

University 4.0 Performance: Improvement of Learning Management System Using E-ServQual Post-Covid-19 Pandemic

(Case Study in Private Universities)

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Abstract—During the Covid-19 pandemic, learning was carried out online by utilizing various Learning Management System (LMS)-based platforms. Not only the reason for the COVID-19 pandemic but LMS is also deemed necessary to be immediately adopted by universities to face the challenges of the industrial era 4.0. To continue to have an advantage amid increasingly high competition, universities are required to improve and improve the quality of the LMS used. One of them is done through testing the user satisfaction response. User satisfaction is measured using the E-ServQual variable consisting of tangible, empathy, reliability, responsiveness, and assurance (TERRA). The instrument questionnaire used closed questions and was given to 100 LMS users, consisting of expectations and reality using a scale such as a scale of 1 for very satisfied, 2 for satisfied, 3 for neutral, 4 for dissatisfied, and 5 for dissatisfied. Then, the data were analyzed using descriptive analysis by calculating the average score variable and measuring the Customer Satisfaction Index. Overall, users are satisfied with the performance of E-ServQual's attributes in implementing the Learning Management System (LMS) during the Covid-19 Pandemic, and in general, the use of LMS has shown good performance. However, from the data on the perception gap between expectations and reality, it shows that the Higher Education Learning Management System needs to improve the appearance of the LMS homepage which is more attractive, operators must be easily contacted by users, and are required that operators work more quickly, seriously, and politely in responding to various problems. user complaints.

Keywords—Covid-19 pandemic, e-servqual, learning management system, university 4.0

I. INTRODUCTION

The pressure of globalization and digitalization which later became the industrial revolution 4.0 requires universities to be able to manage their business processes (business processes) [1] with the application of information technology that combines cyber technology and automation technology, both in

the service process and in the learning process [2]. Thus, higher education is focused on the demands of providing needs that are supported by the Internet of Things, Big Data, and Cyber Security [3]. Education 4.0 integrates various ways of integrating technology both physically and indirectly into learning methods so that the adaptation of this technology in higher education is known as University 4.0 [4].

The presence of technology, especially the popularization and expansion of internet access to smartphones, laptops, tablets, and computers, has greatly influenced education and learning and teaching methods in the world of education [1]. Education in the era of the industrial revolution 4.0 emphasizes changes in learning using web-based digital and mobile technology, applications, systems, devices, and so on. Thus, University 4.0 is a phenomenon of changing learning in higher education using a digital system or commonly called a Learning Management System (LMS), including e-learning.

In addition to the phenomenon of the industrial revolution 4.0, in 2019 there was a world health disaster in the form of the Covid-19 pandemic. The Covid-19 outbreak is a type of epidemic that spreads very high and fast. This epidemic attacks the human immune and respiratory systems [5–8]. Prevention of this outbreak is done by avoiding direct interaction of infected people with people who are at risk of being exposed to this coronavirus [6]. Regulating physical distance and contact that has the opportunity to spread the virus is called social distancing [7]. The learning process at all levels of education is carried out online to prevent more massive transmission. Thus, the implementation of e-learning occurs end masse. Higher education institutions around the world have been encouraged to use e-learning, given that traditional classroom-based learning is not possible under the Covid-19 protocol.

The sudden implementation of online learning due to Covid-19 brought many challenges to higher education [8–12]. Thus, E-learning has experienced massive growth in the

community, government, schools, universities, and several other organizations have used it a lot [13]. The online learning process is technology-based learning that uses service applications in the form of online media that are designed and created to be used in the learning process in the world of education. Online learning also has the advantage of being able to foster self-regulated learning.

For most universities, the shift from classroom-based to online learning has not been run smoothly, and students are still less interested in using it. Apart from all that, private university has begun to adapt to an online learning system, by implementing a Learning Management System or often called e-learning.

Although education 4.0 has entered the world of education at this time, there is still a phenomenon of low knowledge of higher education human resources on information technology. On the other hand, there has also been a wave of dissatisfaction with the implementation of online learning policies. For this reason, it is necessary to measure the usability level of the implementation of e-learning. E-learning is one of the tools that is needed to support academic activities and services in universities.

In this regard, it is necessary to measure the usability of e-learning in universities. These measurements include using the ServQual and CSI (Customer Satisfaction Index) instruments. This is based on the statement that usability can be measured by service quality [14] and the Customer Satisfaction Index [2].

II. LITERATURE REVIEW

A. *University 4.0*

The industrial revolution in this fourth round emerged with the characteristics of digitizing all sectors of life, starting from the industrial world and then seeping into the education sector [3, 4]. Industrial revolution 4.0 is a challenge for universities in Indonesia. This flow needs to be responded to by adapting higher education 4.0 so that it can encourage the nation's competitiveness [3]. Five things need to be considered so that higher education can be competitive, namely:

- Preparation of a more innovative learning system in higher education such as adjusting the learning curriculum and improving student abilities in terms of data Information Technology (IT), Operational Technology (OT), Internet of Things (IoT), and Big Data Analytics, integrating physical objects, digital and human to produce competitive and skilled university graduates, especially in the aspects of data literacy, technological literacy, and human literacy.
- Reconstruction of higher education institutional policies that are adaptive and responsive to the industrial revolution 4.0 in developing the required transdisciplinary sciences and study programs. The Cyber University program began to be pursued, such as the distance learning lecture system, thereby reducing

the intensity of lecturer and student meetings. This Cyber University is later expected to be a solution for the nation's children in remote areas to reach quality higher education.

- Preparation of human resources, in particular, students, lecturers, and researchers as well as engineers who are responsive, adaptive, and reliable to face the industrial revolution 4.0. In addition, rejuvenation of infrastructure and development of education, research, and innovation infrastructure also needs to be carried out to support the quality of education, research, and innovation.
- Breakthroughs in research and development that support the Industrial Revolution 4.0 and the research and development ecosystem to improve the quality and quantity of research and development in universities.
- Breakthrough innovation and strengthen the innovation system to increase industrial productivity and increase technology-based startups.

Technological interference in higher education changes habits in the process of human resource management, finance, academics, and learning processes, from a manual system to an information technology-based Learning Management System (LMS). With this system which is applied to a university or college, it certainly brings about some changes, including in private universities in Indonesia.

B. *Learning Management System*

A learning management system is the use of technology to disseminate information and knowledge in education and training. Meanwhile [12, 15] suggested that the Learning Management System is an information system that integrates various kinds of instructional materials (audio, video, and text) delivered via email, live chat sessions, online discussions, forums, quizzes, and assignments [1]. Implementation of the Learning Management System can use a website-based or application-based information system, as long as there is still technological intervention [1, 10, 11]. Based on the opinion of the researchers above, the Learning Management System (LMS) is not limited to the use of information systems, but also includes learning in which there is technological intervention.

C. *E- ServQual*

Usability is seen as a measure of the quality of the user experience when interacting with products or web-based information systems, applications, software, mobile technology, or other equipment operated by users [16]. Service quality is the delivery of good or superior service, aiming to satisfy customers based on perceptions and expectations [2].

Service quality in determining user satisfaction is measured by the TERRA dimensions which consist of tangible, empathy, reliability, responsiveness, and assurance [2].

- *Tangible*, which describes the physical facilities, equipment, and appearance of personnel and the presence of users. This dimension includes the physical condition of facilities, equipment, and appearance of workers. Because services cannot be observed directly, customers are often guided by visible conditions regarding services in evaluating [17, 18].
- *Empathy*, which indicates the degree of attention given to every customer. This dimension also reflects the employee's ability to perceive the customer's feelings as if the worker himself experienced them. Such as the ease of covering and contacting, providing information to customers in an understandable language and listening to customer responses and questions, and the need for efforts to know customers and their specific needs [2].
- *Reliability*, which shows the company's ability to provide services accurately and reliably, can be trusted, is responsible for what is promised, never gives excessive promises, and always fulfills its promises. In general, the definition of reliability reflects the consistency and reliability (things that can be trusted and accounted for) of the company's performance [19].
- *Responsiveness*, which includes a desire to help customers provide fast and precise, always give proper attention and immediate, and the customer. This responsiveness dimension reflects the company's commitment to providing timely services. This dimension relates to the desire or readiness of workers to serve [20].
- *Assurance*, which includes knowledge and courtesy of employees and workers' ability to provide services that generate trust from their customers. This dimension reflects the company's competence, courtesy to customers, and the safety of its operations. Competence is related to knowledge and skills in providing services. Hospitality refers to how a company's workers interact with its customers and customer ownership. Security reflects the customer's feeling that he is free from the dangers of risk and doubt [17].

III. METHODS

Research methods this research uses quantitative-descriptive methods. This study uses a questionnaire instrument using closed questions, which refers to service quality including TERRA which consists of tangible, empathy, reliability, responsiveness, and assurance [15, 18, 20-22]. The questionnaire consists of an assessment between expectations and reality. The scale used in the questionnaire uses a Likert scale with a scale of 1 for very satisfied, 2 for satisfied, 3 for neutral, 4 for dissatisfied, and 5 for very dissatisfied [21]. Questionnaires were distributed to 100 respondents who were selected based on a simple random sampling technique. Then, the data were analyzed using

descriptive analysis by calculating the average variable score and then assessed with the following interpretation criteria (Table 1):

TABLE I. INTERPRETATION CRITERIA

No.	Average Score	Interpretation
1	4.2 – 5.0	Very satisfied
2	3.4 – 4.1	Satisfied
3	2.6 – 3.3	Quite satisfied
4	1.8 – 2.5	Less satisfied
5	1.0 – 1.7	Not satisfied

Then the **Customer Satisfaction Index (CSI)** is measured so that the results of the measurement can be used as a reference to determine goals in the coming years [16]. CSI Assessment criteria can be seen in Table 2 and the stages of calculating the customer satisfaction index are as follows:

- Calculating Weighting Factors (WF), which is a function of the median importance of each attribute in the form of a percentage (%) of the total median score of importance for all tested attributes.
- Calculating the Weighted Score (WS), which is a function of the median score of the satisfaction level of each attribute multiplied by the Weighting Factors (WF) of each attribute.
- Calculating the Total Median Weight (WMT), which is the total value of the Weighted Score (WS) as a whole.
- Calculating the satisfaction index Customer, the calculation of Weight Median Total (WMT) divided by the maximum scale, and then multiplied by 100%.

TABLE II. CSI ASSESSMENT CRITERIA

Assessment criteria	CSI Value
Very satisfied	0.81-1.00
Satisfied	0.66-0.80
Quite satisfied	0.51-0.65
Less satisfied	0.35-0.50
Not satisfied	0.00-0.34

To facilitate data collection and data analysis, operational variables consisting of dimensions, indicators, and attribute codes are described as follows (Table 3):

TABLE III. DIMENSIONS AND INDICATORS OF E- SERVQUAL

Dimension	Indicator	Code
Tangible	Completeness of service facilities	FY1
	Easy-to-use menus and features	FY2
	Attractive and artistic appearance	FY3
Empathy	Ease of contacting the operator	EM1
	Information is conveyed in an understandable language	EM2
	Listening to customer feedback and questions	EM3
Reliability	Ability to show honesty, not lies (right on the promise)	RL1
	Ability to provide services accurately and reliably	RL2
	Commitment to provide service consistently	RL3
Responsiveness	Help customers solve problems	RS1
	Provide fast and precise service	RS2
	Give serious, precise, and immediate attention	RS3
Assurance	The ability to establish trust will be service and customer data security	AS1
	Able to build customer <i>confidence</i>	AS2
	Courtesy in service	AS3

E-ServQual consists of the dimensions of tangible, empathy, reliability, responsiveness, assurance, which is then measured by indicators of completeness of service facilities, menus, and features easy to use attractive appearance and artistic, ease of contacting the operator, the information conveyed in an understandable language, listening to customer responses and questions, the ability to show honesty not lies (promise), the ability to provide services accurately and reliably (responsibly), commitment to provide consistent service, help customers solve problems, provide fast and appropriate service, give serious, precise and immediate attention, the ability to build trust in customer service and data security, be able to build customer confidence and politeness in service (courtesy).

IV. RESULTS AND DISCUSSION

Measurement of the level of customer satisfaction is needed to determine future goals and to determine the level of satisfaction generated by an attribute. In calculating the level of customer satisfaction, the Customer Satisfaction Index method is used which requires an average score for the level of expectations and an average score for the perception level of the Learning Management System attribute. From the research that has been done, here is a table of ServQual attributes based on the level of expectations and the level of perception of user satisfaction.

TABLE IV. E-SEVQUAL ATTRIBUTES BASED ON EXPECTATION AND PERCEPTION LEVEL

Dimension	Code	Average Score		Gap
		<i>Exp.</i>	<i>Percep.</i>	
Tangible	FY1	4.04	4.01	0.03
	FY2	3.98	3.95	0.03
	FY3	3.66	3.55	0.11
		3.89	3.84	0.06
Empathy	EM1	3.85	3.67	0.18
	EM2	3.61	3.46	0.15
	EM3	4.05	3.95	0.10
		3.84	3.69	0.14
Reliability	RL1	3.78	3.79	- 0.01
	RL2	3.62	3.67	-0.05
	RL3	4.07	4.05	0.02
		3.82	3.84	- 0.01
Responsiveness	RS1	3.64	3.66	- 0.02
	RS2	3.90	3.85	0.05
	RS3	4.37	4.31	0.06
		3.97	3.94	0.03
Assurance	AS1	3.83	3.75	0.08
	AS2	3.69	3.56	0.13
	AS3	4.05	3.98	0.07
		3.86	3.76	0.09

Table 4 above, shows that the average value based on the level of expectations and level of perception of the Learning Management System in Private colleges of performance indicators -rata Average Physical Evidence in the category are satisfied, although it has not reached the expectations of the customer/user. The dimension of physical evidence that has the highest gap is in the attractive and artistic appearance indicator, which is 0.11. So according to user perception, the Learning Management System of private universities has not yet displayed an attractive and eye-catching appearance, so it needs to be improved.

On the Empathy dimension, the average customer is in the satisfied category, but between expectations (expectations) and performance (perceptions), there is a gap that is still far, which is 0.14. This means that the operator's empathy has not met the user's expectations, especially on the indicator of the ease of contacting the operator. So according to students' perceptions, operators of private higher education Learning Management Systems are difficult to contact by users.

The reliability dimension of the average performance is in the satisfied category and has exceeded the expectations/expectations of the customer (user) where the indicator of the ability to provide services accurately and reliably (responsibly) is considered to be the largest exceeding the performance, with an exceedance of 0.05. However, the indicator of commitment to provide services consistently on the reliability dimension still has a gap between performance and expectations. This means that even though they have provided accurate and responsible services, they have not been implemented consistently by the operators of the private higher education Learning Management System.

The responsiveness dimension of the average performance is in the satisfied category even though it has not met user

expectations. This satisfaction can be seen from the indicators that help customers solve problems that have exceeded student expectations. The indicators that still have gaps are providing fast and appropriate services, and indicators giving serious, precise, and immediate attention. This means that even though operators have assisted customers in solving e-learning problems, they are still not considered fast and serious in assisting students.

The dimension of assurance in average performance is already in the satisfied category, although overall it has not met customer expectations. The indicator with the lowest gap is the politeness indicator in service (courtesy), while the one with the highest gap between expectations and performance is the indicator of being able to build customer confidence of 0.13. This means that the presence of the Learning Management System during academic services of private universities has not been able to increase students' confidence in theirs.

From this description, the dimensions whose performance has exceeded user expectations are the dimensions of reliability (the ability to show honesty not lies, the ability to provide services responsibly, and a commitment to provide services consistently) that need to be maintained in the management of e-learning for private universities, as well as need to be improved in terms of consistency in providing services to student complaints and problems.

The dimension with the lowest performance and does not exceed user expectations is the empathy dimension which from the findings of this study is caused by the student's view that students still have difficulty contacting the operator, the information conveyed has not used language that is easily understood by students, and the operator is less responsive in listening to feedback. and inquiries from customers.

Furthermore, an analysis using CSI on ServQual is carried out which consists of the dimensions of tangible, empathy, reliability, responsiveness, assurance, which is then measured with indicators complete facilities service, menus and features are easy to use, attractive and artistic appearance, the ease to contact the operator, the information is delivered in a language that can be understood, listened to feedback and customer inquiries, ability to demonstrate honesty is not lie (*right on the promise*), ability to provide services accurately and reliably (responsibly), commitment to provide consistent service, help customers solve problems, provide fast and precise service, give serious, precise and immediate attention, ability to establish confidence (trust) in customer service and data security, able to build trust themselves (confidence) customers and courtesy in service (courtesy) get the result of the average value of each respective attribute is then used to calculate the customer Satisfaction Index.

V. CONCLUSION

Based on these results show the performance of quality of service of the application of e-learning on campus Private colleges Bandung has to be in the category of good or satisfied with the average value of the gap E-ServQual of 0.06. The

results show that the dimensions whose performance has exceeded user expectations are the dimensions of reliability that need to be maintained in the management of the Learning Management System of private universities, and need to be improved in terms of consistency in providing services to student complaints and problems. The dimension with the lowest performance and does not exceed user expectations is the empathy dimension because students still have difficulty contacting the operator, the information conveyed does not use language that is easily understood by students, and the operator is less responsive in listening to responses and questions from customers.

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