

Analysis of E-Commerce (Bukalapak, Shopee, and Tokopedia) Acceptance Models Using TAM2 Method

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Abstract—The high level of public satisfaction with the sale and purchase transactions is a measure of the success of various business programs. Therefore, companies as the main actors in business processes must be supported by the existence of an information technology. The use of E-Commerce which is digitally able to facilitate buying and selling online but it is still considered difficult, so the company that runs e-commerce needs to know what factors can affect individual interest in using online transactions to improve the existing system to make it better. Based on this, the authors conducted a study to find out what factors could influence the user interest in using e-commerce. The author also makes comparisons of three e-commerce sites, namely Shopee, Tokopedia, and Bukalapak using TAM2 method. The conclusions are drawn using SEM with PLS as a tool for data analysis. The results of this study are to show that measurement evaluation model has been valid and reliable. Then, obtained structural evaluation model shows the aspects which impacts usage behavior and intention of the users. The evaluation results can provide recommendations of the requirement which have to be considered so that could be developed in further research.

Keywords—E-commerce; User Acceptance; TAM 2; SEM-PLS

I. INTRODUCTION

In this modern era, technology has a very important role in life. The use and adoption of Information technology becomes the main concern of many research [1]. It has influenced many aspects as economic, governments, organization, education, industry, and many other things. From scientific side, Information Technology has led the branches of science in the future. The key to reach the success in global competition is an accurate information [2]. With the increasing development of internet usage, user can create an opportunity to build a good impact to organizations [3]. Information Technology has an important role to interact with customers in order to achieve a valuable performance [4]. One of them is through the use of Electronic Commerce (E-Commerce). It influences the business industry beliefs [5]. So that's why E-commerce being one of an important information technology as a result of information technology growth and developments.

This study aims to give a prediction and help modelling the user acceptance of e-commerce in Indonesia. The authors conducted a study by focusing on comparing three E-commerce sites namely Shopee, Tokopedia, and Bukalapak as it becomes the most monthly web visit in Indonesia at Quartal IV in 2019. This study wants to find out based on the customers perspective and to know what factors could influence the interest of buyers in using e-commerce to conduct online trading transactions. The method used is TAM 2 (Technology Acceptance Model 2), as well as drawing conclusions using SEM (Structural Equation Model) with PLS (Partial Least Square) as a tool for data analysis. SEM is considered good in collecting the evidence through questionnaires. The way it collected is effective and efficient and it also easy to understand [6]. Kim Gye Soo (2016) defined that PLS-SEM is fit for conducting an analysis. It is capable to deal with data inadequacies such as an abnormal data and accommodates formally measured constructions [7].

II. LITERATURE REVIEW

A. E-Commerce

E-commerce become possible in 1991 when the internet began to be used to commercial use. Its initial form of commercial transactions begins in the late 1970s. E-commerce refers to describe the activity of trading in products or services using computer networks [8]. Electronic Commerce is a place to share a good deal of information about business and a place to conduct a business transaction through telecommunications networks. E-commerce refers to all aspect in transaction of goods and services between business to business as well as business to consumer [9].

B. Technology Acceptance Model 2 (TAM 2)

TAM is one of the largest popular concepts that is often used to measure user acceptance of a technology. Much research have been done to make some improvements from the originally model [10]. Venkatesh and Davis (2000) did the research and declared a modified TAM model called TAM2 which gives several additional variables to the previous model

[1]. TAM2 theorizes how user accept and use a technology to facilitate their job performing regards to the relationship between user behavior, trust, attitudes, and their interest in using information technology. This method aims to predict and give a model of user acceptance so that it can be designed a planning steps to improve user acceptance level to the technology. The results revealed that TAM2 performed well in both voluntary and mandatory environment [11].

TAM 2 model is suitable for predicting the customer's level satisfaction and acceptance. From TAM 2 model, there are 5 independent variables, namely Subjective Norm (SN), Image (I), Job Relevance (JR), Output Quality (OQ), and Result Demonstrability (RD). There are 4 dependent variables, namely Perceived Usefulness (PU), Intention to Use (IU), Perceived Ease of Use (PEOU), and Usage Behavior (UB). There are 2 moderator variables, namely Experience and Voluntariness.

- Subjective Norm (SN)

Subjective Norms is the perception (image) or a person's view of the beliefs of others that will affect the interest to do or not do the behavior under consideration [12].

- Image (I)

The level of the technology usage is use to improve someone's image or status in someone's social system [13]. Perception of a technology can increase the status of its users which directly affects the usefulness of a technology (perceived usefulness) where the level is influenced by subjective norm.

- Job Relevance (JR)

Variable user perception that a technology can help their work specifically (perceived usefulness).

- Output Quality (OQ)

Associated with user confidence level that the results of a technology can be useful to help their work (perceived usefulness).

- Result Demonstrability (RD)

Variable that a technology can provide measurable results (perceived usefulness).

- Perceived Usefulness (PU)

The level of someone's beliefs that by using a particular system would improve someone's job performance [13]. Perceived Usefulness is defined as a measure where the technology usage is trusted to give a benefit to the user.

- Perceived Ease of Use (PEOU)

It is defined as user convenience as a level of someone's trust in using and understanding technology [14].

- Intention to Use (IU)

User interest on using the technology. It measures the technology usage, it predictable from someone's behavior while paying attention to the technology, such as the willing to increase more supporting equipment, encouragement to keep

using the technology, and the desire to motivate other users [14].

- Usage Behavior (UB)

Usage Behavior states that attitude toward using in TAM is conceptualized as an attitude of someone in accepting or rejecting the use of technology in their work.

- Experience

A variable that distinguishes between experienced and inexperienced users that has a significant effect between determining perceived usefulness with the tendency of behavior to keep using a technology (behavioral intention to use).

- Voluntariness

The measurement level of someone's volunteerism in using a technology without any compulsion from various parties, in other words is a free will [13]. It is a variable that determine in influencing the subjective norm in behavior to keep using a technology (intention to use).

C. Structural Equation Model (SEM)

SEM is one type of statistical model that is used to test the effect of the model by using a combination of existing and theories as well as quantitative research methods also applied to many other areas of social and behavioral and business research [15]. Kaplan (2008) proposes, that SEM can be defined as a methodology class which can represent the hypotheses of mean, variance, and covariance of an observed data [16].

SEM is a multivariate technique which combines aspects of regression, analysis of variance, and factorial analysis to measure estimation of latent variables via observed variables. There are two types of SEM, covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). PLS-SEM is mainly used to improve concepts in explanatory study. It attending to interpret the variance in dependent variables when inspecting the model [17]. The variables in SEM affect each other. The variables in SEM are latent variables and observable variables (indicators) [6].

D. Partial Least Square (PLS)

H. wold (1985) declared that Partial Least Square (PLS) as a soft modeling and a good analytical method that can be used to all various data scale without requiring any assumptions and big samples. It consists of two sections: **measurement model** that display relationship between the constructs and indicator variables (rectangles). This model also known as **outer model**. **Structural model** that represent the constructs (circles or ovals) and also displays the relationships (path) between the constructs which the model also known as **inner model** [17]. Analyze step in PLS-SEM can be seen at the picture below.

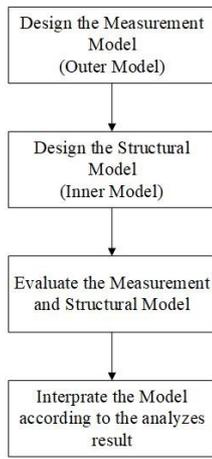


Fig. 1. PLS-SEM Analyzing Step

Fig. 1. shows the analyzing step of PLS-SEM, the first step is to design the measurement model (outer model) to defined and specified relation between the constructs and its indicators. Second, design structural model (inner model) to formulate the relation between the latent variables. Third, evaluate the model (inner and outer model), and the last step is to interpreting the model based on analyzes results of the research model (the significance of variables relations).

III. PROPOSED METHOD

This research using a survey sampling technique as a study method. Samples were taken from the population and collected by a questionnaire which using Google Forms digital questionnaire facilities which the alternative answer are provided using Likert Scale to calculate statements response. Then the data will be analyzed with PLS as the tools for data analysis to analyze the constructs. Data was simulated using TAM2 method.

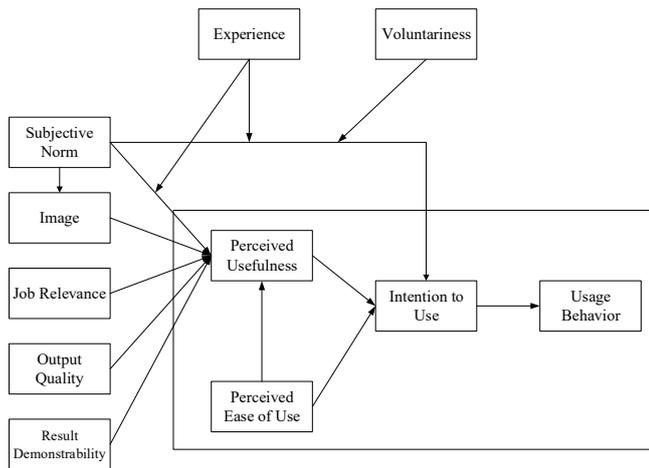


Fig. 2. Construct of Technology Acceptance Model 2 (TAM 2)

Fig. 2. shows that there is a moderate variable as a control of latent variables. Moderator variables of this study are Experience and Voluntariness which describe latent variables will form Intention to Use, Perceived Usefulness, Usage

Behavior, and Perceived Ease of Use. The latent variables in TAM2 method are Subjective Norm, Result Demonstrability, Job Relevance, Image, and Output Quality. Based on the variables, then the hypothesis that can be tested in this research are:

- H1 = Subjective Norm (SN) affects to Image (I)
- H2 = Image (I) affects to Perceived Usefulness (PU)
- H3 = Job Relevance (JR) affects to Perceived Usefulness (PU)
- H4 = Output Quality (OQ) effects on Perceived Usefulness (PU)
- H5 = Result Demonstrability (RD) affects to Perceived Usefulness (PU)
- H6 = Subjective Norm (SN) and Experience affect to Perceived Usefulness (PU)
- H7 = Subjective Norm (SN) and Experience affect to Intention to Use (IU)
- H8 = Subjective Norm (SN) and Voluntariness affect to Intention to Use (IU)
- H9 = Perceived Ease of Use (PEOU) affects to Perceived Usefulness (PU)
- H10 = Perceived Usefulness (PU) affects to Intention to Use (IU)
- H11 = Perceived Ease of Use (PEOU) affects to Intention to Use (IU)
- H12 = Intention to Use (IU) affects to Usage Behavior (UB)

IV. RESULT & ANALYSIS

Hypothesis testing will be tested by PLS-SEM. Reliability and validity related to measurement model will be checked. Modern analysis used in this research is testing with a measurement model and structural model testing.

A. Measurement Model (Measurement / Outer Model)

Measurement model is a test model that specifies the relationship of latent variables and each indicator block. Evaluation of measurement models that are reflective is to test convergent validity, discriminant validity, and reliability. In convergent validity, seen from the Loading Factor and Average Variable Extracted (AVE) obtained. A variable and indicator will be said to be valid if the Loading Factor value > 0.7 and AVE value > 0.5 . For Discriminant validity, seen from Cross Loading value where the value between the latent variable and the indicator must be greater than the other indicators and the value of the square root of AVE $>$ the correlation value between the latent variables.

Based on the validity testing of loading factor, a construct will be declared as valid if the loading factor value is > 0.7 [18]. Shopee has an indicator variable that is not volatile, it is Image variable with indicator X2.3 and the Perceived Usefulness variable with indicator Y1.3, so the invalid indicators must be deleted and the resumption of the estimation process will be continued or later re-estimation to evaluate the measurement model in order to obtain valid test results, so that further testing can be done and all constructs are valid.

Next step is conducting the validity testing stage using AVE where the variable is said to be valid if the AVE value > 0.5 [19]. Bukalapak, Shopee, and Tokopedia shows that all of the variables are valid.

After making sure all variables are valid, then proceed with testing the reliability of the variables. Variable can be said to be reliable if the Cronbach's Alpha value obtained > 0.7 [20]. According to the result, there are variables that are not reliable on Bukalapak and Shopee. In Bukalapak, the unreliable variable is in the Job Relevance, and in Shopee, the unreliable variable is in the Result Demonstrability, Job Relevance, and Intention to Use. For this unreliable variable, the indicator that produces the smallest value on the variable must be deleted first and then re-estimated again to get a reliable result.

B. Structural Model (Structural / Inner Model)

Structural model is a model that presents the predictive correlation (estimation) among latent variables in the research representation. This test aims to see the significance of the relationship between latent variables with research models that look at the path coefficient (path coefficient). To conclude whether a hypothesis is accepted or not, a comparison between | t-statistics | and from t-tables at the degree of freedom and error rate (α) applied. In this study using significance level of 5% with the confidence degree 95%. It generates the critical value about ± 1.96 which means that hypothesis will be accepted if the t-statistic is more than 1.96 and less than -1.96 [17].

TABLE I. HYPOTHESIS TESTING ON BUKALAPAK

Variable	Bukalapak	
	T-Statistics	Notes
X1. SN -> X2. I	6.712	Accepted
X1. SN -> Y1. PU	2.396	Accepted
X1. SN -> Y3. IU	1.363	Not Accepted
X2. I -> Y1. PU	0.502	Not Accepted
X3. JR -> Y1. PU	1.352	Not Accepted
X4. OQ -> Y1. PU	2.666	Accepted
X5. RD -> Y1. PU	1.590	Not Accepted
Y1. PU -> Y3. IU	0.750	Not Accepted
Y2. PEOU -> Y1. PU	2.697	Accepted
Y2. PEOU -> Y3. IU	2.869	Accepted
Y3. IU -> Y4. UB	24.211	Accepted

Table 1 shows the result of hypothesis test on Bukalapak. According to the result, it shows that Subjective Norm (SN) affects to Image (I). Subjective Norm (SN), Perceived Ease of Use (PEOU), and Output Quality (OQ) also affects to Perceived Usefulness (PU). Perceived Ease of Use (PEOU) affects Intention to Use (IU). There is also an effect in

Intention to Use (IU) to Usage Behavior (UB). Subjective Norm (SN) and Perceived Usefulness (PU) has no effect to Intention to Use (IU). Image (I), Job Relevance (JR), and Result Demonstrability (RD) has no effect to Perceived Usefulness (PU). According to the hypothesis above, it obtains a new SEM model as be seen in figure 3.

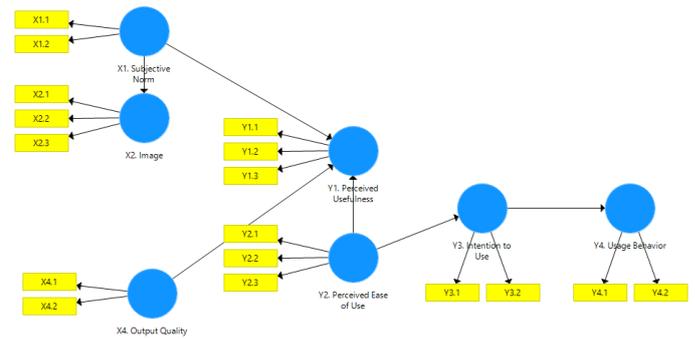


Fig. 3. New SEM Construction of Bukalapak After Hypothesis Test

Fig. 3. shows new SEM construction model of Bukalapak which consist of Image (I), Perceived Ease of Use (PEOU), Subjective Norm (SN), Output Quality (OQ), Perceived Usefulness (PU), Usage Behavior (UB), and Intention to Use (IU).

TABLE II. HYPOTHESIS TESTING ON SHOPEE

Variable	Shopee	
	T-Statistics	Notes
X1. SN -> X2. I	1.137	Not Accepted
X1. SN -> Y1. PU	0.151	Not Accepted
X1. SN -> Y3. IU	0.220	Not Accepted
X2. I -> Y1. PU	1.448	Not Accepted
X3. JR -> Y1. PU	2.179	Accepted
X4. OQ -> Y1. PU	1.221	Not Accepted
X5. RD -> Y1. PU	0.220	Not Accepted
Y1. PU -> Y3. IU	2.274	Accepted
Y2. PEOU -> Y1. PU	5.878	Accepted
Y2. PEOU -> Y3. IU	1.990	Accepted
Y3. IU -> Y4. UB	9.892	Accepted

Table 2 shows the result of hypothesis test on Shopee. According to the result, it shows that Job Relevance (JR) and Perceived Ease of Use (PEOU) affect Perceived Usefulness (PU). Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) affect Intention to Use (IU), and Intention to Use (IU) affects Usage Behavior (UB). Based on the hypothesis above, it obtains a new SEM model as can be seen in figure 4.

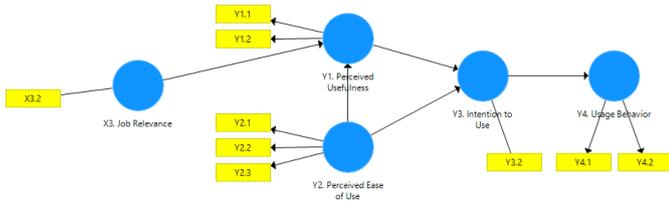


Fig. 4. New SEM Construction of Shopee After Hypothesis Test

Fig. 4. shows new SEM construction model of Shopee which consist of Job Relevance (JR), Intention to Use (IU), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Usage Behavior (UB).

TABLE III. HYPOTHESIS TESTING IN TOKOPEDIA

Variables	Tokopedia	
	T-Statistics	Notes
X1. SN -> X2. I	3.211	Accepted
X1. SN -> Y1. PU	0.953	Not Accepted
X1. SN -> Y3. IU	2.345	Accepted
X2. I -> Y1. PU	0.684	Not Accepted
X3. JR -> Y1. PU	0.102	Not Accepted
X4. OQ -> Y1. PU	0.803	Not Accepted
X5. RD -> Y1. PU	1.160	Not Accepted
Y1. PU -> Y3. IU	1.235	Not Accepted
Y2. PEOU -> Y1. PU	8.136	Accepted
Y2. PEOU -> Y3. IU	2.408	Accepted
Y3. IU -> Y4. UB	23.997	Accepted

Table 3 shows the result of hypothesis test on Tokopedia. According to the result, it indicates that Perceived Ease of Use (PEOU) and Job Relevance (JR) affect Perceived Usefulness (PU). Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) affect Intention to Use (IU), and Intention to Use (IU) affects Usage Behavior (UB). Based on the hypothesis above, it obtains a new SEM model as can be seen in figure 5.

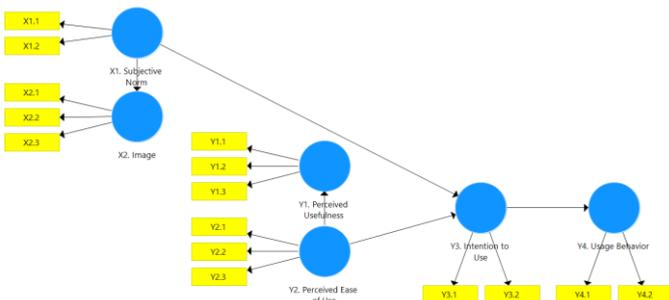


Fig. 5. New SEM Construction of Tokopedia After Hypothesis Test

Fig. 5. shows new SEM construction model of Tokopedia which consist of Perceived Ease of Use (PEOU), Subjective Norm (SN), Intention to Use (IU), Image (I), Perceived Usefulness (PU), and Usage Behavior (UB).

After getting the latest construct model, then do the moderate effect testing of each e-commerce. This study uses two moderator variables, namely Experience and Voluntariness. Experience is categorized into two groups: usage < 1 year and usage > 1 year. Voluntariness is classified into two groups: Voluntary and Not Voluntary. The moderation effect is said to be eligible to affect latent and dependent variables if it has a p-value < 0.05 or p-value > 0.95 [21]. Table 4 shows the hypothesis results of moderate effect testing.

TABLE IV. HYPOTHESIS OF MODERATE EFFECT TESTING

Hypothesis		Bukalapak	Shopee	Tokopedia
H3	SN → PU → Experience	0.839 (Not Accepted)	Not Checked	Not Checked
H5	SN → IU → Experience	Not Checked	Not Checked	0.045 (Accepted)
H6	SN → IU → Voluntariness	Not Checked	Not Checked	0.045 (Accepted)

According to the moderation effect testing, the moderate variables will be qualified if the p-Value < 0.05 or p-Value > 0.95. Based on the table 4, it shows that on Bukalapak, experience does not affect Subjective Norm to Perceived Usefulness (p-Value = 0.839) while the moderation effect of Experience and Voluntariness on Subjective Norm (SN) to Intention to Use (IU) are not checked because the relations are not accepted. In Shopee, it shows that there are no variables checked because the latent variables are not accepted, Subjective Norm (SN) does not affect Intention to Use (IU) and Perceived Usefulness (PU). In Tokopedia, it indicates that Experience (p-Value = 0.045) and Voluntariness (p-Value = 0.045) affect Subjective Norm (SN) to Intention to Use (IU).

V. CONCLUSION

The results of this study are expected to help modelling and predicting the user acceptance so that each management can design an improvement step to increase the level of user acceptance in all three e-commerce in order to make it better.

TAM2 method has been used successfully in analyzing user acceptance to e-commerce application (Bukalapak, Shopee, and Tokopedia) as online business media. User acceptance evaluation with path analysis PLS-SEM technique is considered can make it easier to find out the factors which give an influence to usage behavior.

In Bukalapak, Subjective Norm influences Image and Perceived Usefulness, and there is Output Quality which influences Perceived Usefulness. In Shopee, Job Relevance and Perceived Usefulness influences user intention to use this e-commerce. In Tokopedia, there is Subjective Norm which influences image and also user intention in using Tokopedia. It also influenced by experience and voluntariness of the user. Then, there is a factor that generally influences perceived

usefulness, usage behavior and intention of the user such as Perceived Ease of Use, it affects Bukalapak, Shopee, and Tokopedia.

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