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IS Success Model for EDMODO E-learning User Satisfaction through TAM on Students

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ABSTRACT
This study aimed to analyze the effect of IS Success Model variable on Edmodo's e-learning user satisfaction partially, both directly and indirectly through the TAM variable. This research was conducted through an ex-post-facto approach to undergraduate students. Data collection instruments used questionnaire and observation. The questionnaire was developed from the technology acceptance model (TAM) and information system (IS) success model. The collected data were analyzed through descriptive statistics and path analysis using IBM SPSS 20 program. The results showed that the three core variables of the IS Success model directly had a significant effect on the two core variables of TAM, and the two core variables of TAM directly affected user satisfaction. Indirectly, the three core variables of IS Success model had a significant effect on user satisfaction through the two core variables of TAM. Service Quality, in addition to provide a more significant direct effect on perceived usefulness, also indirectly influenced user satisfaction through perceived usefulness. Perceived ease of use had more significant direct and indirect effects through perceived usefulness on Edmodo e-learning user satisfaction.

Keywords: *IS Success Model; TAM; User satisfaction; e-learning; Edmodo.*

INTRODUCTION

The use of technology in tertiary institutions is a wise decision and the most appropriate thing to do. The use of technology can be done through the use of e-learning and its application for teaching and learning. E-learning is the use of telecommunications technology to deliver information on education and training in tertiary institutions. E-learning is a direct and dynamic learning environment through the use of the internet to improve the quality of learning by providing access to resources, information services, and distance collaboration (Mahande and Jasruddin, 2018).

Supporting e-learning in tertiary institutions, many provided applications can be used, such as Moodle learning management system (LMS), Atutor and Edmodo learning network, Kelase, Profors, etc. This research uses and studies LSn Edmodo. This is very reasonable, because the

learning social network application (learning social network) plays an essential role in daily life, especially in tertiary institutions. Edmodo is one of the social media networks that allows students to practice their learning outside the classroom (Warawudhi, 2017). According to Kongchan, Edmodo is designed very quietly, almost similar to Facebook, and provides space for lecturers, students, and even parents to maximize the learning and teaching process (Purnawarman et al., 2016).

Utilizing Edmodo, students and lecturers can face each other through sharing useful ideas, problems and tips. An ordinary lecturer assigns and groups students' work at Edmodo; students can get help from all classes at Edmodo. In addition, parents can attend classes to bring a level of transparency and observe the process that their children are doing in learning. Edmodo's attractive ability has made many lecturers apply social media in-class lectures. Edmodo has become one of the free social learning platforms and is the most widely used by students and lecturers, because it offers many features that enable various modes of interaction and virtual activity (Dewi, 2014a). This is consistent with the study results of Ramadiani et al. (2017) which shows that the percentage of users of Edmodo e-learning applications is 34% greater, compared to other applications such as Moodle 7%, journal 6%, academics and articles 5%, Library 4%. This means Edmodo is appreciated and has the potential to change the way of learning, stimulate motivation and encourage students to progress (Mahande and Jasruddin, 2018).

Considering the advantages of Edmodo features have in LSn, it turns out contextually that at the Universitas Muhammadiyah Makassar (Unismuh) and Universitas Negeri Makassar (UNM), shows that Edmodo is still less to be used as a learning complement to improve learning experiences. Because digital adoption is slow on campus and lack of students' self-awareness to advance in the era of social media learning. Therefore, this research conducted to identify and explore how student satisfaction was related to the implementation of Edmodo services. This research deeply examined the relationship and influence of external factors on internal factors of usability and ease to produce the determinants of user satisfaction (Mahande and Jasruddin, 2018). This is important to determine the direction of design and development of Edmodo e-learning that suits the needs of users in tertiary institutions.

User satisfaction is the user's subjective assessment of the found information, compared to the expected information that exceeds the evaluation of internal standards (Ramadiani et al., 2017). This confirms that the better or higher Edmodo e-learning factors influence, the higher the user satisfaction utilizes Edmodo-based e-learning. Therefore, an investigation of the determinants of user satisfaction is significant to do. Hopefully, the results presented efforts to expand Edmodo-based e-learning opportunities for students and foster a learning environment that is responsible for their learning.

In this regard, an acceptance/satisfaction model approach is needed as a solution to the research problem. Because of its emphasis on the user satisfaction model of Edmodo application technology, the technology acceptance model is considered as the most appropriate to be used as an effort to produce user satisfaction model for Edmodo e-learning. One of technology acceptance models that is widely used is the Technology Acceptance Model (TAM). The TAM model Davis et al. (1989) which offers a theoretical basis for user acceptance and behaviour in the use of information technology. The TAM model identifies perceived usefulness as the level of work improvement after the system is implemented. Perceived ease is the user's perception of the ease of system adoption. Both of these factors affect the attitude towards technology/application and subsequently affect the trust and behaviour of individuals and satisfaction when adopting a system (Sun et al., 2008).

Edmodo-based e-learning system that derived from user satisfaction will not be fully optimized unless all members of an organization accept the system usage effectively. Another focus in this research is at how the context of system can influence users to use Edmodo-based e-learning systems by observing in the external variables of DeLone & McLean's information system model, namely: information quality, system quality and quality service (service quality) as a construct of user satisfaction (Zamzuri et al., 2012). E-learning systems create information that is communicated to users, then influenced or uninfluenced by the system. The answer whether the user is influenced or not can be reflected by the actual use of student system.

Previous studies had used information technology adoption such as the Technology Acceptance Model (TAM) and DeLone & McLean model to explore patterns of behaviour

and satisfaction of Edmodo-based e-learning user. Initial study conducted by Mahande and Jasruddin (2018) showed that the TAM & IS model had been widely used and developed to track the acceptance of information systems/technology, especially e-learning in several countries including Indonesia. However, the constructs of TAM & IS Model varies according to the research context. The research also showed that e-learning through the TAM & IS model approach at several tertiary institutions in Indonesia was lack. Moreover, the integration of TAM & IS models to investigate Edmodo e-learning user satisfaction in universities, especially in the city of Makassar, is rarely impemented. Contextually, e-learning Edmodo through TAM & IS model approach at Unismuh and UNM Makassar has never been done at all. This research integrated TAM & IS model approach to describe and analyze the influence of Edmodo's e-learning satisfaction variable in undergraduate programs. This research was essential to provide a reference in the framework of Edmodo-based e-learning implementation and development that was sustainable at universities, especially at UNM and Unismuh Makassar.

The selection of TAM & IS variable model was based on initial study (Mahande and Jasruddin, 2018). Previous studies on the relationship between TAM & IS model variables confirmed that service quality, information quality, system quality had influenced significantly the user satisfaction (Aparicio et al., 2016; Ramadiani et al., 2017; Mohammadi, 2015; Chang et al., 2017). Perceived usefulness influenced user satisfaction (Thongmak, 2013; Chang et al., 2017; Yunkul and Cankaya, 2017; Ursavaş and Reisoglu, 2017). Perceived ease of use influenced user satisfaction (Thongmak, 2013; Cakır and Solak, 2015; Mohammadi, 2015; Ursavaş and Reisoglu, 2017). The relationship of these variables is illustrated in the following conceptual model of Edmodo e-learning user satisfaction.

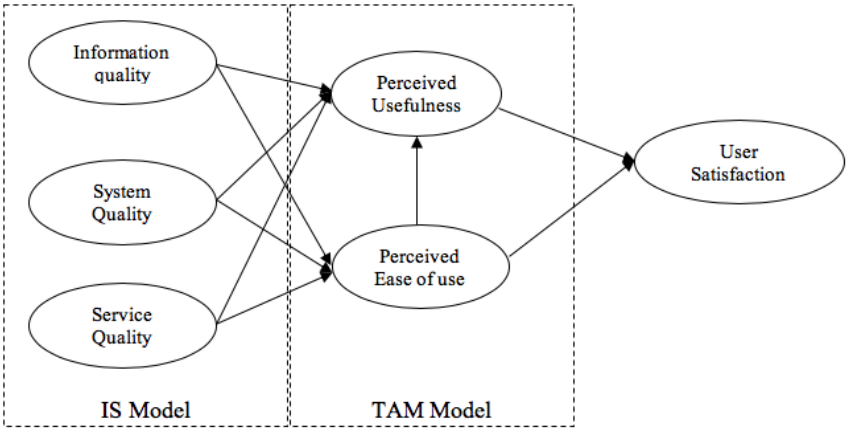

Figure 1. The Conceptual model of e-learning user satisfaction Edmodo (Adapted from Mahande and Jasruddin, 2018)

H1: There is a significant positive effect of information quality on perceived usefulness
H2: There is a significant positive effect of information quality on perceived ease of use
H3: There is a significant positive effect on system quality on perceived usefulness
H4: There is a significant positive effect on system quality on perceived ease of use
H5: There is a significant positive effect on service quality on perceived usefulness
H6: There is a significant positive effect on service quality on perceived ease of use
H7: There is a significant positive effect of perceived usefulness on user satisfaction
H8: There is a significant positive effect of perceived ease of use on user satisfaction
H9: There is a significant positive effect of perceived ease of use on perceived usefulness

RESEARCH METHOD

This type of research was ex-post facto research. The research was carried out in undergraduate program at Faculty of Teacher Training and Education at Universitas

Muhammadiyah Makassar (Unismuh) and Faculty of Engineering at Universitas Negeri Makassar (UNM) Indonesia which had used Edmodo in learning. The research sample was 161, it determined by Isaac & Michael (1971) criteria and distributed proportionally. This research variables consisted of three IS Success model variables as independent variables, namely information quality (IQ), system quality (SyQ), service quality (SeQ). The two TAM model variables as the dependent variable were perceived usefulness (PU) and perceived ease of use (PEOU), and user satisfaction (US). Data collection instruments through questionnaire developed from IS Success Model and TAM Model items using 4-point Likert scale, 1= strongly disagree, 2= disagree, 3= agree, and 4= strongly agree.

The validity of the instrument used content validity through the expert judgment of two people from the field of ICT-online learning expertise and technology acceptance/user experience. Numbers or coefficients indicated reliability. The reliability calculation in this research used the Alpha Cronbach (α) $\geq$ 0.70 (Hair et al., 2006). Data analysis techniques in research used descriptive analysis and path analysis. Descriptive analysis calculates the mean and standard deviation, and presents in the form of graphs/diagrams and tables. The calculation of average score refers to the provisions of categorization (Mardapi, 2008). Path analysis tests hypotheses with a significance level of 0.05. Before testing the hypothesis, an analysis requirements test is performed to test whether the data collected has met the path analysis requirements. Test requirements analysis include: normality test with Kolmogorov Smirnov technique (Sig.> 0.05), linearity test (Deviation from Linearity> 0.05), multicollinearity test (tolerance> 0.1 and variance inflation factor / VIF <10) and homoscedasticity test with Glejser (Sig .> 0.05).

RESULT AND DISCUSSION

The results of the research are presented in the following sections below:

Descriptive Analysis

Table 1. Information quality satisfaction in using Edmodo e-learning

***Item Information Quality* (IQ)**	**Mean**	**S.D.**
IQ1: *I see Edmodo provides the latest learning information content*	3.24	.671
IQ2: *I feel Edmodo provides relevant information as needed*	3.14	.726
IQ3: *I see Edmodo does not offer organized/structured information*	2.40	1.086
IQ4: *I think Edmodo offers more opportunities to access various sources of information*	3.26	.810

Table 1 shows that students agreed with the availability of latest and relevant learning information content as needed. The results of analysis showed that students strongly agreed on giving more opportunities to access various sources of information from Edmodo (IQ4), because the average score was 3.26, which was higher than the average score of other items.

Table 2. System quality satisfaction in using Edmodo e-learning

Item Sistem Quality (SyQ)	**Mean**	**S.D**
SyQ1: I find Edmodo aesthetically pleasing	3.23	.737
SyQ2: I believe Edmodo optimizes response time (fast access and response)	3.10	.810
SyQ3: I believe Edmodo is user-friendly	3.22	.691
SyQ4: I see Edmodo has an exciting feature	3.05	.792
SyQ5: I'm not sure Edmodo is reliable in learning	2.50	1.096

Table 2 shows that students agreed with access and quick response, as well as userfriendly from Edmodo. The analysis showed that students strongly agreed on Edmodo aesthetic appearance (SyQ1) because the average score was 3.23, which was higher than the average rating of other items.

Table 3. Service Quality Satisfaction in using Edmodo e-learning

Item Service Quality (SeQ)	**Mean**	**S.D**
SeQ1: I can easily communicate with lecturers in learning conducted through Edmodo	3.31	.665
SeQ2: I easily collaborate with friends in learning done through Edmodo	3.11	.801
SeQ3: Edmodo provided online help to explain when I was having difficulty	3.30	.724
SeQ4: I feel the lecturer gave a quick response in Edmodo learning	3.12	.687
SeQ5: Edmodo didn't give me a structured course/learning management	2.52	.942

Table 3 shows that students agreed with lecturers, who gave quick responses and assistances when students experienced difficulties in Edmodo learning. From the results of the analysis indicated that students strongly agreed to communicate with the lecturer in learning through Edmodo (SeQ1) because the average score was 3.31, which was higher than the average rating of other items.

Table 4. Perceived usefulness satisfaction in using Edmodo e-learning

Item Perceived Usefulness (PU)	**Mean**	**S.D**
PU1: I believe Edmodo increases learning motivation	3.24	.696
PU2: I think learning through Edmodo is boring	2.32	1.011
PU3: I believe the use of Edmodo will enable the completion of learning tasks faster	3.19	.659
PU4: I believe the use of Edmodo can improve learning performance	3.12	.677
PU5: I think the use of Edmodo can improve effectiveness in learning	3.24	.661

Table 4 shows that students agreed with the use of Edmodo in completing fast learning tasks. The analysis showed that students strongly agreed that Edmodo learning could improve the effectiveness and motivation of learning (PU5, PU1) because the average score was 3.24, which was higher than the average score of other items.

Table 5. Perceived ease of use satisfaction in using Edmodo e-learning

Item Perceived Ease of Use (PEOU)	**Mean**	**S.D**
PEOU1: I feel Edmodo is easy to use	3.18	.732
PEOU2: I think Edmodo is easy to learn	3.18	.672
PEOU3: I find Edmodo easily accessible	3.11	.809
PEOU4: I think Edmodo is not easy to understand	2.28	1.114

Table 5 shows that students agreed with Edmodo easy access. The results of the analysis showed that students strongly agreed with the ease of Edmodo use and the ease of Edmodo to learn (PEOU1, PEOU2) because the average score was 3.24, which was higher than the average score of other items. This was confirmed by PEOU4, which showed that students disagreed if Edmodo would not be easy to understand. This means Edmodo was easily understood by most students.

Tabel 6 *User Satisfaction* e-learning Edmodo

Item User Satisfaction (US)	**Mean**	**S.D**
US1: Edmodo meets my educational and learning needs	3.26	.666
US2: I am satisfied with the performance of Edmodo's learning system/feature	3.04	.804
US3: Learning through Edmodo is not fun for me	2.37	1.172
US4: I feel Edmodo can give confidence	3.08	.670
US5: I believe Edmodo learning is learning that is needed now and in the future	3.31	.801

Table 6 shows that student satisfied in Edmodo e-learning usage because Edmodo could provide self-confidence and meet educational and learning needs. The highest satisfaction came

from Edmodo e-learning usage, because this learning was needed and had potentiality (US5) with an average score of 3.31, which was higher than the average rating of other items.

The requirements analysis test used normality, linearity, multicollinearity and homoscedasticity tests. The results of normality test data on the variables IQ, SyQ, SeQ on PEOU were normally distributed (Sig. 0.359> 0.05). IQ, SyQ, SeQ to PU had normal distribution (Sig 0.253> 0.05). PEOU to PU had normal distribution (Sig. 0.447> 0.05). PEOU and PU on the US had normal distribution (Sig. 0.566> 0.05).

Linearity test results obtained from the value of Deviation from the linearity of independent variables IQ = 0.317, SyQ = 0.187, SeQ = 0.579 toward the dependent variable PU. Deviation value obtained from linearity IQ = 0.518, SyQ = 0.095, SeQ = 0.075 toward the independent variable PEOU. The value of PEOU's Deviation from linearity = 0.150 to PU. PU value = 0.202, PEOU = 0.867 to US. Deviation from linearity value was indicated by Sig value> 0.05. So it could be concluded that the relationship between independent and dependent variables showed linear relationship.

Multicollinearity test was carried out by observing in the value of Vareans Inflation Factor (VIF) <10 (no multicollinearity occurs). Value of Tolerance and VIF IQ variables: Tolerance = 0.646; VIF = 1.547, SyQ: Tolerance = 0.701; VIF = 1,427, SeQ: Tolerance = 0.530; VIF = 1,887 to PU and PEOU. PEOU variable Tolerance and VIF values: Tolerance = 1,000; VIF = 1,000 to PU. Tolerance and VIF values of PU variables were same as PEOU: Tolerance = 0.861; VIF = 1,162, to US. The results of the analysis could be concluded that there was no tolerance value less than 0.10 and a VIF value that exceeded 10, so there was no multicollinearity problem.

Homoscedasticity test results through the Glejser test showed independent variables IQ = 0.586, SyQ = 0.291, SeQ = 0.944 PU. IQ variable = 0.906, SyQ = 0.972, SeQ = 0.492 to PEOU. PEOU Varaibel = 0.212 to PU. PU variable = 0.438 and PEOU = 0.057 to US. The analysis showed the Sig. > 0.05, so it could be concluded there was homoscedasticity.

The results of requirements analysis test confirmed that it could proceed to hypothesis testing.

Hypothesis testing. Path analysis was carried out to test the hypothesis. Three influential variables derived from previous studies were applied as independent variables and perceived usefulness and perceived ease of use as dependent variables as well as intervention and user satisfaction were also used as dependent variables. The influence between the independent and dependent variables was partially summarized in Table 7, then visualized in an empirical model in Figure 2. Three independent variables that mostly influenced on perceived usefulness and perceived ease of use were quality service. Two dependent variables that mostly influenced on user satisfaction was perceived ease of use.

Table 7. Path Analysis

Model		R Square	β	t-value	Sig.
Dependent variable	**Independent variable**				
Perceived Usefulness (PU)	Information Quality (IQ)	0.213	.530	6.569	.000
	System Quality (SyQ)	0.196	.479	6.223	.000
	Service Quality (SeQ)	0.281	.570	7.878	.000
	Perceived Ease of Use (PEOU)	0.139	.459	5.074	.000
Perceived Ease of Use (PEOU)	Information Quality (IQ)	0.110	.309	4.426	.000
	System Quality (SyQ)	0.123	.308	4.721	.000
	Service Quality (SeQ)	0.142	.329	5.129	.000
User Satisfaction (US)	Perceived Usefulness (PU)	0.096	.331	4.115	.000
	Perceived Ease of Use (PEOU)	0.139	.489	5.061	.000

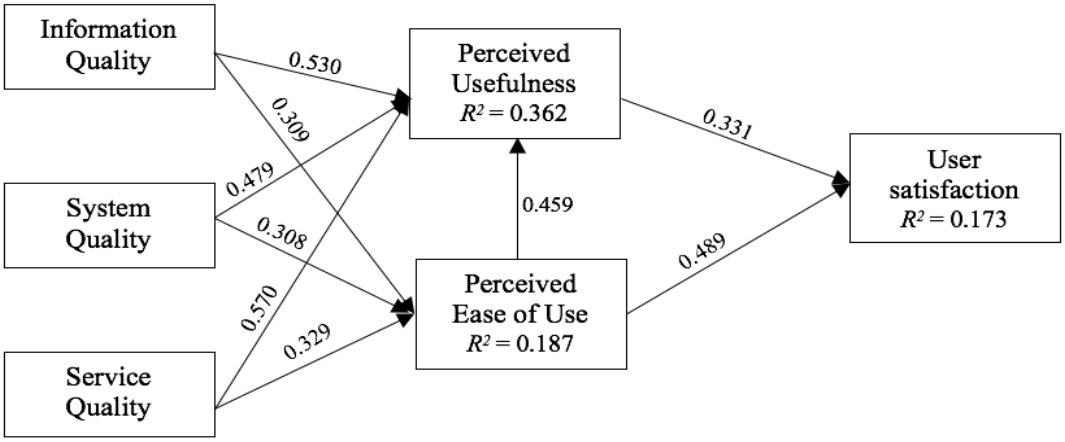

Figure 3. The Empirical Model of Edmodo e-learning user satisfaction

Table 7 showed that Hypothesis 1, IQ, had a significant positive effect on PU (R Square = 0.213, β = .530, t-value> 1,974, Sig. <0.05). A positive value of the path coefficient β = .530 explained that an increase in one unit of IQ could increase PU by 0.530 and a decrease in one unit of IQ could decrease PU by 0.530. R Square determinant coefficient of 0.213 meant that the IQ variable partially influenced PU 21.3% and 78.7% was influenced by other variables. Hypothesis 2 explained that IQ had a significant positive effect on PEOU (β = .309, t-value> 1,974, Sig. <0.05). Hypothesis 3 explained that SyQ had a significant positive effect on PU (β = .479, t-value> 1,974, Sig. <0.05). Hypothesis 4 explained that SyQ had a significant positive effect on PEOU (β = .308, t-value> 1,974, Sig. <0.05). Hypothesis 5 explained that SeQ had a significant positive effect on PU (β = .570, t-value> 1,974, Sig. <0.05). Hypothesis 6 explained that SeQ had a significant effect on PEOU (β = .329, t-value> 1,974, Sig. <0.05). Hypothesis 7 explained that PU had a significant effect on US (β = .331, t-value> 1,974, Sig. <0.05). Hypothesis 8 explained that PEOU had a significant effect on US (β = .489, t-value> 1,974, Sig. <0.05). Hypothesis 9 explained that PEOU had a significant effect on PU (β = .459, t-value> 1,974, Sig. <0.05).

Furthermore, in order to find out more about the direct and indirect effects of independent variables (IQ, SyQ and SeQ) on the dependent variables (PU, PEOU and US), the following Table 8 presents the direct, indirect and total effects.

Tabel 8. Direct, Indirect and Total Effects

User Satisfaction Variable	Satisfaction Determinant	Influence		
		Direct	Indirect	Total
Perceived Usefulness	IQ	0.530	--	0.530
(R^2=0.362)	SyQ	0.479	--	0.479
(ε_1=0.798)	SeQ	0.570	--	**0.570**
	PEOU	0.459	--	0.459
Perceived Ease of Use	IQ	0.309	--	0.309
(R^2=0.187)	SyQ	0.308	--	0.308
(ε2=0.901)	SeQ	0.329	--	**0.329**
User Satisfaction	IQ	--	PU=0.175	PU=0.175
(R^2=0.173)			PEOU=0.151	PEOU=0.151
(ε3=0.909)	SyQ	--	PU=0.158	PU=0.158
			PEOU=0.150	PEOU=0.150
	SeQ	--	PU=0.188	PU=**0.188**
			PEOU=0.160	PEOU=0.160
	PU	0.331	--	0.331
	PEOU	0.489	--	0.489
	PEOU	--	PU=0.224	0.224

Table 8 shows the value of *R Square* (R^2) PU variable of 0.362 which meant that the variables (IQ, SyQ, SeQ, PEOU) simultaneously had an effect of 36.2% on PU and 63.8% influenced by other variables. IQ, SyQ, SeQ had an effect of 18.7% on PEOU. PU and PEOU had an effect of 17.3% on US (Visual in Figure 2). Residual coefficients (ε_1, ε_2 dan ε_3) explained the existence of other variables out of IQ, SyQ, SeQ variables that affected the PU, PEOU and US variables had not examined in this research.

Next, Table 8 explained the three independent variables (IQ, SyQ and SeQ), which indirectly influenced on US-dependent variables, both through PU and PEOU variables were SeQ (see total effect). Next, the PU and PEOU dependent variables that directly influenced the US-dependent variable were only PEOU.

Discussion

The effect of information quality on perceived usefulness. Descriptive analysis results showed that in general undergraduate students had low responses to the quality of information (Figure 2). The low quality of data was strongly influenced by the provided information that had not well organized or structured (Table 1). The path analysis results in Table 7 showed that information quality had a significant positive effect on the perceived usefulness of Edmodo e-learning. The better the quality of presented information, the perceived usefulness of using Edmodo e-learning would also be better. Quality and comfort are the determining factors for individuals in using a product (N. Khan, Rahmani, Hoe, & Chen, 2014). Likewise, the choice of students for e-learning Edmodo was primarily determined by the quality of systematic and structured information.

Effect of information quality on perceived ease of use. Descriptive analysis results showed that generally undergraduate students had low response to the quality of information (Figure 2). The low quality of data was strongly influenced by the provided information that had not well organized or structured. However, the opportunity to access various sources of current and relevant information was quite high (Table 1). The path analysis results in Table 7 showed that the quality of data had significant positive influence on the perceived ease of use of Edmodo e-learning. The better the quality of presented information, the perceived ease of use of Edmodo e-learning would also be better. The quality of Edmodo e-learning information becomes a determinant for students in the use of e-learning. Especially for learning information search, perceived convenience such as information reliability, complexity, and effort (Chung and Koo, 2015) is very important. Combining learning technology and human resources to develop infrastructure capabilities, and strategic positioning perspectives that emphasize orientation in ensuring the quality of information services can increase the ease of interaction (Chuang and Lin, 2013). The statement indicated in the context of learning that the quality of structured information was very important to be presented to facilitate its use. Ease of use had an impact on increasing quantity of Edmodo e-learning use.

The effect of system quality on perceived usefulness. Descriptive analysis results showed that generally undergraduate students had high responses to the quality of system (Figure 2). The high quality of system was strongly influenced by the display system, access speed and user-friendly system (Table 2). The path analysis resulted in Table 7 showed that the quality of system had significant positive effect on the perceived usefulness of Edmodo e-learning. The better the quality of the system, the perceived usefulness of using Edmodo e-learning would also be better. The quality of product system should always be maintained (Ling et al., 2015), the quality of the system influenced the usefulness and it was also perceived by students in e-learning Edmodo. The quality of Edmodo e-learning system can facilitate and improve the effectiveness of student learning communication because it can minimize the use of time (Al-Said, 2015). This statement confirmed that the quality of Edmodo e-learning system is essential to be a concern to usage values for students. The implications of Edmodo e-learning system quality had an impact on the high quantity of Edmodo e-learning use to the level of student satisfaction with Edmodo e-learning.

Effect of system quality on perceived ease of use. Descriptive analysis results showed that generally undergraduate students had high responses to the quality of the system (Figure 2). The high quality of the system was strongly influenced by the display system, access speed and user-friendly system (Table 2). The path analysis results in Table 7 showed that the quality of the system had significant positive effect on the ease of perceived Edmodo e-learning. The better the quality of the system, the perceived ease of use of Edmodo e-learning would also be

better. The ease of the system becomes very important because the slow adoption of the choice of a system that cannot be operated or uneasy to use is the reason, so that the information technology application system is not used (Kellermann and Jones, 2013). These conditions indicated that the quality of the system influenced the ease of use of system. In other words, Edmodo e-learning quality would improve the ease of use of Edmodo e-learning. The ease of using Edmodo had an impact on the satisfaction level of using Edmodo e-learning.

Significantly positive effect on service quality on perceived usefulness. Descriptive analysis results showed that generally undergraduate students had high responses to service quality (Figure 2). The high quality of service was greatly influenced by the ease of communication with lecturers, the rapid response from lecturers, and the assistance of technical difficulties (Table 3). The path analysis results in Table 7 showed that service quality had significant positive effect on the perceived usefulness of Edmodo e-learning. The better the quality of service, the perceived usefulness of using Edmodo e-learning would also be better. The quality of services provided through learning tools has an impact on usability for users (Venkataraman & Ramasamy, 2018 and Sharma, Joshi, & Sharma, 2016). This confirmed that the quality of service of learning media would influence the perceived enjoyment by the use of media. This condition had implications for the quality of provided services in Edmodo e-learning, it was closely related to the perceived usefulness when using Edmodo e-learning. The ease of communication between lecturers and Edmodo facilities/features as well as excellent technical assistance would increase the level of usefulness and even user satisfaction with Edmodo.

Effect of service quality on perceived ease of use. Descriptive analysis results show that generally undergraduate students had high responses to service quality (Figure 2). The high quality of service was greatly influenced by the ease of communication with lecturers, the rapid response from lecturers, and the assistance of technical difficulties (Table 3). The path analysis results in Table 7 showed that service quality had a significant positive effect on the ease of perceived Edmodo e-learning. The better the quality of service, the perceived ease of use of Edmodo e-learning would also be better. Edmodo allows lecturers to create small groups, where students can edit documents simultaneously in real-time, synchronized with Edmodo to motivate and facilitate the construction of individual and collaborative student knowledge (Kongchan, 2013). The quality of services available at Edmodo has a positive perception, so that learning using Edmodo can facilitate and improve the effectiveness of learning communication, as well as being able to do time efficiency (Al-Said, 2015). This confirmed that the quality of available services in Edmodo e-learning could provide convenience for users, both lecturers and students. This condition showed that the quality of services owned by Edmodo e-learning needed to get attention in order to guarantee the ease of use.

Effect of perceived usefulness on user satisfaction . Descriptive analysis results show that generally undergraduate students had responses to perceived usefulness (Figure 2). The high perceived usefulness was influenced by the effectiveness and motivation to learn through Edmodo, and the usefulness in terms of completing college assignments (Table 4). The path analysis results in Table 7 showed that the perceived usefulness had significant positive effect on Edmodo e-learning user satisfaction. The better the perceived usefulness of Edmodo e-learning, the satisfaction of Edmodo e-learning would increase. The usefulness felt by students significantly encourages students to adopt the use of instructional media (Thongmak, 2014) and (Arpaci, 2017). Students, who use Edmodo e-learning have a very positive attitude towards Edmodo (Liaw et al., 2016). It was further explained that students attitudes prioritized usefulness when using Edmodo e-learning. Thus, perceived usefulness contributed to Edmodo e-learning user satisfaction.

The effect of perceived ease of use on user satisfaction. Descriptive analysis results show that generally undergraduate students had low response to perceived ease (Figure 2). The low perceived ease was influenced by the student low response to ease of learning, ease of use and access to information (Table 5). The path analysis results in Table 7 showed that perceived ease had significant positive effect on Edmodo e-learning user satisfaction. The better the perceived ease of Edmodo e-learning, the satisfaction of Edmodo e-learning would increase. The ease of use of learning media would give satisfaction to its users. Students have a positive impression of using Edmodo and feel comfortable interacting online with friends and teachers (Dewi, 2014b).

Perceived ease of use is a happy attitude to use Edmodo (Ursavaş and Reisoglu, 2017b). This statement showed that the perceived ease of use of Edmodo could give satisfaction to its users. User satisfaction of information services is fully mediated through cognitive capital (Sun et al., 2012), it was such as ease of learning.

Effect of perceived ease of use on perceived usefulness. Descriptive analysis results show that generally undergraduate students had high responses to perceived ease (Figure 2). The high perceived ease was influenced by the ease of learning and ease of use and access to information (Table 5). The path analysis results in Table 7 showed that perceived ease had significant positive effect on the perceived usefulness of Edmodo's e-learning. The better the perceived ease of Edmodo e-learning, the perceived usefulness of using Edmodo e-learning would increase. Perceived ease of use was an essential determinant of perceived usefulness in information systems. Perceived ease of use is an important factor related to the acceptance of information technology, especially during the initial adoption phase (Venkatesh and Bala, 2008). Perceived ease of use has a positive effect that can produce uses in its use (Sledgianowski and Kulviwat, 2008). The perceived ease of use and characteristics of student lecturers encourage students to adopt the use of instructional media (Thongmak, 2014 & Arpaci, 2017). This condition implied that Edmodo e-learning ease of use was closely related to perceived usefulness. The ease of use that Edmodo e-learning would make it easier for users to get the use of the system.

Thus, the discussion of the results of the research confirmed that Edmodo e-learning user satisfaction in undergraduate programs was determined by three IS Success Model core variables, namely: IQ, SyQ and SeQ, and two core TAM variables, namely: PU and PEOU. The research results showed that the IS Success Model (IQ, SyQ and SeQ) variables were proven to have direct influences on the TAM (PU and PEOU) variables. The TAM variable had shown to have direct effect on user satisfaction (Table 7), as well as proving the ability of TAM core variables, namely: PU and PEOU in mediating the IS Success Model variable on Edmodo e-learning user satisfaction (Table 8). Indirectly, the IS Success model variable influenced user satisfaction through two TAM variables, namely PU and PEOU (Table 8). This confirmed that three IS Success Model variables, and the two TAM variables could be integrated and used to measure Edmodo e-learning user satisfaction in undergraduate programs.

This research presents theoretical and practical implications. Theoretical implications contribute to the theory of user satisfaction and technology acceptance. The model in this research uses and integrates the IS Success Model theory from DeLone & McLean and the TAM theory (Davis et al., 1989). This model validates the two theories with indicators that build on the satisfaction of Edmodo e-learning in undergraduate students at two universities in Makassar, Indonesia. The results of this research also have practical implications in providing input for leaders and lecturers in tertiary institutions, particularly in the implementation and development of appropriate and sustainable Edmodo e-learning.

CONCLUSIONS AND SUGGESTION

The results show that information quality, system quality, service quality, as well as ease and usability were factors that contributed to the satisfaction of Edmodo e-learning. Ease of use contributes more than perceived usefulness to user satisfaction. The contribution of ease of use is determined by the quality of information, system quality and service quality. The ease of use of Edmodo e-learning is largely determined by the quality of service. Likewise, the perceived usefulness is also determined by the quality of service. Good service quality, such as communication, collaboration, response or assistance in handling system problems, structured learning management will make users easy to access, learn, understand, and motivate the use of Edmodo e-learning for students in undergraduate programs. The ease and usefulness of Edmodo e-learning are caused by the quality of services, information and good system that can provide high level of satisfaction for students. High satisfaction with e-learning Edmodo will be considered as an urgent need today and tomorrow.

This research also recommends for exploring further variables or Edmodo e-learning satisfaction indicators, by adding the number of respondents and carried out in different places not only in the undergraduate program at Faculty of Teacher Training and Education at Unismuh Makassar and Faculty of Engineering at UNM Makassar.

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