Accounting Students' Perceptions of Electronic Learning in Industrial Revolution 4.0

I. Natalia
University of Surabaya, Surabaya, Indonesia

ABSTRACT: This study focused on the continuance usage intention toward electronic learning environments using Dağhan & Akkoyunlu integrated model to understand better the determinants of students' continuance intention to use these environments. The hypothetical model was determined using Technology Continuance Theory, Information Systems Success Model, Cognitive Model, and Information Systems Expectation Confirmation. Empirical data from university students who had used an online learning environment infrequently were tested against the research model by using path analysis. The results indicated that the continuance variable was explained by utilitarian value, satisfaction, perceived value, and perceived usability. The satisfaction variable was explained by system quality, service quality, outcome expectations, and perceived value. The confirmation of the usage of online learning environments could be explained by information quality, system quality, and service quality variables. In line with the obtained findings and results, some suggestion for implementation was provided for the subsequent studies.

Keywords: continuance usage, information systems, information quality, online learning environments, service quality, system quality.

1 INTRODUCTION

Educational institutions have invested in information systems to derive benefits such as increasing the accessibility of education, improving self-efficacy, knowledge generation, cost-effectiveness, learner flexibility, and interactivity (Sinclair, Kable, Levett-Jones, & Booth, 2016 in Alsabawy, Cater-Steel, & Soar, 2016). Changes in technology affect the way of learning delivery. Industrial Revolution 4.0 is a chance to start the changes in delivering education in a developing country.

The use of technology to facilitate better learning and training is gaining momentum worldwide, reducing the temporal and spatial problems associated with traditional learning (Panigrahi, Srivastava, & Sharma, 2018). Technology allows electronic learning (e-learning) systems in an online learning environment. The electronic learning (e-learning) system is a system that uses electronic media for its materials. E-learning that uses internet technology for giving a tutorial, transferring materials, doing discussion, submitting homework, doing the test, repeating tutorial, and doing some else, is mentioned as online learning. Students get more access, facilities, and value in the use of this new technology.

Educational institutions try to develop, use, and apply technology, such as online learning intensively. For institution members, there must be opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using and an understanding of the contexts in which it is best used (Kukulska-Hulme, 2012).

Educational institutions tried the best, but the online learning system gives different interactions within these online learning environments compared to traditional (face-to-face) learning environments. Students can learn in a diverse environment through varied modes of participation (Dağhan & Akkoyunlu, 2016). Teachers' expertise in online teaching, students' readiness to move online, and quality of online content and design are also defined as online learning success factors (Oliver, 2001 in Asiry, 2017). The student acceptance, adoption, and usage of an online learning system are interesting and should be investigated.

Studies on acceptance, adoption, and usage of the new technological developments begin from the point where technology is introduced as an innovation and try to analyze its continuance usage during this time (Dağhan & Akkoyunlu, 2016). Studies on ensuring continuance usage have gained importance.

This study focuses on identifying factors that influence the continuance intention of an online learning system based on students' perspectives. Based on Technology Continuance Theory (TCT), factors that affect continuance intention directly or indirectly are system quality, information quality, service quality/service delivery quality (SDQ), confirmation, satisfaction, outcome expectations, utilitarian value, perceived value, and perceived usability. Few studies have examined the variables within the online learning setting using Dağhan and Akkoyunlu Integrated Flow Framework. This paper argues that these variables influence continuance intention.

This study was conducted after the implementation of electronic learning in an online learning environment attempted within the intermediate financial accounting part one course to identify the readiness of students to move online, to investigate their preference and perception, and to measure the quality of online tutorials. By investigating critical factors continuance intention of online learning adoption for initial adopters, this study attempts to understand the success factors in online learning research and support the development of online learning that led to enhancements in student learning processes.

Some theoretical models that related to behavior in information systems were proposed for explaining and predicting user behavior in IS adoption and continuance are Diffusion of Innovation Theory (1962), Cognitive Model (Oliver, 1980), Social Cognitive Theory (Bandura, 1986), Technology Acceptance Model (Davis, 1989), Theory of Planned Behavior (1991), and Unified Theory of Acceptance and Use of Technology (Venkatesh, Moris, Davis, and Davis, 2003), Information Systems Success Model (Delone & McLean, 1992, 2003; Petter, DeLone & McLean, 2013), Flow theory (Csikszentmihalyi, 2000), Expectation-Confirmation Model for IS continuance (Bhattacherjee, 2001), Technology Continuance Theory (Liao, Palvia, & Chen, 2009), and an Integrated Flow Framework (Dağhan and Akkoyunlu, 2016). Some of the models combine some variables used in the previous model.

The cognitive model that was developed in 1980 by Oliver stated that the confirmation behavior of the users affects satisfaction and satisfaction predicts long-term usage intention. In this model, the attitude variable involves a general evaluation of the technology used, whereas the satisfaction variable comprises a judgment based on performance. In this context, two variables, which affect usage and long-term usage, are included in the same model (Dağhan and Akkoyunlu, 2016). Some of the variables in the Cognitive Model (COG) were combined in the

Technology Acceptance Model (TAM) and Expectation-Confirmation Model (ECM).

Unified Theory of Acceptance and Use of Technology (UTAUT) combines the theory of reasoned action (TRA), the technology acceptance model (TAM), the motivational model, the theory of planned behavior (TPB), a model combining TAM and TPB, the model of PC utilization, the innovation diffusion theory, and the social cognitive theory (SCT), and postulated additional three factors (performance expectancy of the information system, effort expectancy, social influence, and facilitating conditions). Technology Continuance Theory (TCT) combines TAM, ECM, and COG models, and has applicability for users at different stages of the adoption life cycle, i.e., initial, short-term, and long-term users.

Information Systems Success Model has been expanded in three models that estimate the information system's success in different conditions, and their relationships were examined. In the first model, DeLone & McLean Information Systems Success Model introduced in 1992, system quality and information quality were found to affect usage and satisfaction, and it was concluded that usage and satisfaction also affected one another. In the second model, DeLone & McLean Information Systems Success Model was revised in 2003. DeLone & McLean (2003) added two variables that are service quality and usage intention. In the third model, the Information Systems Success Model, updated in 2013. Petter, DeLone, and McLean (2013) added some variables, which are task characteristics, project, and organizational characteristics, and user and social characteristics, constitute the model's independent variable, technology concepts (such as usage, user satisfaction or net benefits) constitute the dependent variable. Although it has been 22 years since the initial conception of the model, system quality, information quality, usage, and satisfaction variables still maintain an appropriate level of explanation percentages. Therefore, these variables are among the important central variables in the final form of the model. One year before the current form of the model was published, research titled "The past, present, and future of IS Success" had been published (Petter, DeLone, & McLean, 2012). Researchers attributed the most important reason for adding new variables and Dağhan and Akkoyunlu Integrated Flow Framework has combined some of the prior studies, such as Cognitive Model, Information Systems Continuance Model, DeLone and McLean's Information Systems Success Model (2003), and Technology Continuance Model with

utilitarian value, outcome expectations, perceived value, and perceived usability. Variables of information quality, system quality & service quality have a positive effect on satisfaction & confirmation is derived from DeLone and McLean's Information Systems Success Model (DeLone and McLean, 2003). Satisfaction, confirmation, and continuance intention are taken from Information Expectation Confirmation Model (Bhattacherjee, 2001), Cognitive Model (Oliver, 1980), and Technology Continuance Model (Liao, Palvia, and Chen, 2009). Four other exogenous variables are utilitarian value (came from the literature Chiu, Chiu et al., 2007; Chiu, Sun, et al., 2007; Kim & Oh, 2011), outcome expectations (came from the literature Hsu et al., 2004), perceived value (came from the literature Chang, 2013), and Perceived usability (came from the literature Chiu et al., 2005). The integrated flow framework/model was valid, reliable, and consistent with the goodness of fit indices indicate that it could be used to determine continuance usage intention of online learning environments (Dağhan and Akkoyunlu, 2016).

This research is based on Dağhan and Akkoyunlu Integrated Flow Framework (2016). Dağhan and Akkoyunlu Integrated Flow Framework is the latest model with a more comprehensive online learning continuance model development. Based on criticism in recent studies, an intrinsic variable like intention has been suggested as a direct estimation of continuance usage (Dağhan & Akkoyunlu, 2016). Dağhan and Akkoyunlu Integrated Flow Framework contain ten variables. Table 1 describes variables and sources from each variable.

Table 1 Variable and Source

No	Variables	Sources
1	Information quality	DeLone and McLean's (2003)
2	System quality	Information Systems Success
3	Service quality	Model
4	Satisfaction	Information Systems Continuance Model (Bhattacherjee, 2001), Cognitive Model (Oliver, 1980) and Technology Continuance Model (Liao et al., 2009).
5	Confirmation	
6	Continuance intention	
7	Outcome expectations	Hsu et al., 2004
8	Utilitarian value	Chiu, Chiu, et al., 2007; Chiu, Sun, et al., 2007; Kim & Oh, 2011
9	Perceived value	Chang, 2013
10	Perceived usability	Chiu et al., 2005

Source: Dağhan & Akkoyunlu (2016)

Information quality (IQ), system quality (SyQ), and service quality (SeQ) have a possible effect on satisfaction (S) and confirmation (C). Information quality (IQ) and system quality (SyQ) have a possible effect on perceived value (PV). Confirmation (C), outcome expectations (OE), and utilitarian value (UV) have a possible effect on satisfaction (S). Utilitarian value (UV), perceived value (PV), perceived usability (PU), and satisfaction (S) have a possible effect on continuance intention (CI).

Information quality refers to perceptions regarding online learning web content issues present information in the appropriate format, up-to-date for user purposes, and high output reliability. System quality refers to perceptions regarding qualities that are valued by users of a system in the online environment such as steps to complete a task, perform predicted results, clear organization information, natural and predictable screen changes, and quick response time (e.g., download time).

Service quality refers to perceptions regarding the overall quality of support received by users of an information system by supporting units. Satisfaction refers to perceptions regarding the satisfaction level of user experience with the system globally. Confirmation refers to perceptions regarding the harmony/compatibility between the users' expectations of the information system and the system's actual performance.

Outcome expectations refer to perceptions regarding effectiveness working on the task, gathering information completely and timely, getting perceive as a competence person, and increasing the sense of accomplishment. Utilitarian value refers to perceptions regarding the comparison between effort and benefit to the user, worthwhile of time spend, and value for the user. Perceived value refers to perceptions regarding keep up to date, satisfies users' needs for knowledge, learning and development, and crucial role for the user. Perceived usability refers to perceptions regarding easy to operate and become skillful, improve online learning performance, fit well, and compatible with the users' learning way. Continuance intention refers to users' intention to continue using the online learning environment.

2 RESEARCH METHODS

In this research, the variables that have been hypothesized in the model and the relationships between these anticipated variables have been determined as a result of a literature review of the models and theo-

ries that have taken place in this study's theoretical framework. The research model can be seen in Figure 1 below.
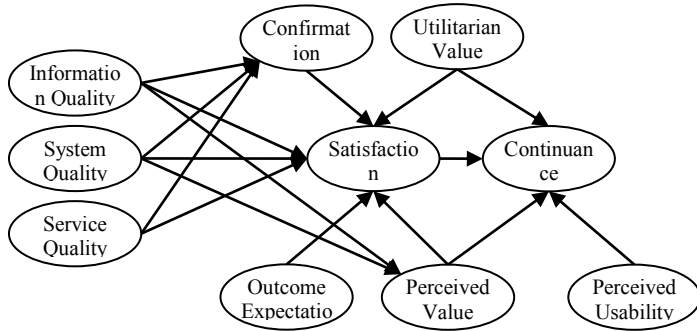

Figure 1. The research model

The model shown in Figure 1 was used to clarify the principal determinants of continuance intention in the electronic online learning setting by testing the following hypotheses.

H1: Information quality will positively affect satisfaction.

H2: System quality will positively affect satisfaction.

H3: Service quality will positively affect satisfaction.

H4: Information quality will positively affect confirmation.

H5: System quality will positively affect confirmation.

H6: Service quality will positively affect confirmation.

H7: Information quality will positively affect perceived value.

H8: System quality will positively affect perceived value.

H9: Confirmation will positively affect satisfaction.

H10: Outcome expectations will positively affect satisfaction.

H11: Utilitarian value will positively affect satisfaction.

H12: Perceived value will positively affect satisfaction.

H13: Utilitarian value will positively affect continuance intention.

H14: Perceived value will positively affect continuance intention.

H15: Perceived usability will positively affect continuance intention.

H16: Satisfaction will positively affect continuance intention.

3 RESULTS AND DISCUSSION

3.1 *Demographic Information*

Students' demographic information is shown in Table 2. As shown in Table 2, males and females were equal. Most of the students were in year 2, had middle computer mastery, and preferred mix method (combination between face-to-face and electronic online learning). After following the electronic online learning, the test results showed that 52,63% of students had got a better post-test grade.

Table 2. Students' Demographic Information

Items	%	Items	%
Sex		Male	50.00%
		Female	50.00%
Year		Computer Mastery	
Year 2	86.36%	Low	4.55%
Year 3	9.09%	Middle	86.36%
Year 7	4.55%	High	9.09%
Pre-test & Post-test		The Preference Method	
Decrease	36.84%	Face-to-face	31.82%
No Change	10.53%	Online Learning	9.09%
Increase	52.63%	Mix Method	59.09%

In the interview section, most of the students had first experienced in electronic online learning through videos about lecture materials and quiz. The online course has been divided into three steps with a related topic and given different video formats for each step. The first step used an animated video with a narrator's voice and music. The second step about account payable and notes payable and computation illustration were animated video with music. The third step about other liabilities with computation illustration was moving slide with effect video. Participants preferred the first video because there was an explanatory voice, shorter duration, and clear. Table 3 contains information about experiment stages and tools.

3.2 *Testing of Reflective Constructive Measurement Models*

The indicators used were 40 items. Tests of construct validity, convergent validity, discriminant validity, and reliability have carried out. All tests have been fulfilled except for the discriminant validity test. To meet the discriminant validity test, six indicators were removed in three stages. Indicators removed in stage I was 2 indicators (IQ1 and IQ6). Indicators removed in stage II were 4 indicators (IQ3, SEQ4, UV3, and PU4). Indicators removed in stage

III were 2 indicators (PV1 and S1). After that, the model and indicators meet all validity and reliability tests.

Table 3 Experiment Stages and Tools

Step	Activities	Tools
Start	Students read the guidelines and do the pretest.	Written announcement.
1	Introduction (3 min. 39 sec.).	Animated video with narrator voice & music
	Students do the posttest.	
2	Account payable, notes payable & computation illustration (7 min. 00 sec.).	Animated video with music.
	Students do the posttest.	
3	Another short-term liabilities & computation illustration (5 min. 15 sec.).	Animated slides in video format.
	Students do the posttest.	
End	Students fill the questionnaires.	Online questionnaires.

This research model has passed the goodness of fit (GOF) model and the R-Square test. GOF model worth 0.7830, then confirmed the model was valid, reliable, and consistent with GOF. R-Square was shown in Table 4. The R-Square values were quite good, with a range between 69.72% until 89.86%.

Table 4 R Square

	R Square	Independent Variables
Confirmation	83.713%	Information Quality, System Quality, Service Quality.
Continuance Intention	69.7221%	Utilitarian Value, Perceived Value, Perceived Usability, Satisfaction.
Perceived Value	71.5304%	Information Quality, System Quality.
Satisfaction	89.8557%	Information Quality, System Quality, Service Quality, Confirmation, Outcome Expectations, Utilitarian Value, Perceived Value.

3.3 Results

The findings of the research are summarised and showed the differences or consistency with the results of some other studies. The results were shown in Table 5. Based on these results, some recommendations are made for future studies and the implementation process.

System quality (SyQ) and service quality (SeQ) affect the satisfaction of online learning environment usage, but information quality (IQ) does not affect the satisfaction (S) of online learning environment usage. These findings partially support the relationships suggested in Dağhan and Akkoyunlu Integrated Flow Framework (2016) and Updated DeLone and McLean's Information Systems Success Model (2003).

System quality (SyQ) and service quality (SeQ) had a predictor effect on satisfaction (S). The effects of system quality (SyQ) and service quality (SeQ) on satisfaction (S) were considered significant and it could be said that these two predictor variables had an indirect effect on continuance intention (CI). Information quality (IQ) did not affect mandatory online learning courses because the online learning web content issue presented information in various formats.

Table 5 The Results

	Hypothesis			Effect	Sample Mean	Standard Deviation	Standard Error	T Statistics
1	IQ	→	S	0.033	0.033	0.073	0.073	0.458
2	SyQ	→	S	-0.113	-0.135	0.042	0.042	2.668118 **
3	SeQ	→	S	0.624	0.636	0.115	0.115	5.429352 **
4	IQ	→	C	0.445	0.44	0.048	0.048	9.199607 **
5	SyQ	→	C	0.253	0.262	0.086	0.086	2.939976 **
6	SeQ	→	C	0.302	0.3	0.086	0.086	3.514277 **
7	IQ	→	PV	0.736	0.742	0.054	0.054	13.62592 **
8	SyQ	→	PV	0.149	0.139	0.07	0.07	2.128617 *
9	C	→	S	0.085	0.123	0.086	0.086	0.991
10	OE	→	S	0.333	0.346	0.045	0.045	7.384924 **
11	UV	→	S	0.159	0.148	0.092	0.092	1.72348 *
12	PV	→	S	0.241	0.237	0.073	0.073	3.290527 **
13	UV	→	CI	0.181	0.175	0.081	0.081	2.243576 *
14	PV	→	CI	0.059	0.062	0.104	0.104	0.567
15	PU	→	CI	0.34	0.33	0.112	0.112	3.035404 **
16	S	→	CI	0.498	0.51	0.076	0.076	6.55122 **

*level of significance (α) of 0.05 (5%, 1 tail, 1.640)
**level of significance (α) of 0.01 (1%, 1 tail, 2.326)

Information quality (IQ), system quality (SyQ), and service quality (SeQ) had a predictor effect on confirmation (C). This result is consistent with the relationship between Dağhan and Akkoyunlu Integrated Flow Framework (2016).

Confirmation (C) had no predictor effect on satisfaction (S). Confirmation (C) had no indirect effect

on continuance intention (CI). These results are inconsistent with the relationship between Dağhan and Akkoyunlu Integrated Flow Framework (2016). In this study, the results had not validated the construct of Dağhan and Akkoyunlu Integrated Flow Framework (2016) and Information Systems Expectation Confirmation Model (Bhattacherjee, 2001 in). These findings do not support the relationships suggested in Technology Continuance Theory (2009), Cognitive Model (1980), and Information Systems Expectation Confirmation Model (2001), and Dağhan and Akkoyunlu Integrated Flow Framework (2016).

The indirect impact of information quality (IQ), system quality (SyQ) and service quality (SeQ) on satisfaction (S) were insignificant. In addition, the direct impact of information quality (IQ) and system quality (SyQ) on perceived value (PV) were significant, and the indirect impact of information quality (IQ) and system quality (SyQ) on perceived value (PV) were insignificant. These findings are inconsistent with the relationship set in Dağhan and Akkoyunlu Integrated Flow Framework (2016).

Outcome expectations (OE) and perceived value (PV) had a predictor effect on satisfaction (S). Utilitarian value (UV) on satisfaction (S) were insignificant. This finding is inconsistent with the relationship set in Dağhan and Akkoyunlu (2016).

Utilitarian value (UV), perceived value (PV), perceived usability (PU), and satisfaction (S) had a direct effect on continuance intention (CI). These findings are consistent with the relationship set in Dağhan and Akkoyunlu (2016).

Electronic online learning could have led to a positive effect if online learner spends enough time in participating in online learning environments and face-to-face meeting (conventional classroom). Participants can reply to the video, do the test, and ask the lecturer. Although the mixing method spends more time than face-to-face meeting in class, students prefer the mixing method.

3.4 Recommendations

The recommendations for future studies are: The attitude variable has not been examined. The research model could be expanded by adding the attitude variable to a larger model and reexamined. The research model needs to be tested in terms of longitudinal consistency. The electronic online learning environment was used in a meeting course and mandatory. Therefore, the results could not be expanded to voluntary environments. The constructs, which have an effect on the continuance intention of electronic online learning environments, need to be tested in both voluntary and mandatory.

The recommendations for implementation process are: Regarding the finding that a quality service that meets the expectations of students ensures the continuance of the online learning environment, particular attention should be paid to the information provided and the overall system design of these environments. The effects on continuance usage of electronic online learning environments should be taken into consideration while designing the courses.

4 CONCLUSION

The successful electronic online learning can be measured from user experience in the continuance intention of electronic online learning. As an implication, the online learning designer may consider many success factors for video design, video content, supporting activities, and benefits for users. Video design can involve animated video with the narrator's voice and music. Video content can be designed to give clear step-by-step organized information, the explanation for each screen changes, up-to-date content, the menu for gathering information completely and timely, and easy to operate. Supporting activities from supporting unit provide fast response time, and support from the lecturer and supporting team for any question or trouble-shooting, and improve online learning performance. Benefits for user are the user experience with the system globally, effective working on the task, getting perceive as competence person, increasing the sense of accomplishment, effort, and benefit to user, worthwhile of time spent, and value for user, gain students' perceptions regarding keeping up-to-date, fulfilling users' needs (for knowledge, learning and developing), giving role for user, making skillful, and compatible with the users' learning way.

REFERENCES

Alsabawy, A.Y., Cater-Steel, A., & Soar, J. 2016. Determinants of perceived usefulness of e-learning systems. *Computers in Human Behavior* 64: 843-858.

Asiry, M.A. 2017. Dental students' perceptions of an online learning. *Saudi Dental Journal* 29: 167–170.

Chiu, C.M., Hsu, M.H., Sun, S.Y., Lin, T.C., & Sun, P.C. 2005. Usability, Quality, Value and E-Learning Continuance Decisions. *Computers & Education* 45 (4): 399-416.

Chiu, C.M., Sun, S.Y., Sun, P.C., & Ju, T.L. 2007. An Empirical Analysis of The Antecedents of Web-Based Learning Continuance. *Computer & Education* 49(4): 1224-1245.

Dağhan, G. & Akkoyunlu, B. 2016. Modeling The Continuance Usage Intention of Online Learning Environments. *Computers in Human Behavior* 60: 198-211.

DeLone, W.H. & McLean, E.R. 1992. Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research* 3(1): 60-95.

DeLone, W.H. & McLean, E.R. 2003. The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems* 19 (4): 9–30.

Kim, B. & Oh, J. 2011. The difference of determinants of acceptance and continuance of mobile data services: A value perspective. *Expert Systems with Applications* 38: 1798–1804.

Kukulska-Hulme, A. 2012. How Should The Higher Education Workforce Adapt to Advancements in Technology for Teaching and Learning? *The Internet and Higher Education* 15 (4): 247-254.

Liao, C., Palvia, P., & Chen, J.L. 2009. Information technology adoption behavior life cycle: Toward a Technology Continuance Theory (TCT). *International Journal of Information Management* 29: 309–320.

Panigrahi, R., Srivastava, P.R., & Sharma, D. 2018. Online Learning: Adoption, Continuance, and Learning Outcome—A Review of Literature. *International Journal of Information Management* 43: 1–14.