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Measuring Technology Readiness Index (TRI) of Management Information System Adoption in Higher Education

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***Abstract*— The Laboratory of Software Engineering and Information Systems at Sriwijaya University is one of the services or learning media for students provided by Sriwijaya University. In order to support operational activities and good laboratory governance, a good management information system is needed. However, the adoption of new technology has some dificulties. It is necessary to know the level of readiness to accept new technology and one method to measure the level of readiness to accept new technology is the Technology Readiness Index (TRI). This research was conducted by distributing questionnaires to lecturers, structural laboratories and regular students of the 2018-2019 fasilkom. Data was processed using the Technology Readiness Index method by dividing the number of statements per variable by the variable weight. Then, the average total score for each statement is multiplied by the variable weight and the TRI value is obtained by adding up the scores of all variables. The results of this study found that the level of user readiness is included in High Technology Readiness with a score of 3.76. The Optimism value contributes the largest value to the total TRI value of the other variables, namely 1.010018. Then followed by Innovativeness of 0.986842, Discomfort of 0.917793 and Insecurity of 0.848009.**

Index Terms—E-Readiness; IT Adoption; Technology Readiness Index (TRI).

I. INTRODUCTION

Nowadays, information technology has become part of everyday life. Almost all aspects of life are closely related to information technology. This can happen because of the many uses of the application of technology

Information, for example retrieving, storing, manipulating, displaying, sending data that makes operational activities more effective and efficient. Many people feel that information has become one of the basic commodities and even information is something that can be traded at this time. Advances in information technology also lead us to the era of globalization more quickly.

All parties feel the impact of advances in information technology. Many organizations are competing to apply information technology in order to increase the effectiveness, efficiency and productivity of their organization. Sriwijaya University is one of the tertiary institutions that has used information technology in almost all activities of its academic community. It is hoped that by applying technology in all of its services, Sriwijaya University can become a World Class University.

One of the services or practicum learning media for students provided by Sriwijaya University is the Software Engineering and Information Systems Laboratory of Sriwijaya University[2]. However, management activities that are there have not been computerized so that they are not effective and efficient. In order to support operational activities and good laboratory governance, a good management information system is needed. The laboratory management information system that is built is expected to enable the Software Engineering Laboratory and University Information Systems to implement ISO/IEC 17025 (International Organization for standardization / International Electrotechnical Commission)[2].

However, implementing new information technology is not easy to do. To be able to adopt a new

information technology, very careful preparation is needed so that the implementation of the new system can work properly[5]. Information System Implementation is a very complex process, not only because of the many different aspects of updating that need to be considered at the same time, but also because of the impact of the new system on the organization[8]. It is necessary to know the level of readiness to accept new technology before adopting a new technology. One method to measure the level of readiness for acceptance of new technology is the Technology Readiness Index (TRI)[4]. Technology Readiness (TR) is a person's tendency to accept and utilize technology in their work or daily life. Meanwhile, the Technology Readiness Index (TRI) is an index for measuring user readiness in adopting new technologies [10].

Based on the problems above, the author aims to evaluate the level of readiness for the adoption of Laboratory Management Information System technology using the Technology Readiness Index (TRI), which refers to previous research[1]. The results of this study are expected to provide information and evaluation for Sriwijaya University to successfully adopt the Management Information System for Software Engineering Laboratory and Information Systems for Sriwijaya University.

II. Literature Review

A. *IT Adoption Readiness*

Technology Readiness can be defined as readiness to apply technology that is intended to help a job[11]. The Technology Readiness method is used to find out the level of openness of users towards new information technology. Nowadays, information technology has a vital role in the world of work, especially those that interact directly with technology[6], and user readiness factors play a greater role in influencing the success of an Information Systems project compared to user involvement in an Information Systems project[9]

B. *Technology Readiness Index (TRI)*

The Technology Readiness Index (TRI) was originally developed on 2000[4]. The level of readiness is a person's tendency to utilize and use technology to achieve goals in their work and daily life. Meanwhile, the Technology Readiness Index (TRI) is an index for measuring user readiness in adopting new technologies. There are four indicators to measure the level of user readiness in adopting new technology, namely optimism, innovativeness, discomfort, and insecurity[4]. While the three categories of technology readiness index are

- Low Technology Readiness, TRI is greater than or equal to 2.89
- Medium Technology Readiness, TRI is in between 2.90 and 3.51
- High Technology Readiness, TRI is greater than 3.51.

III. Methodology

This research was conducted using a survey method. Through this method, data collection that occurred in the past or the present includes beliefs, opinions, characteristics, attitudes, and variable relationships to test hypotheses related to sociological and psychological variables from samples drawn from certain populations. The data obtained from the results of this survey were then analyzed and measured to what extent the level of readiness of the system users was.

The following Figure 1 presents information about the research method. We conducted literature study evolving IT adoption, e-readiness, and several method to measure index of IT adoption readiness including TRI. The next step is to design a questionnaire based on the TRI framework. then tested the validity and reliability of the questionnaire. when the calculation is valid, the questionnaire is ready to be distributed.

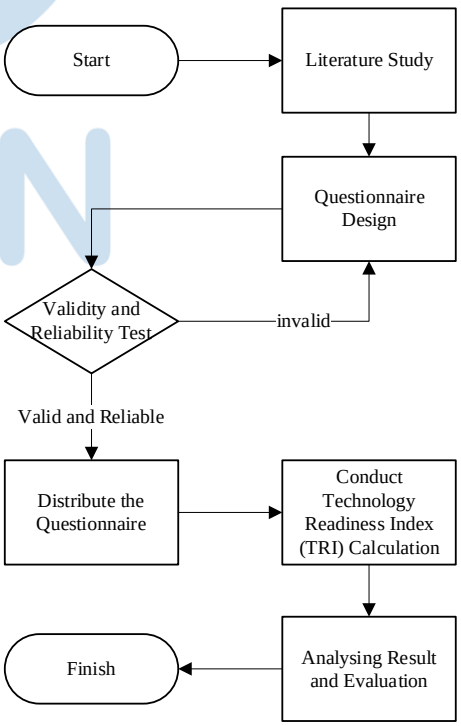

Fig. 1. Research Method

In this case, the technology that will be adopted and the readiness of its users will be measured is a Laboratory Management Information System (SIMLAB) located at the Laboratory of Software Engineering and Information Systems, Sriwijaya University. While the target users to be studied include laboratory administrators, lecturers and students in the second and third year.

Sampling was carried out selectively using a quota sampling technique. The preparation of the questionnaire will be based on each variable of the Technology Readiness Index[4]. The number of indicators in the research conducted on privious study in total was 36 indicators, namely 10 indicators of optimism variables, 7 indicators of innovation variables, 10 indicators of discomfort variables, and 9 indicators of insecurity variables. However, in a different study, not all indicators were used, but were adapted to the research topic[3]. So that the questionnaire statements that have been adjusted to this study shown in Table I.

TABLE I. QUESTION INSTRUMENTS

ID	Questions
Optimism (OPT)	
OPT1	I prefer to use SIMLAB because previously all processes were done manually
OPT2	SIMLAB is more comfortable to use because it is a new technology
OPT3	I like to use SIMLAB because it suits my needs
OPT4	SIMLAB makes my work or activities more efficient
OPT5	I was given more freedom at work
OPT6	By using SIMLAB, I don't miss any information
OPT7	I feel confident that SIMLAB will do what I tell it to do
Innovativeness (INN)	
INN1	Usually, I look for more details about a new technology
INN2	I can use and access SIMLAB without the help of others
INN3	Usually, I use the latest technology to help with my work
INN4	I feel that I don't have many problems using SIMLAB compared to other colleagues
Discomfort (DIS)	
DIS1	I feel that SIMLAB complicates my work
DIS2	I feel that SIMLAB is only aimed at people who master technology
DIS3	The guide to using SIMLAB is difficult to understand
DIS4	I feel embarrassed when I have problems using SIMLAB in front of other people
DIS5	I believe more in human work than SIMLAB
Insecurity (INS)	
INS1	I'm worried that other people can see the data I enter
INS2	I'm not sure the data will be processed until the destination
INS3	I prefer to interact with humans compared to SIMLAB
INS4	I always double-check the data entered so that there are no errors

IV. RESULT AND DISCUSSION

A. *Validity and Realibility Test*

The prepared questionnaire was then distributed to 30 respondents for instrument testing in the form of validity and reliability tests to find out whether the questionnaire was appropriate. The next step is distributing questionnaires to predetermined respondents. Table II shows the result of testing has been done.

TABLE II. VALIDITY AND REALIBILITY TEST

ID	VALIDITY TEST		REALIBILITY TEST	
	R COUNT	RESULT	R COUNT	RESULT
OPT1	0.179	INVALID	VARIABLE IS EXCLUDED	
OPT2	0.703	VALID	0,712	RELIABLE
OPT3	0,489	VALID	0,718	RELIABLE
OPT4	0,532	VALID	0,716	RELIABLE
OPT5	0,637	VALID	0,708	RELIABLE
OPT6	0,520	VALID	0,716	RELIABLE
OPT7	0,662	VALID	0,712	RELIABLE
INN1	0,393	VALID	0,723	RELIABLE
INN2	0,323	INVALID	VARIABLE IS EXCLUDED	
INN3	0,495	VALID	0,717	RELIABLE
INN4	0,568	VALID	0,715	RELIABLE
DIS1	0,507	VALID	0,717	RELIABLE
DIS2	0,301	INVALID	VARIABLE IS EXCLUDED	
DIS3	0,554	VALID	0,716	RELIABLE
DIS4	0,439	VALID	0,720	RELIABLE
DIS5	0,634	VALID	0,712	RELIABLE
INS1	0,323	INVALID	VARIABLE IS EXCLUDED	
INS2	0,615	VALID	0.715	RELIABLE
INS3	0,419	VALID	0,719	RELIABLE
INS4	0.411	VALID	0,721	RELIABLE

Four statement items whose R Count values are below the table R values and considered as invalid (OPT1, INN2, DIS2, INS1) so that these four invalid items are excluded. While at section of realibility test, all statement items have a value above 0.60, so all statement items can be said to be reliable. After all the instruments are valid and reliable, the questionnaire is feasible to distribute with a predetermined sample.

B. *Respondents*

The total population in this study was 553. The number of samples was taken as much as 20% of the total population[7]. So, the sample quota in this study is 111 respondents.

Grouped by occupation, majority of respondents came from students with a percentage of 93.8%, the second was the laboratory structure with a percentage of 3.5% and the last were lecturers with a percentage of 2.7%. Whereas according to the origin of the department, most of the respondents came from the Information Systems major with a percentage of 78.6%, followed by the Informatics Engineering major with a percentage of 12.5% and the last was the Computer Systems major with a percentage of 8.9% briefly presented in Figure 2 and Figure 3.

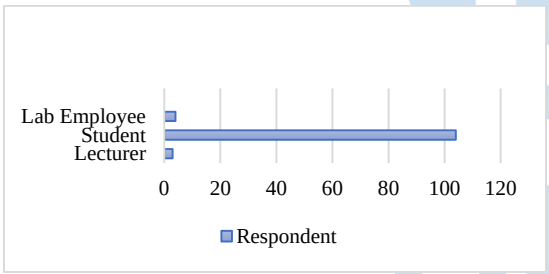

Fig. 2. The respondents grouped by occupation

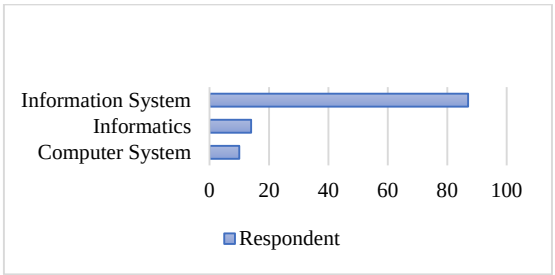

Fig. 3. The respondents grouped by department

C. *Measuring Technology Readiness Index*

Furthermore, calculations are performed using the TRI method. Each variable will be evaluated to find out what is needed to improve the readiness of the users of this Laboratory Management Information System (SIMLAB). The first step is to determine the weight of the statement. Each variable is worth 25% then each variable is divided by the number of statements in that variable.

$$\text{OPT} = \frac{25\,\%}{6} = 4{,}16\,\%$$

$$\text{INN} = \frac{25\,\%}{3} = 8{,}33\,\%$$

$$\text{DIS} = \frac{25\,\%}{4} = 6{,}25\,\%$$

$$\text{INS} = \frac{25\,\%}{3} = 8{,}33\,\%$$

TABLE III. QUESTION WEIG

Variable	Variable weight	Question	Question Weight
OPT	25%	OPT2, OPT3, OPT4, OPT5, OPT6, OPT7	4,16%
INN	25%	INN1, INN3, INN4	8,33%
DIS	25%	DIS1, DIS3, DIS4, DIS5	6,25%
INS	25%	INS2, INS3, INS4	8,33%

From Table III we can infer the weight for each statement. The statement on the Optimism variable is 4.16%, Innovativeness is 8.33%, Discomfort is 6.25% and for Insecurity is 8.33%.

After knowing the weight of each statement, then the average value of each statement is multiplied by the weight of the statement.

$$\text{OPT2} = \frac{464}{111} \text{ x } 4{,}16\% = 0.17$$

$$\text{OPT3} = \frac{441}{111} \text{ x } 4{,}16\% = 0.16$$

$$\text{OPT4} = \frac{467}{111} \text{ x } 4{,}16\% = 0.17$$

$$\text{OPT5} = \frac{442}{111} \text{ x } 4{,}16\% = 0.16$$

$$OPT6 = \frac{449}{111} \text{ x } 4{,}16\% = 0.16$$

$$OPT7 = \frac{436}{111} \text{ x } 4{,}16\% = 0.16$$

$$INN1 = \frac{425}{111} \text{ x } 8{,}33\% = 0.31$$

$$INN3 = \frac{452}{111} \text{ x } 8{,}33\% = 0.33$$

$$INN4 = \frac{438}{111} \text{ x } 8{,}33\% = 0.32$$

$$DIS1 = \frac{435}{111} \text{ x } 6{,}25\% = 0.24$$

$$DIS3 = \frac{405}{111} \text{ x } 6{,}25\% = 0.22$$

$$DIS4 = \frac{401}{111} \text{ x } 6{,}25\% = 0.22$$

$$DIS5 = \frac{389}{111} \text{ x } 6{,}25\% = 0.21$$

$$INS2 = \frac{396}{111} \text{ x } 8{,}33\% = 0.29$$

$$INS3 = \frac{387}{111} \text{ x } 8{,}33\% = 0.29$$

$$INS4 = \frac{347}{111} \text{ x } 8{,}33\% = 0.26$$

OPT = OPT2+ OPT3 + OPT4 + OPT5 + OPT 6
= 0.17 + 0,16 + 0,17 = 0,16 + 0,16 + 0,16
= 1,01

INN = INN1 + INN3 + INN4
= 0,31 + 0,33 + 0,32
= 0,98

DIS = DIS1 + DIS3 + DIS4 + DIS5
= 0,24 + 0,22 + 0,22 + 0,21
= 0,91

INS = INS2 + INS3 + INS4
= 0,29 + 0,29 + 0,26
= 0,84

Technology Readiness Index = OPT + INN + DIS + INS
= 1,01 + 0,98 + 0,91 + 0,84
= 3,76

The TRI value obtained is 3.76. This shows that TRI is greater than 3.51 which means the level of readiness for SIMLAB adoption is in the High Technology Readiness category.

The Optimism value contributes the largest value to the total TRI value of other variables, namely 1.01. The highest optimism value among other variables indicates that respondents believe this information system can have a positive impact on laboratory management. The second largest value is Innovativeness of 0.98. This means that users have high innovative nature, are happy to accept new technology and easily adapt to new technology. Discomfort and Insecurity variable values are the variables with the lowest portion, namely 0.91 for Discomfort and 0.84 for Insecurity. This shows that users feel uncomfortable using this SIMLAB and users also feel insecure in providing information.

V. CONCLUSION

The Readiness of Information System users of the Software Engineering Laboratory and Information Systems is classified as High Technology Readiness. The application of a laboratory information system is very likely to be carried out as a future improvement. This research suggests several things that can be done to increase the Technology Readiness of users of this Laboratory Information System, namely providing explanations to users about functions, advantages compared to previous conventional management and guidelines for using this Laboratory Information System, conducting Usability Testing for a better experience using Lab Information Systems . So that users are comfortable and not confused in using this Laboratory Information System. In addition, the implementation of restrictions on data access in the Laboratory Information System should be more organized which allows each role or user to have different authorities.

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