IT ADOPTION MODEL FOR HIGHER EDUCATION

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ABSTRACT

Information Technology (IT) is a critical asset for higher education institutions and support institutional strategic objectives. One of the most common problems of using ICT in education is to base choices on technological possibilities rather than educational needs. In developing countries where higher education is fraught with serious challenges at multiple levels, there is increasing pressure to ensure that technological possibilities are viewed in the context of educational needs. In the IT adoption is necessary to consider several important aspects related to these technologies, such as the direction of technological development in accordance with the strategic plan. The problems arise when the Higher Education will adopt a new technology but does not consider the current technology trends. Hype Cycles provide technology trend with a graphic representation of the maturity and adoption of technologies and applications, and how they are potentially relevant to solving real business problems and exploiting new opportunities. In this paper will propose IT adoption model for higher education base on the factor that influences IT adoption in higher education which is obtained from another research with adding a technology trend as a factor that influence. By using factor analysis with SPSS, produces five group of factors that infuluence for IT adoption in Higher Education. IT Adoption Model For Higher Education can be used by universities as a reference to adopting a new technology that is in line with the strategy that has been set with with attention to each of the factors that influence.

Keywords: *Information Technology, IT Adoption, Hype Cycle, Higher Education*

1. INTRODUCTION

The development of information and communication technologies (ICT) are increasingly faster has forced every business to monitor the direction in which IT trend in the future will be towards forcing a business organization to adopt new emerging technologies [1]. The adoption of emerging technology in business is broadly studied but the resulting research has produced inconsistent results [2]. Information Technology (IT) is a critical asset for higher education institutions and can aid and support institutional strategic objectives such as recruitment of students and faculty [3]. Higher education institutions are using IT to develop course materials, deliver and share course content, lectures and presentations, facilitate communication among lecturers and students, encourage pedagogical innovation, increase cooperation and collaboration, conduct research, enhance professional development, and provide administrative and management services [4].

One of the most common problems of using IT in education is to base choices on technological possibilities rather than educational needs. In developing countries where higher education is fraught with serious challenges at multiple levels, there is increasing pressure to ensure that technological possibilities are viewed in the context of educational needs [5]. The adoption of IT emerging technologies is an important area of study that can assist both academic institutions and business in allocating limited resources and prioritizing research and development budgets based on current use and future needs [6].

Advances in technology, not something that is inevitable but it must encounter, for which a business organization needs to adopt the technology. In the IT adoption is necessary to consider several important aspects related to these technologies, such as the direction of technological development in accordance with the strategic plan as well as the vision and mission of the organization, and determine the utility of these technologies is actually in accordance with the business processes of the organization [7]

Hype Cycles provide a graphic representation of the maturity and adoption of technologies and applications, and how they are potentially relevant to solving real business problems and exploiting new opportunities [8]. Gartner Hype Cycle methodology gives you a view of how a technology or application will evolve over time, providing a sound source of insight for managing its deployment within the context of your specific business goals [9]. The greatest benefits of globalization will accrue to countries and groups that can access and adopt new technologies. Indeed, a nation level of technological achievement generally will be defined in terms of its investment in integrating and applying the new, globally available technologies [10]. The key issue why Gartner forward the concept of hype cycle is

A. Why do organizations repeatedly fall victim to hype-driven innovation adoption, even when they know about the hype cycle?
B. Why do organizations repeatedly fall victim to hype-driven innovation adoption, even when they know about the hype cycle?
C. What techniques do industry leaders use to track, prioritize, evaluate and drive innovation into the business?

In this paper, IT adoption model for higher education develop base on the factor that influences IT adoption in higher education which is obtained from another research. Gartner concept about technology adoption in hype cycle into consideration the factor in IT Adoption

2. RELATED WORK

IT are widely spread and used. It is essential to understand the determinants of IT adoption. Consequently, it is necessary to know the theoretical models. There are few reviews in the literature about the comparison of IT adoption models at the individual level, and to the best of our knowledge there are even fewer at the firm level. This review will fill this gap. In this study, we review theories for adoption models at the firm level used in information systems literature and discuss two prominent models: diffusion on innovation (DOI) theory, and the technology, organization, and environment (TOE) framework. The DOI found that individual characteristics, internal characteristics of organizational structure, and external characteristics of the organization are important antecedents to organizational innovativeness. The TOE framework identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context. Most empirical studies are derived from the DOI theory and the TOE framework. As the TOE framework includes the environment context (not included in the DOI theory), it becomes better able to explain intra-firm innovation adoption; therefore, we consider this model to be more complete. The TOE framework also has a solid theoretical basis, consistent empirical support, and the potential of application to IS adoption [11]

3. RESEARCH METHODOLOGY

The method used for this research is a design science research methodology (DSRM) proposed by Peffer. There are six stages to be done, identify the problem and motivate, define objectives of a solution, design and development, demonstration, evaluation, and communication. [12].

A. Identify Problem and Motivate

In this stage will be the identification of issues relating to the adoption of information technology, especially in the world of education or other organization. Problem identification is done by a literature review related paper discusses the adoption of information technology to obtain factors that usually considered in adopting a technologically in the organization. The motivation for doing this research is to help the university in determining of IT Adoption with a good understanding of factor that influences IT adoption.

B. Define objectives of a solution

This paper will discuss on factor that influences IT adoption in higher education. The objective of this research is to develop information technology adoption model for higher education. This model will use to guide university if it will adopt a technology.

C. Design and Development

In this step, collect factor that influences IT adoption obtained from another research. Gartner concept about technology adoption in hype cycle into consideration the factor in IT Adoption

D. Demonstration

In this step will develop the information technology adoption model for higher education base one the identification of factor that influences IT adoption. Models are constructed also adopted from proposed

framework of IT adoption influencing factors in small medium enterprise (SME) context.

E. Evolution

Based on the model of the adoption of information technology in university, organized a measuring instrument in the form of a detailed questionnaire that contains questions related to the factor that influences adoption an information technology. This questionnaire is given to the respondents from various universities in Indonesia. Factor analysis is used for data reduction or summarization or reduction of dimensions.

F. Communication

The result is generating IT Adoption Model for Higher Education base on internal factors and external factors that influence IT adoption in higher education publish in international journal. research problems. The unit of analysis can focus on a theoretical concept or a whole theory or framework.

4. DEMANDS AND OPPORTUNITIES IN THE ADOPTION OF IT

Harry and friend in the book titled Information and Communication Technology in Organizations Adoption explain that the use of IT in organizations is a dynamic interaction between the process of technological innovation that leads to new IT applications and reinvention of existing applications, and the process of organizational innovation that consists of the actual adoption and implementation of an IT application in an organization, the use of these applications and the effect this has on the work and communication in the organization. Van den Hooff in this book presented model as a tool to determine the suitability of a specific form of IT within an organization, and also provides insight into the

interaction between the characteristics of the technology and (processes within) an organization. [13]

This model combines two lines of reasoning. The first line of reasoning springs from the organizational domain and focuses on the demands that an organization's processes put on information and communication media. These processes make up the key activities of an organization and are typically guided by strategy processes. The other line of reasoning springs from the IT domain, and focuses on the opportunities certain technologies (or media) offer to change or improve communication processes. Changes in information and communication processes in turn offer possibilities for changes in organizational processes, which can ultimately affect the organization's strategic position [13]

5. FACTORS INFLUENCING THE IT ADOPTION

Many organizations are spending large amounts of Rahab and Jogiyanto Hartono in paper Adoption of Information Technology on Small Businesses: The Role of Environment, Organizational, and Leader Determinant examined the effects of leaders, environmental, and organizational determinants of the decision in small businesses to adopt IT. It concludes that IT knowledge of leader, business size, and information intensity are important determinants of the decision to adopt IT. The implications of this study are highlights the importance of having IT knowledgeable leaders. A small business managed by leaders who understands the benefits of IT adoption will be able to take advantage of the promised benefits of IT adoption, including improved organizational

Figure 1. Demand and opportunities in the adoption of IT Demands and opportunities in the adoption of IT [12]
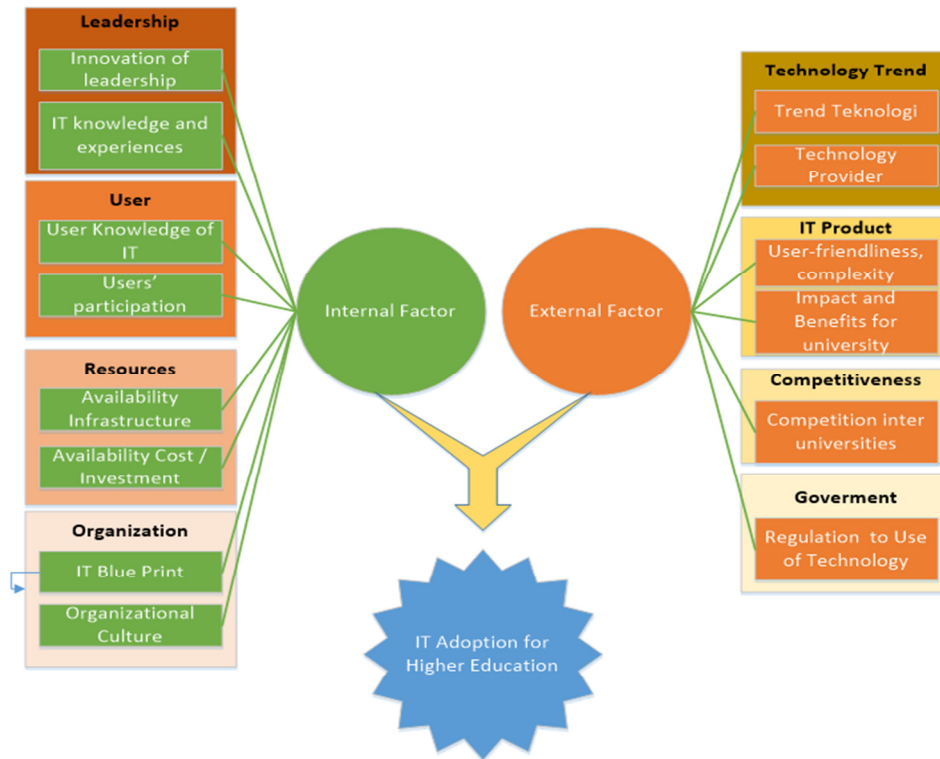
Figure 2. IT Adoption Model for Higher Education

efficiency, and effectiveness [14]. Base on the Proposed framework of IT adoption influencing factors in SME context, there is some factor that influences IT Adoption, influencing factors are categorized into two major clusters of factors and their subcategories: internal and external factors [15].

A. Internal Factor
- Owner / Manager characteristic
- Organizational behavior and characteristics

Results of the study on some related literature adoption of information technology in an organization found that IT adoption is influenced by internal factors and external factors. Researchers then tried to map the internal factors and external factors based on the results of previous research relevant to the adoption of IT in higher education in order to obtain the following data.

A. Internal Factor
Internal factors to the adoption of information technology in universities are grouped into several elements of which
- Leadership
- Users
- Human resources

- Firms' resources
- IT Users

B. External Factor
- IT Product in market
- External and competitive pressure
- External IT Consultant and Vendor
- Government

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- Organizational

B. External Factor
Internal factors to the adoption of information technology in universities are grouped into several elements of which
- Technology trend
- IT Product
- Competition
- Regulation

Based on these factors, will prepare a model of information technology adoption in which one element to be considered is the technology trend. Technology trend will be based on the results of the analysis of Gardner. Limitations of the study

related to the adoption of information technology in universities make researchers try to adopt some of the existing models in previous studies with the added element of technology trends that would essentially be taken out of the hype cycle theory proposed by Gartner. Basically, the model of adoption is following after an attempt to universities to align business strategy, organization strategy, and information strategy. The resulting model is seen on figure 1

7. EVALUATION MODEL USING FACTOR ANALYSIS

Based on the model of the adoption of information technology in Higher Education, organized a measuring instrument in the form of a detailed questionnaire that contains questions related to the factor that influences adoption an information technology. This questionnaire is given to the respondents from various universities in Indonesia. Factor analysis is used for data reduction or summarization or reduction of dimensions. Is the interdependent technique to examine the relationship between a set of variable. This analysis tries to find relationships between numbers of variables that are free from one another so that it can be made of one or several sets of variables that are less than the amount of the initial variables. In this case, the variable that has the greatest correlation group will establish a set of variables. By using SPSS obtained the following results.

A. KMO measure of sampling adequacy

Is an indicator to measure the suitability factor analysis, the value of the minimum that must be reached to declare variables and samples that can be analyzed further are 0.5. Based on the results of testing with SPSS then retrieved the output as follows:

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.672
Bartlett's Test of Sphericity	Approx. Chi-Square	254.018
	df	91
	Sig.	.000

Figure 3. KMO measure of sampling adequacy

The value of KMO and Bartlett's test is 0.672 with significance 0.00. Because these values are already above 0.6 and significance well below 0.05, then the sample is variable and there is actually enough can be analyzed further

B. Measure of Sampling Adequacy (MSA)

MSA value ranges from 0 to 1 with the following criteria:

- MSA = 1; the variable can be predicted without error by the other variables
- MSA > 0.5; variables can still be predictable and can be analyzed more
- MSA < 0.5; variables are not predictable and cannot be analyzed further, or should be removed from the other variables

Based on the results of testing with SPSS then retrieved the output as follows

Anti-image Correlation				
Innovation of Leadership	.734ª	.072	-.070	.014
IT Knowledge and Experiences	.072	.511ª	-.054	-.218
User Knowledge of IT	-.070	-.054	.717ª	-.410
User Participation	.014	-.218	-.410	.534ª
Availability Infrastructure	-.113	.165	.046	-.324
Availability Cost / Investment	.013	-.191	.018	.070
IT Blue Print	-.249	-.067	.075	-.238
Organizational Culture	-.186	-.241	.145	.045
Trend of Teknology	-.134	-.329	-.277	.317
Technology Provider	.050	.277	.044	-.356
User-friendliness, complexity	.086	-.218	-.122	.289
Impact and Benefits for university	.052	-.086	-.099	.141
Competition inter universities	-.177	.027	-.204	-.065
Regulation to Use of Technology	.077	.138	.055	-.055

a. Measures of Sampling Adequacy(MSA)

Figure 4. Measure of Sampling Adequacy

C.   Communalities

This is the proportion of each variable's variance that can be explained by the factors (e.g., the underlying latent continua). It is also noted as h^2 and can be defined as the sum of squared factor loadings for the variables. Communalities is a value that indicates the variable contribution of the factors that shape. Can also be defined as the value of a quantity variance (in percentage) of a variable can be explained by factors that are formed. This same understanding communalities value with the value of the coefficient of determination (in the regression model). Based on the results of testing with SPSS then retrieved the output as seen on Figure 6.

Communalities

	Initial	Extraction
Innovation of Leadership	1.000	.708
IT Knowledge and Experiences	1.000	.744
User Knowledge of IT	1.000	.712
User Participation	1.000	.628
Availability Infrastructure	1.000	.667
Availability Cost / Investment	1.000	.470
IT Blue Print	1.000	.671
Organizational Culture	1.000	.630
Trend of Teknology	1.000	.560
Technology Provider	1.000	.615
User-friendliness, complexity	1.000	.573
Impact and Benefits for university	1.000	.671
Competition inter universities	1.000	.643
Regulation to Use of Technology	1.000	.662

Extraction Method: Principal Component Analysis.

Figure 5. Communalities

For the variable innovative leadership, the value of communalities = 70,8%. This means about 70.8% variance from the innovative leadership of the variable can be explained by factors that are formed. And so on with other variables.

D.   Loading Factor

Loading Factor is a value indicating the relationship (correlation) of a variable against the factor. If a variable has a value of loading factor on certain factors (compared to other factors), then the variable will be a member of or shaper of such factors. Based on the results of testing with SPSS then retrieved the output as seen at figure 7.

Component Matrix[a]

	Component				
	1	2	3	4	5
Regulation to Use of Technology	.687	-.390	-.157	-.089	-.071
Technology Provider	.649	.215	-.272	-.265	-.056
Availability Infrastructure	.595	-.300	.471	.039	-.021
Impact and Benefits for university	.593	-.479	.254	-.127	.096
Competition inter universities	.581	-.153	-.415	-.320	-.086
Trend of Teknology	.544	.466	-.143	.086	.139
Organizational Culture	.537	-.218	-.349	.338	-.241
User Knowledge of IT	.536	.424	.165	-.444	.142
IT Blue Print	.518	.180	.404	.420	-.174
User-friendliness, complexity	.516	-.407	.142	.073	.341
User Participation	.513	.371	.322	-.327	-.128
Availability Cost / Investment	.468	.053	-.391	.207	.228
Innovation of Leadership	.426	.220	.017	.298	-.624
IT Knowledge and Experiences	.381	.325	-.002	.445	.543

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Figure 6. Component Matrix

To make it easier to classify the variable anywhere that goes on each factor then performed with varimax rotation of the process method, so that the following table is generated.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Impact and Benefits for university	.774	.231	.132	-.034	.022
Availability Infrastructure	.741	.015	.199	.012	.280
User-friendliness, complexity	.687	.176	-.010	.253	-.077
Competition inter universities	.183	.741	.242	-.023	-.032
Regulation to Use of Technology	.525	.603	.083	.014	.124
Organizational Culture	.203	.582	-.200	.185	.419
Technology Provider	.060	.570	.497	.165	.109
User Knowledge of IT	.125	.125	.808	.161	-.029
User Participation	.165	.031	.737	-.004	.239
IT Knowledge and Experiences	.120	-.056	.097	.845	.059
Trend of Teknology	-.047	.255	.425	.520	.206
Availability Cost / Investment	.077	.456	.003	.504	.043
Innovation of Leadership	-.044	.223	.133	-.018	.799
IT Blue Print	.326	-.125	.194	.288	.654

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Figure 7. Rotated Component Matrix

8.   CONCLUSION

In this paper produce generate IT Adoption Model for Higher Education base on internal factors and external factors that influence IT adoption in higher education. IT Adoption of the resulting models can be used by universities as a reference to adopting a new technology that is in line with the strategy that has been set. By using factor analysis with SPSS,

produces 5 group of factors, i.e.
1. The First Factor has component variables:
   - The impact and Benefits of the IT Products for the College
   - The Availability of Infrastructure
   - IT is user-friendly Products
2. The Second Factor has component variables:
   - Competition between university
   - Regulation of Related Use of Technology
   - College Culture
   - Vendors Technology Providers
3. The Third Factor has the component variables:
   - Knowledge of TI members in university
   - Participation of members in university
4. The Fourth Factor has the component variables:
   - IT Knowledge of Leadership of university
   - Trend Technology
   - The Availability of Costs
5. Fifth Factor has the component variables:
   - Innovative Leadership
   - The Existence of IT Blue Print.

The results of this study can be used to build a decision support system to adopt a technology based on the model generated.

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