Examining The Correlations Between Software Quality (E-Service) And Key User Behavior Outcomes in The Context of Universities

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Abstract— To keep pace with rapid technological changes, higher education organizations are part of this change, and they need to adopt a new approach to serve their students because they represent the majority of the audience. In this paper, the author develops a conceptual model for exploring the association between three main components: the quality of e-services, satisfaction, and actual usage. The author fits the association between the proposed model and the obtained primary data depending on the Convenience Non-Probability technique. Further, another method (Modeling Structural Equation) is applied to examine the associations. The results reveal a strong positive association between each e-service quality, student satisfaction, and usage.

Index Terms— University e-services quality, student satisfaction, e-services, quality of e-service

I. INTRODUCTION

Services are becoming more and more crucial from an institutional competitive standpoint in today's competitive situations [1]. Students at higher education institutions are becoming increasingly like customers due to the marketplace. Universities must constantly investigate opportunities for exporting higher education services since higher education is part of the global industry [2].

Due to the education sector being based on knowledge services rather than tangible products, educational institutions need to serve competitively in a way that reflects their superiority in crafting one-of-a-kind experiences. Universities are expected to provide excellent online service quality in addition to competing in areas like research and innovation to meet the needs of their students and so gain a competitive edge [3]. This is predicated on the idea that since students are the main target of universities, the standard of such services has to be raised to match their demands [3]. However, despite the quality of electronic services being an essential factor in improving the education process, few studies have yet to give an overview of the quality of electronic services (e-services) from a university context. Therefore, the main goal of this research is to explore the association between e-service quality and the intention to use it. By understanding this association, we can identify factors that need to be worked on to develop e-services that support the university audience.

II. ELECTRONIC SERVICES QUALITY

The quality of e-services represents a crucial factor in the success or failure of these services among the users [4].

Because it directly affects customers and enterprises, this topic is taking a severe place in academic research (1). According to M. Šajbidor, providing consumers with an excellent interactive information flow experience is the true essence of e-services [5]. Therefore, the interactive information flow developed between the client and the organization must be the foundation of the e-services strategy. S. Heidenreich discusses how users engage with and assess technology-based products [6]; he contends that a very complex procedure leads to customers needing more satisfaction with such products. Second, pre-consumption comparison standards do not always determine contentment in this instance.

Yoo and colleagues developed a nine-item SITEQUAL measure to assess e-service quality on four dimensions: usability, processing speed, security, and aesthetics [7]. They claim that e-services have laid firmly on the following:

• Users, as the actual evaluators of e-service quality, hold the key to understanding what e-service developers need. Their perception is invaluable, as it guides the definition of quality, not vice versa.

• E-services quality is delivered to customers in the typical vernacular instead of formal language, and absolutely, it must be apart from the technical vocabulary of the e-services.

• One's idea of quality may change when using essential online services without the ability to shop, which needs to be covered by the SITEQUAL domain.

R. M'rad initially conceptualized e-services quality from the means-end chain theory [8]. According to this concept, word-of-mouth outcomes, repurchase intention, and client satisfaction are significantly impacted by the awareness or appraisal of total e-services quality. He established a

contextual model for understanding the quality of e-services in their work, and it validates the correlation between customer satisfaction, repurchase intention, and overall e-services quality. Additionally, the research concluded that the overall quality of e-services influences customer satisfaction and repurchase intention and that customer satisfaction further governs repurchase intention [8].

M. Wolfinbarger and his colleagues highlighted some crucial implications of measuring user perceptions regarding their experience with a certain e-service [9]. In their research, they imply that evaluations of the e-services quality are heavily influenced by website design and fulfilment/reliability. They used focus groups, a sorting task, and an online client panel survey to develop the fourteen-item eTailQ scale. This scale consists of website design (including some design-related attributes as well as a personalization item and a product selection item), reliability/fulfilment (such as timely delivery and correct product portrayal), security or privacy issues (trusting in the website), and client service (providing solutions, staff members that genuinely want to help, and quick responses to questions). However, the highest possible standard of e-services must be provided to attract more online clients. Improved service quality could offer many new services at a lower cost, expand the geographic reach, and offer a broader range of products.

III. HIGHER EDUCATION'S ELECTRONIC SERVICE QUALITY

The quality of e-services within higher education cannot be overstated. This is consistent with the finding that education e-services positively impact student satisfaction. However, the capacity to develop standardized e-service quality dimensions has been continually influenced by the various interpretations of academic societies surrounding e-service quality. For example, Cheng and Tam stated that the term "education quality is a rather vague and controversial concept" should be considered by many stakeholders while attempting to define the concept of quality in higher education. Students are the key stakeholders in the use of different university services. Since they are acknowledged as the most critical stakeholders in any higher education institution, students' experiences with the numerous e-services available during their time as students raise the question of how satisfied they are with e-services for education [10].

In their paper, X. Mamakou Xenia J, Zaharias, Panagiotis, Milesi, and Maria asserted that providing excellent service to the audience can result in superior business education and positively impact academic outcomes [11]. Contact administration, faculty, curriculum, responsiveness, facility access, and tangible evidence are the content that can be offered to the students over e-services. R. Khan determined factors such as the ability to time, cost, and program difficulties that assess the quality of university e-services

[12]. Al-Nuaimi used the "Alexa Internet" website to analyze the e-services at twenty public institutions in Malaysia [13]. They evaluate the university's website performance based on six factors: the average number of pages viewed, the amount of time users spend on the site, the traffic rank, the proportion of visitors from Malaysia and other countries, and the number of inbound connections from other websites. The findings showed that all assessed universities' e-services should have operated better. Shahzad conducted a study to investigate the quality of e-services in the university libraries. The study covers three of public Malaysian universities that provide their services to students online [14]. The findings demonstrated a significant correlation between e-service quality and dependability. A measurement tool for gauging the perceived quality of e-services in Malaysian universities and colleges was proposed by [15]. He proposed five factors that embody the basis for measuring e-services: technical aspects, academic issues, non-academic issues, accessibility, and reputation. The tool was applied in a case study involving 409 students in six Malaysian institutions. According to the findings, accessibility is the most critical factor influencing an e-service's quality. Sultan has suggested a different measurement tool, dubbed "The Performance-based Higher Education", which consists of 67 items and evaluates how well e-services are assessed at various Japanese universities [16]. The factor analysis, validity, and reliability tests yielded satisfactory results. The characteristics of dependability, effectiveness, capability, efficiency, competencies, assurance, and unexpected scenario management are determined by the total loaded items. However, the literature only includes a few studies regarding the quality of university e-services. Also, the evaluation tools used to measure the quality of e-services are mainly derived from different disciplines and applied in this context. In the next section, the author explores the quality concept and proposes a model that measures the relationships between student satisfaction and the quality of e-services.

IV. THE PROPOSED MODEL

It is widely acknowledged by previous research focused on the traditional business environment and handling service quality aspects. However, precisely and in relation to the university's e-services, the studies are limited to some extent in this context. This is especially true regarding the comprehensive influence of a student's assessment of the effectiveness and quality of e-services on their satisfaction with the e-services, behavioral intention to use and the usage. Therefore, in this paper, the author attempts to bring out the relationships between these concepts within the framework of university e-services, relying upon prior research on user behavior, information systems, and various services marketing. Consequently, the accepted theoretical concepts of satisfaction, quality, and goals for the sequence of implications recognized in many service contexts, such as

[17],[18], are used to build the conceptual model depicted in Fig. 1.

The assumed associations often depend on the quality of e-services provided by universities, which can impact students' satisfaction levels and, consequently, their attitudes toward using the e-services, which can affect the degree of behavioural intent. The following subsections will be proposed associations according to the literature, and then the formulated hypotheses will be developed, and the essential components of the proposed model will be defined.

A. The Association Between Quality of University E-Services and Student Satisfaction

Many researchers have made efforts to understand the key characteristics that influence the end-users. [19] state that a user's overall assessment of a service's quality is based on how well it functions compared to similar offerings from competitors. Santouridis et al. have shown that customer pleasure and service quality have a strong and positive association [20]. Service quality is an extraordinary criterion allowing the user to assess their satisfaction. [21] state that evaluating the quality of delivered e-services in the internet marketplace required to involve the end user as an essential element of the evaluation process. "Satisfaction is an immediate reaction to how much value is received from using the product in specific use situations", according to Lina and Roidah [22]. Therefore, satisfaction should follow if a user has a positive attitude regarding the quality of their online experience.

Consequently, the degree of satisfaction with the university-provided online service will depend on how well or poorly students rate the quality. This means satisfaction should happen if the provided e-service is considered good quality. As a result:

H1. The quality of university e-services significantly influences satisfaction among students.

B. The Association Between University E-Service Quality and Usage

The literature on the technology acceptance model (TAM) exposes that the ease of use and usefulness of e-services (which employ a range of information technologies and online applications) is what ultimately leads to the increasing willingness to implement them [23]. Perceived e-service quality in the online context may boost actual utilization, such as repurposing university e-services. For example, an e-retail study [24] has discovered a clear relationship between utilizing online services and their quality. From this aspect, the quality of an e-service is positively correlated with the likelihood of using it again and recommending it to others. As a result, the actual utilization of a particular e-service is linked to the user's assessment of its quality. As a result, make the following assumption:

H2. Student satisfaction has a significant, favorable impact on actual usage.

C. Student Satisfaction and Actual Usage

When it comes to client satisfaction and actual usage, satisfied clients build upon their feeling of comfort when using a product. According to this theory, consumers' attitudes toward using e-services are determined by their inclination to react either favorably or unfavorably to the e-services [25]. However, more research is necessary to properly comprehend the relationship between student satisfaction and the actual utilization of university e-services. Nonetheless, there is a claim that actual positive use of the same service provider is strongly correlated with user happiness with the services. For instance, it has been shown that various e-service quality aspects benefit the user's decision to utilize e-services when it comes to online buying [25][26]. There is a clear correlation between actual usage and another example from the information systems area [27]. Accordingly, the available secondary data shows that highly satisfied students with academic online services are more likely to have a positive attitude toward e-services. Thus

H3. The quality of university e-services has a significant, favorable impact on actual usage.

Fig. 1: E-Services Quality Model

V. RESEARCH METHODOLOGY

A. Sampling method

The sampling technique is an essential component of statistical analysis. Thus, it is determined in accordance with the research goals. The author of this study recommended using "the convenience Non-Probability sampling method" to collect research data. This approach was selected due to its lower costs than alternative sampling techniques, reasonable processing time, and decreased likelihood of data distortion by individuals. It also eliminates the need for costly data collection and treatment, promotes information clarification, and helps researchers build rapport and trust—thus obtaining the insider's perspective. However, the bias issue that could arise throughout the selection process highlights this method's downside.

B. Questionnaire Construction

A self-administered questionnaire is used to test the assumed hypotheses. After creating a structured questionnaire following consultation guidelines and analyzing existing literature, the first pool of respondents is sent to a panel of specialists via focus groups. A self-prepared questionnaire based on scales taken from earlier research was

one of the tools used to collect the data. All items are measured using a seven-point Likert scale that ranges from "strongly agree" (1) to "strongly disagree" (7). Ultimately, the scale has undergone some rewording and modification in order to meet the study requirements.

C. Data Sample

A rigorous sample-size study balances rejection and non-rejection throughout the investigation. 300 students were involved in collecting data for this study. This sample size aimed to ensure the data was not distorted or biased. The planned investigation is carried out based on the idea of reducing the gap between the parameter and estimate. On the other hand, a high sample size contributed to confidence in the data collected, avoiding the bias trap. The population size, time factors, accuracy, and reliability are considered before the sample size is verified. Roscoe's rule of thumb [28] states that "a sample of 30 to 500 is large enough sample," thus the guideline applied here for choosing the appropriate sample size.

D. Measurement Validity

The model's fit quality is assessed using the model-fit metrics (χ^2/df, GFI, NFI, CFI, RMSEA) [29]. The findings demonstrate that every number exceeded the standard acceptance threshold. As a result, Table I shows that the measurement model and the collected data suit each other rather well.

Cronbach's alpha and exploratory factor analysis are used in this study to confirm the validity and reliability of the questionnaire. According to [30], the internal consistency of the items is evaluated using Cronbach's alpha coefficient, which has to be more than 0.7 for acceptance. As shown in Table II, the Cronbach's alpha value for this study is more than 0.7, indicating that all constructs have good internal consistency and satisfactory reliability. The main component analysis is used to regulate the underlying structure of each construct via the Varimax rotation [29]. According to [29], the main component analysis depends on factor loading values that have to be more than 0.7 for each item. Table II demonstrates that loading values are at a proper factor for all items with values larger than 0.7.

Further, using a convergent validity test, the relationship between items on different scales is identified according to loadings greater factor as proposed by [29]. Table II presents the results, which indicate that the constructs have sufficient convergent validity because the item loadings were more significant than 0.7. To summarise, the findings confirm the reliability and validity of the questionnaire constructs.

Table I: Measurement Models: Endogenous and Exogenous

Goodness-of-fit measure	value	Exogenous	Endogenous
χ^2/df	=< 3.00	1.815	1.884
GFI	>= 0.90	0.954	0.985
AGFI	>= 0.90	0.983	0.931
NFI	>= 0.90	0.964	0.981
CFI	>= 0.90	0.982	0.991
RMSEA	=< 0.05	0.036	0.038

Table II: Analysis of the Reliability of the Gathering Data

Elements model	exploratory factor	Cronbach's alpha
University e-service quality	.942	.832
	.962	
	.836	
	.968	
	.817	
Students' satisfaction	.924	.873
	.965	
	.789	
	.872	
	.921	
Actual usage	.924	.915
	.931	
	.863	
	.861	
	.811	

VI. RESULTS

A. Demographic Data

The results in this part of the study accurately reflect the demographic characteristics of the survey participants. 158 male respondents (53%) and 142 female respondents (47%) make up the 300 respondents that are students, both male and female. Table III shows the education level according to gender.

Table III: The Education Level According to Gender

Level of Education		Gender	
		Male	Female
Diploma	62	46	108
Degree	74	77	151
Master	15	16	31
PhD	7	3	10
Total		158	142

B. Estimating Structural Model

Table IV shows the mean values and standard deviations for each construct. On a scale from 1 to 7, students' satisfaction has the most significant mean (3.59). The related means for Actual usage and University e-service quality are 3.48 and 3.39.

Table IV: Mean Score and Standard deviation of the Model factors

Factors	Mean	Standard Deviation
University e-service quality	3.39	.857
Students' satisfaction	3.48	.793
Actual usage	3.59	.914

C. Structural Equation Modeling

Structural Equation Modeling (SEM) is applied to determine whether the model and the primarily collected data are fitted. The technique is chosen given that it can examine several dependency relationships, particularly the direct and indirect impacts between the model's structures [31]. As a way to evaluate the SEM results, the author has examined the fit indices to determine whether the collected data and the structural model fit together. The feasibility of each path represented in the model has been reviewed by determining whether the weights are statistically and practically significant.

The Amos analytical tool uses the maximum probability estimation method in the SEM estimation process. A satisfactory model fit was shown by comparing each fit measure to its specified value. Ultimately, the data are analyzed to determine the model's importance and the level of hypothesized relationships. The path values for every dependent variable shown in Fig. 2 are included in the results.

The collected data support all hypotheses. Three factors are tested in the model. The results showed that the quality of university e-services significantly influences satisfaction among students ($\beta= 0.27$, $P<0.001$), supporting hypothesis H1. Student satisfaction significantly favors actual usage ($\beta= 0.28$, $P<0.001$). Hypothesis H2 is supported. The quality of university e-services has a significant, favorable impact on actual usage ($\beta= 0.18$, $P<0.001$), supporting hypothesis H3. Thus, all hypotheses are supported. A summary of the testing results is shown in Table V.

Table V: Hypotheses Testing Results

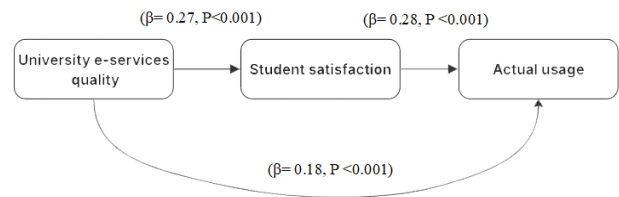| Hypotheses	Path	Direction	Results
H (1)	Quality of perceived university e-services → Student satisfaction	Positive	Supported
H (2)	Perceived university e-service quality → Actual usage	Positive	Supported
H (3)	Students' satisfaction → Actual usage	Positive	Supported

Fig. 2: Path Test of the Model

VII. DISCUSSION

In this research, the author attempts to improve upon a new model for university student evaluations of the quality of e-services. This study contributed to a groundbreaking study examining how university e-service quality evaluations affect student behavior outcomes. Based on the proposed model, the author examined three factors in their associations: the quality of e-services, customer satisfaction (represented by students), and actual utilization. The results revealed that the quality of university e-services directly impacts student satisfaction. In addition to the effect that university e-services have on student behavior, the theoretical development postulated that students' opinions would positively affect how their attitudes about these services change over time. According to the research, student opinions of university e-services will be determined by quality.

Nevertheless, prior e-service quality models did not consider the significance of student perceptions regarding university e-services. The research findings indicate that when students use university e-services, they form a favorable/unfavorable opinion regarding these e-services. This can be a new finding since the other studies have only discussed it in the context of online retail, for example [24]. Furthermore, the results are consistent with earlier research conducted in other contexts [20], [15]. Numerous studies in different environments focus on the behavioral intentions of their clients. This study focuses on how students intend to use university e-services in terms of their behavior (education context). Few studies have examined e-services in the context of education, despite a large body of research covering the effectiveness of e-services and their influence on behavioral goals. However, the results that were obtained draw further attention to how the quality of e-services impacts university students' satisfaction.

Finally, the results indicate that the satisfaction of the students influences the intentions and the use of the academic e-services. This conclusion is consistent with a study that examined customer satisfaction and how it affected respecting consumers' attitudes, behavioral intentions, and actual usage. For example, the servicing provider's managed trademark communication significantly impacts the development of positive trademark impressions [22]. Therefore, customers pleased with a particular trademark should develop positive trademark impressions, behavioral

intents, and actual usage. The results of this study essentially build on previous research on e-retailing services by concentrating on student satisfaction with university e-service features and how satisfaction affects the actual usage of the university's e-services.

VIII. CONCLUSION

This research examines the correlation between e-service quality and student attitudes to enhance the quality of educational institution e-services. It posits and empirically confirms theories regarding the correlations between e-service quality and student satisfaction. The findings revealed a theoretical model utilized as a basis for evaluating e-service quality and its impact on student satisfaction and actual usage. In addition, it comes up with a conceptual model which can be applied to assess the quality of university e-services. The author suggests utilizing this model in other Internet-based service contexts for future work.

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