

THE PERCEPTION OF THE STUDENTS TOWARDS THE USEFULNESS AND EASY OF USE OF AN OPERATIONS RESEARCH VIRTUAL LABORATORY

Kiayati Yusriyah¹, Sudaryanto²

^{1,2} Gunadarma University

Jl. Margonda Raya No. 100 Pondok Cina, Depok, Indonesia

Email: kiayati@staff.gunadarma.ac.id

sudaryanto@staff.gunadarma.ac.id

ABSTRACT

In the recent years, information technology assisted learning has been widely used in higher education institution. One of the IT-based learning material is operations research virtual laboratory developed by industrial engineering laboratory, Gunadarma University. Technology acceptance model (TAM) is used as the approach for the analysis of the perception of the students towards the use of operation research virtual laboratory in the learning process. TAM comprise of three main variables, namely perceived usefulness (PU), perceived easy of use (PEOU) and perceived intention of actual use (PAU). A sample size of 77 respondents are taken, comprise of 38 students from Faculty of Economics and 39 students from Faculty of Industrial Technology.

The results revealed that the perception of the student to the usefulness of the operations research virtual laboratory is significantly affected by the frequency in using the internet. The location of accessing internet and the ownership of the computer provide positive influence the perceived easy of used. However, the perceived easy of use has low effect to the perceived usefulness of operations research virtual laboratory. The similar result also obtained in the case of the effect of the perceived easy of use to the actual intention of used. The perceived usefulness (PU), perceived easy of used (PEOU) simultaneously provide the significant effects on the perceived intention of actual used (PAU).

Keywords : TAM, perceived usefulness, perceived easy of use, virtual laboratory

1. INTRODUCTION

The advanced development of ICT has bring to many implication, including in higher education. Conventional system, in which face to face meeting between lecturer and students taken place has also disadvantages, in particular if related to the place and time constraints. One alternative solution for solving the problem related to time and place is the use of advance

information and communication technology. This study focuses on the use of Information and Communication Technologies in higher education. A

model composed of the variables which can explain ICT usage at Gunadarma University is established and tested within the study.

Operation Research Virtual Laboratory (V-Lab) is a virtual laboratory specially designed for supporting the practice of operations research laboratory for the student that take the course of operations research. The aims of this virtual laboratory is to provide an assistance for the students to improve their skill in laboratory practice without direct help from assistants and can be carried out without concerning time and place constraints. OR Virtual Lab has following features: pre test, post test, tutotial, simulation and practice materials.

This research is carried out to measure the perception of the students towards perceived usefulness (PU) and perceived easy of use (PEOU) and perceived intention of actual use (PAU) of virtual operations research laboratory. It is intended that in the long range this research can be use as one of the references in developing the similar modules for virtual laboratory in other field of study/programs of the university.

The adoption of new technology, including ICT is supposed to be affected by the user perception. Technology acceptance model (TAM) is usually used as the approach for the analysis of the acceptance of information technology in the learning process. TAM considers following variables, namely perceived usefulness (PU), perceived easy of use (PEOU) as determinants for the perceived intention of actual use (PAU) for the acceptance of new technology.

2. THEORETICAL BACKGROUND

According to Brown (2000), Feasey (2001), electronic learning can be defined as learning activities using electronic networks for delivering, interaction and facilitating that supported by many types of learning services. The electronic learning may have at least one of the following functions, as supllement/optional to the delivered teaching materials, complement and substitution (Siahaan, 2002).

According to Loftus in Siahaan (2007), electronic learning required participants with high motivation and commitment for self learning, intended to learn, read and develop continuously. He or she may have unpleaseant experiences with

conventional learning, in particular for specific field of study and need alternative approach that more attractive. The other characteristics is that the participant constrained by the time and place to take the regular/ conventional learning.

The results of the research reveals that the use of active instructional strategy could improve the capability of the students in understanding the learning materials. Active learning is usually used as a method for improving the effectiveness of lerning by employing different mode of learning, including multi media. The advance of ICT enable the online enrichment of learning materials through the availability of tutorial, modules, solved problem and even online virtual laboratory. Virtual laboratory usually combined visual and audio mode, and therefore need the active participation of the students to enhance the understanding of the learning materials.

It is very important for educator experts to know wether there were enough evidences supporting the use of different virtual learning methods in increasing the active participation, involvement and achivement of learning goals. The results of the researches revealed that the use of virtual laboratory could increase the capability of the students to learn for physics and improve the active learning experiences ((Finkelstein, et all, 2006 in Mickel dan Danner (2007). The research conducted by Mickell dan Danner (2007) revealed that 86.9 % students have the perception that face to face laboratory practice in Biology more effective than virtual laboratory. However, 60.8 % of the respondents understood the contents presented in the virtual laboratory.

Understanding why people accept or reject new technology has become to be one of the most interesting issues in adoption of new technology research. The acceptance of ICT by potential users is become a necessary condition for its success. Davis et.al. introduced the TAM to provide an explanation of the determinants of technology acceptance. The technology acceptance model is an extension of theory of reasoned action (Davis et al., 1989), addresses

the issue of how users come to accept and use a technology, in which a number of variables may influence their decisions to use it. There are two specific variables, perceived usefulness (PU) and perceived ease of use (PEOU), which are hypothesized to be fundamental determinants of user's acceptance or attitudes, intentions for actual use (PAU). Perceived usefulness is defined as the degree to which a person believes that using a particular technology will improve his or her job performance. People tend to use or not to use a new technology to the extent they believe it will be beneficial or help them perform their job better (Davis et al., 1989). This means the user has a perception of how useful the technology is in performing his job tasks that may take the form of decreasing the time for doing the job, increasing efficiency, effectiveness and accuracy.

Perceived ease of use refers to the degree to which a person believes that using a particular technology will be less or even free of effort. If they believe that a given application is useful, but it is too hard to use, this situation may not lead to the intention to the actual use, due to the fact that the potential benefits of usage are outweighed by the effort of using the new technology (Davis and Arbor, 1989).

Davis, Bagozzi dan Warshaw (1989) advocated that perceived ease of use (PEOU) and perceived usefulness (PU) as two independent variables and the perceived actual use of the new technology (PAU) as the dependent variable. He found that PAU was significantly correlated with both self-reported current usage and self-predicted future usage. PEOU was also significantly correlated with current usage and future usage. He also found that the PAU had a significantly greater correlation with system usage than did PEOU. Further regression analysis suggested that PEOU might be an

antecedent of PU rather than a direct determinant of system usage, in which PEOU affects technology acceptance indirectly through PAU.

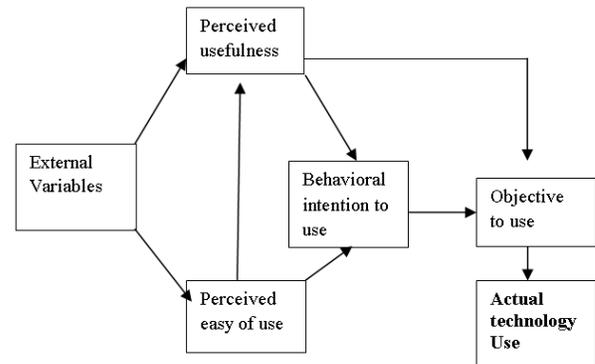


Figure1. Technology Acceptance Model (Davis, Bagozzi dan Warshaw, 1989)

3. RESEARCH METHOD

The subjects of the research are 77 students that have taken the operational research subjects coming from from the Faculty of Economics (39) and Faculty of Industrial Technology (38). Conventionally, the students practice the simplex method in face to face meeting in the laboratory under supervision of laboratory assistants.

To solve the given linear programming problem, the following steps should carried out: problem identification, model construction, converting into standard form, establishing initial simplex table, and finally find solution iteratively. The accomplishment of the experiment is managed as follows: 2 hours conventional face to face laboratory tasks followed by 2 hours assignment using virtual laboratory without guidance from laboratory's assistant. After completing the laboratory practice, the respondents are given questionnaire as measurement intruments for the perception of the student towards the perceived usefulness, perceived easy to use and intention actual use of the virtual laboratory.

A five scale Likert summated rating is used to rate the answer of the proposed statements. varying from very agree (5) to very disagree(1). In summary, there are 3 statements related to the perceived usefulness, 10 statements associated to perceived easy to use and 4 statements referred to perceived intental for actual use. The question related to the respondents profiles comprise of the origin of the students (faculty, study program), gender, computer ownership and frequency in using internet.

The model used in this research is reseedented in Figure 2.

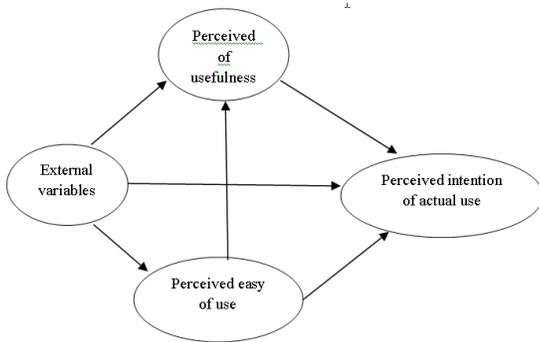


Figure 2. Research model

4. RESULT AND DISCUSSION

The respondents were originated from two different group of students, comprise of 38 students of Faculty of Economics and 39 students from Faculty of Industrial Technology. Based on the gender, the proporsion of male and female sudents in nearly equal (38 male, 39 female). After accomplishment the laboratory practices, the students fulfilled the questionaires and send back via email.

The further information related to the respondents can be explained as

follows: 35 out of 77 respondent has their own the computer, 34 student access internet everyday, 26 students use the internet once every two days, and 13 out of 77 students access internet every three days. All the respondents have the experienced in using internet.

Based on the duration of using internet, 67 % of them use the internet more than 2 hours every session and only less than 4 % less than 1 hours. In term of place in using internet, 38 % of them access the internet at home and 44% at internet service provider (warnet). The rest use the internet either at Internet Lounge or in other place.

The classical statistical test was carried out using the statistical package of R Commander 251. The results of reliability and validity test indicated that all indicator variables of PEOU are valid and reliable with the value of *Cronbach's Alpha* of 0.9452. The similar results are obtained in the case of indicator variables of PU with the *Cronbach's Alpha* of 0.753. The result of the reliability and validity test of also indicated that all n indicator variables of PU are valid and reliable. Based on these results, those indicator variables can be used in the further steps.

Regresssion analysis is used to explore the causal relationship between independent variables and dependent variables. A statistic R Commander 251 software is used. The first analysis is a partial analysis the effects of external variables to perceived of us (PU). The external variables comprise of the origin of the faculty, the duration in using internet, frequency in using internet, gender, location in accesing internet and the ownernship od the computer. The regression results indicates that the frequency in using internet become the only variables provides the very significant effect to

perceived of usefulness ($p: 3.5 \times 10^{-12}$ with $R^2 = 0.57$). It can be explain that increasing frequency or intensity in using internet provide a positive experience about the usefulness of the internet in general and virtual laboratory in particular. The value high value and significant of intercept indicates that there are another external factors should elaborated and be included in the model.

The partial analysis the effects of external variables to perceived of easy to use ((PEOU). Two out of 6 external variables, the location in accessing internet and the ownership of computer provide significant effects to PEOU. The ownership of computer will provide easy to access, and do not require to go to the warnet or other similar place. The significant value intercept indicates also indicates that some other external a factors should be taken into consideration in the model.

As the duration of internet access increase, so is the perception towards easy of use of virtual laboratory. It may be as a result of the experience in using internet. The ownership of computer will increase the skill in using computer, including in accessing internet. Therefore, the ownership of computer provide significant effects on their perception towards the easy of use of virtual laboratory. From the regression analysis, PEOU provides no significant effects to PU. This result is different with the results of early researchers.

The regression analysis between two variables PU and PEOU to perceived actual to use (AU) provide the following

results. As predicted, PEOU provide positive and very significant effects to AU that strengthen the proposition as the perceived easy of use increase, the intense to use the system or technology will also increase. The perceived of usefulness (PU) also provide a positive and significant ($P = 0.06$) effects to AU. It provide the effects as predicted. However, the coefficient of determination for this regression analysis is relative low with $R^2 = 0.1126$. The high value and very significant the value of intercept indicates that some other variables may become the determinants of AU.

5. CONCLUSION

The perception of the student to the usefulness of the operations research virtual laboratory is significantly affected by the frequency in using the internet. The location of accessing internet and the ownership of the computer provide positive influence the perceived easy of used. However, the perceived easy of use has low effect to the perceived usefulness of operations research virtual laboratory. The similar result also obtained in the case of the effect of the perceived easy of use to the actual intention of used. In summary, the perceived usefulness (PU), perceived easy of used (PEOU) simultaneously provide the significant effects on the perceived intention of actual used (PAU).

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