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Assessing actual usage and satisfaction factors of Microsoft Teams in online learning

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ABSTRACT

This study examines the factors influencing students' online learning using Microsoft Teams at the PLN Institute of Technology. Using primary data from 301 students, the study found that the use of Microsoft Teams improved student achievement and learning performance during the pandemic. The structural equation model (SEM) method tested the model with low validity, with all variables having an AVE value more than 0.5 and higher than the cross-loading factor valid, the outer model analysis demonstrated good convergent validity. Dependability and trustworthiness were shown by the composite reliability rating, which was over 0.70. Both perceived usefulness (PU) and perceived ease of use (PEOU) were shown to have a strong correlation, and the inner model analysis revealed positive path coefficient values without any weak variables. These results supported by hypothesis testing imply that lecturers can modify their curricula to enhance student performance in the event of a pandemic. There was shown to exist a strong relationship between the perceived ease of use and perceived usefulness.

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1. INTRODUCTION

There has been a positive case of COVID-19 in Indonesia was to begin with identified in early 2020 (March) and this can be said to be the beginning of a change in people's life patterns. We can see this with the changes in all kinds of fields, encompassing the area of teaching. Education at all levels, from elementary school to tertiary institutions, must be able to adapt quickly to be proficient in using technology, both in terms of hardware and software. Most levels of education will not experience difficulties in using various kinds of devices. Still, Elementary school students must learn to use various kinds of devices even though they are not yet fluent in reading, yet they must be able to use them if they do not want to miss the subject given. The COVID-19 outbreak has affected people's existence in diverse fields, covering social, financial, and educational aspects [1]–[3]. Most of the educational institutions have turned to e-learning platforms to pursue their learning goals [4], [5]. The COVID-19 epidemic has compelled governments, corporations, and other organizations in addition to colleges to organizations to rapidly scale their electronic service offerings [6], [7]. Most tertiary organizations, especially in Indonesia, had to introduce and utilization of online technology in emergency distance learning to maintain learning activities during the novel coronavirus

pandemic [8]. The COVID-19 epidemic, suddenly transformed the education industry, shifting from traditional classroom instruction to virtual learning and internet resources [9], [10].

A sort of theory called the technology acceptance model (TAM) applies an explanation based on behavior methodology that is frequently utilized to investigate the procedure of implementing information technology. The relationship between perceived usefulness and perceived ease of use is explained theoretically by TAM, this is a further development of the theory of reasoned action (TRA) [11]. A theoretical model to explain why students adopt online learning is called the TAM. Perceived usefulness and perceived ease of use are the two concepts that will shape attitudes about e-learning [12]. The objective of this model, which is based on the TAM, is to improve online learning by offering customized and focused solutions for researchers, marketers, developers of e-learning systems, administrators, and universities [13]. With the TAM Individuals' adoption patterns of technology is predictable based on perception and beliefs [14]. The crucial point of the consider is to create an all-encompassing TAM that can effectively evaluate the acceptability of e-learning [15].

Distance education is unique pedagogical method that incorporates computer technology and informatics into the traditional classroom setting [16]. Blackboard is a highly online learning platform, useful during the coronavirus pandemic [17]. E-learning platforms can significantly enhance the skills and knowledge of students, educators, learners, administrative personnel, and those interested in staying updated about educational institutions [18], [19]. Since the outbreak, the emergency declaration has compelled the high education institutions (HEI) to reopen, marking a significant development as the educational sector looks for alternatives in the face of home confinement and lockdown. These platforms consist of Microsoft Teams, Zoom, Webex, and Google Classroom [20], [21]. During a pandemic, reliance on information technology, especially the use of the Microsoft Teams application, is recommended to increase the knowledge of teachers and students [22], [23]. Access speed, quality, and knowing user needs are required to improve e-learning system services [24].

Numerous research studies have delved into the various elements influencing the appropriation of cloud computing in institution of higher education and these studies have primarily focused on the realms of technology, organization, and the surrounding environment [25], [26]. Utilizing efficient e-learning technology, such as video games, Instagram, cloud computing, authoring tools, mobile and wireless technologies, and review summaries, is crucial for interactive learning and achieving learning objectives [27], [28]. There is a growing need for e-learning education, especially in higher education, where users need to be able to connect to their courses at all times and places [29]. It is intended that by creating a gamification application prototype, electronic-based learning will be able to be used for a wider range of disciplines and themes, increasing student motivation and making the learning process more engaging [30]. The well-designed, technology-integrated campus is fundamental to the growth of a digital university through learning, teaching and research facilities, improving student internships and providing provide comfortable surroundings [31], [32]. The preceding research on online learning during the pandemic, the technology employed, and the techniques for gauging the degree of satisfaction of instructors and students are all covered in the first, second and third paragraphs. Nevertheless, there hasn't been much research done on the relationship between perceived usability aspects, convenience, intention to use, utility, and user behavior in online learning with Microsoft Teams. Thus, I believe there is a need for study that addresses the TAM approach while using Microsoft Teams.

The aim of this study is that simplicity and flexibility of the e-learning participation venue allows students to participate more frequently in the teaching and learning process, leading to deeper understanding of the topics being discussed. Institute of Technology PLN is a private university which during the pandemic used the Microsoft Teams as an online learning medium, and now Microsoft Teams is still used to support hybrid learning (online and offline). The research also to find out how student acceptance during online learning is towards the use of technology, especially Microsoft Teams [33].

The factors to be examined refer to the TAM method i.e., in terms perceived ease of use, perceived usefulness, attitudes towards use, intention to use behavior and actual use to deliver a design model that is structural equation model (PLS-SEM) software application. The contribution that is expected from this research is as material for consideration for the development of the online learning models. This hybrid learning program would be able to run effectively by means into 3 phases of step which are described in method section.

2. METHOD

As above has mentioned this section will describe how the hybrid learning program method and the three phases of the research's step diagram. It could be used to accomplish the goals and enable answers to the background questions. The steps are shown in Figure 1.

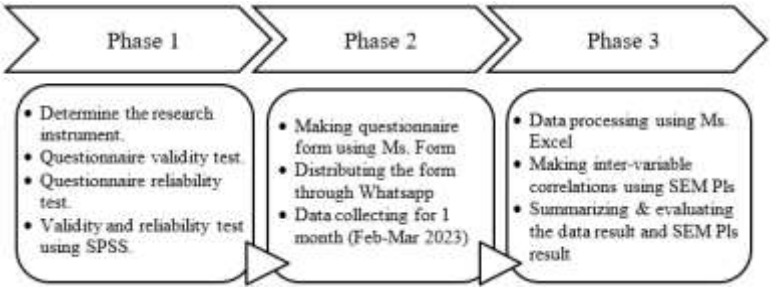

Figure 1. Research methodology

The research was conducted on Institute of Technology PLN campus, which is a private university located in West Jakarta, DKI Jakarta, Indonesia. There are four faculties on campus, namely the Faculty of Electricity and Renewable Energy (FKET), the Faculty of Engineering and Energy Business (FTBE), the Faculty of Infrastructure and Regional Technology (FTIK) and the Faculty of Telematics Energy (FTEN). There are currently 3,342 students enrolled in the even-numbered semesters of the 2022-2023 academic year. Because the data is qualitative in nature and the respondents are students utilizing Microsoft Teams, purposive sampling is the sample strategy employed. This kind of method has been implemented by Alvarado-Bravo *et al.* [34]. So, the researcher can gain detailed knowledge about a specific phenomenon rather than making a general conclusion based on statistical inference. Based on the results of calculations using a confidence level = 90%, margin of error = 5%, population proportion = 50% with a total population = 3,342, the number of samples for respondents is obtained at least 252 respondents [35]. The calculations through the calculator.net website is as shown in Figure 2.

Figure 2. Find out the sample size and the margin of error

In Figure 2 states the number of respondents used is at least 252 respondents from the number of active students as many as 3,342 with. These results already represent the number of samples used in this research and it has been accomplished by Ahmad *et al.* [36].

To answer the objectives of this study, several questions were prepared, as follows:

a) To what extent do attitudes toward consumption impact consumer behavioural intentions?
b) Does the intended use of behaviour impact its actual usage?
c) To what extent does the perceived ease of use impact individuals' attitudes towards utilizing this element?
d) To what extent does the perceived ease of use impact the perceived usefulness?
e) What impact does the perceived usefulness have on individuals' attitudes towards using a particular product or service?
f) What impact does the perceived usefulness have on the intention to use behavioural factors?
   Description: (PEOU: perceived ease of use, PU: perceived usefulness, ATU: attitude toward using, BI: behavioural intention to use, AU: actual use) +

The following are the hypotheses tested based on the questions above:

a. Hypothesis 1
   H0: P Values > 0.05; PEOU influences PU.
   H1: P Values < 0.05; PEOU influences PU.

b. Hypothesis 2
   H0: P Values > 0.05; PEOU does not influence ATU.
   H1: P Values < 0.05; PEOU does not influence ATU.
c. Hypothesis 3
   H0: P Values > 0.05; PU does not influence ATU.
   H1: P Values < 0.05; PU does not influence ATU.
d. Hypothesis 4
   H0: P Values > 0.05; PU does not influence BI.
   H1: P Values < 0.05; PU influences BI.
e. Hypothesis 5
   H0: P Values > 0.05; ATU does not influence BI.
   H1: P Values < 0.05; ATU does not influence on BI.
f. Hypothesis 6
   H0: P Values > 0.05; BI does not influence ATU.
   H1: P Values < 0.05; BI influences ATU.

3. RESULTS AND DISCUSSION

The research instrument is a device for gathering information to obtain complete, systematic, and good results so that they are easy to process [37]. This research tools were made in the form of a questions and adjusted to the indicators contained in the research variables. The survey was made by utilizing a Microsoft form and distributed through groups or groups on social media using the link https://forms.office.com/r/UjAQQrbqC3. The month-long data collection phase took place in February and March of 2023. A total of 301 respondents were obtained, as shown in Table 1.

Table 1. Respondent by gender, age and faculty

Characteristic	Frequency	Percentage
	Sex	
Men	186	61.79
Woman	115	38.21
	Age	
17	90	29.90
21	200	66.44
Over 25	11	3.65
	Faculty	
FKET	91	30.23
FTBE	58	19.27
FTIK	39	12.96
FTEN	113	37.54

This study uses the PLS-SEM version 4, to look for factors that can measure the level of satisfaction in using Microsoft Teams in online learning. The reasons for selecting the PLS-SEM model as an alternative to structural equation modeling based on covariance (traditional SEM) and its benefits incorporate the capacity to represent both several independents and multiple dependents are: i) the ability to deal with multiple correlations between independents, ii) resilience in the face of data noise and data loss, and iii) directly builds independent latent variables from response variable cross-products, enhancing the robustness of forecasts [38]–[40]. Below are the modeling results produced by PLS-SEM. It is consisting of indicators of perceived ease of use (PEOU), perceived usefulness (PU), attitude toward use (ATU), behavioral intention to use (BI), and actual use (AU), as shown in Figure 3.

The Figure 3 design model is the result description of PLS-SEM as mentioned in previous paragraph. The implementation the Figure 3 is divided into 2 stages. In the first phase, an external model analysis is performed, which aims to test the accuracy and consistency of the data before starting the internal model analysis. Average variance extracted (AVE), composite reliability, discriminant validity, convergent validity, and lastly Cronbach's alpha variable comprise the procedure that is used.

The goal of convergent validity is to ascertain whether a link between an indicator and concept or latent variable is legitimate. The loading factor limit used is 0.70, so if the external loading value is greater than 0.70, the indicator is considered to have convergent validity and is considered to have high validity. As shown in Table 2, the ATU3 value with ATU and the ATU5 value with ATU are less than 0.07, a new indicator model is created, as shown in Table 3.

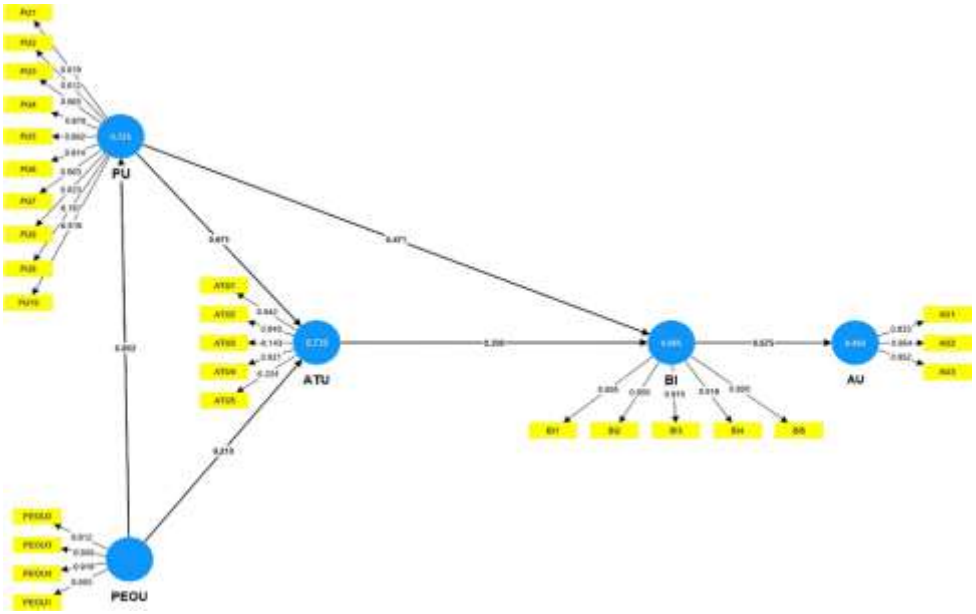

Figure 3. Design model

Table 2. The value of convergent validity

	ATU	AU	BI	PEOU	PU
ATU1	0.944				
ATU2	0.949				
ATU3	-0.143				
ATU4	0.925				
ATU5	-0.224				
AU1		0.833			
AU2		0.864			
AU3		0.852			
BI1			0.895		
BI2			0.850		
BI3			0.915		
BI4			0.919		
BI5			0.880		
PEOU1			0.865		
PEOU2				0.912	
PEOU3				0.900	
PEOU4				0.919	
PU1					0.819
PU10					0.810
PU2					0.812
PU3					0.865
PU4					0.878
PU5					0.892
PU6					0.814
PU7					0.863
PU8					0.823
PU9					0.767

The purpose of calculating the AVE is to elucidate the extent of variance or diversity within a factor. As number of observable variables encompassed by latent construct increases, so does the amount of variation or diversity that can be enccounted for by said construct. The AVE value used is 0.5. The outcomes of the AVE calculation appear in Table 4, where every variable has a value that exceeds 0.5 so that it can be said that all variables are valid.

The purpose of discriminant validity is intended to ensure, every term in every latent model is unique with respect to the other variables. Cross loading is employed to evaluate the discriminant validity of the reflective model prior to comparing the AVE value using the squared correlation coefficient between the constructs or when comparing the loading factor value using the cross-loading value. All the outcomes of the entire process for all variables are considered valid considering that the loading factor value exceeds the cross-loading value, as shown in Table 5.

Table 3. Convergent validity value after normalization

	ATU	AU	BI	PEOU	PU
ATU1	0.944				
ATU2	0.949				
ATU4	0.925				
AU1		0.833			
AU2		0.864			
AU3		0.852			
BI1			0.895		
BI2			0.850		
BI3			0.915		
BI4			0.919		
BI5			0.880		
PEOU1			0.865		
PEOU2				0.912	
PEOU3				0.900	
PEOU4				0.919	
PU1					0.819
PU10					0.810
PU2					0.812
PU3					0.865
PU4					0.878
PU5					0.892
PU6					0.814
PU7					0.863
PU8					0.823
PU9					0.767

Table 4. AVE value

	AVE
ATU	0.883
AU	0.722
BI	0.796
PEOU	0.809
PU	0.697

Table 5. Validity discriminant value

	ATU	AU	BI	PEOU	PU
ATU1	0.944	0.589	0.676	0.765	0.821
ATU2	0.949	0.590	0.691	0.748	0.805
ATU4	0.925	0.557	0.634	0.694	0.782
AU1	0.513	0.833	0.545	0.493	0.536
AU2	0.500	0.864	0.591	0.433	0.522
AU3	0.559	0.852	0.583	0.523	0.578
BI1	0.690	0.638	0.895	0.656	0.695
BI2	0.592	0.541	0.850	0.537	0.569
BI3	0.664	0.600	0.915	0.652	0.702
BI4	0.610	0.579	0.919	0.559	0.649
BI5	0.606	0.645	0.880	0.548	0.649
PEOU1	0.654	0.437	0.536	0.865	0.717
PEOU2	0.701	0.537	0.632	0.912	0.780
PEOU3	0.757	0.560	0.593	0.900	0.766
PEOU4	0.704	0.502	0.624	0.919	0.798
PU1	0.746	0.497	0.668	0.872	0.819
PU10	0.644	0.557	0.563	0.602	0.810
PU2	0.663	0.496	0.596	0.769	0.812
PU3	0.721	0.576	0.631	0.705	0.865
PU4	0.744	0.560	0.642	0.710	0.878
PU5	0.732	0.551	0.600	0.722	0.892
PU6	0.691	0.545	0.619	0.674	0.814
PU7	0.815	0.496	0.644	0.772	0.863
PU8	0.635	0.542	0.554	0.595	0.823
PU9	0.713	0.547	0.590	0.634	0.767

The next is the calculation of composite reliability which aims to demonstrate the instrument's consistency, accuracy, and accuracy in measuring constructs. To achieve a composite reliability number more than 0.70 indicates good reliability. In Table 6, more than 0.70 is the composite dependability value (CR value > 0.70) so that all variables are of good or reliable value.

Table 6. Composite reliability value

	Composite reliability (rho_c)
ATU	0.958
AU	0.886
BI	0.951
PEOU	0.944
PU	0.958

The last value is Cronbach's alpha, which has the same purpose as composite reliability, but the difference is that composite reliability is used to measure the actual value, whereas Cronbach' alpha it used to measure the lower bound of the value of dependability. Every Cronbach's alpha result was more than 0.70, indicating that the variables used were acceptable or reliable. This result is the same as the value on composite reliability, as shown in Table 7.

Table 7. Cronbach's alpha value

	Cronbach's alpha
ATU	0.933
AU	0.808
BI	0.936
PEOU	0.921
PU	0.951

The second stage of Figure 3 design model is to carry out an inner model analysis which aims to predict causality (cause-effect relationships) between latent variables or other variables. Those variables are unable to be measured directly. The measurement process consists of path coefficient, looking for R^2 value, Stone Geisser value, Goodness of Fit (GoF), and partial effect measures.

One of the second stage processes in the path coefficient. It aims to determine the direction in which the variables' relationship is directed. This allows you to use the strength of the relationship between variables to determine whether a hypothesis has a positive or negative direction. Based on the results shown in Table 8, all variables are in the range 0 to 1 so that the relationship between variables is stated to be positive.

Table 8. Path coefficients value

	Path coefficients
ATU -> BI	0.308
BI -> AU	0.675
PEOU -> ATU	0.204
PEOU -> PU	0.852
PU -> ATU	0.681
PU -> BI	0.471

The next process of the second stage is an evaluation the R^2 value, where the R^2 criterion consists of three classifications, i.e., strong if the value of R^2 is greater than or equal to 0.67, it can be considered strong. If R^2 is greater than or equal to 0.33, it can be categorized as moderate. Lastly, if R^2 is greater than or equal to 0.19, it can be classified as weak [41]. In Table 9, the variables ATU and PU are categorized as having strong value while AU and BI are categorized as moderate. This means that all variables are not included in the weak category.

Table 9. R-square value

	R-square	R-square adjusted
ATU	0.742	0.740
AU	0.456	0.454
BI	0.564	0.562
PU	0.725	0.724

The next process in the second stage is to find the Q^2 value (stone geisser value). This process is to seeks and provide a solid predictive relevance for the model. The resulting Q^2 value is greater than 0, so the model has a good predictive relevance, as shown in Table 10.

Table 10. Q2 value

	Q^2predict
ATU	0.611
AU	0.300
BI	0.435
PU	0.723

Next, GoF is used to validate the overall structural model. The GoF value is the square root of the average community index multiplied by the average value of R^2. GoF values range from 0 to 1 with interpretations of small values (0 to 0.24), medium values (0.25 to 0.37) and high values (0.38 to 1). Based on the calculations, the average AVE value is 0.78, the average R^2 value is 0.62 so that the resulting Gof value is 0.697, which means it is included in the high interpretation value.

After we get those values, the next step is to find the F-square, which aims to find out the extent of influence the relative latent, the effect of an independent variable on a latent dependet variable. The criteria for the value of the F-square are divided into three categories, i.e., weak if the F-square value is 0.02, moderate if the F-square value is 0.15, and strong if the F-square value is 0.35 [42]. Based on the results shown in Table 11, the highest value is the relationship between PEOU and PU, which is 2.64, meaning that PEOU has a very strong influence on PU.

Table 11. F-square value

	F-square
ATU -> BI	0.059
BI -> AU	0.837
PEOU -> ATU	0.044
PEOU -> PU	2.640
PU -> ATU	0.493
PU -> BI	0.137

The completern of stages and processes of Figure 3 model design which are the outer model and inner model analysis have been carried out. The next process is the hypothesis testing which aims to test a statement statistically so that it can be used to draw conclusions whether a statement can be accepted if the P values are <0.05, whereas if the P values are > 0.05, then statement is rejected. The results of the hypothesis testing shown in Table 12 show that the resulting P values are less than 0.05 (P values <0.05), so that all statements are accepted, and it is concluded that all variables influence each other.

Table 12. P values

	T statistics (|O/STDEV|)
ATU -> BI	3.025
BI -> AU	17.267
PEOU -> ATU	2.764
PEOU -> PU	37.876
PU -> ATU	9.320
PU -> BI	4.507

4. CONCLUSION

The SEM method tested the model with low validity, but all variables had an AVE value of > 0.5, loading factor > cross-loading value, and Cronbach's alpha value > 0.70. The path coefficient values of all variables were positive, and the R-squared results showed no weak variables. The Gof value was 0.697, indicating a high interpretation value. F-square results showed a strong relationship between PEOU and PU, with a value of 2.640. Hypothesis testing (P values < 0.05) confirmed the validity of all statements, indicating that Microsoft Teams can easily adapt to lectures during the pandemic. Using both inner and outer models, the study examined the data's validity and dependability. With all variables having an AVE value more than 0.5 and higher than the cross-loading factor valid, the outer model analysis demonstrated good convergent validity. Dependability and trustworthiness were shown by the composite reliability rating, which was over 0.70. Both PU and PEOU were shown to have a strong correlation, and the inner model analysis revealed positive path coefficient values without any weak variables. These results supported by hypothesis testing imply that lecturers can modify their curricula to enhance student performance in the event of a pandemic.

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