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Ipma Analysis of The Students' Acceptance on The Use of Celoe Learning Management System (LMS), at Telkom University

Analisis Ipma Penerimaan Penggunaan Teknologi Celoe Learning Management System (LMS) Pada Mahasiswa Telkom University

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ABSTRACT

The current COVID-19 pandemic is causing big problems around the world, including in education, which is experiencing changes in its learning system. Distance learning is now used by all universities in Indonesia due to the impact of the pandemic. Telkom University has developed an e-learning technology, called CeLOE Learning Management System (LMS) as a distance learning platform for all lecturers and students. The purpose of this study is to determine the importance of rating by using IPMA based on the factors that influence the acceptance of CeLOE LMS technology using the General Extended Technology Acceptance Model for E-Learning (GETAMEL). The minimum sample in this study amounted to a minimum of 379 samples of respondents conducted by CeLOE LMS users. This study uses a non-probability sampling technique and the analysis technique used in this study is PLS-SEM using SmartPLS 3.2.9 software.

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ABSTRAK

Pandemi COVID 19 yang sedang terjadi saat ini menyebabkan masalah besar di seluruh dunia termasuk pada dunia pendidikan mengalami perubahan sistem pembelajaran. Saat ini pembelajaran jarak jauh digunakan oleh seluruh perguruan tinggi di Indonesia karena dampak pandemi. Telkom University membuat teknologi e-learning dinamakan CeLOE Learning Management System (LMS). CeLOE Learning Management System (LMS) digunakan sebagai platform pembelajaran jarak jauh untuk seluruh dosen dan mahasiswa. Tujuan penelitian ini untuk mengetahui importance rating dengan menggunakan IPMA dari faktor – faktor yang memengaruhi penerimaan teknologi CeLOE/GETAMEL). Sampel minimal pada penelitian ini berjumlah minimal 379 sampel responden yang dilakukan oleh pengguna CeLOE LMS. Penelitian ini menggunakan teknik sampling non-probabilitas dan teknik analisis yang digunakan pada penelitian ini adalah PLS-SEM dengan menggunakan software SmartPLS 3.2.9.

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Introduction

The essential role of ICT is indisputable in the field of education system in Indonesia in particular, and in the world in general as the technology has provided opportunities to further develop education management and learning processes in universities (Song et al, 2015). The Minister of Education and Culture of the Republic of Indonesia has then issued Circular Letter No. 4 regarding the implementation of education policies during pandemic of COVID-19 that every learning process was to be carried online (Astini, 2020).

The Learning Management System (LMS) is used by most universities as a means of distance learning today. LMS is a term generally used to describe a system for online education services for teachers, students, and other academic staffs (Aldiab et al, 2019). Meanwhile, according to Ouadoud et al. (2018), Learning Management System is a web-based software program that covers various learning services in the world of education. The benefits of using this LMS are for distance learning facilities in the development of users' knowledge and competence. In addition, they can also access and use it interactively with various available sources, with no time limitation in its use.

Telkom University has a unit that manages online learning which we call CeLOE or Center for e-Learning and Open Education and a platform for online learning management, namely LMS or Learning Management System. This LMS is to help lecturers prepare and create online learning content. This Covid-19 pandemic has impacted not only the education sector but also almost all sectors of the economy, business, non-profit organization, government, and so on. The use of the new LMS creates new culture of learning, as well as problems in doing online learning. Not only students, but also lecturers are not used to providing online learning and therefore have their own complaints. This transformation of online learning is no longer an option, but a necessity in a changing environment that is happening all over the world. According to Rahayu et al. (2017) an information system can be a benchmark by users in assessing the acceptance of an information technology. Therefore, a tool is needed to measure the level of acceptance of technology by the users. In this study the technology model used is the General Extended Technology Acceptance Model for E-Learning (GETAMEL). This model has combined the Technology Acceptance Model (TAM) with the five external factors of the GETAMEL model. The TAM model used is Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Intention to Use (ITU), Attitude Towards Using (ATU), Actual Use (AU). The five external factors of the GETAMEL model used, on the other hand, consist of Experience (XP), Enjoyment (ENJ), Computer Anxiety (CA), and Self-Efficacy (SE).

Method

The LMS is used by most universities as a means of distance learning. According to Rahayu et al. (2017) an information system can be a benchmark by users in assessing the acceptance of an information technology. Therefore, a tool is needed to measure the level of the users' acceptance of technology .

Sukarya et al. (2020) mentioned there are several models for measuring the level of acceptance of a technology by users, one of which is the Technology Acceptance Model (TAM). TAM is one of the methods that can be used to find out what factors affect the new technology introduced or to be used. The model used in this study has been modified into the General Extended Technology Acceptance Model for E-Learning (GETAMEL), namely, combining the Technology Acceptance Model with external factors from the GETAMEL model and eliminating the Subjective Norm (SN).

This research uses quantitative methods for analyzing large amounts of data that can be easily expressed in numbers; we may even find unanswered research questions or untested hypotheses to be addressed. Then, this study adds the importance performance map analysis (IPMA) to generate knowledge about which drivers should be prioritized to achieve a target of interest that will be included in the discussion and suggestions.

Results and Discussion

This research uses primary data collection by distributing questionnaires to certain respondents. Respondents were users of the CeLOE Learning Management System (LMS) at Telkom University Students. The number of samples required is 379 with complete answers according to the specified criteria.

Measurement Model Test Results (Outer Model)

Testing the measurement model or the outer model was carried out by measuring convergent validity and discriminant validity. The outer model for this research is shown in Figure 1.

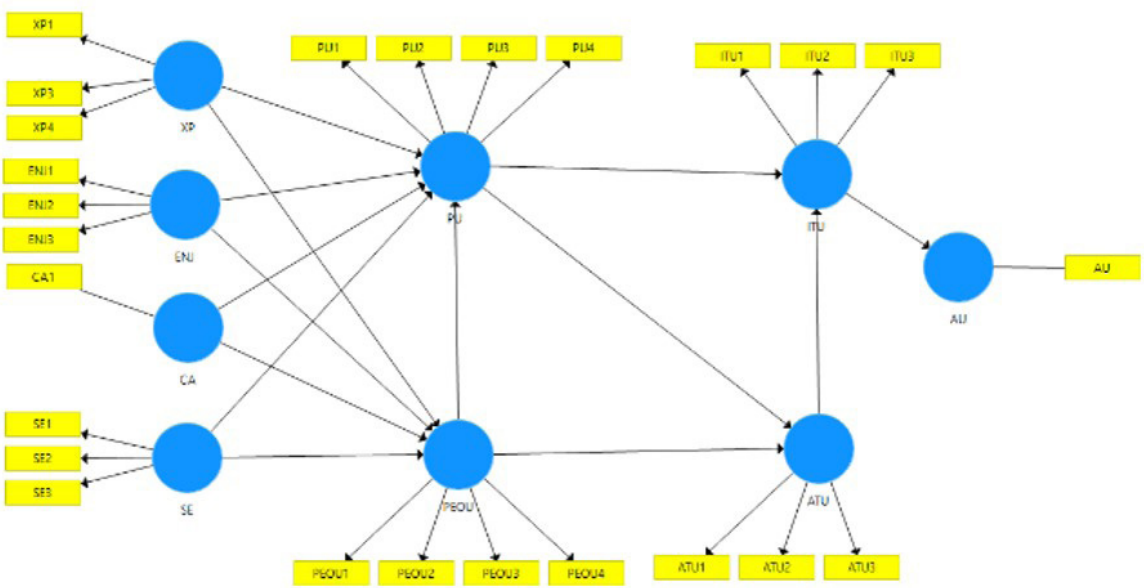

Figure 1 Outer Model
(Source: Processed Data)

Convergent Validity

Three approaches, which are composite reliability, factors loadings, and average variance extracted (AVE), are used to examine convergent validity. Convergent validity is used to test the level of accurate indicators to measure the object of research. The indicator used in this study is the loading factor and average variance extracted (AVE). Referring to Hair et al (2017), an item has convergent validity if the score is more than 0.5. The calculations by using SmartPLS 3.2.0 show that all indicators in this study have a loading factor value of more than 0.5 which means that all indicators are valid. Table I is AVE results.

Table I Avarage Variance Extracted (AVE)

Latent Variables	AVE
Perceived Usefulness (PU)	0.690
Perceived Ease of Use (PEOU)	0.722
Attitude Towards Using (ATU)	0.711
Intention to Use (ITU)	0.811
Actual Use (AU)	1.000
Experience (XP)	0.715
Enjoyment (ENJ)	0.797
Computer Anxiety (CA)	1.000
Self-Efficacy (SE)	0.809

(Source: Processed Data)

From the AVE results, it can be concluded that the questionnaire meets the criteria of convergent validity because all variables have a value of more than 0.5.

Discriminant Validity

Discriminant validity is the extent to which a construct is truly distinct from other constructs by empirical standards (Hair et al., 2017). There are three ways to access discriminant validity, which are Fornell-Larcker's criterion, cross loadings, and the Heterotrait-Monotrait ratio of correlations (Hair et al., 2017). This research uses Fornell-Larcker's criterion, the Heterotrait-Monotrait ratio of correlations. Table II is the results of Fornell-Larcker's criterion.

Table II Fornell-Larcker Criterion of Discriminant Validity

	ATU	AU	CA	ENJ	ITU	PEOU	PU	SE	XP
ATU	**0.843**								
AU	0.194	**1.000**							
CA	0.355	0.091	**1.000**						
ENJ	-0.113	-0.005	-0.128	**0.893**					
ITU	-0.140	0.063	-0.202	0.265	**0.901**				
PEOU	-0.096	0.023	-0.060	0.233	0.224	**0.849**			
PU	-0.234	-0.047	-0.207	0.185	0.268	0.071	**0.831**		
SE	-0.178	0.052	-0.075	0.190	0.265	0.194	0.210	**0.899**	
XP	0.004	0.045	0.003	-0.065	0.288	0.087	0.098	0.060	**0.845**

(Source: Processed Data)

Fornell and Larcker used the square root of AVE which should be larger than the latent variable correlations (LVC). Table 2 shows the square root of AVE, where each latent variable's value is greater than other LVC. The AVE square root score of each variable is higher than the correlation between the two variables in the model, so that the variables in this study have met discriminant validity. Table III shows the cross-loading of all indicator items with each construct. It can be observed that items loading of the construct have a higher value than loading on other constructs. Both findings confirm the strong discriminant validity of the reflective constructs. All HTMT values are less than 0.9, then the validity has been met in this study. It can be concluded that all constructs in this model have met the criteria for discriminant validity.

Table III Heteroit-Monotrait Ratio of Correlations

	ATU	AU	CA	ENJ	ITU	PEOU	PU	SE	XP
ATU									
AU	0.222								
CA	0.394	0.091							
ENJ	0.124	0.035	0.135						
ITU	0.159	0.069	0.214	0.303					
PEOU	0.099	0.031	0.053	0.229	0.227				
PU	0.252	0.051	0.204	0.198	0.287	0.087			
SE	0.208	0.056	0.080	0.217	0.302	0.188	0.226		
XP	0.096	0.052	0.034	0.100	0.332	0.108	0.122	0.079	

(Source: Processed Data)

Reliability Test

Sekaran and Bougie (2016) explain that the reliability test is a measurement of the consistency of the results of an indicator measurement which is strengthened by the Cronbach alpha where the consistency of each answer is tested. The Cronbach alpha calculation is said to be good if the value is more than 0.5 and if the composite reliability value is more than 0.8; then, it can be said to be reliable. Table IV is the results of the reliability test.

Table IV Reliability Test

	Cronbach Alpha	Composite Reliability
ATU	0.798	0.880
AU	1.000	1.000
CA	1.000	1.000
ENJ	0.873	0.922
ITU	0.883	0. 928
PEOU	0.884	0.912
PU	0.854	0.899
SE	0.882	0.927
XP	0.806	0.883

(Source: Processed Data)

Inner Model

The next step is to test the inner model if the outer model has met the terms and conditions. According to Ghozali (2014) the inner model (inner relations, structural model, and substantive theory) describes the relationship between latent variables based on substantive theory. This model is evaluated using R-square for the dependent construct, Stone-Geisser q-square test for predictive relevance, and t-test as well as the significance of the coefficients of structural path parameters. Inner model from this research can be seen on Figure 2.

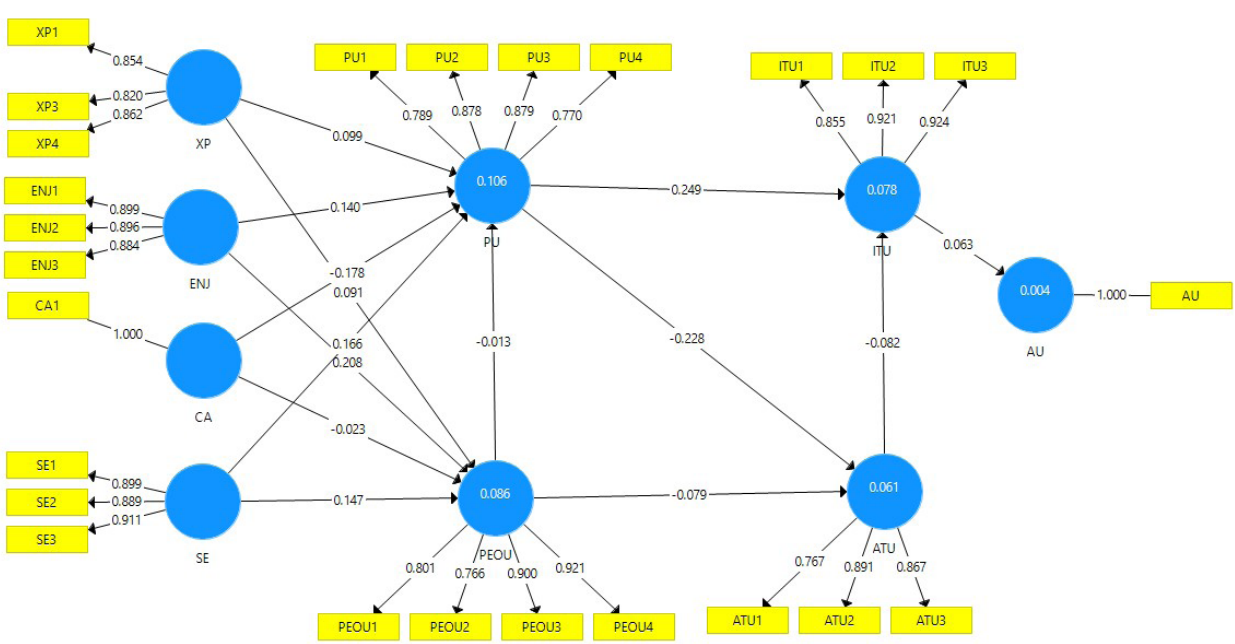

Figure 2 Inner Model
(Source: Processed Data)

Path Coefficient

Path coefficients in the PLS-SEM are checked for the relationship between constructs and significance level. Path coefficient is a value to determine whether the relationship between the variables is positive or negative. Path coefficient value is in the range -1 to 1, and if the value is 0-1, the relationship is deemed positive. Table 5 is the result of the Path coefficient, which shows direct effect results for each hypothesis. Firstly, variables which have no significant effect are CA on AU (-0.082), PEOU on ATU (-0.079), ATU on ITU (-0.082), CA on PU (-0.178) and PU on ATU (-0.228). Secondly, variables which have strong significant effect are ITU on AU (0.063), XP on PEOU (0.091), XP and PU (0.099), ENJ on PU (0.140), SE on PEOU (0.147), SE on PU (0.166), ENJ on PEOU (0.208) and PU on ITU (0.249).

Hypothesis Testing (Bootstrapping)

This research uses a significant level of 0.05 or 5% if the t-value has a value greater than 1.65, and if the p-value of less than 0.05, then the H1 result is automatically accepted.

Table V Hypothesis Testing for Direct Effect

Hypothesis	Variable Relationship	Original Sample (O)	t-Statistic	p-value	Hypothesis
H1	PU □ATU	-0.228	5.100	0.000	(Accepted)
H2	PU □ ITU	0.249	4.545	0.000	(Accepted)
H3	PEOU□ PU	-0.013	0.144	0.885	(Rejected)
H4	PEOU□ATU	-0.079	1.330	0.184	(Rejected)
H5	ATU□ITU	-0.082	1.623	0.105	(Rejected)
H6	ITU□AU	0.063	1.087	0.278	(Rejected)
H7	XP□PU	0.099	1.218	0.224	(Rejected)
H8	XP□PEOU	0.091	1.072	0.284	(Rejected)
H9	ENJ□PU	0.140	2.291	0.022	(Accepted)
H10	ENJ□PEOU	0.208	3.710	0.000	(Accepted)
H11	CA□PU	-0.178	3.497	0.001	(Accepted)
H12	CA□PEOU	-0.023	0.468	0.640	(Accepted)
H13	SE□PU	0.166	3.107	0.002	(Accepted)
H14	SE□PEOU	0.147	2.809	0.005	(Accepted)

(Source: Processed Data)

It is known that in the original sample (O) there are negative results, so it can be interpreted that there are positive and negative influences among variables. The p-value is used to determine whether a null hypothesis is accepted or not (H0). If the p-value is more than 0.05 then the null hypothesis is rejected and vice versa, if the p-value is less than 0.05 then the null hypothesis is accepted.

There are 4 kinds of effects namely, significant positive effect, the insignificant positive effect, the significant negative effect, and the insignificant negative effect. It can be interpreted that a significant negative effect means reducing the value of the intended variable, while an insignificant negative effect means a negative effect, but the value is not too significant on the intended variable.

In this study, there are several null hypotheses rejected, namely, H1, H2, H6, H7, H8, H13, and H14, which means that the alternative hypothesis is accepted. While the hypothesis accepted are the hypothesis H3, H4, H5, H9, H10, H11, and H12, which means that the alternative hypothesis is rejected.

The following is a complete explanation of the hypothesis in this study: (a) H1, namely perceived usefulness (PU) on attitude towards using (ATU), shows a negative and significant effect as indicated by the p-value of 0.000 and the original sample value of -0.228, (b) H2, namely perceived usefulness (PU) on intention to use (ITU), shows a positive and significant effect with a p-value of 0.000 and the original sample value of 0.249, (c) H3, namely perceived ease of use (PEOU) on perceived usefulness (PU), shows a negative and insignificant effect as indicated by the p-value of 0.885 and the original sample value of -0.013, (d) H4, namely perceived ease of use (PEOU) on attitude towards using (ATU), shows a negative and insignificant effect, which is indicated by a p-value of 0.184 and the original sample value of -0.079, (e) H5, namely attitude towards using (ATU) against intention to use (ITU), shows a negative and insignificant effect as indicated by the p-value of 0.105 and the original sample value of -0.082, (f) H6, namely intention to use (ITU) on actual use (AU), shows a positive and insignificant effect as indicated by the p-value of 0.278 and the original sample value of 0.063, (g) H7, namely experience (XP) on perceived usefulness (PU), shows a positive and insignificant effect, which is indicated by a p-value of 0.224 and the original sample value of 0.099, (h) H8, namely experience (XP) on perceived ease of use (PEOU), shows a positive and insignificant effect as indicated by the p-value of 0.284 and the original sample value of 0.091, (i) H9, namely enjoyment (ENJ) on perceived usefulness (PU), shows a positive and significant effect as indicated by the p-value of 0.022 and the original sample value of 0.140, (j) H10, namely enjoyment (ENJ) on perceived ease of use (PEOU), shows a positive and significant effect as indicated by the p-value of 0.000 and the original sample value of 0.208, (k) H11, namely computer anxiety (CA) on perceived usefulness (PU), shows a negative and significant effect as indicated by the p-value of 0.001 and the original sample value of -0.178, (l) H12 test, namely computer anxiety (CA) on perceived ease of use (PEOU), shows a negative and insignificant effect as indicated by a p-value of 0.640 and the original sample value of -0.023, (m) H13 test, namely self-efficacy (SE) on perceived usefulness (PU), shows a positive and significant effect as indicated by the p-value of 0.002 and the original sample value of 0.166, (n) H14 test, namely self-efficacy (SE) on perceived ease of use (PEOU), shows a positive and significant effect as indicated by the p-value of 0.005 and the original sample value of 0.147.

Importance and Performance Matrix Analysis (IPMA)

The Importance and Performance Matrix Analysis (IPMA), according to Latan and Noonan (2017), was first introduced by Martilla and James (1977) which was named Importance-Performance Analysis (IPA). The analysis of IPMA is a complementary analysis in PLS-SEM that uses the mean of an unstandardized latent variable score to calculate the value of an exogenous variable (Garson, 2016). The importance of IPMA is that it can be used to extend PLS-SEM (SmartPLS) as the results or variables that can be used to determine latent variables (Hair et al., 2014). The IPA depiction is to build a two-dimensional map obtained based on the results of a customer satisfaction survey by describing performance in a horizontal line (X-axis) and using the importance in a vertical line (Y-axis). IPMA generates knowledge about which drivers should be prioritized to achieve a target of interest. Figure 3 shows the results of IPMA.

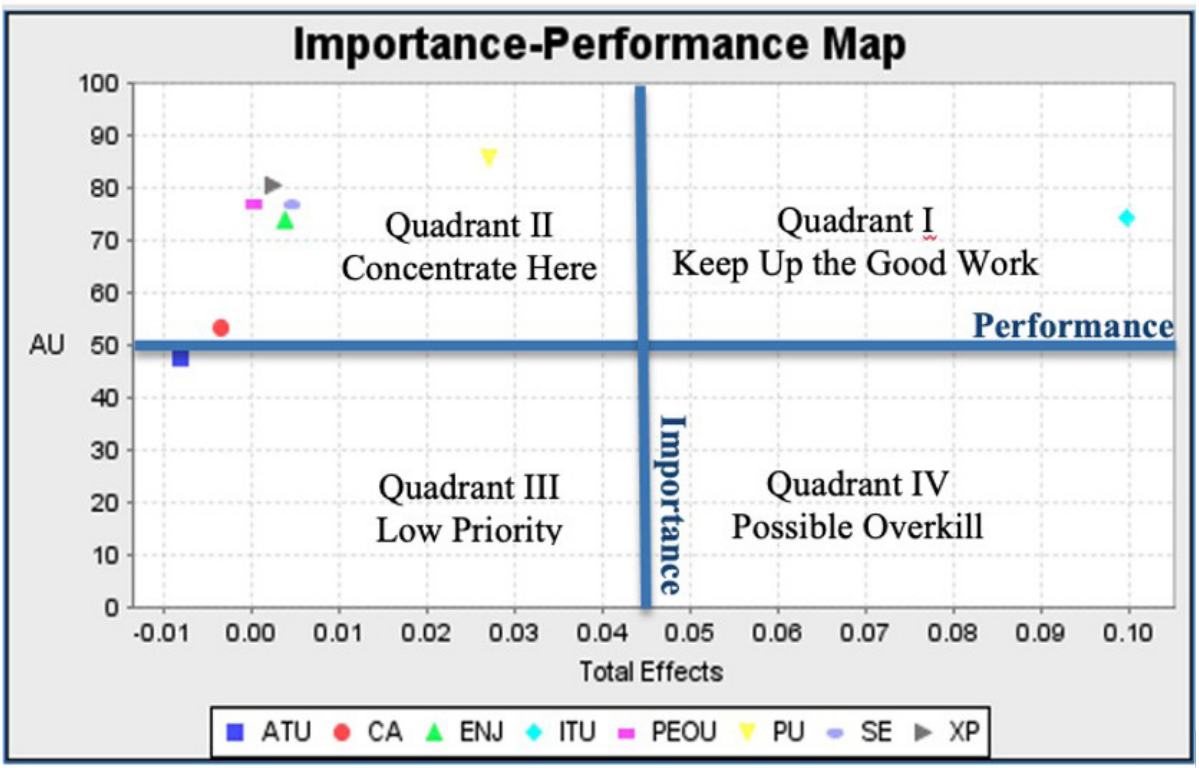

Figure 3 Importance-Performance Map Analysis Actual Use
(Source: Processed Data)

The explanation of the indicators from Figure 3 can be seen in Table 6, and the results of importance-performance matrix (IPMA) from this research are shown.

Table VI Importance-Performance Matrix (IPMA) Results

	Total Effects of Actual Use (Importance)	Index Values (Performances)
ATU	-0.008	47.534
CA	-0.003	53.188
ENJ	0,004	74.031
ITU	0.1	74.382
PEOU	0	77.11
PU	0.027	85.597
SE	0.005	76.825
XP	0.003	80.666

(Source: Processed Data)

The importance value on ATU is -0.008 and the performances value is 47.534; the importance value on CA is -0.003 and the performance value is 53.188; the value of importance on ENJ is 0.004 and the value of performance is 74.031; the importance value on ITU is 0.1 and the performance value is 74.382; the importance value on the PEOU is 0 and the performance value is 77.11; the importance value on PU is 0.027 and the performance value is 85.597; the importance value on SE is 0.005 and the performance value is 76.825; the value of importance on EXP is 0.003 and the value of performances is 80.666.

Conclusion

During COVID-19 pandemic, all teaching and learning activities have been shifted to online activities. Therefore, for all Telkom University students who use CeLOE LMS as a media for learning activities such as, looking for materials, collecting assignments, doing assignments, and carrying out exams with CeLOE LMS, the suggestions that the author can give are based on the results of the Importance and Performance Matrix Analysis (IPMA) for Telkom University are as follows:

1. Maintain the Intention to Use (ITU) factor because ITU is in quadrant I by maintaining the CeLOE LMS system, so that it can be accessed quickly without any obstacles for its students.
2. Detract the Computer Anxiety (CA) factor because CA is in quadrant II, by fixing all obstacles and troubles occurred by improving CeLOE LMS.
3. Improve the enjoyment factor (ENJ) because ENJ is in quadrant II by improving the CeLOE LMS system so that Telkom University students feel enjoy using the CeLOE LMS.
4. Improve the Perceived Ease of Use (PEOU) factor because PEOU is in quadrant II by fixing all kinds of complaints from Telkom University students to increase their confidence in using CeLOE LMS.
5. Improve the Perceived Usefulness (PU) factor because PU is in quadrant II by fixing all complaints from users and improving the CeLOE LMS system.
6. Improve the Self-Efficacy (SE) factor because SE is in quadrant II by improving the system from features of how to use it so that it can be accepted by users.
7. Improve the Experience (XP) factor because XP is in quadrant II, by improving the way the CeLOE LMS system, and continuously improving the system performance.
8. Attitude Towards Using (ATU) factor is in quadrant III. This happens because quadrant III has low priority, meaning that this quadrant has low importance and low performance.

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