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The Delone and McLean Information System Success Model: Investigating User Satisfaction in Learning Management System

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ABSTRAK

Sistem e-learning dirancang dengan mempertimbangkan kebutuhan peserta didik untuk memberikan kesempatan belajar yang berkualitas serta pengalaman belajar yang positif agar dapat meningkatkan kepuasan pengguna dan mencapai kesuksesan sistem secara menyeluruh. Survey kepuasan mahasiswa terhadap sarana dan prasarana dalam kegiatan pembelajaran menunjukkan sekitar 18.3% kurang puas terhadap fasilitas yang tersedia. Tujuan penelitian mengeksplorasi penggunaan dan kepuasan pengguna Sistem Pengelolaan Pembelajaran (SIPEJAR) sebagai platform e-learning. Penelitian ini mengadopsi D&M IS Success Model sebagai kerangka teoritis. Metode penelitian dengan pendekatan kuantitatif eksplanatif. Responden 84 mahasiswa dipilih menggunakan metode proportionate stratified random sampling dengan rumus Taro Yamane pada tingkat signifikansi 10% dari populasi mahasiswa sebanyak 542 mahasiswa. Data dikumpulkan melalui kuesioner dan analisis dengan SEM-PLS. Hasil penelitian menunjukkan kualitas pelayanan berpengaruh positif dan signifikan terhadap penggunaan dengan nilai p-value sebesar 0,029 namun tidak untuk kualitas sistem dan kualitas informasi. Kualitas sistem, kualitas informasi, kualitas pelayanan berpengaruh signifikan terhadap kepuasan pengguna dengan nilai p-value masing-masing sebesar 0,004, 0,038, dan 0,003. Selain itu penggunaan sistem juga memiliki pengaruh signifikan terhadap kepuasan pengguna dengan nilai p-value sebesar 0,000. Identifikasi penggunaan serta faktor-faktor yang mempengaruhi kepuasan pengguna baik positif maupun negatif, penyedia e-learning dapat memusatkan perhatian pada peningkatan aspek-aspek tertentu dari pengalaman pengguna dan melakukan penyempurnaan terhadap proses pembelajaran secara keseluruhan.

ABSTRACT

E-learning system is designed with the consideration of the learners' needs in order to provide quality learning opportunities and positive learning experiences. This study aim to analyze user satisfaction and achieving overall system success. A survey on student satisfaction regarding the facilities and infrastructure in the learning activities indicates that approximately 18.3% are dissatisfied with the existing facilities.The objective of this study is to analyze the use and satisfaction of users of the Learning Management System (SIPEJAR) as an e-learning platform. The Research method was conducted with an explanatory quantitative approach and adopts the D&M IS Success Model as a theoretical framework. A total of 84 students were selected as respondents using the proportionate stratified random sampling method with Taro Yamane's formula at a significance level of 10% from the population of 542 undergraduate psychology students. The data was collected through questionnaires and analysis with SEM-PLS. The research results show that service quality has a positive and significant effect on usage, p-value of 0.029 but not for the system quality and information quality. System quality, information quality, and service quality have a significant effect on user satisfaction, p-values respectively, of 0.004, 0.038, and 0.003. Apart from that, system usage also has a significant influence on user satisfaction, p-value of 0.000. By identifying the usage and factors that influence user satisfaction, e-learning providers can focus their attention on improving specific aspects of the user experience and enhancing the overall learning process.

1. INTRODUCTION

Information systems have a crucial role in providing better services and creating competitive advantages, therefore it is important to understand how the use of information systems can be an effective solution in overcoming various obstacles and improving service quality (Hidayatullah et al., 2020; Sebe, 2023). The rapidly increasing development of information and communication technology has had a significant impact on the education sector and has requires the world of education to always adapt to technological developments in order to improve the quality of education, especially adapting the use of information and communication technology in technology-based learning processes so that higher education continues to strive to find models that effective in providing better opportunities and learning for students (Agustian & Salsabila, 2021; Prifti, 2022; Ratheeswari, 2018). The main focus of teaching and learning activities in higher education is students' learning abilities so that

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the integration of education and measurable technology is an important step in improving the quality of learning, where the success of the information system used in an organization is one of the organization's goals (Sholihah & Lenggono, 2020; Vartiainen et al., 2016).

The success of an information system does not only depend on the system itself, but can be manifested through understanding and benefits obtained from using the system. There are two aspects of failure in implementing an information system, namely the technical aspect, which is related to the technical quality of the information system and the non-technical aspect is related to the perception of information system users which influences their desire to use the information system that has been developed (Bosica et al., 2021; Kivunja, 2015). Some of the obstacles that often occur in using the system are the low quality of the information system, such as slow loading and uploading of documents, the use of teaching media that is less interesting or interactive and the unavailability of test materials as evaluation material (Ayuni & Mulyana, 2019; Putri et al., 2023). Therefore, it is important to continue making improvements to the information system so that it can be used as an effective evaluation tool in assessing the success of implementing an information system (Antonius Edy & Anyan, 2022; Utomo et al., 2018). One important factor in measuring the level of information system implementation is user satisfaction, therefore user satisfaction is a dependent variable that must be taken seriously (Lestariningsih et al., 2020; Rahmat et al., 2019; Wijaya & Suwastika, 2017).

The development of information technology encourages the use of e-learning as an effective learning medium, e-learning based learning highly emphasizes constructivist approach that involves all learning elements, both teachers and students (Al-Fraihat et al., 2020; Sutadji et al., 2020). E-learning has become a popular choice in improving the quality of education and the use of e-learning aims to increase the effectiveness and efficiency of learning (Nugroho et al., 2019; Sharma & Bhatta, 2018). Researchers continue to work to identify key factors that influence the utilization and success of e-learning. One model that is often used in investigating information system success is the DeLone & McLean Information System Success Model (D&M IS Success Model). In the D&M IS Success Model, several constructs are used to evaluate the success of information systems including system quality, information quality, service quality, system usage, user satisfaction, and net benefits. In recent years, much research has been conducted regarding the application of the D&M IS Success Model in the context of e-learning (Alotaibi & Alshahrani, 2022; Raharja & Rokanta, 2023; Yudiawan et al., 2022);

System quality, information quality, and service quality have a close relationship with system use and user satisfaction, higher system quality tends to increase use and produce user satisfaction (Elmunsyah et al., 2023; Fernando et al., 2019). User satisfaction is an important factor in determining the success of an e-learning system and has become the main indicator in assessing the success of popular information systems and is often used in measuring system quality (DeLone & McLean, 1992; Kurt, 2019). Satisfaction in the context of e-learning, refers to the level of satisfaction felt by users with their learning experience. Therefore, it is important to note that the e-learning system must be designed by considering students' needs and providing a positive learning experience so that students will feel that their needs are a top priority and are met by higher education institutions thereby increasing the level of student satisfaction with higher education, e-learning must prioritize the quality of systems, information and services in order to increase user satisfaction and achieve overall system success (Al-Azawei et al., 2023; Rahmat et al., 2019; Satuti et al., 2020).

Malang State University (UM) has adopted a technology-based learning system called SIPEJAR to support student learning activities. According to the findings of a survey conducted to assess student satisfaction with the facilities and infrastructure provided during learning activities, it has been revealed that around 18.3% of the students expressed their dissatisfaction with the current facilities. Evaluation is important to determine the level of success in implementing SIPEJAR. One method that can be used to evaluate the system is to determine the level of user satisfaction. Several researchers have conducted studies on SIPEJAR (Amalia & Megasari, 2021; Khafit et al., 2020). These studies aim to describe students' perceptions of the usefulness, ease of use, and accessibility of implementing SIPEJAR without measuring the level of SIPEJAR usage and user satisfaction. This research aims to explore the use and satisfaction of SIPEJAR by adopting the D&M IS Success Model as a theoretical framework. The D&M IS Success Model can be used to measure the level of satisfaction in using e-learning. The D&M IS Success Model was utilized by previous studies (Larasati & Andayani, 2019; Mtebe & Raphael, 2018; Yosep, 2015). However, they did not take into account the usage variables when measuring user satisfaction levels. A similar model was also applied by previous study in identifying the contributing factors to the success of e-learning by using the variables of usage and user satisfaction as observed factors (Al Mulhem, 2020; Ohliati & Abbas, 2019). However, this study did not analyze the influence between these two variables. The D&M IS Success Model in this research uses five constructs, namely system quality, information quality, service quality, system usage, and user satisfaction. System quality, information quality, and service quality partly or jointly can influence system usage and user satisfaction (Al-Adwan et al., 2021; Yakubu & Dasuki, 2018; Zhao et al., 2020). According to this model, user satisfaction can be seen from the extent to which the system meets these factors. This study aim to analyze user satisfaction and achieving overall system success. The evaluation of user satisfaction can assist in assessing the success of the learning delivered through SIPEJAR, enabling Universitas Negeri Malang (UM) to

identify areas that need improvement to enhance the quality of learning materials and more effective learning strategies. This aims to aid students as users of SIPEJAR in achieving their learning objectives.

2. METHOD

This research uses an explanatory quantitative approach with the aim of testing the proposed hypothesis. Explanatory research is used to explain causal relationships between variables through hypothesis testing (Singarimbun & Effendi, 2020). Figure 1 includes the stages of this research.

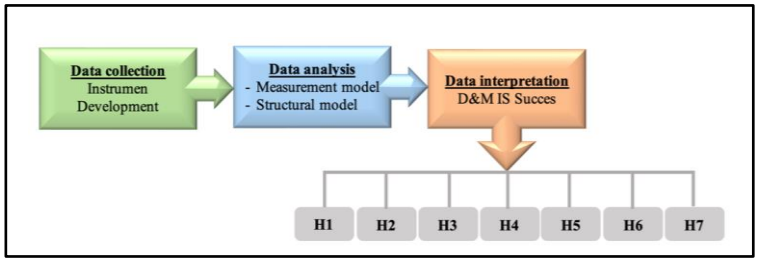

Figure 1. Research Steps

Data collection uses open and closed questionnaires as a data collection tool. The variables in the instrument were adapted from several previous studies (Chopra et al., 2019; Gable et al., 2008). The instrument distributed online to respondents consisted of 29 question items using Likert scale with a rating scale of 1 (one) to 4 (four) as the maximum value (Abdillah & Jogiyanto, 2015; Ghozali, 2014). A total of 84 respondents were selected for the study using the proportionate stratified random sampling technique with the Taro Yamane formula at a significance level of 10%. The target population consisted of undergraduate psychology students in the academic years 2021 and 2022, who were also SIPEJAR users with a minimun of one year of experience using the system. The overall population size was estimated to be 542 students. This technique was employed because the population consists of subpopulations, so the sample was taken from each subpopulation (Sholihah, 2020). Sample characterization is show in Table 1.

Table 1. Sample Characterization

Sample Characterization		Frequency	Percent
Gender	Male	14	17%
	Female	70	83%
Age	18-20	67	80%
	21-23	17	20%
Experience with SIPEJAR	1-2 years	52	62%
	More than 2 years	32	38%
	Total	**84**	**100%**

Figure 4 shows the conceptual framework and proposed hypotheses. System quality refers to the user's assessment of SIPEJAR's performance. Information quality is defined as the result of the system, where system users measure the quality of information produced by SIPEJAR. Service quality is a comparison of expectations with the actual services received by SIPEJAR users. The context of usage refers to the use of SIPEJAR itself, while user satisfaction is the response of SIPEJAR users to interactions with the system and utilization of SIPEJAR output. The conceptual framework is show in Figure 2.

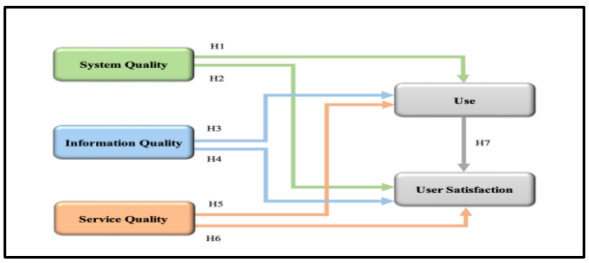

Figure 2. Conceptual Framework

System quality refers to the evaluation of information system processes which focuses on the results of user interaction with the system (Krisdiantoro et al., 2018; Pawirosumarto et al., 2015). System quality is an inherent characteristic and is associated with the system itself, including factors such as ease of use, ease of learning, and features of intuitiveness. System quality can be assessed based on several other factors such as usability, integration, and sophistication (Chopra et al., 2019). If users have experienced these aspects, they will feel confident and will not hesitate to reuse the system, so that the intensity of system use can increase. If the system exhibits high quality features and functionality, ensuring users have a positive experience can increase the overall user satisfaction obtained from using the system. Several studies have examined the actual influence between system quality and user usage and satisfaction (Martins et al., 2019; Yosep, 2015). The research results show that there is a positive relationship between system quality and user usage and satisfaction.

3. RESULT AND DISCUSSION

Result

Data analysis via SmartPLS 3.0 software. PLS is a structural equation analysis method (SEM) that focuses on variance, which allows measurement model testing and structural testing simultaneously. The measurement model (outer model) is evaluated through convergent validity and discriminant validity as well as composite reliability and Cronbach's alpha. Summary of measurement model testing as in Table 2.

Table 2. Value Measurement Model

Construct	Items	Loading Factor	AVE	Cronbach Alpha	Composite Reliability	Discriminant Validity
System quality	sq1.1	0.741	0.532	0.824	0.872	Valid
	sq2.1	0.766				
	sq3.1	0.715				
	sq4.1	0.747				
	sq5.1	0.642				
	sq6.1	0.757				
Information quality	iq1.1	0.614	0.540	0.878	0.903	Valid
	iq2.1	0.746				
	iq3.1	0.735				
	iq4.1	0.760				
	iq5.1	0.746				
	iq6.1	0.724				
	iq7.1	0.791				
	iq8.1	0.751				
Service quality	seq1.1	0.717	0.514	0.764	0.841	Valid
	seq2.1	0.682				
	seq3.1	0.736				
	seq4.1	0.713				
	seq5.1	0.736				
Use	use1.1	0.638	0.502	0.679	0.800	Valid
	use1.2	0.658				
	use2.1	0.772				
	use3.1	0.757				
User satisfaction	us1.1	0.804	0.623	0.879	0.908	Valid
	us2.1	0.773				
	us3.1	0.815				
	us4.1	0.776				
	us5.1	0.757				
	us6.1	0.809				

Convergent validity can be seen from the loading factor value for each construct indicator > 0.6 and the average variance extracted (AVE) value > 0.5 (Solimun, et al. 2017). Based on Table 2, all constructs have an AVE value of more than 0.5 so they can be declared valid. The composite reliability value is > 0.7 and Cronbach's alpha > 0.6, so that all constructs are declared reliable. Reliability measurement can be done by looking at the composite reliability value and Cronbach's alpha > 0.7 but a value of 0.6 is still acceptable. The cross-loading value of each construct is greater than the correlation with other latent variables, therefore discriminant validity is

declared valid. Evaluation of the structural model (inner model) is aimed to predict the relationship between latent variables. The structural model is assessed using R-square for dependent constructs, p-values or t-values for each path to test significance between constructs in the structural model. The R-square value is used as a measuring tool to determine the contribution of exogenous variables to endogenous variables in the research context. The result is show in Table 3.

Table 3. R-Square Value

Construct	R-Square
Use	0.252
User Satisfaction	0.693

Table 3 show analysis results show that the R-Square value for the *use* variable is 0.252, which means that exogenous variables (system quality, information quality, service quality) influence *use* by 25.2% (weak model), while the remaining 74.8% is influenced by other variables that not included in the research model. The R-Square value of the user satisfaction variable is 0.693, meaning that the variables of system quality, information quality and service quality influence user satisfaction by 69.3% (strong model), while the remaining 30.7% is influenced by other variables not examined in this research. Hypothesis testing is a way of making decisions in evaluating research results against predetermined objectives. Table 4 shows the results of hypothesis testing in this study.

Table 4. Summary of Hypothesis Testing

Hypothesis	Path	Path coefficient	t-statistics	p-value	Information	Result
H_1	SQ → Use	0.141	0.749	0.454	(+) not significant	Rejected
H_2	SQ → US	0.248	2.875	0.004	(+) significant	Accepted
H_3	IQ → Use	0.117	0.645	0.519	(+) not significant	Rejected
H_4	IQ → US	0.198	2.085	0.038	(+) significant	Accepted
H_5	SEQ → Use	0.299	2.189	0.029	(+) significant	Accepted
H_6	SEQ → US	0.261	3.007	0.003	(+) significant	Accepted
H_7	Use → US	0.314	4.743	0.000	(+) significant	Accepted

Based on Table 4, two hypotheses are rejected, namely the influence of system quality on usage (H_1) and information quality on usage (H_3) because the p-values are 0.454 and 0.519 respectively. Hypothesis testing can be seen from a p value ≤ 0.05 indicating a significant influence and a p value ≥ 0.05 indicating an insignificant influence. Apart from that, it can be done by looking at the t-value which is considered significant if the t-value is > 1.96. Five other hypotheses ((H_2); (H_4); (H_5); (H_6); and (H_7)) has a significant influence with a p-value ≤ 0.05 & t-value > 1.96. SIPEJAR user satisfaction is influenced by the variable of system, information and service quality. Then the SEM-PLS Result is show in Figure 3**.**

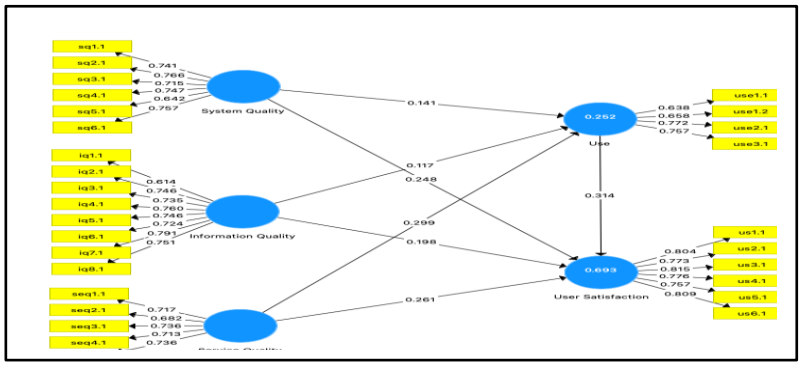

Figure 3. SEM-PLS Result

Figure 3 shows that the SIPEJAR usage variable has a dominant influence with a path coefficient value of 0.314 on user satisfaction. Increasing use will have an impact on increasing user satisfaction. Service quality has a positive and significant effect on user usage and satisfaction with path coefficient values of 0.299 and 0.261.

Discussion

SIPEJAR provides a different learning approach for students. The research results show that the hypothesis (H_1) is rejected. System quality has no significant effect on system usage. Using SIPEJAR is mandatory so students continue to use the system without paying attention to the quality of the system. These results are in line with research by previous studies state that system quality has no effect on the use of e-learning systems (Al-Fraihat et al., 2020; Salam & Farooq, 2020). However, on the contrary, other studies stated that system quality has a positive impact on system usage (Mtebe & Raphael, 2018; Zhao et al., 2020). A system that can meet user expectations and needs can encourage the level of use of the system. System quality influences user satisfaction significantly, so hypothesis (H_2) is accepted. The quality of the SIPEJAR system which is easy to use, has various features and functions in learning, and modern features can increase user satisfaction on SIPEJAR because users feel the system is able to meet their needs. These results are in line with research by which states that system quality has a significant influence on user satisfaction. A high-quality system is more likely to increase satisfaction (Fernando et al., 2019).

Information quality does not have a significant effect on the use of SIPEJAR, so hypothesis (H_3) is rejected. This might be influenced by the mandatory use of SIPEJAR so that students continue to use the system without paying attention to the quality of the information as well as the influence of system quality on the use of SIPEJAR. This finding contradicts the general view that information quality has an important role in encouraging system use, but this result is in line with research who stated that there is no significant relation between information quality and system usage (Salam & Farooq, 2020). In contrast to the research results state that the quality of information has a positive and significant impact on the use of e-learning systems (Pawirosumarto et al., 2015). The use of e-learning will increase when the system can present clear, precise and accurate information.

Information quality is proven to have an influence on system user satisfaction so that hypothesis (H_4) is accepted. The quality of SIPEJAR information delivered concisely, clearly, accurate, easy to understand, and adequate according to student needs, hence tends to increase student satisfaction. The good quality of SIPEJAR information allows students to increase productivity in learning. This finding is in line with the research results show that the quality of information and user satisfaction are connected and support each other (Elmunsyah et al., 2023; Sary et al., 2021). Information quality refers to the quality of content that influences the e-learning system, where high quality information will have an impact on increasing satisfaction.

Service quality significantly influences the use and satisfaction felt by SIPEJAR users so that hypotheses (H_5) and (H_6) are accepted. This shows that the facilities provided by SIPEJAR such as adequate resources and support, stable access, and clear instructions in learning are able to increase the use of SIPEJAR and produce user satisfaction. On the other hand, if the service quality is low and does not meet these factors, it will reduce the use and satisfaction of SIPEJAR users. These results strengthen the research results who stated that there is a significant relationship between the quality of service provided by e-learning and user usage and satisfaction (Al-Azawei et al., 2023; Ohliati & Abbas, 2019). The quality of services provided, such as the availability of good technical support in resolving problems, can increase the frequency of e-learning usage and satisfaction to the services. The use and satisfaction of SIPEJAR users is statistically significant so that hypothesis (H7) is accepted. Based on the results of data analysis, the use of SIPEJAR has a significant influence on user satisfaction. Students utilize SIPEJAR for the learning process, completing assignments with frequent access and supported by good quality systems, information and services will tend to increase satisfaction with SIPEJAR. The results of this study confirm study who argue that system usage encourages user satisfaction (Ithriah et al., 2020). A positive user experience with the system can contribute to increased user satisfaction.

In this study, it was found that The D&M IS Success Model has significant implications in identifying the level of usage and user satisfaction. The findings of this research can be utilized by Universitas Negeri Malang (UM) to identify areas that need improvement in order to enhance the quality of learning materials and implement more effective learning strategies to assist students as users of SIPEJAR in achieving their learning goals, ultimately leading to positive impacts on their academic achievements.This research has several limitations, including the research sample size is relatively low and is only limited to one faculty. Therefore, the number and characteristics of respondents in future research need to be taken into consideration. Future research can analyze the impact of using e-learning by considering other variables such as individual impacts and perceived learning outcomes from the student's perspective.

4. CONCLUSION

D&M IS Success Model is able to be an indicator for measuring SIPEJAR user satisfaction, of the seven hypotheses proposed there are five hypotheses that have a significant effect and two hypotheses are not proven to have a significant effect. The use and user satisfaction towards SIPEJAR is influenced by factors of system quality, information quality and service quality. Service quality is the dominant factor influencing students to use SIPEJAR. The level of use of SIPEJAR is a driving factor in increasing user satisfaction. The results of this

research reveal that there are still several variables that are considered low by users, such as system quality and information quality. This variable was not proven to be a factor that had a significant influence on the use of SIPEJAR.

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