Human Organization Technology Fit (HOT Fit) as Evaluation Model in E-learning System of Politeknik Negeri Bali

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Abstract—**E-learning is the use of information technology and computers to create learning experiences. Politeknik Negeri Bali (PNB) as one of the educational institutions in Indonesia has implemented e-learning in the learning process. Because of the importance of the PNB e-learning, an evaluation of the PNB e-learning system must be carried out. The object of this research is PNB e-learning system and the model used to evaluate PNB e-learning system is Human Organization Technology Fit (HOT FIT) model. The HOT Fit model can assess the success of information systems, acceptance of system, and assess the compatibility between human-organization-technology in system implementation. The Human Compenent consists of System User (SU) and Users' Satisfaction (US) variable; the Organizaton Component consists of Organization Structure (OS) and Enviroment (E) variable; while the Technology Component consists of System Quality (SQ), Informatio Quality (IQ), and Service Quality (SerQ) variable. These variables are considered to have an effect to Net Benefit (NB) of the e-learning system of PNB. The analytical method used is Structural Equation Modeling using Partial Least Square. The results show that Information Quality (IQ) variable has a direct and significant effect on System User (SU) and Users Satisfaction (US) variables and indirect effect on Net Benefit (NB). System User (SU), Users Satisfaction (US), and Environment (E) variables also have a significant direct effect on Net Benefit.**

Keywords—e-learning, evaluation, human organization technology fit (hot fit), structural equation model

I. INTRODUCTION

E-learning, also called internet learning, is education through internet, network, or standalone computers. The term E-learning first appeared since 1999, where the term was originally used on a CBT (Computer Based Training) system. The term then develops with specific meanings such as online learning and virtual learning. But now e-learning is defined as learning through the internet [1], [2]. According to [3], e-learning is the use of information technology and computers to create learning experiences. In addition, e-learning provides an automatic and real time feedback to teachers and students [4], [5].

Politeknik Negeri Bali (PNB) as one of the educational institutions in Indonesia has implemented e-learning in the learning process. Because of the importance of the PNB e-learning system, the e-learning system must be developed. As a basis and material for the development of e-learning, evaluation of the PNB e-learning system should be done.

There are several models that can be applied for system evaluation, which are End User Computing Satisfaction (EUCS), Fit Technology Task (TTF), Technology Acceptance Model (TAM), IS Success Model, Unified Theory of Acceptance and Use of Technology (UTAUT), and the Human Organization Technology Fit (HOT FIT). Among these models, the HOT-FIT model is considered to be the most apropriate to the existing problem conditions in PNB.

The HOT FIT model prioritizes three components, namely the Human component, which evaluates the system from the system user and user satisfaction; organization component include leadership, support from top management and staff (organization structure), also organizational environment; and technology component consisting of system quality, information quality, and service quality. These components are analyzed for their effect on Net Benefit or the usefulness of the system. The advantages of the HOT FIT Model are that it can accommodate organizational structure and organizational environment variables, where these variables are not found in other models [6]. This research aims to know the effect of human component, organization component, and tecnology component on net benefit of PNB e-learning system.

II. METHOD

This research was located at the Politeknik Negeri Bali, Indonesia. The data used are primary data collected using a questionnaire. The number of respondents who participated in this study were 81 people. The sampling technique used was a two stages stratified random sampling, which was taken based on status (lecturers and students) and the respondent's department. There are three main components, which are Human Component (consists of Syste User (SU) and Users' Satisfaction (US) latent variables); Organization Component (consists of Organization Structure (OS) and Enviromental (E) latent variables); and Technology Compoent (consists of Information Quality (IQ), System Quality (SQ), and Service Quality (SerQ) latent variables). These latent variables are considered to have an effect to Net Benefit (NB) of PNB's e-learning system.

The analytical method used is Structural Equation Modeling using Partial Least Square (PLS). The evaluation phase of the model is:

- Draw the Path Diagram.
- Evaluation of measurement models is done using the indicator validity criteria (loading factor must be greater than 0.4), Construct validity (reliability composite value and cronbah's alpha must be greater than 0.6), convergent validity (value of Average Variance Extracted (AVE) must be greater than 0.5) [7], [8], [9], [10].
- Evaluation of structural models using the criteria of R-square, F-Square, Q-Square, and Goodnes of Fit (GoF).
- Hypothesis testing the effect of exogenous latent variables on endogenous latent variables in the model.

III. RESULT

The Path Diagram of the model formed is as follows:
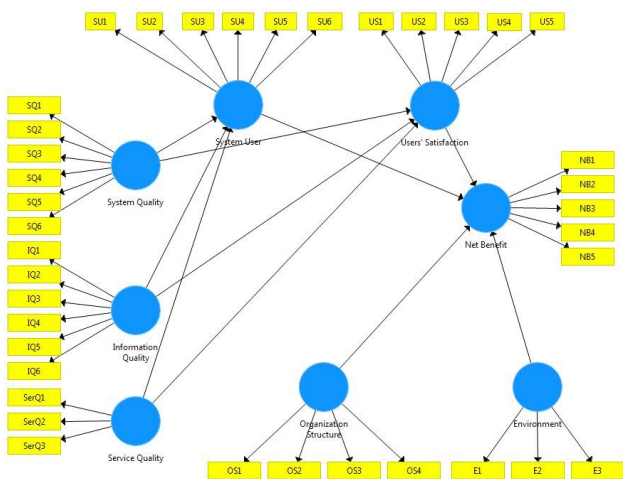
Source: Data Analyzed, 2019.

Fig. 1. Path diagram.

Figure 1 shows the relationship between human components (System Users and Users Satisfaction), Technology components (System Quality, Information Quality, and Service Quality), Organizational components (Organization Structure and Environment) and their effects on Net Benefit (program usefulness). The variables of System Quality, Information Quality, and Service Quality are considered to influence the System User and Users Satisfaction and have an indirect effect on Net Benefit. The Organization Structure and Environment variables are thought to have an effect directly on Net Benefit. The analytical method algorithm used is the path method as structural weighting and the bootstrap method as a data resampling method.

A. Evaluation on measurement model

1) Indicator validity: The validity of the indicator is evaluated using the loading factor criteria. The value of the loading factor shows how many variants of the indicator can be explained by latent variables. Table I shows the value of loading factors for each indicator. The results of the table show that there is one indicator that has a loading factor of

less than 0.4, namely the US5 indicator with a value of loading factor of 0.288. This indicator is declared invalid and eliminated from the model.

TABLE I. INDICATOR VALIDITY

Indikator	loading factor	indicator validity	Indikator	loading factor	indicator validity
E1	0.890	valid	SQ2	0.828	valid
E2	0.820	valid	SQ3	0.452	valid
E3	0.888	valid	SQ4	0.809	valid
IQ1	0.776	valid	SQ5	0.734	valid
IQ2	0.846	valid	SQ6	0.729	valid
IQ3	0.702	valid	SU1	0.779	valid
IQ4	0.784	valid	SU2	0.825	valid
IQ5	0.799	valid	SU3	0.809	valid
IQ6	0.621	valid	SU4	0.818	valid
NB1	0.854	valid	SU5	0.643	valid
NB2	0.862	valid	SU6	0.772	valid
NB3	0.870	valid	SerQ1	0.686	valid
NB4	0.814	valid	SerQ2	0.863	valid
NB5	0.760	valid	SerQ3	0.715	valid
OS1	0.726	valid	US1	0.699	valid
OS2	0.839	valid	US2	0.907	valid
OS3	0.838	valid	US3	0.853	valid
OS4	0.735	valid	US4	0.731	valid
SQ1	0.746	valid	US5	0.288	Not valid

Source: Data Analyzed, 2019

2) Construct validity and convergent validity: Each construct (variable) formed by the indicator must also fullfil the validity requirements. To measure connstruct validity, Composite Reliability and Cronbach's Alpha criteria are used. The construct is declared reliable if the Composite Reliability and Cronbach's Alpha values are greater than 0.6. While Convergent Validity is measured by the criteria of Average Variance Extracted (AVE). AVE values must be greater than 0.5 to show good convergent validity measures. Table II shows composite reliability values, cronbach's alpha, and AVE respectively construct.

TABLE II. COMPOSITE RELIABILITY, CRONBACH'S ALPHA, AND AVERAGE VARIANCE EXTRACTED

Construct	Composite Reliability	Cronbach's Alpha	AVE	Reliability
Environment (E)	0.900	0.835	0.751	Reliabel
Information Quality(IQ)	0.889	0.850	0.575	Reliabel
Net Benefit (NB)	0.919	0.889	0.694	Reliabel
Organization Structure (OS)	0.866	0.796	0.618	Reliabel
Service Quality (SerQ)	0.801	0.627	0.576	Reliabel
System Quality (SQ)	0.867	0.813	0.529	Reliabel
System User (SU)	0.901	0.867	0.603	Reliabel
Users' Satisfaction (US)	0.879	0.813	0.646	Reliabel

Source: Data Analyzed, 2019

These results indicate that the composite reliability value and cronbach's alpha for each construct is greater than 0.6 and the AVE value is greater than 0.5 so that each construct is declared reliable.

B. Evaluation of Structural Model

Evaluation of structural models is done using the criteria of R Square, Q Square, and GoF. The value of R Square and Q Square which approaches 1 indicates the strength of a good model. While the GoF 0.1 value indicates a small GoF value, a value of 0.25 indicates a moderate GoF value, and a value of 0.36 indicates a large GoF value. The following table shows the R-Square, Q-Square, and Gof values obtained.

TABLE III.   R-SQUARE, Q-SQUARE, AND GOODNESS OF FIT

Endogenous Variable	R Square	Q Square	GoF
Net Benefit	0.794		
System User	0.298	0.911	0.55
Users Satisfaction	0.384		

Source: Data Analyzed, 2019

The R-Square value for the Net Benefit endogenous variable is 0.794 or 79.4%. This means that the Net Benefit variable variance can be explained by the System User, Users Satisfaction, Organization Structure, and Environment variables of 79.4%. System User has a R square value of 0.298 or 29.8%. This means that the variable User System variables can be explained by the System Quality, Information Quality, and Service Quality variables of 29.8%. Users Satisfaction has a R square value of 0.384 or 38.4%. Artiya variables Users Satisfaction can be explained by the variable System Quality, Information Quality, and Service Quality of 38.4%.

The Q Square value is 0.911 or 91.1%. This shows that the overall formed model has been explained by 91.1% by the variables used. The GoF value in this model is 0.55 which states a large (very good) GoF value.

In addition to these criteria, the structural model is also evaluated using the F-Square criteria. F square or effect size states the size of the effect of exogenous latent variables (independent) on endogenous latent variables (dependent). The value of f square 0.02 states a weak influence, the value of 0.15 states moderate influence, and the value of 0.35 states a strong influence [8]. The following table presents the F square values of each exogenous variable and its classification.

TABLE IV.   F-SQUARE

Effect	F Square	Classification
IQ -> NB	0.060	Moderate Effect
IQ -> SU	0.062	Moderate Effect
IQ -> US	0.098	Moderate Effect
OS -> NB	0.002	Weak Effect
SerQ-> SU	0.016	Weak Effect
SerQ-> US	0.002	Weak Effect
SQ -> SU	0.004	Weak Effect
SQ -> US	0.023	Moderate Effect
SU -> NB	0.593	Strong Effect
US -> NB	0.095	Moderate Effect

Source: Data Analyzed, 2019

The results in Table IV shows that there is a strong effect of the System User (SU) variable on the Net Benefit variable (NB) with a f square value of 0.593. Moderate effect occurs

between Information Quality (IQ) variables indirectly towards the Net Benefit (NB) variable; Information Quality (IQ) variable on System User (SU); Information Quality (IQ) variable against Users Satisfaction (US); System Quality (SQ) against Users Satisfaction (US); and the Users Satisfaction (US) variable on Net Benefit (NB). While the weak influence occurs in the influence of the Organization Structure variable (OS) on the Net Benefit (NB) variable; Service Quality variable (SQ) for System User (SU) variables; Service Quality (SerQ) variable for Users Satisfaction (US) variables; and System Quality (SQ) variables for System User (SU).

C. Hypothesis Testing

The general hypothesis tested is:

H0 : $\gamma i = 0$ (The ith exogenous latent variable does not have a significant effect on endogenous latent variables)

H1 : $\gamma i \neq 0$ (The ith exogenous latent variable have a significant effect on endogenous latent variables)

The rejection criteria for H0 or Ha acceptance is if the statistical value t is greater than the t-table value (two-tails) of 1.65 (at alpha 10%) or the p-value is less than alpha. If H0 is rejected and Ha is accepted, it can be stated a significant path coefficient, or exogenous latent variables that have a significant effect on endogenous latent variables [9]. Table V shows the results of hypothesis testing.

TABLE V.   HYPOTHESIS TESTING OF DIRECT EFFECT

Direct Effect	Path Coefficient	T Statistics	P-Value	Significance
SQ -> SU	0.086	0.606	0.554	Not Significant
SQ -> US	0.186	1.511	0.131	Not Significant
IQ -> SU	0.364	2.490	0.013	Significant
IQ -> US	0.430	3.168	0.002	Significant
SerQ -> SU	0.148	1.240	0.215	Not Significant
SerQ -> US	0.051	0.476	0.635	Not Significant
US -> NB	0.268	1.872	0.062	Significant
SU -> NB	0.557	4.394	0.000	Significant
OS -> NB	0.028	0.386	0.699	Not Significant
E -> NB	0.153	2.236	0.026	Significant

Source: Data Analyzed, 2019

The results of hypothesis testing indicate that there are several significant variable influences on the alpha level of 10%, namely the effect of Information Quality (IQ) variables on the System User (SU) variable; the influence of Information Quality (IQ) variables on Users Satisfaction (US); the effect of System User (SU) variable on Net Benefit (NB); the influence of Users Satisfaction (US) on Net Benefit; and the influence of Environment (E) on Net Benefit (NB). While other influences are not significant at the alpha level of 10%.

Variables that have a significant effect on the System User and User Satisfaction are Information Quality while the System Quality and Service Quality have no significant effect. The quality of the system such as a user friendly,

guaranteed security, easy access, and fast response time, turned out to not be the main variables that significantly influence system users and user satisfaction. User System and User Satisfaction are not significantly affected by the quality of the system because currently the quality of the system is not the main focus for users of the e-learning system. This can happen because the e-learning system used is a standard system, namely the Learning Management System (LMS) so that it does not have a significant effect on system users and user satisfaction.

Service quality such as system guide, fast service, and responsive service, also does not have a significant effect on system users and user satisfaction of PNB e-learning system. This is because most of the e-learning users utilize the e-learning system to upload or download teaching/learning materals only, so most of the users do not require any service from the operator. Therefore the service variable has no significant effect on system users and user satisfaction.

Currently the focus of system users and user satisfaction is the information quality of the e-learning system. In order to increase the system users and user satisfaction, the e-learning system should have a good information quality such as precise and accurate information, complete and detailed information, and also according to the time series. It can be said that at present, e-learning users prioritize good quality information compared to system quality and service quality. Good information quality provides comfort and satisfaction for users of e-learning system because it can conduct information about learning quickly, precisely, accurately, and in accordance with time series. The better the information quality, the more appropriate decisions will be made. System users certainly hope that by using the system they will get the information they need. Information systems that are able to produce information that is timely, accurate, as needed, and relevant, will affect the user satisfaction.

System User (SU) and Satisfacton User (US) have a significant effect on Net Benefit (NB). This means that system user and user satisfaction have a significant influence on the usefulness of the system. Relationships between System Users with Net Benefit, and User Satisfaction with Net Benefit are positive (viewed from the sign of the Path Coefficient). This shows that the better the use of e-learning systems and the better user satisfaction of e-learning systems, the e-learning system is increasingly beneficial for its users.

Organization Structure (OS) does not have a significant effect on Net Benefit (NB). This means that the role of the organization (institutions) in its structure and duties as a planner and provider of facilities and infrastructure in the implementation of e-learning systems has no significant effect on the usefulness of the system. E-learning users assume that it is the organization's obligation as a planner and provider of facilities and infrastructure in the implementation of e-learning systems. Hence the performance of the organization does not significantly influence the usefulness of the system.

Environment (E) has a significant effect on net benefit (NB). This means that the atmosphere of the work environment in Politeknik Negeri Bali has a significant effect on the usefulness of the e-learning system. The existence of a good working environment, such as good communication from the institution, healthy competition in the use of e-

learning, and the support of various work units, will increase the usefulness of the e-learning system. Good communication about e-learning will make users understand the importance of e-learning. The more frequent use of e-learning will increase the usefulness of the e-learning system itself. Likewise with the existence of healthy competition in the use of e-learning will make the environment around the user motivated to use the e-learning system.

In addition to the direct effect, indirect effects appear on several variables, where the results of hypothesis testing are listed in Table VI.

TABLE VI.   HYPOTHESIS TESTING OF INDIRECT EFFECT

Indirect Effect	Path Coefficient	T Statistics	P-Value	Significance
IQ -> NB	0.318	3.08	0.002	Significant
SerQ -> NB	0.096	1.139	0.255	Not Significant
SQ -> NB	0.098	0.93	0.353	Not Significant

Source: Data Analyzed, 2019

These results indicate that there is a significant indirect effect of the Information Quality (IQ) variable on the Net Benefit (NB) variable, while Service Quality (SerQ) and System Quality (SQ) do not significantly influence Net Benefit.

Information quality variable significantly influence the net benefit variable indirectly. The relationship between those two variables is positive so that if the information quality of e-learning system is good, fast, precise, accurate according to reality, and according to time, the system users will increasingly feel that the e-learning system is beneficial for them. While the quality of the system and service quality does not affect the usefulness of the e-learning system.

IV.   CONCLUSIONS AND SUGGESTIONS

From the results of the analysis obtained, a number of things are concluded. The variable that have a significant effect on system users and user satisfaction is the information quality, while the system quality and the service quality do not have a significant effect on system user and user satisfaction. This indicates that users of the e-learning system at the Politeknik Negeri Bali prioritize information quality over system quality and service quality.

System user and user satisfaction influence significantly the usefulness of the system directly. The more often the system is used and the more users feel satisfied, the e-learning system is considered useful.

Environment variable has a significant effect directly on the net benefit variable. This indicates that a good environmental atmosphere in the use of the Politeknik Negeri Bali's e-learning system can improve the usefulness of the e-learning system.

Information quality variable has a significant indirect effect on the variable net benefit of the Politeknik Negeri Bali's e-learning system. This means that if the quality of information is getting better, more precise, accurate, detailed, and according to the time series, it will be helpful for users to

make the right decisions. Hence, the e-learning system will be more useful.

As for suggestions, the development of e-learning needs to be emphasized in Information Quality, namely the suitability of information with inputted data, accurate information, complete and detailed, in reality, easy to read, and in accordance with time series. In addition, the Environment variable of the Organization component also has a significant influence on Net Benefit so that the development of PNB's e-learning system also needs to improve the environment which includes good communication from the responsible unit, healthy competition in using the system, as well as support from various work units. Human components (System User and Users Satisfaction variables) also have a significant influence on Net Benefit so that the development of e-learning must also pay attention to human aspects, including providing training to users so that users can be proficient in using PNB's e-learning systems. In addition, the facilities and features of the PNB's e-learning system are designed according to user needs and can run according to their functions so that user satisfaction can be improved.

ACKNOWLEDGEMENT

REFERENCES

[1] M.R. Martınez-Torres, S.L Toral, and F. Barrero, "Identification of the design variables of elearning tools," Interact. Comput., vol. 23, no. 3, pp. 279- 288, 2011.

[2] J.G. Ruiz, M.J. Mintzer, and R.M. Leipzig, "The impact of e-learning in medical education," Acad. Med., vol. 81, no. 3, pp. 207-212, 2006.

[3] W. Horton, E-learning By Design, San Francisco: Pfeiffer, 2006.

[4] G. Wong, T. Greenhalgh, and R. Pawson, "Internet-Based medical education: A realist review of what works, for whom and in what circumstances," BMC Med. Educ., pp.10-12, 2010.

[5] M.F. Mascolo, "Beyond student-centered and teacher-centered pedagogy: teaching and learning as guided participation," Pedagog Human Sci., vol. 1, no. 1, pp. 3-27, 2009.

[6] M.E. Erlirianto, A.H.N. Ali, and A. Herdiyanti, "The implementation of the human, organization, and technology–fit (HOT–fit) framework to evaluate the electronic medical record (emr) system in a hospital," Procedia Computer Science, vol. 72, pp. 580 – 587, 2015.

[7] W.W. Chin, The Partial Least Squares Approach For Structural Equation Modelling, Modern Methods For Bussiness Research, London: Lawrence Earlbaum Associates. 1998, pp. 295-236.

[8] W.W. Chin, How to Write Up and Report PLS Analysis. Handbook of Partial Least Squares: concepts, Methods, and Application in Marketing and Related Fields, Berlin: Springer, 2010, pp. 655-690.

[9] J.F. Hair, C.M. Ringle, and M. Sarsted, "PLS-SEM: Indeed a silver bullet," Journal of Marketing Theory and Practice, vol. 19, no. 2, pp. 139-150, 2011.

[10] J.F. Hair, M. Sarsted, C.M. Ringle, and J.A. Mena, "An Assessment Of The Use Of Partial Least Square Structural Equation Modelling In Marketing Research," Journal of The Academy of Marketing Science, vol. 40, no. 1, pp. 414-433, 2012.