

Evaluating a Presence and Journal Information System using an Expanded IS Success Model: Incorporating Technology Readiness

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Abstract. This research evaluated the presence and journal information system in Indonesia high school. Students and teachers used this system to fill attendance and administrative tasks at school. During two years of usage, teachers and students were found lack of use to the system. This research evaluated the system using an expanded Delone and Mclean IS Success Model incorporated with Technology Readiness Index (TRI) factors. This study used several variables such as system quality, information quality, user satisfaction, net benefits, optimism, innovativeness, discomfort, and insecurity.

SEM PLS was used for data analysis with Smart PLS 4.0 application. The survey was conducted with 402 teachers and students. The result found system quality, information quality, optimism, discomfort, and insecurity significantly influenced user satisfaction. User satisfaction further impacted on net benefits. However, innovativeness had no effect on user satisfaction.

This result is expected to give the high school guidance in creating strategic decisions for system improvement based on system quality and information quality along with optimism, discomfort, and insecurity. While providing an initial model application, the single school sample, and cross-sectional data limit result generalization. Specific guidance for system improvements is also needed. Further validation across schools could better establish model utility for understanding technology acceptance and informing education system implementations.

Keywords: IS evaluation, Presence Information System, Delone and Mclean IS Success Model, Technology Readiness Index, Net Benefit

1. Introduction

Many schools in Indonesia implemented distance learning for a period of two years during COVID pandemic, from 2020 to 2022. Throughout the distance learning period, one of the private high schools in Indonesia faced challenges in managing administrative tasks related to learning, such as attendance records, filling out reflective teaching journals, monitoring teacher activities, and documenting student cases in school. A Presence and Journal Information System was developed to address these issues and ensure that distance learning can be properly monitored while maintaining effective administrative processes in schools.

During the two years of implementing the system, teachers and students were found less use of the system. The data analysis found that 3% of students were not fill daily attendance and 41% of school subjects were not found in reflective teaching journal that must be fill by teachers. Based on this problem, evaluation must be conducted for better system usage. Several researchers also reported that information system projects have a higher failure rate compared to other projects (Nguyen et al., 2015). The success rate of an information system was only about 25-40% from 2007 to 2016, and its failure rate reached 31%. Therefore, this research was conducted to evaluate the presence and journal information system and give a recommendation to the high school for system improvement.

This study utilized the Delone and McLean IS Success Model and the Technology Readiness Index to examine the factors that influence the success of the presence and journal information system. Several variables used in this method are system quality, information quality, optimism, innovativeness, user satisfaction, and net benefits.

2. Theoretical Background

2.1. Information System Evaluation

Several previous studies have reported high failure rates in the implementation of information systems. The success rate of information system implementations was reported to be only 32%, with the public sector experiencing the highest failure rate at 84% (Altuwaijri & Khorsheed, 2012). Ineffective implementation of information systems can lead to loss in the IT field investments.

An information system evaluation is crucial part to ensure its success. Evaluation provides continuous feedback, enabling the system to be developed continuously (Sligo et al., 2017). Understanding the factors that contribute to the success of information systems in organizations can help reduce implementation failures (Monem, 2013). Various methods have been employed to evaluate information systems, such as the Technology Acceptance Model (TAM), DeLone and McLean model, and the Gable et al. model (Manchanda, 2013).

2.2. Updated Delone and Mclean IS Success Model

The Updated DeLone & McLean IS Success Model is a method used for analyzing the success of information system implementation. This method is quite popular and supported by various studies (Manchanda, 2013; Sabeh et al., 2021). The method explains that six factors contribute to the success of an information system, which can be observed through the relationships between information quality, system quality, service quality, use, user satisfaction, and net benefit (Çelik & Ayaz, 2022).

System quality described as the useful characteristics of the information system include ease of use, flexibility, reliability, and speed. Information quality contains information system outputs such as managerial reports and web pages include relevance, ease of understanding, data accuracy, conciseness, completeness, timeliness, and user-friendliness. Service quality means providing an assessment of the quality of services provided to support the use of information systems can be done by both the IT service team and the information systems department (Efiloğlu Kurt, 2019).

System use is Assessing user adoption of the information system includes evaluating factors such as the frequency of use, the number of users, the purpose of use, and user habits. User satisfaction

explained as the level of user satisfaction with the information system. Net Benefits addressed to the contributions of an information system to individuals, companies, organizations, industries, and countries include improving decision-making processes, enhancing productivity, increasing sales, reducing costs, boosting profitability, and fostering economic growth (Petter et al., 2013).

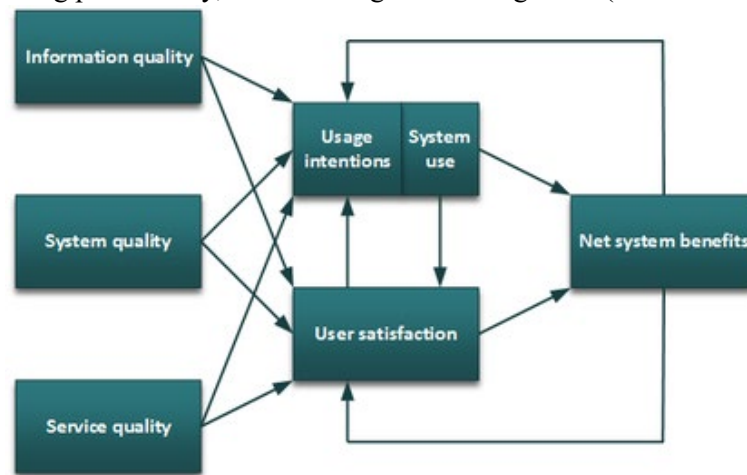


Fig. 1: Updated Delone and Mclean

2.3. Technology Readiness Index

One characteristic of an individual in accepting new technology is their readiness. Readiness can be measured using an instrument called the Technology Readiness Index (TRI). TRI is a method developed by Parasuraman (Nugroho, 2015). TRI consists of two main components: supporting components, which are optimism and innovativeness, and inhibiting components, which are discomfort and insecurity. There are some explanations related to the components of TRI, optimism represents a positive outlook on technology and its usefulness in enhancing an individual's efficiency and performance at work (Nugroho & Fajar, 2017). Optimism is the opposite of fear and negative experiences. Innovativeness refers to an individual's characteristic of being a pioneer and adopting something new, such as new technologies (Blut & Wang, 2020). Optimism and innovativeness are components of contributor of technology readiness.

The inhibitor component from technology readiness, consist of discomfort and insecurity. Discomfort refers to the feeling of unease and lack of control over technology, as well as the perceived difficulty in using it (Parasuraman, 2000). Insecurity is the inhibiting factors where there is an element of distrust and skepticism towards a technology (Panday & Purba, 2015). This becomes inhibitor to an individual's readiness in accepting the use of technology.

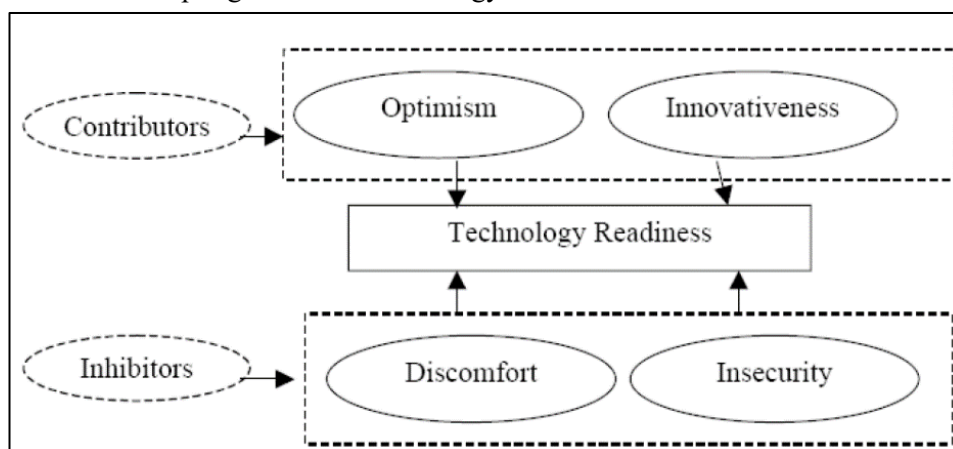


Fig. 2: Technology Readiness Index

2.4. Prior Research

Several studies and related works on information system success have utilized the Delone & McLean IS Success Model. Various researchers have also modified this method by combining it with other methods such as TAM, UTAUT, Task Technology Fit model, and Expectation-Confirmation Model of IS Continuance (Sabeh et al., 2021). Previous research has produced various conclusions regarding the relationships between constructs in both the Updated DeLone and McLean IS Success Model and the modified methods. A study by Aldholay (Aldholay et al., 2018) found that system quality, information quality, service quality, and self-efficacy have a positive influence on user satisfaction and actual system usage.

Ghaith Al Abdalah (Al-Abdallah, 2015) added the constructs of system security and interference design quality as additional components to the Delone and McLean method in evaluating information systems in the banking sector, specifically in mobile banking, to achieve user trust and commitment. It was reported that user satisfaction has a positive impact on trust, and trust has a positive impact on user commitment. A study by Jeyaraj (Jeyaraj, 2020) conducted a meta-analysis of various studies in e-learning system from 1992 to 2019 regarding the model of Delone and McLean method and the modifications. The study found several conclusions, such as the interchangeability of the constructs of net benefits and perceived usefulness, and the consistent relevance of service quality across all contexts. Several studies examined information systems with voluntary or mandatory usage contexts, which can impact the construct of system use in the Delone and McLean model.

Several studies evaluating information systems in mandatory usage contexts, such as Monem's research (Monem, 2013), suggested mandatory information systems prioritize the quality of usage over the quantity of usage. Kristy (Kristy et al., 2022) has stated the combination of the Delone and McLean method with the TAM (Technology Acceptance Model) is the most used model. The influential factors identified in this research are the system, users, and the organization. Nugroho (Nugroho & Fajar, 2017) conducted a study combining TAM and Technology Readiness Index (TRI) on a web based mandatory attendance system. The findings revealed that only optimism and innovativeness from TRI were accepted as influential factors.

The research conducted by Hamzah (Hamzah et al., 2022) focused on measuring university e-learning in Indonesia. The result showed that technology readiness factors which are optimism, innovation, discomfort, and insecurity was significantly influenced user satisfaction. User satisfaction was influenced by ease of use and technology readiness of e-learning users. Subiyakto (Subiyakto et al., 2019) research focused on the readiness and success of ubiquitous learning in Indonesia. This study combined Delone and McLean IS Success Model and TRI. The result showed the indicators of TRI have a positive impact on information quality, system quality, and service quality. Another studies by Tuyet & Tuan (Tuyet & Tuan, 2020) in self-service technology also found technology readiness had positively impacted satisfaction.

3. Research Design

The model used in this research is the expanded Delone and Mclean IS Success Model by incorporating the TRI. The model from Delone & Mclean was adjusted by eliminating service quality and use/intention to use construct. The high school does not provide an IT support service, as reflected in the service quality variable in Delone & Mclean IS Success Model (Petter et al., 2013). Therefore, service quality can be eliminated. The presence of the information system is mandatory for all teachers and students, making it a mandatory system, and thus the intention to use variable can be removed. This is supported by Kristy research (Kristy et al., 2022), which revealed that intention to use is not suitable for mandatory systems. User satisfaction is recommended for evaluating the success of mandatory systems.

TRI represents the technology readiness index based on an individual's perception or opinion about technology, rather than their ability or capacity to use technology (Nugroho, 2015). Several studies from

Hamzah, Subiyakto and Tuyet (Hamzah et al., 2022; Subiyakto et al., 2019; Tuyet & Tuan, 2020) have elaborated Delone and Mclean IS Success with TRI model which includes optimism, innovativeness, discomfort, and insecurity in e-learning, ubiquitous learning, and self-service technology. A study from Alam (Alam et al., 2019) also stated model development by combining readiness and success constructs using Delone & Mclean IS success and TRI constructs.

Based on the Delone and Mclean and TRI model, this research model used as the following below.

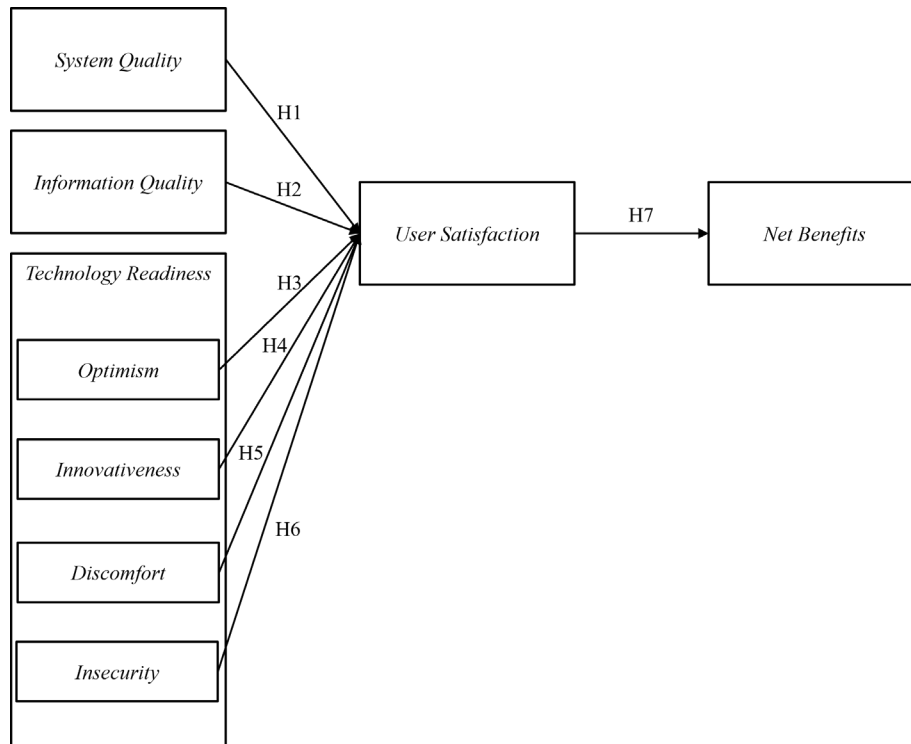


Fig. 3: Research Model and Hypothesis

The research hypothesis formed from the relationship between variables as follows:

H1: System Quality has a significant influence on User Satisfaction.

H2: Information Quality has a significant influence on User Satisfaction.

H3: Optimism has a significant influence on User Satisfaction.

H4: Innovativeness has a significant influence on User Satisfaction.

H5: Discomfort has a significant influence on User Satisfaction.

H6: Insecurity has a significant influence on User Satisfaction.

H7: User Satisfaction has a significant influence on Net Benefits.

The following table below is the list of indicators used to measure the information system success factors.

Table 1: Indicator Description

Variable	Indicators
System Quality	The system is always available. The system is easy to be use. The system is easy to understand. The system has a fast response time when accessed. The system has a comprehensive feature.
Information Quality	The system provides complete data and information. The system provides accurate data and information. The system provides data and information that is easy to read and understand. The system provides up-to-date data and information.
Optimism	Technology can assist in my work in the organization. Technology makes me more productive.

	I will continue to use technology throughout my career. I rely on technology to accomplish tasks or achieve certain goals. I will use more renewable technologies.
Innovativeness	I am always seeking information about the latest technology. I strive to use the latest technology to facilitate my work. I can quickly and proficiently master and utilize technology.
Discomfort	I feel embarrassed when people notice that I am unable to use technology correctly. I feel that others are always one step ahead in the using of technology compared to me. I prefer using simpler technology rather than complex ones. I feel uncomfortable using online technology like this attendance and electronic journal system.
Insecurity	I rely too much on technology to perform tasks. Using this system makes me feel insecure. This system makes me interact less with others. I feel insecure using online systems.
User Satisfaction	I enjoy using the presence and electronic journal information system. I am satisfied with the performance of the presence and electronic journal information system. I am satisfied with the functionality of the presence and electronic journal information system in managing educational documents, such as attendance and journal records. Overall, I am satisfied with the performance of the presence and electronic journal information system.
Net Benefits	The presence and electronic journal information system has provided me with new knowledge about the use of technology. The presence and electronic journal information system helps to save time and effort in managing educational documents. The presence and electronic journal information system is highly beneficial for me and the school in achieving our goals.

This research utilized the entire population in the high school. A total of 402 school population is a system user, including teachers and students. The respondents participated in the survey by filling out the online questionnaire with 33 questions based on indicators in table 1. The collected data processed using the Structural Equation Modeling Partial Least Square (SEM PLS). SEM PLS is an appropriate data analysis method for analyzing data with a small sample size and complex models. SEM PLS could analyze data with both formative and reflective constructs (Fong & Law, 2013).

Structural model testing is conducted to examine the relationships between exogenous and endogenous variables. These inter-variable relationships serve as the answers to the formulated research hypotheses. The suggested critical value for the t-values is 1.96. A criterion considered acceptable if the t-values value is more than 1.96 and the probability value is less than 0.05 (Prof. Dr. Umi Narimawati et al., 2020).

4. Result and Discussion

Data processing was conducted using the SEM PLS method with smartPLS 4.0 application. The questionnaire was distributed to all users which are teachers and students with total of 402 respondents. The first step conducted was measurement model (outer model) with convergent validity. Convergent validity is a measurement model with reflective indicators based on the correlation between indicator values and construct values (Musyaffi et al., 2022). Validity testing was performed by examining the loading factor and average variance extracted (AVE) values. The recommended loading factor and AVE value for each construct is greater than 0.5 (Adrianto & Fajar, 2023; Hair et al., 2021). The first validity

test result showed 2 indicators, which are DIS4 and INS1 were having loading factor values below 0.5. A retest conducted by removing these two indicators. The following table shows the results of the second validity testing. The result of validity test is shown in the table below based on analysis from smartPLS 4.0 application:

Table 2: Validity Test Result

Variables	Indicators	Loading Factor	AVE	Result
System Quality	SQ1	0.616	0.526	Valid
	SQ2	0.793		Valid
	SQ3	0.760		Valid
	SQ4	0.753		Valid
	SQ5	0.690		Valid
Information Quality	IQ1	0.829	0.612	Valid
	IQ2	0.768		Valid
	IQ3	0.776		Valid
	IQ4	0.755		Valid
Optimism	OPT1	0.791	0.543	Valid
	OPT2	0.660		Valid
	OPT3	0.817		Valid
	OPT4	0.714		Valid
	OPT5	0.691		Valid
Innovativeness	INN1	0.806	0.516	Valid
	INN2	0.729		Valid
	INN3	0.709		Valid
	INN4	0.619		Valid
Discomfort	DIS1	0.774	0.718	Valid
	DIS2	0.883		Valid
	DIS3	0.881		Valid
Insecurity	INS1	0.746	0.634	Valid
	INS2	0.681		Valid
	INS3	0.939		Valid
User Satisfaction	US1	0.839	0.754	Valid
	US2	0.878		Valid
	US3	0.860		Valid
	US4	0.895		Valid
Net Benefits	NB1	0.831	0.751	Valid
	NB2	0.884		Valid
	NB3	0.884		Valid

All of indicators used in this research are valid based on the loading factors and AVE value which are greater than 0.5. The next step test conducted was reliability test for each construct. Reliability testing was conducted to measure the consistency of each construct used. Reliability testing conducted by examining the Cronbach's alpha and composite reliability value, which are expected > 0.7 (Cheung et al., 2023). The result of the reliability testing is presented in the table below:

Table 3: Reliability Testing Result

Variables	Cronbach's Alpha	Composite Reliability	Result
System Quality	0.771	0.846	Reliable
Information Quality	0.789	0.863	Reliable
Optimism	0.791	0.855	Reliable
Innovativeness	0.719	0.809	Reliable
Discomfort	0.812	0.884	Reliable
Insecurity	0.762	0.836	Reliable
User Satisfaction	0.891	0.925	Reliable

Net Benefits	0.834	0.900	Reliable
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The table above shows the values of Cronbach's alpha and composite reliability are greater than 0.7. This indicates all constructs have met the criteria for reliability. Constructs with strong reliability could be reused for future research. Structural model testing was conducted to observe the relationships between exogenous and endogenous variables. These inter-variable relationships provide answers to the hypotheses formulated in the research. Hypothesis testing was performed after validity and reliability test give a satisfied result. Statistical significance of indicator weight based on a t-value 1.96 and level of significance of 0.05 (Hair et al., 2020). The hypothesis result is significant if the t-value is greater than 1.96 and not significant if below 1.96. The result of the hypothesis testing is shown in the table below:

Table 4: Hypothesis result

Hypothesis	T-value	Result
System Quality → User Satisfaction	4.924	Significant
Information Quality → User Satisfaction	5.910	Significant
Optimism → User Satisfaction	2.477	Significant
Innovativeness → User Satisfaction	0.379	Not Significant
Discomfort → User Satisfaction	2.630	Significant
Insecurity → User Satisfaction	3.284	Significant
User Satisfaction → Net Benefits	12.176	Significant

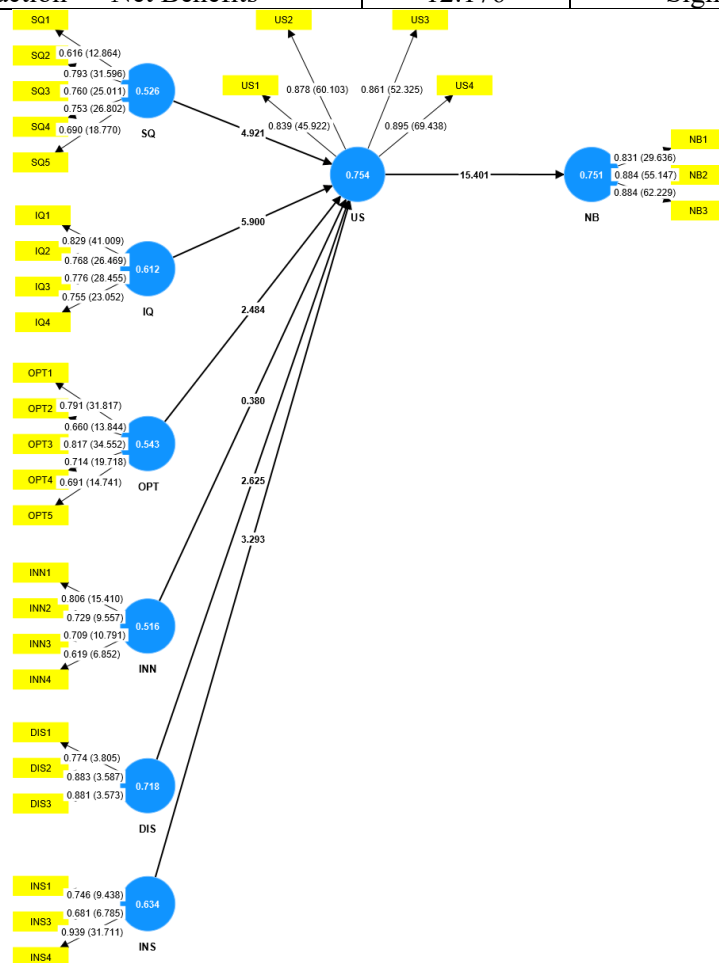


Fig. 4: Hypothesis result

- H1: System quality significantly influenced user satisfaction.

The t-value result for H1 is 4.924. Since the value of $4.924 > 1.96$, it can be concluded that system quality significantly influenced user satisfaction. This indicates that system quality such as ease of

use, flexibility, and response time plays a significant role in affecting user satisfaction (Agustina & Sutinah, 2019; Autzen, 2007)

2. H2: Information quality significantly influenced user satisfaction.
The t-value result for H2 is 5.910. Therefore, it can be concluded that information quality has a positive influence on user satisfaction. This indicates that information quality such as completeness, usability, and accuracy positively affect user satisfaction. Users would feel satisfied when they use a system with easily access and understand (Alotaibi & Alshahrani, 2022; Jami Pour et al., 2022).
3. H3: Optimism significantly influenced user satisfaction.
The t-value result for H3 is 2.477. Since $2.477 > 1.96$, it can be concluded that optimism significantly influenced user satisfaction. This indicates that user's optimism about positive view of technology in their work positively affect user satisfaction. The higher the user's optimism, the more it can enhance user satisfaction with the system (Elliott et al., 2012).
4. H4: Innovativeness does not significantly influence user satisfaction.
The t-value result for H4 is 0.379. Since $0.379 < 1.96$, it can be concluded that innovativeness does not significantly influence user satisfaction. This indicates that user's innovativeness of to be a pioneer in technology usage does not positively affect user satisfaction. This is also confirmed in a previous study by Subiyakto (Subiyakto, 2018; Subiyakto et al., 2019) on assessing information system integration and ubiquitous learning in Indonesia, where innovativeness was found to be not significantly related to user satisfaction. This is not to be expected because innovative users should be a person with high demand of using technology to affect user satisfaction. Several studies were found innovativeness influenced satisfaction (Wang & Wang, 2022)
5. H5: Discomfort significantly influenced user satisfaction.
The t-value result for H5 is 2.630. Since $2.630 > 1.96$, it can be concluded that discomfort significantly influenced user satisfaction. This indicates that the user's discomfort through technology such as lack of control and being overwhelmed by it positively affects user satisfaction. User's discomfort in using technology creates a perception of a system that cannot accommodate and assist in their tasks, potentially lowering user satisfaction (Hailey Shin et al., 2021).
6. H6: Insecurity significantly influenced user satisfaction.
The t-value result for H6 is 3.284. Since $3.284 > 1.96$, it can be concluded that insecurity significantly influenced on user satisfaction. This indicates that user's insecurity through technology such as distrust and skepticism positively affect user satisfaction. This could lead to a reluctance to continue using the system and thereby reducing overall user satisfaction with the system (Subiyakto, 2018).
7. H7: User satisfaction significantly influenced net benefits.
The t-value result for H7 is 12.176. Since $12.176 > 1.96$, it can be concluded that user satisfaction significantly influenced on net benefits. Several indicators used to measure user satisfaction are the performance and functionality of the system. High satisfaction perceived by users could influence net benefits derived from the system. Users will be able to feel the benefit provided by the system in assisting their work (Monika & Gaol, 2017).

5. Conclusion

The study was conducted to evaluate the presence and journal information system at high school using expanded Delone and Mclean IS Success Model by incorporating TRI. This evaluation is expected to give the school guidance in creating strategic decisions for system improvement. The result found that system quality, information quality, optimism, discomfort, and insecurity significantly influenced user satisfaction. User satisfaction also significantly affects net benefits. On the other hand, the variable innovativeness was found to have no significant impact on user satisfaction (Subiyakto et al., 2019).

System quality and information quality can represent user's perceptions of the system's usability (Petter et al., 2013). User satisfaction influenced by the system's excellence and the information

provided by the system to users. The better the system is at delivering information, the more satisfied users will be in using the system. Optimism, innovativeness, discomfort, and insecurity represent users' perceptions of technology readiness. Technology readiness provides an overview of users' characteristics in relation to technology and information system usage (Parasuraman, 2000). Users who are embraced and ready with technology usage will feel more satisfied as the system could assist them in work. On the other hand, user satisfaction with the system will have a positive impact on net benefits for the organization. The school will gain positive effects, such as improved teachers and students performance, as users perceived benefits and satisfaction in using the system.

As the result from this research, Delone and Mclean IS success model and TRI could be used as model to assess evaluation of presence and journal information system in high school. The school should point out the system and information quality by utilizing and improving the IT infrastructure such as servers and system user interface. The school also should provide courses and training about technology readiness for users, especially teachers and students. These courses and training could provide new insights for teachers and students to the system usage. Keeping high user satisfaction would affect net benefit for school. The school activities such as students attendance and teachers administrative task would be done faster by using technology.

However, this study still has limitations such as single school sample and cross-sectional data. The research model requires further validation. A lot of work is needed to gain a satisfied result by taking a survey at more than one school sample. Specific practical recommendations based on the factors examined would also strengthen the research. While offering a useful modeled application, more work is needed to verify the utility of the expanded Delone and Mclean IS success and TRI model for assessing education systems across schools, informing implementation and acceptance strategies. There are limitations in prior research due to Delone and Mclean IS Success and TRI model in school system. Future research is required to evaluate this research model for a better result.

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