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COVID-19 Pandemic Impact on E-Learning Adoption and Its Utilization at Higher Education: A Comparative Analysis of Institutions and Students' Perspectives

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ABSTRACT

COVID-19 has forced Somali universities to implement e-learning systems to ensure education continuity. This study identifies the components that drive the effectiveness of e-learning platforms within Somali private universities by utilizing insights from student feedback. To accomplish this, the study employed the renowned DeLone and McLean's Information Systems Success (D&M IS) model, serving as a framework for evaluating and validating the factors pertaining to the e-learning platform's success. A questionnaire has been employed with the aim of gathering data from students to satisfy the research's objectives. In this study, 867 respondents were collected and analyzed using a structural equation model (SEM). Additionally, the results showed that Service Quality (SRQ), System Use (SU), System Quality (SQ), and User Satisfaction (US) significantly influenced Net Benefit (NB) of the e-learning platforms. However, there was no correlation between Information Quality (IQ) and User Satisfaction (US). This study provides useful insight to guide policy decisions and support e-learning. However, the study is limited since it is narrowly focused on Somalia, which limits its generalizability to other developing countries.

1. INTRODUCTION

By the end of December 2019, COVID-19, a new infectious respiratory disease, had arisen in Wuhan, China. The ongoing worldwide health crisis caused by SARS-CoV-2, a human-to-human transmissible virus; severe acute respiratory syndrome Coronavirus is contagious [1]. The COVID-19 pandemic affects education globally, forcing higher education institutions (HEIs) to replace conventional teaching methods with physical classroom interaction [2]. With the use of Information Technology (IT), students are engaged online. It has adopted teaching virtually to provide courses online [3, 4]. Consequently, e-learning has been among the most popular as well as contended topics [5]. In addition, the extraordinary event established e-learning as among the essential elements of teaching as well as learning in HEIs across the globe [6]. The conventional method of face-to-face physical engagement in learning was replaced by e-learning. Students are confident that their learning won't be interrupted, even in an emergency [7]. Globally, e-learning became more prominent, and resources were allocated for educational e-learning programs and technological advancements. It has become more advanced to have the tools in the domain to promote student-teacher interactions. Computer technology applications and internet connections have been examined as e-learning's main components [8]. E-learning describes a variety of learning practices. These include distance learning [6, 9], online learning [10], and virtual learning [11]. The effectiveness of e-learning has been demonstrated to impact students' academic performance [12]. Furthermore, it has developed into an effective learning tool, especially when paired with the internet. When e-learning programs are efficiently executed, there is a large improvement in the learner satisfaction level [13]. Furthermore, e-learning systems allow instructors to plan, manage, deliver, and monitor the learning process. Therefore, HEIs must foster a cohesive learning environment to improve students' performance and increase knowledge acquisition. With the advent of ICT, the education sector has encountered a dramatic transformation in which the focus has transferred from educators to learners [14]. Also, there exists an ongoing transition in the relationship between HEIs as well as students, in which students are viewed as customers while universities are viewed as educational services providers [15, 16]. In other words, e-learning systems are only as successful as the students' willingness and desire to accept them [17, 18]. E-learning is comprised of strategic planning and implementation, as well as good government technology and institutions are essential for its successful implementation Embi et al. [19-21]. In light of this, it is now necessary to develop usable e-learning systems for various institutions where they can conduct their operations efficiently [22-25]. According to Martínez-Caro [26], using technology to learn

online is crucial for students. The results showed that factors determine e-learning effectiveness in industrial engineering. Mbarek and Zaddem [27] stated that social presence, perceived ease of use (PEOU), perceived usefulness (PU), self-efficacy, training design to represent the determinant of online training [14]. Further, e-learning has also become mainstream in Medical Education (ME), including nursing, public health, medical, and other allied health fields. In addition, the results of a thorough examination by Regmi and Jones [28] of the elements enabling and hindering effective e-learning in HSE establish doubts about whether e-learning in medical education will genuinely improve learning. Several researchers have also investigated factors effecting students' acceptance in the e-learning. According to Amin et al. [29], the tourism and hospitality industries influence e-learning effectiveness. A comprehensive study was conducted to analyze the various factors that affect e-learning's effectiveness. Moreover, the study showed that IT had a positive impact on e-learning effectiveness. A study by Omani and Celcima [30] compared psychology and English language students at Kosovo universities to investigate the effectiveness of online learning in HEIs. The study found that Students studying English are more likely than students studying psychology to pursue higher education online. Further, Roman and Plopeanu [31] examined the factors that influence effective online learning during the COVID-19 epidemic in Romanian universities. Also investigates the preferences of economics students in Romania when it comes to learning strategies (conventional, online, and hybrid). Examining the data gathered from a sample comprising 1,415 students enrolled in five prominent economics faculties in Romania, the research utilizes ordinal and bivariate logit regression models for analysis. The results showed that the economics students in various learning techniques and e-learning effectiveness during the pandemic. The purpose of this study is to assess COVID-19's impact on the adoption and utilization of e-learning in higher education institutions. The D&M ISS model is used in this study to examine how e-learning affects student satisfaction, System Quality (SQ), and Service Quality (SRQ). This study attempts to understand the impact of Covid-19 on e-learning in HEIs. The model enables researchers to investigate the effect of e-learning on many dimensions to discover the factors influencing these dimensions. This paper is organized into the following sections: Section II provides a theoretical background and discusses related research. Section III discusses the research model and hypotheses. The methods and materials used in the research are explained in Section IV. The results of hypothesis testing are presented in Section VI, along with a discussion of limitations. This paper concludes in Section VII.

2. RELATED WORK

2.1 Technology Acceptance Model (TAM)

TAM is widely used to assess user acceptance of technological advances [32]. PU and PEOU are two beliefs that underlie the use of information systems (IS). The PEOU stands for potential users of the system, which measures its user-friendliness. PU refers to the subjective belief that employing a given technology will enhance a user's activities [32]. Technology adoption rates and satisfaction with educational technology can be determined by PU and PEOU.

2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

A UTAUT aims to clarify how users intend to use IS and their subsequent behavioral usage patterns [33]. The UTAUT can provide insight into the complexities of technology adoption in diverse education environments by examining performance expectancy, effort expectancy, social influences, and facilitating conditions [34, 35], and provides a nuanced view of user acceptance and system success by evaluating the effects of social factors, expectations, and perceived effort on IS integration [34].

2.3 The D&M Model

The D&M IS methodology in measuring the success of IS was proposed in 1992. Due to the complexity of the systems, previous studies of IS Success were inaccurate and limited [36]. Six aspects were prioritized: System Use (SU), User Satisfaction (US), Information Quality (IQ), individual impact, SQ, as well as organizational impact [37, 38]. DeLone and McLean [39] changed the model to examine feedback from researchers on the model's strengths and weaknesses. Moreover, the model categorized organizational impact as Net Benefits (NBs) and included a new element, SRQ, as SRQ is crucial to the IS's success. Additionally, they separated use, intent to use, and actual use [37]. SQ is comprised of system performance, technical attributes, and user-friendliness [39]. Additionally, SRQ resembles the responsiveness and competence of technological workers. IQ refers to the validity, accuracy, and accessibility of system content. Use is seen as the initial phase of a system's success, as effective use implies total acceptance. Users' satisfaction resembles the level of satisfaction as well as the system's acceptance. NBs are perceived as organizational and individual impacts on task performance and efficiency [40]. The contributions made by numerous IS researchers [41-47] managed to persuade to validate and expand the earlier IS Success Model. As presented in the theoretical model, as shown in Figure 1, three independent variables, namely IQ, SQ, and SRQ, significantly influence SU and US, and both predict the system's success in the future. Hence, high-quality e-learning systems could be related to increasing US and NBs.

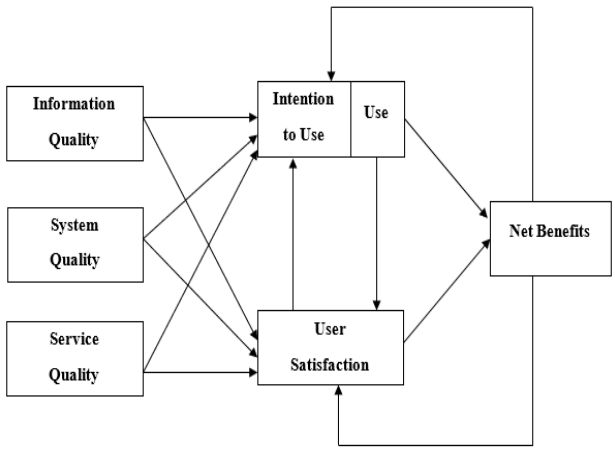

Figure 1. The IS success model [39]

3. HYPOTHESIS DEVELOPMENT

The D&M IS model was used to assess the effectiveness of e-learning platform. To further minimize the model's complexity, feedback links obtained from NB to SU and the US have been excluded from this research. Hence, eight hypotheses below have been formulated, as shown in Figure 2.

3.1 System Quality (SQ)

The SQ dimension usually centers on the performance, expected features, and IS system serviceability, whether in use or under evaluation [48]. Moreover, DeLone and McLean [49] evaluated the SQ based on its usefulness, flexibility, availability, response time, ease of use and reliability. Although there are numerous measures with respect to SQ, including adaptability, response time, the accuracy of the system, accessibility, user-friendliness, reliability, as well as systems features, ease of use, efficiency, ease of learning, availability, flexibility, systems integration, interactivity, and sophistication, researchers typically select among the measures based on the study context. A number of previous studies have shown that the SQ dimension significantly impacts system satisfaction and the use of e-learning [38, 50-57]. Thus,

H1: System Quality (SQ) significantly positively impacts System Use (SU) in the e-learning portal.

H2: System Quality (SQ) significantly positively impacts User Satisfaction (US) in the e-learning portal.

3.2 Information Quality (IQ)

The IQ dimension relates to the properties with respect to an information system's output. IQ is determined by the type of IS used [38]. Additionally, IQ is described as the accuracy and correctness of the information given by the system. Apart from that, the proper information is recommended to be accessible to the appropriate person at the appropriate time [38, 58]. Moreover, consistent indicators of IQ with regard to the e-learning domain include understandability, usefulness, currency, completeness, reliability, accuracy, relevance, and timeliness. Additionally, IQ has proven to be a critical quality antecedent that influences the US as well as SU [40, 51, 54, 56, 59-62]. Thus,

H3: Information Quality (IQ) significantly positively impacts System Use (SU) in the e-learning portal.

H4: Information Quality (IQ) significantly positively impacts User Satisfaction (US) in the e-learning portal.

3.3 Service Quality (SRQ)

The IS Success Model was enhanced by including the SRQ dimension [39]. IT support staff, and the IS department are responsible for providing users with high-quality support. Initially, ten dimensions were utilized to measure SRQ, but these have since been reduced to five: reliability, assurance, tangibles, responsibility, and empathy. Several studies have shown that SRQs positively impact SUs and satisfaction in e-learning [38, 51, 55-57, 62-65]. Thus,

H5: Service Quality (SRQ) significantly positively impacts System Use (SU) in the e-learning portal.

H6: Service Quality (SRQ) significantly positively impacts User Satisfaction (US) in the e-learning portal.

3.4 System Use (SU)

The term SU refers to the overall time spent on an e-learning system, its reasons for using it, and the degree to which e-learners use it [39, 49]. In addition to navigating e-learners within the digital system, search and retrieval of information are also included in SU. Nevertheless, "intention to use" refers to an attitude, while "system use" refers to the actual behavior which is viewed as the most important success-related variable [39]. Hence,

H7: System Use (SU) significantly positively impacts in the e-learning portal.

3.5 User Satisfaction (US)

The term US refers to the degree of satisfaction a user has with an IS. It is a significant indicator with respect to the IS's success [48]. Moreover, e-learning users are satisfied when the IS provides them with the required information and satisfies their learning needs. [17, 51, 53, 57, 59]. Thus,

H8: User Satisfaction (US) significantly positively impacts in the e-learning portal.

3.6 Net benefits (NBs)

In the original model, the NBs dimension, also known as an innovation variable, was combined with organizational and individual factors into one. Using the IS Success Model [39] as a research model, the dependent variable is the extent to which IS can contribute to the success of a company, an organization, a group, or even an individual.

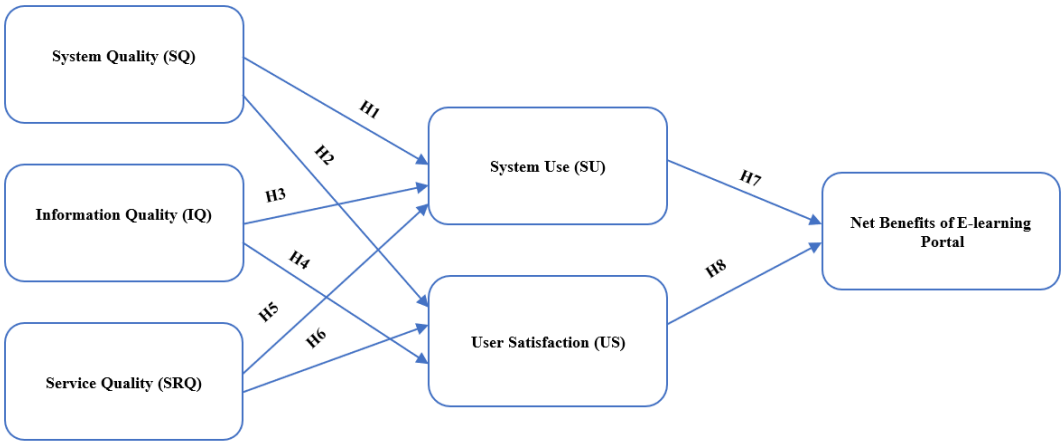

Figure 2. Research model

4. RESEARCH METHODS

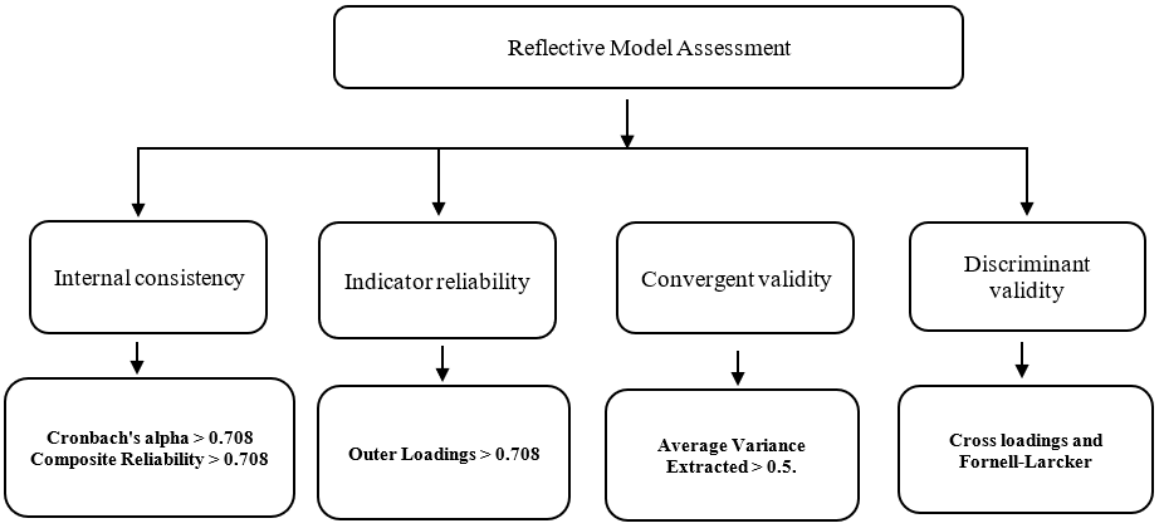

Figure 3. Reflective model assessment [66]

A quantitative approach was selected to evaluate e-learning's effectiveness. The survey was completed using Google Forms. Consequently, the links were disseminated to students via a lecturers' WhatsApp group to facilitate participant access. Purposive sampling was employed based the population's characteristics. The research hypothesis was empirically confirmed using a survey technique. The study focused on registered students in a private university in Somalia, with a population size representing the target audience. The study collected 867 valid responses from the participants and used SEM as the statistical analysis method. According to the study by Hair Jr et al. [67], SEM requires at least 200 samples, in order to guarantee a robust SEM and provide confidence in parameter estimates. Therefore, efforts were made to acquire the necessary sample size to ensure a reliable and satisfactory outcome. In this context, the researchers created an English-language questionnaire. The structure of the survey contains two sections. The first section contains respondent's details and, the second section comprises factors addressing the conceptual model. All constructs were measured by employing a total of 23 items, with four items measuring the SQ variable. Four more items measured IQ, and four more were utilized to operationalize the SRQ of the e-learning support team. The SU construct was operationalized with four items; the US has three items, and NBs with the remaining three items. This study utilized the Likert scale to measure attitudes since it's widely used [68]. Based on the criteria shown in Figure 3, the measurement model was evaluated.

5. RESULTS

A preliminary analysis phase is performed using SPSS to identify errors and missing data points based on the methodology described in [67]. Subsequently, Using Linear Interpolation, SPSS's Replace Missing Values function addresses any minor gaps in the data. Since this data was gathered from one source, Podsakoff et al. [69] stress the importance of assessing the common method variance. According to Harman's single-factor test, the primary factor accounts for 39.7% of the variance, which falls short of the 50% threshold advocated by Podsakoff et al. [69]. Regarding demographic profiles, 56.06% of participants identify as male, while 43.94% identify as female. According to their age, the participants are distributed as follows: 22% were below the age of 20, 43% were between 21 and 30, 27% were between 31 and 40, and 8% were beyond the age of 41. In terms of the respondents' distribution by program they were enrolled in, the statistics discovered that 29% were enrolled in diploma programs, followed by 38% in bachelor's and 33% in Master's programs. The demographic profile details are presented in Table 1. SmartPLS3.0 software was used to analyze this data using the Partial Least Square (PLS) method [67, 70].

Table 1. Respondent's details

Distribution		Frequency	Percentage (%)
Gender	Male	486	56.06
	Female	381	43.94
Age Group	Less than 20 Year	191	22.00
	21-30 Years	373	43.00
	31-40 Years	234	27.00
	More than 41 Years	69	8.00
Education Level	Diploma	251	29.00
	Bachelor	329	38.00
	Master's	286	33.00

5.1 Measurement model

5.1.1 Convergent validity

Convergent validity is a measure of internal consistency used to determine whether items within the same scales are correlated with each other in measuring similar constructs [67,71]. This study examined factor loading, average variance extracted (AVE), composite reliability assessed (CR), Cronbach's alpha (α), Jöreskog's rho (ρc), and Dijkstra-Henseler's rho (ρA) measurements. The study found that the factor loadings exceeding the desired level of 0.7, and the AVE also exceeding the recommended threshold of 0.5, as shown in Table 2. Based on the results, all three criteria were met as all met the suggested threshold values.

Table 2. Convergent validity

Construct	Item	Loading	ρA	ρc	α	AVE
SQ	SYQ1	0.907	0.907	0.907	0.935	0.782
	SYQ2	0.869				
	SYQ3	0.874				
	SYQ4	0.886				
IQ	INQ1	0.730	0.746	0.749	0.839	0.566
	INQ2	0.757				
	INQ3	0.714				
	INQ4	0.806				
SRQ	SRQ1	0.905	0.893	0.902	0.925	0.756
	SRQ2	0.843				
	SRQ3	0.841				
	SRQ4	0.888				
SU	SU1	0.894	0.869	0.878	0.911	0.719
	SU2	0.826				
	SU3	0.787				
	SU4	0.880				
US	US1	0.891	0.851	0.880	0.902	0.703
	US2	0.897				
	US3	0.912				
	US4	0.615				
NBs	EP1	0.877	0.829	0.839	0.897	0.745
	EP2	0.820				
	EP3	0.890				

Table 3. Discriminant Validity-HTMT Criterion

	NBs	IQ	SRQ	SQ	SU	US
NBs						
IQ	**0.594**					
SRQ	0.603	**0.609**				
SQ	0.679	0.709	**0.497**			
SU	0.621	0.745	0.538	**0.670**		
US	0.707	0.483	0.462	0.611	**0.462**	

Table 4. Discriminant Validity-Cross Loading

	E-Learning Portal	IQ	SRQ	SQ	SU	US
EP1	**0.877**	0.447	0.449	0.568	0.491	0.583
EP2	**0.820**	0.375	0.441	0.422	0.413	0.450
EP3	**0.890**	0.399	0.473	0.533	0.472	0.507
INQ1	0.306	**0.730**	0.275	0.380	0.394	0.168
INQ2	0.498	**0.757**	0.435	0.494	0.482	0.321
INQ3	0.306	**0.714**	0.352	0.378	0.453	0.397
INQ4	0.303	**0.806**	0.437	0.506	0.491	0.282
SRQ1	0.469	0.489	**0.905**	0.408	0.445	0.398
SRQ2	0.505	0.347	**0.843**	0.458	0.407	0.378
SRQ3	0.332	0.446	**0.841**	0.336	0.342	0.284
SRQ4	0.499	0.480	**0.888**	0.351	0.459	0.351
SU1	0.529	0.586	0.464	**0.519**	0.894	0.371
SU2	0.405	0.453	0.456	**0.517**	0.826	0.262
SU3	0.396	0.446	0.353	**0.467**	0.787	0.332
SU4	0.467	0.569	0.348	**0.512**	0.880	0.425
SYQ1	0.578	0.530	0.414	0.907	**0.477**	0.539
SYQ2	0.498	0.502	0.429	0.869	**0.549**	0.462
SYQ3	0.573	0.529	0.451	0.874	**0.508**	0.468
SYQ4	0.452	0.519	0.294	0.886	**0.565**	0.445
US1	0.488	0.341	0.272	0.488	0.292	**0.891**
US2	0.526	0.356	0.413	0.500	0.431	**0.897**
US3	0.574	0.396	0.399	0.499	0.447	**0.912**
US4	0.403	0.230	0.272	0.299	0.157	**0.615**

Table 5. Structural Model-Hypothesis testing

Hs	Path	Std. Beta	SE	t-Value	f^2	R^2	VIF	Q^2	p-Values	Supported
H1	SQ->SU	0.322	0.115	2.803	0.123		1.604		0.003***	Yes
H3	IQ->SU	0.338	0.115	2.950	0.036	0.476	1.411	0.428	0.002***	Yes
H5	SRQ->SU	0.164	0.097	1.697	0.126		1.724		0.045***	Yes
H2	SRQ->US	0.423	0.110	3.835	0.166		1.604		0.000***	Yes
H4	IQ->US	0.055	0.103	0.536	0.039	0.330	1.411	0.263	0.296	No
H6	SRQ->US	0.192	0.112	1.708	0.003		1.724		0.044***	Yes
H7	SU-> NBs	0.346	0.073	4.741	0.183	0.458	1.204	0.384	0.000***	Yes
H8	US-> NBs	0.457	0.091	4.998	0.320		1.204		0.000***	Yes

5.1.2 Discriminant validity

According to Henseler et al. [72], the Fornell and Larcker [73] criteria cannot identify a discriminant validity absence in common research situations. Therefore, this study relied on the multitrait-multimethod matrix proposed by [72] by utilizing the Heterotrait-Monotrait (HTMT) ratio of correlations. At first, we determine if HTMT .85 [74] or HTMT .90 [75] have higher values. The discriminant validity will be compromised if the condition HTMT exceeds the former values. The HTMT values in Table 3 and Table 4 are all above the threshold values of HTMT .90 and HTMT .85, demonstrating discriminatory validity.

5.2 Structural model

A structural model was used to verify the validated measures based on the collected data. Hair Jr et al. [67] recommend that 5000 resamples be used to study standard beta, R2, and t-values, along with Predictive Relevance (Q2) and Effect Size (f2). Based on Table 5 and Figure 4, all of the above parameters and matrices were evaluated. The results of the study showed that the relationship between SQ, IQ, SRQ, and SU were significant; hence, (**H1** β=0.322, p<0.003, f2=0.123, **H3** β=0.338, p<0.002, f2=0.036, **H5** β=0.164, p<0.045, f2=0.126) all are supported. Factors related to SQ and SQR were positively related to US (**H2** β=0.423, p<0.000, **H6** β=0.192, p<0.044, f2=0.003 Furthermore, the results indicate a significant correlation between the SUs, USs, and NBs, hence, (H7 β=0.346, p<0.000, f2=0.183, H8 β=0.457, p<0.000, f2=0.320). However, the findings indicated that IQ had zero influence on the US (**H4** β=0.055, p>0.296, f2=0.039); thus, H4 was not recognized. In Table 5, R2 values are 0.476 for SU, 0.330 for US, and 0.4458 for NBs of e-learning portal. According to Hair Jr et al. [67], the changes that occur in R^2 have to be assessed to check the f^2 value. According to Cohen's [76], the result of f2 shows significant effect sizes for supporting hypotheses with 0.35 (large), 0.15 (moderate), and 0.02 (weak). Further, the Variance Inflation Factor (VIF) criteria was used to determine the multicollinearity between the variables within the model. Table 5 shows VIF values are lower than 5.00 [77, 78]. The blindfolding was used to measure Q2 [67]. Table 5 shows that the model's Q2 value is higher than zero for SU (Q2=0.428), US (Q2=0.263), and NBs for the e-learning portal (Q2=0.428).

6. DISCUSSION

The D&M IS model is used to assess the factors that lead to private universities in Somalia accepting an e-learning platform during COVID-19. To discuss the e-learning acceptance by students, the research model included six variables: SRQ, SQ, IQ, SU, and US, as well as the NBs of the e-learning portal. It was expected that SQ would impact both SU and the US in e-learning. SQ is characterized by its functionality, ease of use, and reliability. It will directly affect the student and instructor's usage when utilizing e-learning. This study's findings supported the correlation between SQ and SU, demonstrating that SQ positively and statistically significantly influences students' inclination to use e-learning. The research presents that SQ and SU are tightly associated with the effectiveness of an IS, which is supported by the test findings. This aligns with similar studies [54, 79-82]. SQ is essential to guaranteeing the sustainability of e-learning. Users are primarily focused on the effectiveness of a system that allows them to create top-notch online activities utilizing a quality system. Irrespective of the situation, users demand a system of high quality. Moreover, this underscores the necessity for information technology organizations to emphasize the significance of quality management systems. The absence of quality is a notable oversight among information technology providers. This shortcoming caused users of the system to reject its adoption, which has negative consequences for stakeholders. Furthermore, the outcomes of this study show that the correlation between SQ and US, underscoring that SQ exerts a positive and substantial impact on students' contentment with e-learning. Furthermore, US refers to the technical quality of the system, which includes the ease with which the learning platform is used, its ability to meet user requirements, its interactive capabilities, the presence of necessary features and functions, as well as the cohesion and uniformity of the different components. In this scenario, a high-quality e-learning system may meet students' expectations. These findings validate prior research, which discovered a substantial relationship between SQ as well as US [83]. This research indicates that interaction, navigation speed, as well as user interface are important to people when deciding their degree of satisfaction. When users perceive e-learning as engaging, featuring an instinctive layout that facilitates easy access to information and promptly addressing concerns, their overall experience is enhanced. Likewise, the system's accessibility and the responsiveness of support personnel to students' queries and needs contribute to their heightened satisfaction level.

The D&M ISS implies that IQ influences both SU and US. E-learning SU is affected by IQ. Security, relevance, personalization, readability, as well as completeness are all features of high-quality information. Additionally, the findings indicate that the quality of information impacts the system's ability to achieve its goals significantly. This is consistent with studies similar to it [82, 84-86]. Semantic success measures like relevance, consistency, completeness, accuracy, and timeliness could be used to evaluate the quality of the system's provided information [39]. Providing a greater degree of IQ will result in increased system satisfaction. IQ was one of the primary elements impacting instructors and

students US [83, 86-89]. As stated previously, the non-significance of the association between US and IQ in this study is likely due to the effect of the instructors, in which the students' replies may vary depending on the instructor type they are relying their responses on.

It was recommended that SRQ would considerably impact SU and US. The performance of e-learning administrators impacts students' views of e-learning's usefulness and their usage of it. The responsiveness of an administrator to a user is closely related to the quality of service. The more the system administrator's response, the bigger the system's influence and usage. High-quality services are characterized by clear instructions and online support. Additionally, when system errors occur, the administrator is readily prepared as well as cooperative. The findings suggest a significant relationship exists between the SRQ of an IS's and its use variables [80]. In the relationship between SRQ as well as US, the positive influence with regard to SRQ on student satisfaction with e-learning demonstrates that IT support, along with technical staff knowledge, response, and empathy, as well as IT resources, computers, internet access, and the availability of servers, are significant determinants of US. Note that this outcome aligns with previous research [82, 90, 91].

Similar to the D&M IS [39] model, it was claimed that the US would greatly impact the net advantages of an e-learning portal. The outcomes of this study confirm the relationship between the US and net advantages of e-learning portals, indicating that student satisfaction with the application has a beneficial effect on e-learning usage. This is consistent with comparable research [54, 86]. Similarly, this study demonstrated a substantial positive correlation between the SU regarding the e-learning system and the attained benefits. The findings suggest that students might perceive enhanced benefits if the e-learning platform is used more frequently. Furthermore, these results suggest that student satisfaction has a pivotal role in realizing the advantages of e-learning. This aligns with comparable research [13, 40, 92].

6.1 Practical and Theoretical Implications

There are several ways in which the study contributes to the body of literature in terms of theory. Firstly, it is considered a pioneering evaluation of the success of e-learning by utilizing the D&M IS model. Secondly, the findings validate the D&M IS model applicability to the Somali context. Finally, the study explains the success of e-learning within the context of Somalia's private universities. In particular, the study explores how system usage affect the benefits of e-learning portals. Additionally, the study offers several practical implications that may be useful to macroeconomic policymakers: (I) Strengthening the educational recovery post-COVID-19 by increased funding for digital libraries. (II). Training and workshops will be conducted in universities to raise student awareness to ensure continuity in the learning process.

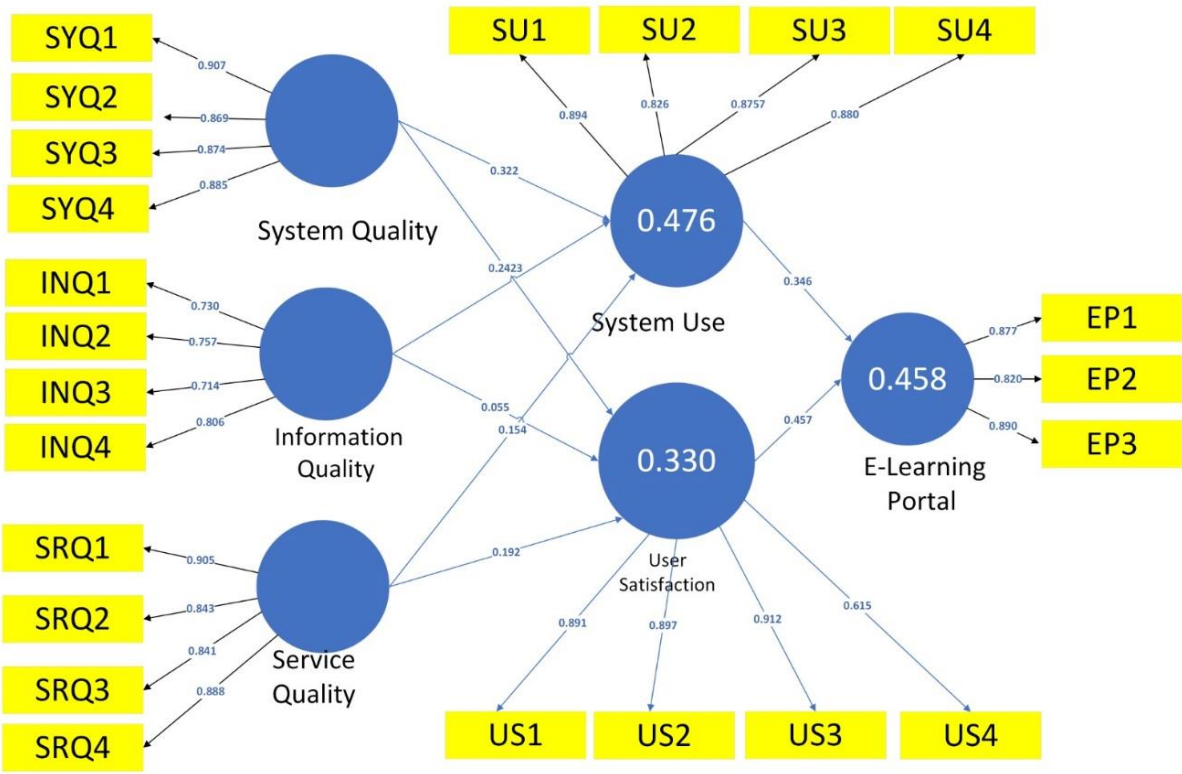

Figure 4. Structural Model

6.2 Limitations

This study has several limitations despite its valuable contributions. Initially, data were collected in Mogadishu, Somalia. Future studies should include Kismayo, Baidabo, Hargeisa, and Garowe to get a more comprehensive picture. Additional factors, such as information processing capabilities and requirements, will help us better understand universities' e-learning adoption. Furthermore, this study explores the technological advancement of e-learning in Somalia. To promote technological advancements in their respective education sectors, other least-developed countries (LDCs) could adopt a similar approach. It is possible to conduct similar studies in LDCs to address technological disparities and

enable the region to grow. In this context, future research could explore different methodologies, like a qualitative study employing interviews, enabling a more in-depth evaluation of the e-learning portal for Somali private universities. Overall, while this study makes important strides in understanding e-learning platform success in Somali private universities, future research should consider these limitations and broader contexts for more robust findings.

7. CONCLUSIONS

The objective of this study is to evaluate the factors contributing to the effectiveness of the e-learning platform in Somali private universities based on students' viewpoints. The CR and Cronbach's alpha values were determined to be satisfactory. Additionally, all variables had AVE values exceeding 0.5, confirming convergent validity. Moreover, the R2 values of the variables provide an explanation for the model. Except for one hypothesis, the testing hypotheses' results revealed that the remaining seven were supported. Consequently, these findings contribute to the existing theory by addressing a gap within the realm of IS. They offer empirical evidence regarding the success of e-learning platforms in Somali private universities. Furthermore, these results have the potential to be relevant to e-learning platforms across developing countries. To measure the success elements of e-learning platforms in various nations, the proposed approach can be utilized effectively. By identifying the key success variables that contribute to the utilization of an e-learning platform, these findings can assist in the implementation of effective e-learning platforms.

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