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Utilization of Blockchain Technology in Online Learning

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Abstract: The rise of online learning nowadays, encourages learning patterns have to move from face to face to the network. This trend has become one of the easy alternatives for many of the general public to be able to learn or conduct training based on online and in the end, they can get a certificate after participate into that online training. BINUS as one of the tertiary institutions that has implemented online learning and has a learning website to support it. But along with the convenience available, easy access to learning, online learning activities need to be recorded as well, for example: behavior of learners, activities including attendance, and quizzes need to be recorded to avoid fraud. Fraud in manipulating attendance, or in activities carried out on the learning page. One of the most popular technologies being discussed today is Blockchain, and its can be utilized to support a better learning system. Readiness in applying this technology will be measured using the Technology Readiness Index (TRI) method.

Keywords: Online, Blockchain, Learning, TRI

1. INTRODUCTION

The online learning method has become the most talked about lately, the uniqueness of the features offered such as providing general learning, on a global scale and for completing learning, this can also be used to develop countries [1]. This method has begun to be offered for people who have problems in attending lectures regularly, by offering flexibility through learning methods that are not bound by time and place. This online-based learning application is very easy to use only by using a communication network access. These learning services generally provide learning programs, exercises, assessments and certificates when the user has completed. Looking at the workflow of online learning, it is necessary to have a system that can support the registration process, learning (including attendance, assessment), payment and certification when completing learning. Currently, one of the technologies that is developing is Blockchain. Blockchain is a system used for recording transactions in many databases that are widely distributed on many computers, each of which is identical. This system is also known as the Distributed Ledger. This recording is decentralized, and is a system that does not use third parties. Records of transactions that have occurred are kept by many computers scattered in the network itself so that it is not possible to be hacked / modified unilaterally without changing the majority of all databases [2]. These recording transactions cannot be duplicated and do not need to be authenticated by certain authorities,

but are carried out by a distributed system called nodes, thus ensuring more security and without any interruption from any party.

2. LITERATURE REVIEW

Blockchain is a technology used to maintain a growing list of blocks (records) using the concept of a distributed database. Each block has a time (timestamp), as well as links (links) to other / previous blocks. These transactions cannot be duplicated and do not need to be authenticated by any particular authority, but are carried out by distributed systems called nodes. Generally, blockchain technology is managed by a peer-to-peer network that collectively adhere to certain protocols and are used to create validation of new blocks / nodes [5]. Blockchain itself basically uses a collection of block lists of transactions in a large bookkeeping / distributed database or a digital transaction that has been executed and shared with all blockchain participants / users. Every transaction in it has been verified in the general agreement of the majority of participants in the system. And once the data enters the blockchain, the data information can never be erased. The blockchain contains special, verified data on every transaction that has ever been executed. Just for the basic analogy, it is very easy to steal / take the cake from the jar that is stored in the market and seen by thousands of other humans [6]. This technology is a distributed digital data transaction and management system where all users of the system have a common consensus [7,8]. The application and discussion related to blockchain technology cannot be separated from the Bitcoin phenomenon [9]. The popularity of one type of virtual currency makes the general public often associate blockchain with Bitcoin. However, bitcoin is only one product that utilizes blockchain technology. Readiness Index technology is used as a measure of user's readiness to accept new technology, besides that, it is used to determine the behavior of users towards the new technology so that they can allocate marketing resources effectively. Four factors, namely: Optimism, Innovativeness, Discomfort and Insecurity in him [10].

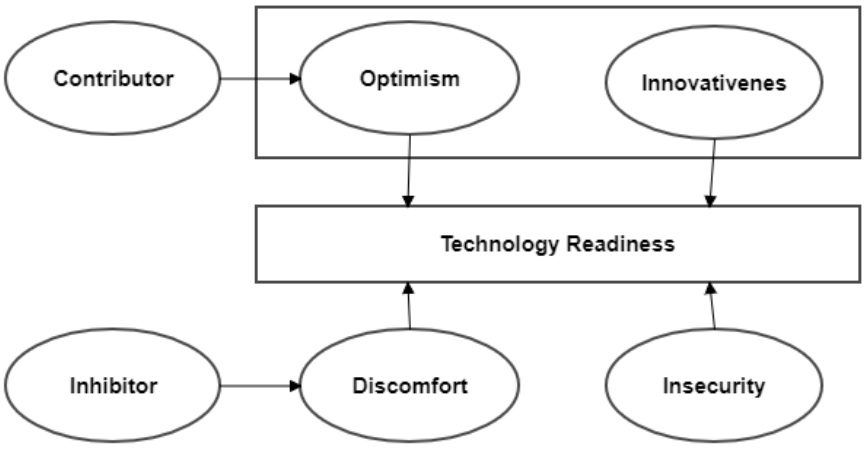

Figure 1. Technology Readiness Index

3. HYPOTHESES

In this study, to support the research question, and to see the relationship of the variables used in this study, the researcher will test the following hypotheses:

1) H1: User discomfort affects the Readiness Technology
2) H2: User innovation (Innovativeness) affects the Readiness Technology
3) H3: User Insecurity affects Readiness Technology
4) H4: User optimism affects the Readiness Technology

4. RESEARCH METHODOLOGY

4.1. Population and Sample

The population used as respondents in this study were educational employees who used learning portals at XYZ College. Several teaching staff who have been and are currently teaching online programs at XYZ College were sampled in this study.

4.2 Research Model

This study will use the concept of user readiness in the adoption of Blockchain technology on a learning portal that is specifically applied to online programs at XYZ Higher Education, using the TRI method (Parasuraman, 2000). The conceptual framework / model in this study Figure 1.

4.3 Tools

This research uses literature study and also a questionnaire as a technique in collecting data. The questionnaire was arranged according to a Likert scale. The Likert scale used is a 5 level Likert scale with a neutral label in the middle / third position. The questionnaire instrument was made based on the variables developed by Parasuraman [10].

5. RESULT AND DISCUSSION

5.1 Respondent Description

A total of 21 questions were distributed consisting of 6 simple questions regarding respondents' knowledge of Blockchain technology, and 15 other questions consisting of several questionnaire variables used in accordance with the TRI. Respondents who gave feedback were 51 lecturers who filled out questionnaires that we have distributed through online media. From the results of the above questions, it can be seen that as many as 31 respondents have known this technology, and in particular 24 respondents have known and have heard of the use of this technology in the field of education, so that the amount of data that can be used in drawing results and conclusions, only 24 respondents filled in. complete and can be analyzed to determine the level of readiness in implementing and utilizing Blockchain technology in the field of education.

5.2 Data Analysis

The analysis technique used in processing the data obtained was using the SEM method based on Partial Least Square (PLS) with smartPLS tools (v.3.3.2).

1) Evaluation of Measurement Model

The stages of testing a measurement model are as follows: a. Individual test item reliability. Convergent validity is the value of the loading factor for each construct of the outer model with a reflexive indicator, this can be seen from the correlation between the item / indicator score and the construct's score. An individual indicator is considered reliable if it has a correlation value greater than 0.70. In the path diagram image below, it can be seen that all items have a loading factor above 0.7 so there is no need for items to be deleted.

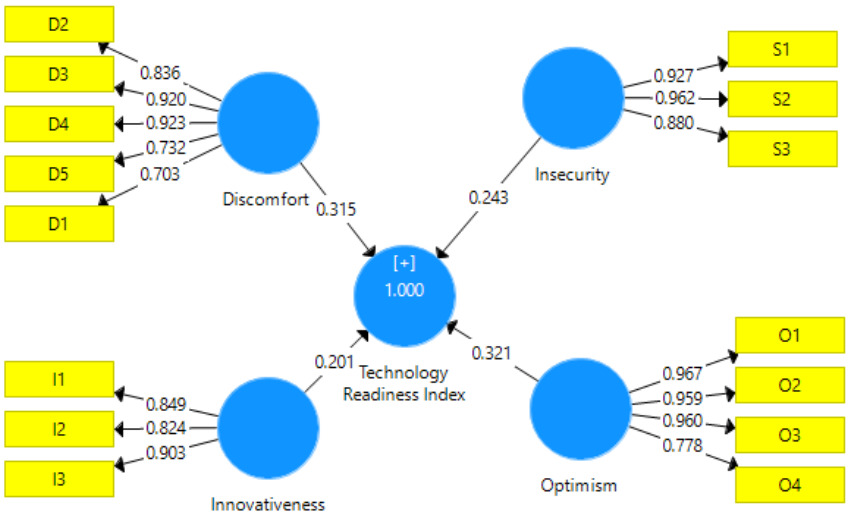

Figure 2. Path Diagram

2) Internal Consistency Test

The accepted value for composite reliability is greater (>) than 0.7. In the figure below, it can be seen that the composite reliability value of all constructs is> 0.7 so that the internal consistency test is fulfilled.

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Discomfort	0.88568456	0.91633172	0.91505259	0.68564835
Innovativeness	0.82333860	0.84110241	0.89437975	0.73868715
Insecurity	0.91306241	0.91466205	0.94560652	0.85299801
Optimism	0.93627407	0.93615266	0.95610696	0.84584036
Technology Readiness Index	0.96069736	0.96716950	0.96568708	0.65698287

Figure 3. Internal Consistency Test

3) Discriminant validity

The condition of this test is that the AVE value must be greater than 0.50. It has been fulfilled according to the table above. The next condition that must be fulfilled is the value of the square root AVE of each variable, which must be greater than the correlation value with other variables. It can be seen that all the values of the square root of AVE are greater than the

correlation values with other variables. Thus, the research model has met discriminant validity.

	Discomfort	Innovativeness	Insecurity	Optimism
Discomfort	0.82803886003536	0.00000000000000	0.00000000000000	0.00000000000000
Innovativeness	0.70930535004055	0.85946910855776	0.00000000000000	0.00000000000000
Insecurity	0.86388982908127	0.78723068651513	0.92357891229254	0.00000000000000
Optimism	0.77524747677083	0.88006212977840	0.82354806497282	0.91969579655528

Figure 4. Discriminant Validity

5.3 Structural Model

To determine the significance level of the path coefficient, the t-value generated by running the Bootstrapping algorithm is used to answer the research questions asked. At the 0.05 significance level, the results of the structural model test can be seen in the figure below:

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Discomfort -> Technology Readiness Index	0.31496187462945	0.31619090360224	0.03407769127677	9.24246516794247	0.00000000000006
Innovativeness -> Technology Readiness Index	0.20091449932949	0.19974363147174	0.02136670406389	9.40315823763672	0.00000000000006
Insecurity -> Technology Readiness Index	0.24348192896598	0.24377973932491	0.01879578690553	12.95406945129237	0.00000000000006
Optimism -> Technology Readiness Index	0.32089820975775	0.32113500314606	0.02413584808095	13.29550172347236	0.00000000000006

Figure 5. Structural Model

6. CONCLUSION

The conclusions obtained from the results of data collection and analysis are related to the readiness to use Blockchain technology with the Technology Readiness Index method. Hypothesis testing uses statistical values so for alpha 5% the t-statistic value used is 1.96. So that the criteria for acceptance / rejection of the hypothesis is that Ha is accepted and H0 is rejected when the t-statistic is> 1.96. To reject / accept the hypothesis using probability, Ha is accepted if the p value is <0.05. So, when viewed from the existing results, for the hypothesis H1, H2, H3, H4 are all accepted, which means that all variables have an influence with Technology Readiness.

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