

The effect of system reliability, information sharing and service quality on e-learning net benefit in public sector organizations

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ABSTRACT

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The purpose of this study was to investigate how public sector workers in Indonesia use e-learning systems and how they can benefit from them. The researchers analyzed five variables that contribute to the effectiveness of e-learning: system reliability, information sharing, service quality, user satisfaction, and net benefit. Structural Equation Model analysis was used to analyze the data collected from 203 respondents who were public sector employees in Indonesia. The findings of this study revealed that information sharing, and service quality significantly impact user satisfaction, which in turn has a significant effect on net benefits. Additionally, system reliability was found to significantly impact user satisfaction. This theoretical implication suggests that there is a direct relationship between the level of information sharing and service quality provided by a public sector organization and the level of user satisfaction experienced by its usage of e-learning. The practical implication of the finding is that public sector organizations must prioritize the reliability of their e-learning systems. This includes investing in regular maintenance and updates, ensuring proper testing and quality control procedures, and addressing any issues or downtime quickly and effectively.

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1. Introduction

The community has responded favorably to the quick advancements in information and computer technology. Many public services have incorporated ICT, while businesses refer to it as e-business or e-commerce, governments use e-government and education adopts e-learning. Roffe (2002) posits that e-learning encompasses all types of instruction which utilize electronic media or information technology. However, it is imperative to note that not all e-learning programs are efficacious or beneficial to their intended audience. According to Gorry's (1971) findings, there are two forms of deficiencies that can occur in the implementation of information systems. The initial kind is technical and has to do with the system's quality, while the latter is non-technical and is associated with how the system is perceived by users, affecting their willingness to adopt and make use of it. Creating synergies is crucial between information systems and supporting technology, as well as between users and other parties that interact with the system. When there is a lack of synergy between the information system and users' willingness and readiness, users may become dissatisfied. Typically, this occurs due to differing perspectives between business units and information system providers. Such issues are common in the relationship dynamics that exist between these two groups (Kern & Willcocks, 2002; Clark, 2002). Furthermore, the integration of information technology in all organizational activities has become imperative, making it essential to evaluate the costs and benefits of IT (Remenyi et al., 2007). Stoneburner et al. (2002) emphasize the importance of system evaluation to ensure the effective implementation of systems and their positive impact on services. To assess the success of information systems, various studies have explored successful models such as E-Learning (Melis et al., 2003; Chua & Dyson, 2004; Levy, 2006; Mason & Rennie, 2006). The evaluation of the effectiveness of e-learning usage in public sector institutions is important to achieve maximum benefits from

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their learning rooms. To accomplish this goal, a well-known evaluation model called DeLone and McLean's Information Systems Success Model will be utilized.

2. Literature Review and Hypothesis

Previous studies have found that users are primarily satisfied with the adoption of technology based on its ease of use (Bhatt, 2021; Chen & Wu, 2017; Rahmi et al., 2018). The users' perception of the system's usability, or ease of use, plays a crucial role in information system adoption and use (Kijisanayotin, 2009). Ithriah et al. (2020) recommend that the e-learning system is well-organized in content and features, and easy to use for higher adoption and satisfaction levels. The perceived ease of use, which refers to how easily users can learn and use computer technology, is a vital characteristic of the information system (Davis, 1989). If the information system is easy to use, users are more likely to be satisfied without investing much effort or time. Violante and Vezzetti (2015) note that improving e-learning applications' limitations can facilitate usage and enhance user satisfaction. The value that end users derive from information based on its content, form, and time is known as information sharing. The standard way to evaluate a system's output, which is the reports it generates, is known as information sharing. The essential attributes of the sought-after data dissemination within the system comprise of accuracy, precision, currency, reliability, completeness, conciseness, relevance, comprehensibility, significance, timeliness, comparability, and format, as stated by Swaid and Wigand (2009). The quality of information is central to the content of e-learning. The primary objective of an e-learning system is to furnish learners with vital information. The precision of information and the features offered have a significant sway on user approval. It is imperative that adaptive system concepts are updated and current. The effects of learning feedback on user contentment should also be recognized as a component of information sharing. If the system's information is dependable, current, and apt for learners' requirements, satisfaction levels will increase (Pratiwi & Mujadilah, 2021). System service quality refers to the provision of information system updates and troubleshooting responses by system developers to users of the system. The level of quality in this service is determined by whether it meets user expectations or falls short, which may ultimately impact the effectiveness of the information system. A study by Shanka et al. (2012) found that there is a positive correlation between user satisfaction and service quality. Users will be more satisfied with an e-learning system if they can quickly download lecture materials, assess online learning outcomes in a way that is comparable to traditional learning, and easily contact managers if they have trouble accessing the system. Utilizing instructional methods to enhance the comprehensibility of the presented material is one distinguishing attribute of e-learning that has the potential to impact user satisfaction (Siritongthaworn & Krairit, 2006). The utilization of media components such as images and language constructions to convey educational tactics and information that facilitate the transmission of the material exhibited is also an additional distinctive aspect of e-learning. These media components augment the visual presentation and facilitate ease of access to e-learning data for users (Liu et al., 2009). Students consider e-learning as an interactional process between them and their instructors, with an aim to gain a sound evaluation of the learning process. Marković and Jovanović (2012) and Zhang et al. (2006) provided case studies that indicated the efficacy of employing diverse evaluation methods in e-learning. Such methods include tests, quizzes, and other forms of knowledge assessment, which can foster increased satisfaction amongst learners, especially when coupled with opportunities for interactive communication (Siritongthaworn & Krairit, 2006).

The user's perceived level of satisfaction with the system after using it is known as user satisfaction. According to Appleton-Knapp & Krentler (2006), Satisfaction is the feeling that the customer's expectations have been met or exceeded. By comparing expectations to the actual product or service, it is therefore possible to draw the conclusion that satisfaction is a level of feeling. According to Razak et al. (2016), individual satisfaction of customers or consumers can be captured by their emotions of contentment or dismay (dissatisfaction) which arise from evaluating product performance against their prior expectations. The perceived usefulness of an organization's performance, which is the effect of using information systems, is frequently used to measure net benefits. Numerous previous studies have examined the connection between system end-user satisfaction and net benefits (e.g. Jaafreh, 2017; Nyagowa et al., 2013). It is expected that an increase in the level of satisfaction among users regarding a particular information system would result in a corresponding increase in the overall net benefits experienced by the users. If someone is satisfied with the information system that is utilized, then they are more likely to feel safe and at ease using the system. Thus, the following hypotheses were proposed:

H₁: *System reliability has a significant and positive effect on user satisfaction.*

H₂: *Information sharing has a significant and positive effect on user satisfaction.*

H₃: *Service quality has a significant and positive effect on user satisfaction.*

H₄: *User satisfaction has a significant positive effect on net benefit.*

The model refers to the research model that was used by Suryanto et al. (2023) with a theoretical framework as shown in Fig. 1.

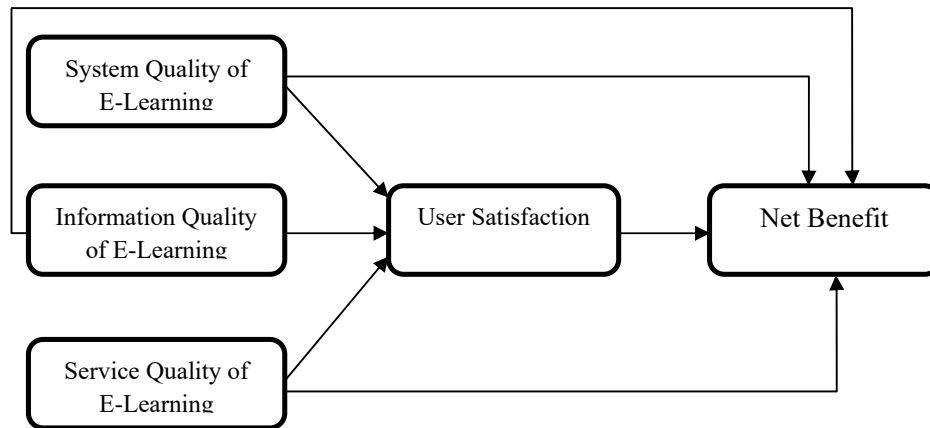


Fig. 1. Theoretical Framework

3. Method

The approach taken by the researchers was quantitative. They studied how the reliability of the system, the sharing of information, and the quality of the service impact the satisfaction and net benefit of e-learning users. This method involves gathering data through instruments and analyzing it to test hypotheses. The researchers administered a questionnaire using a Likert scale format to collect data in March-April 2022. Purposive sampling was employed, which involves selecting participants with specific characteristics or traits related to known population features. To conduct this research, a sample of 203 public sector workers who had participated in online learning or teaching using websites or applications were chosen. The study conducted statistical analysis utilizing Statistical Structural Equation Modeling (SEM), with a specific use of Partial Least Square version 3 (PLS-SEM). According to Annarelli et al. (2020), system reliability denotes the likelihood of a system fulfilling its intended purpose adequately within a stated timeframe and predetermined operating circumstances. The operational definition of system reliability is determined by assessing the frequency of failures or downtime experienced by a system over a specified period of time, as compared to its expected performance. Factors such as component failure rates, maintenance schedules, and environmental conditions can impact a system's reliability. A system is considered reliable if it consistently performs its intended function with high availability and low failure rates.

Information sharing refers to the process of exchanging information between individuals, groups, organizations or systems in order to improve decision-making, achieve common goals or solve problems (Fawcett et al., 2007). It involves the transfer of specific information from one entity to another, with the aim of enhancing knowledge, understanding, and collaboration. Furthermore, the term service quality pertains to the extent of conformity between the services rendered by a corporation and the anticipated level of satisfaction of its customers (Parasuraman et al., 1985). It signifies the degree of effectiveness in meeting the customers' demands and preferences, and the alignment of these with the corporation's vision and objectives. Service quality is perceived as a critical aspect in retaining and acquiring customers, and in optimizing the overall performance of the enterprise. Lastly, net benefit in e-learning refers to the overall value that learners gain from participating in an online course or program (Lee-Post, 2009). It is the difference between the benefits of e-learning and the costs involved in acquiring those benefits. Net benefit in e-learning can be measured by quantifying the gains learners achieve from e-learning activities, such as improved knowledge and skills, increased motivation to learn, and greater flexibility in scheduling and pacing. To evaluate the reliability of the questionnaire's inductor items, a validity assessment was conducted using convergent validity. This examination scrutinized the factor loading indicators of the individual items, and a score of at least 0.6 was deemed satisfactory. The internal consistency of the questionnaire items was measured in the reliability test, which utilized both the Composite Reliability value and Cronbach's Alpha value. Additionally, the AVE value, which represents the average percentage of variance scores derived from a specified set of latent variables, was considered. To ensure reliable results, the researcher established a minimum threshold for each metric in subsequent tests, including an AVE value greater than 0.5, a Cronbach's Alpha value greater than 0.6, and a Composite Reliability value greater than 0.7.

4. Results

To meet the standards for hypothesis testing, the AVE values must exceed 0.5, Composite reliability values have to reach 0.7 or higher, and Cronbach's alpha values should be greater than 0.6 for reliability testing. The variables that have composite reliability values exceeding 0.70, Cronbach's alpha that is greater than 0.6, and AVE higher than 0.5 have been displayed in Table 1. Therefore, it can be inferred that these variables have achieved a high level of composite reliability. The outcomes of the validity assessment presented in Fig. 2 reveal that every item under investigation in this research possesses validity due to their factor loading values exceeding > 0.6 .

Table 1
Composite Reliability and Cronbach's Alpha

Variable	Composite Reliability	Cronbach's Alpha	AVE
Information sharing	0.855	0.843	0.702
Net Benefit	0.857	0.848	0.778
Service Quality	0.849	0.837	0.717
Quality System	0.866	0.852	0.803
User Satisfaction	0.845	0.832	0.748

The reliability and consistency of sharing information is reflected in its Composite Reliability score of 0.855, Cronbach's Alpha score of 0.843, and AVE score of 0.702. Similarly, Net Benefit has high scores for Composite Reliability (0.857), Cronbach's Alpha (0.848), and AVE (0.778). Service Quality has a Composite Reliability score of 0.849, a Cronbach's Alpha score of 0.848 and an AVE score of 0.778. Quality System has the highest Composite Reliability score of 0.866, Cronbach's Alpha score of 0.852 and an AVE score of 0.803, indicating its credibility and consistency. Lastly, the Composite Reliability score for User Satisfaction is 0.845, Cronbach's Alpha score is 0.832, and AVE score is 0.748 (Table 1).

Table 2 shows that the correlation between user satisfaction and system reliability, information sharing, and service quality has an R-Square value of 0.602, which means that these variables account for 60.2% of user satisfaction. The R-Square value of the model that determines the impact of system reliability, information sharing, service quality, and user satisfaction on net benefits is 0.371. This value indicates that 37.1% of the impact on net benefits can be explained through these variables. Furthermore, the study revealed that 63.8% of other unconsidered factors contribute to the impact on net benefits.

Table 2
Results of Path Coefficients

Hypotheses	Original Sample	T Statistics	P Values
Information sharing → User Satisfaction	0.239	3.489	***
Service Quality → User Satisfaction	0.358	4.950	***
System Quality → User Satisfaction	0.371	6.619	***
User Satisfaction → Net Benefit	0.597	8.879	***
R Square	Values		
Net Benefit	0.371		
User Satisfaction	0.602		

As a basis for hypothesis testing, if the T statistic value for the formative construct is greater than 1.96 and the P value is less than the 5% limit ($p\text{-value} < 0.05$), the hypothesis can be examined. Based on Table 2, the connection between system reliability, information sharing, service quality, and user satisfaction with net benefits, all have a P value lower than 0.05 and a T statistic value over 1.96, indicating that they are valid (significantly accepted).

Table 3
Indirect Effect

Relationship	Original Sample	T Statistics	P Values
System Quality → User Satisfaction → Net Benefit	0.343	5.160	0.000
Information sharing → User Satisfaction → Net Benefit	0.264	3.325	0.000
Service Quality → User Satisfaction → Net Benefit	0.329	3.127	0.000

The research used the bootstrapping method on the research model to assess how much influence the intervening variable has on the dependent variable as a secondary association. By analyzing the T and P values from the specific indirect effects test, the study was able to determine the impact of user satisfaction on the relationship between system dependability, information exchange, service quality, and net benefits. The outcomes are displayed in Table 3 and reveal that user satisfaction acts as a mediator between the aforementioned variables and their net advantages. The study's results show that a system's level of reliability significantly affects user satisfaction, emphasizing the importance of users perceiving the e-learning system as trustworthy to enhance their satisfaction. It means that users are more likely to be pleased with a system of higher quality. Furthermore, individuals who utilize information systems effectively and achieve their intended goals are more inclined to experience contentment and continue to use the system. This research distinguishes itself from previous studies conducted by Leclercq (2007), Sumiyati et al. (2013), and Jaafreh (2017) by uncovering the relationship between user satisfaction, system reliability, and ease of use in a case study. This study's findings indicate that information sharing has a positive and noteworthy impact on user satisfaction. Specifically, if e-learning presents a higher quality of perceived information, users report a greater level of satisfaction. Conversely, if information sharing is deemed inadequate, user satisfaction is also reduced. Thus, it can be inferred that an individual is more likely to attain satisfaction with the information received if the system furnishes superior quality content. These results align with Jaafreh's (2017) investigation and support the DeLone and McLean's (2003) framework.

The study showed that the pleasure of users in e-learning is affected by the standard of service. This means that how good the service provided is perceived by users can have a positive or negative effect on their satisfaction. Therefore, if e-learning services are of excellent quality, users are more likely to be satisfied. E-learning provides various ways to test knowledge, such as quizzes and tests, and encourages user interaction, which can lead to increased satisfaction. These findings support DeLone and McLean's (2003) model and are consistent with previous research conducted by Jaafreh (2017) and Bahari and Mahmud (2018), which have also found a positive relationship between service quality and user satisfaction.

The study's results indicate that user satisfaction levels in E-Learning have a significant impact on net benefits. When users perceive high levels of satisfaction, net benefits also increase. Conversely, if users feel unsatisfied, net benefits decrease. To reap long-term benefits, users need to feel content and at ease while using the system. These findings are consistent with the research conducted by Halawi et al. in 2005 that established a correlation between user satisfaction and net benefits. Furthermore, the study shows that user satisfaction acts as a mediator between system quality, information quality, service quality, and net benefits. Therefore, higher system, information, and service quality will likely result in greater levels of user satisfaction and net benefits. These findings align with the DeLone and McLean (1992, 2003) model and Jaafreh's (2017) study.

The system's quality is determined by the performance of both its hardware and software. System reliability, which is a crucial aspect of user perception of information technology, directly affects user satisfaction (DeLone and McLean 2003; Freeze et al. 2010). Usability, reliability, and efficiency are some of the characteristics that fall under system reliability, making them important factors in e-learning from a user's perspective. System reliability is also assessed based on usefulness, usability, responsiveness, reliability, and flexibility (Fardoun, et al. 2009). User satisfaction with the e-learning system depends on how easily understandable the guidelines are, how relevant the content is to learning needs, and how simple the system is to use, with accessible features that enhance communication between teachers and students. According to Dayang et al. (2012), the satisfaction of users of a system is impacted by its functionality, responsiveness, reliability, and flexibility. The e-learning system can achieve user satisfaction by providing clear guidelines, relevant content, user-friendly features, and improved teacher-student communication (Al-Fraihat et al., 2020; Freeze et al., 2010; The effectiveness and usability of learning materials, as well as e-learning features, have been found to be correlated with learning outcomes, system usage, and satisfaction, as posited by Suryanto et al. (2023) and supported by the research conducted by Eom et al. (2006), Freeze et al. (2010), and Chang (2013).

5. Conclusion

According to the research results, the primary determinants of user satisfaction and perceived net benefits in the context of e-learning are system reliability, information sharing, and service quality. The aforementioned findings reveal that enhancements in the quality of system, information, and services have a direct impact on the increase of user satisfaction, resulting in overall amplified net benefits. As system, information, and service quality hold a substantial influence over user satisfaction, any increment of the latter will positively affect the net benefit of e-learning, thereby reinstating the use of the system. The augmentation in user satisfaction, thus, serves as an effective measure towards the reinforcement of the implementation of e-learning. The present study posited a unidirectional association between information sharing and user satisfaction in the context of e-learning. Specifically, it was suggested that as the level of information sharing increases, the quality of the e-learning system would improve, subsequently heightening user satisfaction. This satisfaction, in turn, is contingent on the provision of precise assessment, timely presentation of information, comprehensive coverage of lecture material, and clarity of information and material. Thus, it is the degree of congruity between content and user needs that is crucial in shaping user satisfaction and experience in e-learning.

As practical implications, content suitability can facilitate user engagement in e-learning, foster motivation to learn, and increase retention rates. Moreover, personalized learning can facilitate experiences that cater to the diverse needs of learners, such as their learning style, background, or interests. Overall, research in this area can have important implications for education and training and can help ensure that learners have access to high-quality, appropriate learning materials that enable them to achieve their goals.

As limitations, this research did not examine user backgrounds that may affect their understanding of e-learning content, and to develop approaches that cater to their unique needs. Future research can explore ways to personalize content based on learners' backgrounds, interests, and learning preferences. This can ensure that learners engage with the material in a way that is most suitable and effective for them.

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