommended. Upcoming study should analyze and tests the study model other branches. Second, Saudi Arabia has education culture that emphasizes on paper, which may effect on blackboard systems usage; upcoming study should inspect this study model in a new domain. Third, this study focusing mainly on students' continuance usage, upcoming study may be expanded to deliberate the role of self-efficacy; relative advantage; and top management support.

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