An Analysis of the Acceptance of Cbt Vhs Application Using Technology Acceptance Model (Tam) and Theory of Planned Behavior (TpB) Integration

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Abstract. One of the technology implementation in education is for learning evaluation. Computer Based Test (CBT) can be used as an assessment in learning evaluation. The research aim to analyse technology acceptance of Vocational High School (SMK) CBT using Technology Acceptance Model (TAM) and Theory Of Planned Behavior (TPB) integration. This research uses corellational research with ex-post facto approach. The participants in this research are Vocational students who use CBT on daily test, Mid Test and Final test. The total of the participants are 137 students of SMK and the participants are chosen by stratified random sampling technique. The data is analysed using SEM (Structural Equation Model) with SmartPLS Version 3.0 software. The result of this research indicate that the model comply the value of Goodness of fit SMSR of 0,063 and show that (1) Computer Self Efficacy effect on PEOU; (2) Complexity effects on PEOU; (3) PEOU effects on PU; (4) PU effects on ATU; (5) PEOU effects on ATU; (6) PU does not effects on BIUS; (7) ATU effects on BIUS; (8) SN effects on BIUS; (9) PBC effects on BIUS. The technology acceptance model that is obtained can give the description that regardless of the benefits of CBT, if there is no regulation to use CBT, the system of CBT will not effect the intention to use the system.

1. Introduction

Information technology is growing rapidly and has influenced in most society life aspects, education is one of them. Nowadays, various information and communication technologies have the ability to facilitate education and learning process [1]. It is not only using information technology, but learning process can be performed by CBT (Computer Based Test). CBT can be used as a tool to evaluate/assess learning process for it can describe the actual conditions and reduce the level of fraud committed by students. It is not only implemented in National Examination but it is also used in Quiz, Mid Semester Exam and Final Semester Exam. The hope of using the CBT system, students become accustomed to use and it can teach them to be honest in doing the questions.

The level of user acceptance of the use of CBT applications can be measured by a theory approach that can describe the acceptability and use level of a technology that is the integration theory of Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB). TAM suggests that perceived usefulness and perceived ease of use are beliefs about a new technology that affects
individual attitudes toward the acceptance and use of technology (Davis, 1989). The combined theory between TAM and TPB is used because in the TAM model, the influence of social factors and control factor in behavior is not included. In addition there are other factors of TAM and TPB Variable that is the ability of students to use computers and the complexity of students in using the CBT system.

**CBT (Computer Based Test)**

Assessment is a complementary of educational process which is very important because it measures student learning [1]. Assessment is a crucial aspect of the educational process because it has a direct impact on student learning. Summative assessment helps determining whether the student has achieved the stipulated objectives. Formative assessment provides prescriptive feedback to help students achieve their goals [2]. The examples of new types of assessments are portfolio assessment, performance appraisal, self-assessment and peer assessment [3]. Recently, information and communication technology has been using CBT as an assessment tool. It is proposed as a solution for the mechanism of assessment process [4]. Prior to the existence of computer-based tests, the test is usually in written (paper based test/PBT), but along with the development of information technology it is replaced with computer-based test even by using internet. CBT allows teachers to compare the design of their assessment approach across different tasks and modules. In addition, type of CBT, Supervised Mode was used in this research, ie participants who joint test has been registered will automatically have a username and password and it is used to sign in to the exam page.

**TAM (Theory Acceptance Model)**

TAM was developed by Fred D. Davis in 1985. It was developed based on the Theory of Reasoned Action (TRA) model devoted to modelling user acceptance of information technology. According to Fred D Davis [5] TAM's main purpose is to provide a basis for seeing the influence of external factors on the beliefs, attitudes, and objectives of information technology users. TAM assumes 2 individual beliefs, namely Perceived usefulness (PU) and ease of use or Perceived ease of use (PEOU), the two components are the main influences of technology acceptance behavior.

![Figure 1. TAM(Technology Acceptance Model)](image-url)
Table 1. Construct of TAM

| Variables Construct          | Definition                                                                 |
|------------------------------|-----------------------------------------------------------------------------|
| Perceived Usefulness (PU)    | The degree to which a person believes that using technology would enhance his or her job performance [5]. |
| Perceived ease of use (PEOU) | is the degree to which a person believes that using a technology would be free of effort [5]. |
| Attitude Toward Behaviour (ATU) | is an individual positive or negative feelings about performing the target behaviour. |
| Behavioral Intention to Use (BIUS) | An intention to perform certain behavior. The exisstance of a positive intenrio CBT, are believed to be able to move the use the application |
| Complexity                   | “the degree to which an innovation is perceived as being difficult to use”.Roger [6] |
| Computer Self efficacy       | “an individual’s perceptions of his or her ability to use computer in the accomplishment of task [7]. |

**TPB (Theory Of Planned Behaviour)**

TPB is the development of Theory of Reasoned Action (TRA). This theory was developed by Ajzen (1985) by adding a construct of perceived behavioral control (PBC) that will affect interest and behavior. Behavioral beliefs produce an attitude of likes or dislikes for behavior, normative beliefs (normative beliefs produces subjective norms (SN) and provide behavior control (PBC). Attitudes, SN, and PBC will result in behavioral intention/BIUS and which will then cause behavioral aspect. In sequence, behavioral beliefs produce attitudes toward positive or negative attitude, control beliefs produce PBC, normative beliefs produce SN [9].

![Figure 2. TPB (Theory Of Planned Behaviour)](image-url)
Table 2. Construct of TPB

| Variables Construct       | Definition                                                                 |
|---------------------------|---------------------------------------------------------------------------|
| Attitude                  | the amount of a person's feelings for accepting or rejecting an object or behavior and measured by a procedure that places the individual on a two-polar evaluation scale [8]. |
| Subyektif Norm/SN         | perceptions of other people’s beliefs that will affect the interest to perform or do not perform a behavior [8] |
| Perceived behavioral control/PBC | ease or difficulty entrusted to perform behavior. [8] |

TAM and TPB integration

TAM is used as a theory of the acceptance of the use of technology, which the intention is influenced by PU and PEOU. However, TAM does not include the influence of social factors and behavioral control factors, whereas it is known that these two factors have a significant influence on the behavior of technology use. These factors are present in TPB. The control factors in TPB are perceived behavior control and social factors called subjective norms that have been shown to influence to behavioral intention to use.

Figure 3. Conceptual model and hypothesis

The table below is summarize the construct and the related causal links that we use from previous studies to develop our model.

Table 3. Related causal link

| Constructs              | Related causal links                           |
|-------------------------|-----------------------------------------------|
| Complexity              | Complexity → PEOU                             |
| Computer self efficacy  | Computer self efficacy → PEOU                  |
| PEOU                    | PEOU → PU                                     |
|                         | PEOU → ATU                                    |
| PU                      | PU → ATU                                      |
|                         | PU → BIUS                                     |
| ATU                     | ATU → BIUS                                    |
| SN                      | SN → BIUS                                     |
| PBC                     | PBC → BIUS                                    |
2. Research Method

The type of research used in this study is ex-post facto research. According to Sugiono [10], ex-post facto research is a study conducted to examine events that have occurred and then backward to find out the factors that cause the incident. The ex-post facto research aims to find the possible causes of changes in behavior, indication or phenomena caused by an event, behavior, phenomenon that causes the changes in the overall independent variable to occur. In this study, the researcher used survey methods.

Population is a region consisting of object/subject having certain quality and characteristics determined by researcher to be studied and then drawn its conclusion [9]. The population in this study were students using CBT application. Sampling using stratified random sampling method, which is done by sorting the population based on the class first, then taken respondents randomly. The sample was taken from the population with a 5% error rate. From 223 students were taken 137 respondents. Data collection in this study was obtained by distributing questionnaires to be filled by students using CBT applications. The questionnaire provided 4 answer choices.

Test validity of constructs is performed by seeking the expert judgment. After the instruments were tested by construct validation, then tested. Instruments will be tested to 35 people of the population. Furthermore, correlation calculations using SPSS software. Rtable for n = 35 is 0.334, hence it can be concluded that instrument used in this research is valid.

This research used reliability test with Alpha Crobanch formula. If the value of Alpha is greater than 0.80 then the questionnaire items used are stated reliable or consistent, otherwise if the Alpha value is less than rtable then the questionnaire items used are not reliably or inconsistent (Husain Usman: 2009). Calculation of instrument reliability value used SPSS software. Instrument reliability test results using SPSS showed a value of 0.935.

| Table 4. Reliability |
|----------------------|
| Reliability Statistic|
| Cronbach's Alpha     | N of Items |
| .935                 | 35         |

3. Result and Discussion

3.1 Result
This research was conducted in February 2018 until March 2018. The research includes taking data by spreading the closed questionnaire to the students. The number of questionnaires distributed were 137 questionnaires. For the next calculation (prerequisite test and hypothesis test) used a significance level of 5% (0.05). The overall data obtained is considered feasible to be analyzed. Then, data were processed using SPSS software and smartPLS.
Table 5. Deskriptif statistic

| No | Variabel             | Sum | Max | Min | Mean     | Standar Deviasi |
|----|----------------------|-----|-----|-----|----------|-----------------|
| 1. | Computer Self-efficacy | 1251 | 4   | 2   | 3.2578   | 0.5991          |
| 2. | Complexity           | 1209 | 4   | 1   | 3.1484   | 0.7725          |
| 3. | PEOU                 | 2533 | 4   | 1   | 3.2982   | 0.6324          |
| 4. | PU                   | 2479 | 4   | 1   | 3.2279   | 0.5812          |
| 5. | BIUS                 | 2086 | 4   | 2   | 3.2594   | 0.5608          |
| 6. | ATU                  | 1593 | 4   | 1   | 3.1111   | 0.6110          |
| 7. | SN                   | 1505 | 4   | 1   | 3.4004   | 0.5884          |
| 8. | PBC                  | 1565 | 4   | 1   | 3.2348   | 0.6031          |

Hypothesis testing in this study using smartPLS v 3.0. The partial least square (PLS) approach was adopted to analyze the questionnarire data. It is a multivariate analysis suitable for exploring the relationships among a set of factors. PLS approach is also more suitable than structural equation modeling (SEM) for analyzing cases of a small sample size. [10]. PLS is a powerful analytical method because it does not assume data with a certain scale measurement, small sample quantities[11]. Therefore, the advantages of using PLS in normal multi variant rhythm do not have to be fulfilled. Specifically speaking, the necessary minimum sample size for PLS approach to yield reliable results is either ten times the number of items of the most complex construct, or ten times the number of independent variables that impact the most complex dependent variable[10].

Figure 4. Loading factor

The measurement model testing result a strong evidence of the robustness of the constructs measure denoted by their internal consistency reliabilities as manifested by their composite reliability. The range the composite reliabilities is 0.8-0.9 most all of these reliability indices properly exceed the threshold of 0.70 recommended , However, in the development stage of the research, the loading scale of 0.5 to 0.6 is still acceptable, Ghozali [11]. Additionally, the average variance extracted (AVE) for each measure far exceeds the lower bound threshold value of 0.50 recommended, Ghozali [11].
PLS generates the convergent validity tests of the scales by extracting the factor loadings and cross-loadings of all indicators to their own respective constructs.

Table 6. Assessment of the measurement model

| Contract | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|----------|-----------------|-------|-----------------------|----------------------------------|
| ATU      | 0.8268          | 0.8311| 0.8851                | 0.6587                           |
| BIUS     | 0.8676          | 0.8775| 0.9049                | 0.6573                           |
| PBC      | 0.8708          | 0.8772| 0.9117                | 0.7209                           |
| PEOU     | 0.8835          | 0.8854| 0.9117                | 0.6329                           |
| PU       | 0.9162          | 0.9173| 0.9347                | 0.7049                           |
| SN       | 0.8729          | 0.8744| 0.9135                | 0.7260                           |
| complexity | 0.7876    | 0.7910| 0.8762                | 0.7027                           |
| Cse      | 0.7833          | 0.8049| 0.8736                | 0.6981                           |

Inner model testing was performed after the outer model evaluation. Inner test model is performed by looking at R-square on construct. The R2 value of 0.67 is categorized as substantial (good), R2 of 0.33 is categorized as moderate, R2 value of 0.19 is categorized as weak and R2 value of> 0.70 is categorized as strong [10].

Table 7. R-Square

| Konstruk | R-square |
|----------|----------|
| ATU      | 0.4308   |
| BIUS     | 0.5790   |
| PEOU     | 0.4805   |
| PU       | 0.4848   |

Standardized Residual of the Root Mean Square (SRMS) was calculated, this being the average difference between the predicted and observed correlations (variances and covariances) based on the residual standard deviation. Therefore, it can be considered a goodness-of-fit measurement (model) for PLS-SEM [12]. Given that the SRMS is an absolute measurement, value below 0.08 are generally considered a good fit [13]. In this sense, the SRMS value obtained from the model of this research is of 0.063, which indicated an adequate level of adjustment.

Table 8. Hypothesis measurement

| Hypothesis | Path       | Path coefficient | T value | Result   |
|------------|------------|------------------|---------|----------|
| H1         | CSE → PEOU | 0.4647           | 6.7103  | Support  |
| H2         | CC → PEOU  | 0.2873           | 3.4018  | Support  |
| H3         | PEOU → PU  | 0.6959           | 13.890  | Support  |
| H4         | PU → ATU   | 0.4532           | 4.1981  | Support  |
| H5         | PEOU → ATU | 0.2546           | 2.0086  | Support  |
3.2 Discussion

Computer Self Efficacy affects PEOU with t count (6.7103) > t table (1.960). It means that Computer self efficacy variable have positive effect to PEOU using CBT SMK (H1). Related research [14]–[18]. This proves that the higher or more skilled students in using computers or Computer self-efficacy, the easier the students use the CBT system SMK. When students have the ability to use the computer they will feel the ease of using the application including in this case is when they use a computer (CBT). Complexity affects PEOU with t count (3.4018 > t table (1.960) means that the complexity variable positively affects PEOU using CBT SMK (H2). When the system used during exams further saves students time during task performing, students more easily integrate the answers in paper into CBT and data security of their answers are guaranteed then students will feel comfortable in using the system.

PEOU affects PU with t count (13.890) > t table (1.960). It means that the PEOU variable (ease) positively influence to PU CBT SMK (H3). Related research [5], [19]–[21]. The ease of operation of the CBT system will make students easier to complete their tests such as navigation, user interface, existing tools and flexible when the teacher delivers the exam out of the lesson. Also, it will facilitates students' work. The higher the use of CBT SMK system, the higher the usability of the system. Students will be more satisfied and eventually make their acceptance of the CBT system is increasing.

PU affects ATU with t count (4.1981) > t table (1.960). Means that variable of PU influence to ATU CBT SMK (H4). Related research [22]–[24]. It can logically be stated a system that provides many benefits or usefulness to its users will affect the attitude to use the system.

PEOU affects ATU with t count (2.086) > t table (1.960). Means that the variable PEOU affect the ATU CBT SMK (H5). Related research [22], [24]. Logically, when the system provides ease, in this case easy to use navigation, user interface, tools that exist in the application to its users, it will affect the attitude to use the system. PU does not affect BIUS where t count (1.7579) < t table (1.960). Means that the PU variable does not affect the BIUS CBT SMK (H6). Related research [17], [21], [23], [25], [26]. Usefulness or the use of CBT system is not a factor affecting interest in using the CBT system. During this time the CBT system is only used to work on the test, there is no other function used by students in using CBT system. In this case, thus, regulation is also very necessary. Due to the existence of regulation or coercion, when students have to do exams out of school hours, they have to find a device or internet connection. Regardless of the benefits provided by CBT if there is no regulation then the system will not affect a person's intention to use.

ATU affects BIUS with t count (2.4761) > t table (1.960). Means that ATU variable influence to BIUS CBT SMK (H7). Related research [21], [23], [26]–[29]. The higher the attitude toward the use of CBT system then the higher the interest of using the system. Thus, the better the user attitude towards the CBT system then it can increase interest in using the system. SN influences BIUS where t count (3.2195) > t table (1.960). Means that SN variables affect the BIUS CBT SMK (H8). Related research
These findings may imply when users find people around them (peers, heads of skill programs, and principals) have adopted CBT as a assessment tool, they will be more willing to use CBT. Furthermore, PBC affects BIUS with t count (3.8690) > t table (1.960). Means that the variable of PBC influences to BIUS CBT SMK. Related research [23], [30]–[32]. Behavior control, in this case is supported by device facilities and internet connection, when they have the will and ability to use CBT, it will affect their intention to use CBT system.

This research indicates that MPW has no effect on BIUS. The usefulness or the use of CBT system is not a factor affecting interest in using the CBT system. During this time the CBT system is only used to work on the test, no other functions are used by students in using the CBT system. In this case regulation is also very necessary. Due to the existence of regulation or coercion, when students have to do exams out of school hours they have to find a device or internet connection. Regardless of the benefits provided by CBT if there is no regulation then the system will not affect a person's intention to use.

4. Conclusion and Implication

This study aims to analyze the influence of the use of CBT system in the test, both daily test, Mid term test and Final test as one of the means in SMK in conducting the assessment. The model used in this research is TAM Integration (Technology Acceptance Model) and TPB (Theory of Planned Behavior). Additionally, the method used to analyse the influence between constructs was PLS with smartPLS software. No matter the benefits of CBT in the absence of regulation, the system will not affect a person's intentions to use.

Based on the results of research, it shows that there is a need for extensive regulation on the implementation of CBT, it is not only a regulation on the technical implementation. However, schools should establish a provision to implement CBT in all majors and subjects. Thus, by the consequence of adding facilities and the execution of longer sessions taken.

Furthermore, the regulation on the use of CBT of the Education Board will force schools to use the CBT system on each evaluation conducted. By the condition of the school being studied, the results show CBT is capable of being used in assessment and enabling other schools are also able to do the same. The implication of the students, they will be satisfied when CBT is used in assessment because, by using it, the use of time can be more effective. In addition, by the CBT, teachers will be easier in managing the score.

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5. Limitation and Suggestion

The limitations of this study are the lack of external variables used in the study. The questionnaires distributed are less extensive. In addition there may be statements in the questionnaire that are less understandable by the respondents so as it will make respondents provide answers that are less
understandable in accordance what is meant by the questions. For further research it is suggested to add an interview to avoid the respondent's bias response and to choose a research object with a higher level of generalization.

The CBT system will be more useful by integrating into e-learning schools and adding discussion on each item and displaying student's answer records, so the students can find out the right answers. In addition, the schools are suggested to direct teachers who have not used CBT to maximize the system, therefore it can support student learning activities.

6. References

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