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## An adoption of acceptance model for the multi-purpose system in university library

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### ABSTRACT

Since previous study offered a more general context of the IT acceptance model, here we place specific emphasis on the library context. Our study examines whether and why the Technology Acceptance Model (T.A.M.) can be used in a multi-purpose system (M.P.S.) in a university. The M.P.S. is a system for users to borrow, return and renew books on loan. The variables in this study were modified, such as Perceived Usefulness (P.U.) and Perceived Ease of Use (P.E.O.U.) as independent variables and acceptance of IT as a dependent variable. The sampling technique used was proportionate stratified random, using 98 students of the Faculty of Teacher Training and Education who have implemented the M.P.S. system. Data processing techniques used multiple linear regression analysis with the SPSS data processing tool. The results showed that usefulness and ease of use have significantly positive effect on the M.P.S. acceptance model. The research focused on a university context in single province in Indonesia. Further research may extend the study with a focus on profit or non-profit organisations and different geographical areas.

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acceptance model; multi-purpose system (M.P.S.); perceived usefulness (PU); perceived ease of use (P.E.O.U.); Technology Acceptance Model (T.A.M.)

## 1. Introduction

The library in the university has implemented various automation systems. One of the systems is a multi-purpose system (M.P.S.). An M.P.S. is a tool for borrowing, returning and renewing books on loan. The M.P.S. fulfils the needs of users in the Library. By using the M.P.S., the users can serve themselves without having to use the library staff. Despite the benefit M.P.S.s provide, some problems do arise, like

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failure in processing transactions, language constraints and unclear instructions on system and transaction receipts do not display all the information.

The M.P.S. does offer a solution for users, but there are some problems and students feel confused and have to ask staff for help. Problems such as failure of the transaction system, during students using the system too quickly and the system not updating correctly. This causes the process of disarming the book by scanning it to fail and will set off the alarm when the user passes the security gate.

In addition, when the R.F.I.D. chip of book is not detected by the system it will mean the transaction is not successful. This problem can be solved by repeating a transaction, unfortunately, since there are no clear instructions on how to repeat a transaction correctly, the user can become confused. Moreover, the receipt does not display the full title and barcode of the book. The book's barcode is crucial because one book title has many copies and each copy has a unique barcode number. Therefore, the barcode information needs to be listed so that books borrowed by users can be truly recognised and not interchangeable with other books.

Some students did not feel satisfied with the system. However, some enjoyed using the system. Therefore, the researcher tries to elicit the specific problems by investigating users' experiences. To measure and solve this condition, previous research about the *Technology Acceptance Model* (T.A.M.), which is an adaptation of the *Theory of Reasoned Action* (T.R.A.), was discussed. The T.A.M. method was used by researchers to measure the acceptance level of a system based on user desire (Davis, 1993). Therefore, this research tries to find out the acceptance of M.P.S. and the factors that influence the acceptance of M.P.S. using the T.A.M. method.

Finally, this research figures out the acceptance of M.P.S. and the factors that influence the acceptance of M.P.S. using the T.A.M. method. This research is structured as follows: the next section will provide the theoretical (correlation between all variables) with possible propositions and the conceptual framework. The next section will present the methodology, analysis and hypothesis results. The final section will conclude and discuss the implications of the study.

## 2. Theoretical framework

Several models are used to analyse and understand the factors that influence the acceptability of the use of technology; Pleasure Arousal Dominance (P.A.D.) (Bakker, van der Voordt, Vink, & de Boon, 2014; Hall, Elliott, & Meng, 2017; Mehrabian, 1996), T.R.A. (Albarracín, Fishbein, Johnson, & Muellerleile, 2001; Trafimow, 2009), Consumer Acceptance Technology (C.A.T.) (Kulviwat, Bruner, Kumar, Nasco, & Clark, 2007; Maita, Saide, Indrajit, & Irmayani, 2018; Shao & Siponen, 2011; Venkatesh, Thong, & Xu, 2018) and T.A.M. (Davis, 1993; Viswanath, Michael, Gordon, & Fred, 2003).

The P.A.D. theory believes human behaviour affects an action performed by the human being. P.A.D. was developed by Mehrabian (1996). P.A.D. explains that the use of a technology is influenced by pleasure, arousal and dominance. The other theory is T.R.A., it is a basic theory of behaviour which says that behaviour is influenced by a desire. This model uses three components, are the behavioural intention, attitude and subjective norms affecting behaviour (Lu, Huang, & Lo, 2010).

In addition, a theory of behaviour that connects human reason and ‘affects’ was presented by Kulviwat et al. (2007). C.A.T. improves interest predictions for adopting high-tech products by integrating construction ‘affects’ and building additional cognitive into T.A.M. models. The C.A.T. model adds a perception of relative excellence, pleasure perception and perception of desire. The T.A.M. concept was first developed by Davis (1993), this theory is a development of T.R.A. developed specifically for modelling user acceptance of information technology. T.A.M. aims to provide a basis for determining the influence of external factors on user trust, attitudes, and objectives. In this case, there are two individual beliefs assumed by T.A.M., namely Perceived Usefulness (P.U.) and Perceived Ease of Use (P.E.O.U.) perceptions.

The purpose of T.A.M. is to explain the external factors of user behaviour towards information technology based on the acceptance of the implementation of the technology itself. T.A.M. describes the acceptance of information technology with certain dimensions that may influence the acceptance or absence of information technology by the user. Empirically, T.A.M. has been proven to provide an overview of behavioural aspects of P.C. users, which many P.C. users easily accept this information technology because the technology fulfils the user’s requirements. In addition, the T.A.M. model was developed by Davis who adapted T.R.A. (Technology of Reasoned Action). This model is the theory of information systems about how users are willing to accept and use technology. According to Davis, T.A.M. has four main constructs; P.U., P.E.O.U., Behavioural Intention to Use and Actual System Usage.

The Modified T.A.M. Model by Davis (1993) introduced two key variables, P.U. and P.E.O.U., with central relevance predicting Acceptance of IT (Saraswati & Kiswara, 2013). Both P.U. and P.E.O.U. have an influence on Behavioural Intention to Use and Actual System Usage of these two variables, which can be replaced by the variable Acceptance of Information Technology.

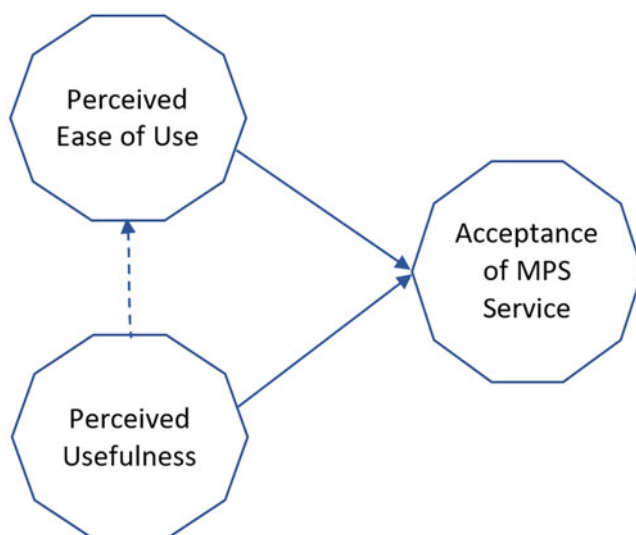
P.U. also influences the P.E.O.U. The users will use the system if the system is useful for them, regardless of whether the system is easy to use or not.

We offer some possible correlations between these issues, such as: (1) P.U. has a positive influence on the acceptance of an M.P.S./acceptance of I.T.; (2) P.E.O.U. has a positive influence on the acceptance of an M.P.S./acceptance of I.T.; and (3) Both P.U. and P.E.O.U. have positive influences on the acceptance of an M.P.S./acceptance of I.T. (Figure 1).

### 3. Multi-purpose system

The M.P.S. is a self-service system, used for borrowing, returning and renewing books on loan. Every book in this library has a R.F.I.D. chip that can be read by the M.P.S. This is connected with the barcode scanner to detect the library card barcode, and a thermal printer to print the transaction receipt. The M.P.S. is available in various languages, such as Indonesian, English and Arabic (see Figure 2).

We illustrate the procedure of how to use the M.P.S. in the university’s library. For better performance during the borrowing process, the user may put the book in front of the M.P.S. in order to let the system read the book’s R.F.I.D., then the user can select the desired menu (see Figure 2).



**Figure 1.** Conceptual model.



**Figure 2.** Multi-purpose system.

Once the user has chosen the appropriate menu, the M.P.S. will ask the user to scan the barcode card (see [Figure 3](#)), then the system will record the transaction and print the transaction receipt (see [Figure 4](#)).

To return the books, the user follows the same process as borrowing. The books that are refundable on M.P.S. are books which are still within the borrowing period. If the book is overdue, the M.P.S. cannot process the book's return and the user must return the books directly to the staff and pay the fine. The procedure about how to return books via the system is as follows:

1. Put the book that will be returned in front of the M.P.S.
2. Touch the menu → Return.
3. Touch the print button. M.P.S. will print transaction receipt
4. Return process complete.



**Figure 3.** User chose the desired function.



**Figure 4.** User scans the library card.

To extend the book's loan period the user should take the following steps:

1. Put the book that will be renewed in front of the M.P.S.
2. Touch the menu → Renew.
3. Touch the print button. M.P.S. will print transaction receipt
4. Renewal process has been completed.

#### **4. Methodology**

In this study, the authors used a questionnaire and literature review approach. The study starts with an abstract, introductions, literature review, problems identification, perform data, and then make conclusions.

This research began with the problem identification process by conducting interviews and preliminary observations, then determined the population and sample research. After the validity and reliability test, the questionnaires distributed to the sample were conducted. The results of the questionnaire were then tested using



**Figure 5.** The M.P.S. prints the transaction receipt.

descriptive test, classical assumption test, multiple linear regression tests, coefficient of determination test and hypothesis test with the SPSS application tool (Saide, Indrajit, Trialih, Ramadhani, & Najamuddin, 2019; Landau, 2004). Then a conclusion was drawn based on the results (Figure 5).

The first part of the questionnaire was a brief introduction about the importance of the research. The second part asked for demographic information. The third part contained questionnaire measures based on the constructs under study. The final part of the questionnaire was a comment section to be completed by the respondents. The SPSS was used to measure demographic scales and generate descriptive statistics (Saide et al., 2017, 2019). Firstly, the target sample data was established through SPSS 22.0, and the narrative statistical analysis and non-response bias of the samples was tested before and after. These items were scored using a 5-point Likert scale (Joshi, Kale, Chandel, & Pal, 2015; Saide et al., 2017); 1 = corresponding 'strongly disagree' and 5 = 'strongly agree'. There were 16 questions to be answered.

#### 4.1. Population and sample

The population in this research was library users from the Faculty of Teacher Training and Education class of 2014–2016. While the sample was taken based on the Slovin formula (Creswell, 2009; John, 2013) as follows:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{4199}{1 + 4199(0,1)^2}$$

$$n = \frac{4199}{42,99} = 97.67 = 98 \text{ respondents.}$$

There was 98 people as sample from Slovin formula. The sampling method used *Proportionate Stratified Random*. The samples were taken based number of students

**Table 1.** Linear regression.

Model		Unstandardised Coefficients		Standardised Coefficients Beta
		B	Std. Error	
1	(Constant)	4.675	1.567	
	X1 (P.U.)	.203	.053	.309
	X2 (P.E.O.U.)	.286	.046	.503

at each department in the Faculty of Teacher Training and Education, State Islamic University of Sultan Syarif Kasim Riau.

#### 4.2. Classic assumption test

The classic assumption test aims to determine whether the data have been processed normally or not. This test is required before we execute the data with multiple linear regression tests. The classical assumption test used in this research is multicollinearity test, autocorrelation test, heteroscedasticity test and normality test.

#### 4.3. Multiple linear regression tests

This test determines the influence of two or more independent variables (IV) and dependent variable (DV) of a metric type. The multiple regression equation, can be seen in the following formula:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3... B_kX_i + e$$

Y = response variable

a = constants

b = regression parameters

## 5. Results

### 5.1. Descriptive analysis

Based on results of descriptive analysis (Zikmund, 2005), the variables in this study show the percentages, such as P.U. – 87.99%; P.E.O.U. variable – 80.78%; the dependent variable is Acceptance of IT – 84.89%. Regarding the results, we stated that: (1) the users felt the M.P.S. was helpful; (2) we strongly agree that the M.P.S. supported the users needs; and (3) the users accepted implementation of an M.P.S. in the UIN Suska Riau Library.

### 5.2. Multiple linear regression

Based on the table of multiple linear regression and previous scholars (Campbell & Campbell, 2008; Gingrich, 1995), the authors obtained the regression equation as follows:



$$Y = 4,675 + 0.203X_1 + 0,286X_2$$

In terms of this result (see [Table 1](#)), both PU (X1) and PEOU (X2) have a positive influence on the acceptance of an M.P.S. An unstandardised coefficient constant value of 4.675. This number is a constant number indicated the users were accepting of an M.P.S. against PU (X1) and PEOU (X2) variables. This means that if the value of the independent variable does not change and is considered constant then the level of acceptance of M.P.S. is equal to 4.675.

The PU regression coefficient (X1) = 0.203 shows the influence of this variable to the M.P.S. A positive sign indicates a positive relationship coefficient. It means that every increase in the PU (X1) variable of one unit while the other independent variable is constant, the acceptance level of an M.P.S. will increase by 0.203.

The P.E.O.U. regression coefficient (X2) = 0.286, indicates the influence of this variable on the acceptance of an M.P.S. A positive sign indicates a positive relationship coefficient. With the meaning of each increment on the PEOU (X2) variable for one unit, while the other independent variable is constant, the acceptance level of M.P.S. will increase by 0.286.

### 5.3. Findings

Hypothesis results showed a positive relationship between P.U. (X1) and acceptance rate of M.P.S./Y1) with linear regression test and T-test obtained  $t_{count} > t_{table}$  ( $3.846 > 1.661$ ) and regression value of 0.203. This finding was similar to previous research by Dalimunthe and Mustofa (2016).

The usefulness factor shows that an existing system may improve user performance in conducting transactions more effectively and efficiently. In addition, the user felt it was easy to perform a transaction and they trusted that the M.P.S. was useful to them. Therefore, the users were accepting of the existence of this system and thus, user satisfaction increased.

Similarly, for the second hypothesis showed that P.E.O.U. (X2) positive affected on the acceptance rate of an M.P.S. (Y1). This is because in the linear regression test and T-test we obtained a  $t_{count} > t_{table}$  ( $6.269 > 1.661$ ) and a regression value of 0.286.

The ease of use factor indicated that M.P.S.s were considered easy to use. The M.P.S. provided flexibility when interacting with the user, and the user felt confident in operating the M.P.S. Accordingly, because the system is easy to understand, the user felt that the system fulfilled their needs.

The last hypothesis presented that both P.U. (X1) and P.E.O.U. (X2) have a significant positive effect on the acceptance level of an M.P.S. (Y1). This is because in the F-test we obtained  $F_{count} > F_{table}$  ( $18,754 > 3,13$ ).

For the last factor, P.U. and P.E.O.U. has had a positive effect on user acceptance of an M.P.S., this needs to be considered when developing other M.P.S.s. Taking these things into account means that when the user feels the system is helpful and enables them to perform tasks easily, they will continue to use the M.P.S.

#### **5.4. Dominant factor**

The dominant factor obtained from the multiple linear regression can be seen in Table 1. The standardized coefficients column shows a P.U. factor of 30.9%, and a P.E.O.U. factor of 50.3%. Thus, the P.E.O.U. factor has more influence on the acceptance of an M.P.S. than the P.U. factor. When designing the system, the developer should consider 'ease of use' very strongly. However, if an M.P.S. is useful but not flexible and the user found it hard to use, the system may be considered unacceptable and will not be used.

#### **6. Conclusion, implications and future studies**

After the research was carried out on the users of the UIN Suska Riau Library, it was found that the ease of use and usefulness factors significantly influenced the acceptance of the M.P.S. in the UIN Suska Riau Library. Based on the descriptive analysis conducted, we know that users of the UIN Suska Riau Library strongly agree with and assume that the M.P.S. can: improve performance/desire; can execute tasks quickly; and make the job easier and more efficient. However, in addition, there are some users of the library who do not agree with this statement. This is because the M.P.S. sometimes fails to complete the transactions, so users feel their needs are not met by the system.

Therefore, library management should pay attention to and improve the usability of and overcome the problems with the M.P.S., so that the systems can be completely accepted by all library users, as high usability significantly influences the acceptance of the M.P.S. in the UIN Suska Riau Library. Library users also strongly agree with the statement that the M.P.S. is easily operated, is accessible and also easy to understand. However, there are still students who disagree with the statement. This is because of the lack of M.P.S. usage guidance. M.P.S. training is done only once a year for new library users and it is not effective in teaching the students how the system works. The ease of use factor is dominant in affecting the acceptance of the M.P.S. and this should be considered by the library management in order to increase user acceptance of the system.

Based on the results of this study, M.P.S. acceptance level is influenced by ease of using the operating the system. Therefore library management should make instructions on M.P.S. usage procedures available and conduct training more frequently in order to provide better understanding for the users.

Improving receipt displays and resolving transaction errors that occur in the M.P.S. would help the system meet the needs of the library user. For further research, it is desirable to use a larger sample and use external variables from the T.A.M., method which is not studied in the research.

Lastly, we are not to claim that these framework results will be suitable in all types of organisation, because this study focused only on library context. While the strength of this study provides an opportunity to explore the T.A.M. adoption on an M.P.S. system, limitations do exist. The object of this study was a non-profit organisation. Finally, we acknowledge that further studies would be worthwhile to develop and strengthen the framework and foundation. Therefore, future research could be

expanded to research other types of organisations, such a for-profit company. In addition, future related research on data collection can adopt in-depth interviews to observe the research object.

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