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Strategic Management inEnhancing Higher Education Performance Using Information And Communication Technology

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ABSTRACT:*The research is hypothesis testing that is aimed to; (1) analyze the impact of information and communication technology towards institutional culture, (2) analyze the impact of information and communication technology towards higher education performance, and (3) analyze the impact of information and communication technology towards higher education performance when mediated by institutional culture. Data are collected with the use of questionnaires distributed to four universities in Batam, using controlled random sampling. There was a total of 385 questionnaires collected and used for this research. Results show that all except for one hypothesis is accepted. In conclusion, the findings of this research are as follows; (1) information and communication technology significantly impact institutional culture, (2) information and communication technology significantly impact higher education performance, and (3) information and communication technology when mediated by institutional culture significantly impact higher education performance.*

KEYWORDS -Information and Communication Technology, ICT, Higher Education, Performance, e-learning, culture

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I. INTRODUCTION

Institutional culture has been widely used as a variable in any types of industries. Its vast interpretation is both common and complex at the same time as it involves humans as its main feature. Performance indicators of Higher Education in Indonesia can be determined based on Indonesia's Regulations, which includes research, public service, and teaching. Theories, tools, and researchers have agreed on the fact that performance measures are important, which ultimately leads to institutions' goal of customer satisfaction and cost reduction [1]–[3]. Hence, financial capabilities are also one of performance indicators in Higher Education institutions.Good performance is attained through institution's awareness towards its critical factors that leads to significant development in the institution (Parmenter, 2015, p.7). Looking at the advancements in technology, compelling ideas in regards to e-learning systems to aid teaching, research and administration process has been widely implemented throughout the world [5], [6]. This shows that, Information and Communication Technology (ICT) may well be one of the answer to gaining a high performance and reliable Higher Education Institution. It has been extensively known that culture plays a part in the implementation of change [7]. Throughout the years, culture has been researched and found to play a pervasive part of work environment consisting of values, beliefs, norms, and assumptions on stakeholders, thus affecting performance of institutions [8]–[10]. Therefore, culture is a crucial mediating factor to determine impacts towards performance in Indonesia. The research problem of this research are as follows: (1) Is there any impact between ICT and institutional culture? (2) Is there any impact between ICT and higher education performance? (3) What role does institutional culture play in the impact between ICT and higher education performance?

II. LITERATURE REVIEW

Information and Communication Technology

Information and Communication Technology (ICT) in this dissertation will be focused on e-learning system. This is due to the object of this dissertation focuses on Higher Education institutions. Thus, it is best to provide a more focus ICT concept in order to provide a clear view of the relationships between variables.

e-learning is a short term for electronic learning, thus, it is crucial to know the definition of learning before moving on to e-learning. Leaning is a series of course corrections to provide guidance to the right direction, where it involves meshing new materials into something known to human brain, which will essentially rewire human brains and changing as well as broadening their point of views [11]. Learning is also defined as a process of constructing meaning from activity ad experience, cognitive operations that help learners encode

information into long-term memory [12]. Hence, learning is increase of knowledge, gathering and providing new information, as well as making the unknown to be known to the human knowledge.

In the late 1990s, the world starts to introduce the highly effective and efficient Computer Based System (CBT) [11]. This is the start of the changes in knowledge and information sharing and where e-learning is introduced. e-learning is basically facilitating all learning activities virtually, expanding the possibility of learning and gathering more information compared to manual learning [12].

Initial theory-based design framework for e-learning is based on three key components working collectively to foster meaningful learning and interactions, they are; pedagogical models of constructs, instructional and learning strategies, and pedagogical tools or online learning technologies. These components form an iterative relationship that has been used widely by researchers as a grounded design framework that guides the design of e-learning. [12] Based on these dimensions of e-learning, Dabbagh (2005) has constructed the following theory-based design framework of e-learning (Figure 1):

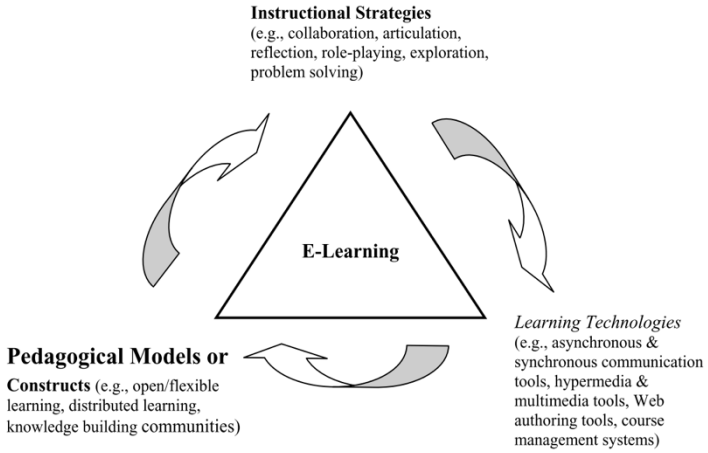


Figure 1. Theory-based design framework for e-learning

Source: Dabbagh (2015)

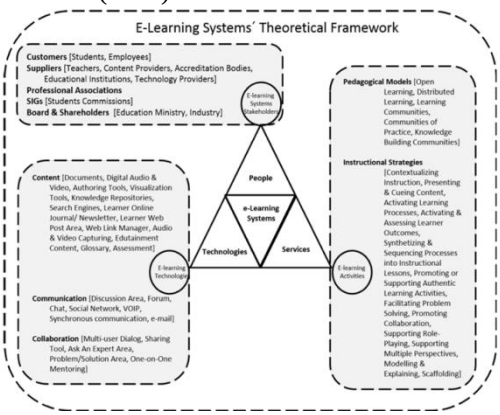
Fig.1 has been widely used as the basic design framework of e-learning. Aparicio, Bacao& Oliveira (2016) has managed to construct a theoretical framework of e-learning system, Fig.2, grounded on the initial framework shown in Fig.1.

There are three main components of e-learning systems, they are people, technologies and services, as shown in Fig.2. This technology allows both direct and indirect interactions between various group of users, these complex interactions will then help provide services according to the specifies strategies of activities. Thus, it is clear that e-learning activities aligned with e-learning pedagogical models and the instructional strategies will provide clear service specifications. [13]

Aparicio, Bacao& Oliveira (2016) has reviewed the e-learning dimensions, which are, e-learning system stakeholders, pedagogical models, instructional strategies, and learning technologies. These dimensions have been proven to provide the framework shown in Fig.2 with a more holistic view.

Figure 2. Holistic e-learning systems theoretical framework

Source: Aparicio, Bacao, & Oliveira (2016)



Culture

Organizational culture is "a pattern of shared tacit assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems." There are three levels of culture as shown in Fig.3 (Schein, 2009, p. 21-27).

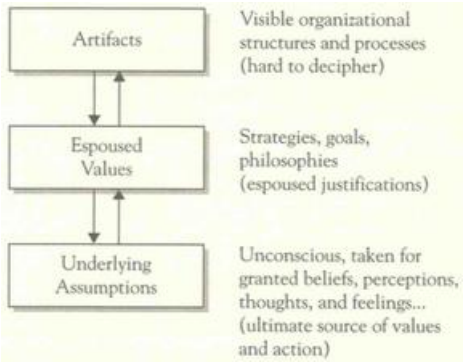


Figure 3: The three levels of culture

Source: Schein (2009), p.21

Culture has been widely researched and known to be related with a lot of variables. It provides a broad influence on many dimensions in industries [15]. Organizational culture is a critical factor in implementing innovations and it may hinder as a barrier to change [16].

Culture is behavioral cognitive, and emotional process that a group learn, adapt, and hold common assumptions in a period of time, where it is used in extrapolating problems [17]. The extravagant amount of research in culture dimensions has been widely tested and used in many research as well as practice [15], the cultural dimensions that is well known and have been widely used is Hofstede's cultural dimension [15]. However Schein (2004), was one of the first to provide a clear definition of culture, where his study of culture focuses on the level of artifacts, beliefs and values, as well as underlying assumptions. In 2010, Schein redefines culture as a pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which is accepted collectively and is deemed valid, thus it will be taught to new members as the correct way to perceive, think, and feel in relation to those problems [18].

Most literature on culture focuses on two major aspects; content, which involves the values and behaviors held by firm's members, and strength or the depth and breadth of behaviors embedded among firm's members [19]. There are many types of cultures; open and closed culture, founder culture, family culture and many more [20]. These types of culture plays a big part in influencing both internal and external organization's orientation [21]

There are numerous dimensions of organizational culture, based in Schein (1985) in Schein (1990), there are seven underlying dimensions of organizational culture, they are as follows; organization's relationship to its environment, nature of human activity, nature of reality and truth, nature of time, nature of human nature, nature of human relationship, and nature of homogeneity vs. diversity. On the other hand, Hofstede's cultural dimensions are masculinity/femininity, individualism/collectivism, power distance, uncertain avoidance, and long-term orientation [15]. Hofstede's framework is useful in formulating hypotheses for comparative cross-cultural studies. Thus, Hofstede's framework is popular in international marketing studies. Furthermore, Zhu (2015) assessed organizational culture from seven dimensions, namely; goal orientation, innovation orientation, participation in decision making, structured leadership, supportive leadership, shared vision, and formal relationships. Based on the dimensions and definitions provided, Zhu's research are more in sync with the needs of this dissertation.

III. HIGHER EDUCATION PERFORMANCE

Various research has been done to identify performance indicators of higher education institutions. In order to clearly identify which dimensions should be used in this dissertation, thus it is essential to understand what performance means. Performance is the future value attained based on retained criteria, where it is case and decision-maker specific. It is essential for top management to set the criteria, such as targets to be reached, process to reach the target and the time at which the aims are reached [22].

In recent years, researchers have shown that performance measures can be distinguished into two parts, financial and non-financial [23], the fact that private higher education institutions are non-profit oriented, financial indicators have not been uncontroversial. Performance measurement focuses on the use of qualitative and quantitative indicators to measure activities and achievements, but performance measures can be defined

broader, where it uses performance information to control and manage. This broader definition is also known as performance management [24]. Performance measurement currently assumes an important role in institutions, it is more than just quantification and accounting, it also provides institutions with the basis to assess progress towards their objectives, identify strengths and weaknesses, decides on future initiatives, towards achieving their goal of improving institution's performance [1]

It is not an easy task for any institutions to provide an accurate and usable performance measurement report. It is vital for institutions to have internal ownership of framework; to provide a more specific and customized measurement, as well as accurate and timely underlying data; to ensure performance measurement framework is not flawed [24]

Performance Indicators tell management what teams are delivering; it should not be confused with Key Performance Indicators (KPIs). Key Performance Indicators tell management how the organization is performing in their critical success factors and, by monitoring them, management is able to increase performance dramatically (Parmenter, 2015, p.7). Parmenter (2015, p.7), also states that the difference between performance indicators and key performance indicators is that KPIs are deemed fundamental to the organization's well being and it focus on he most critical aspects of organization's performance for the current and future success of the organization, while performance indicators complement KPIs in aiding teams to align themselves with their organization's strategy.

Higher Education performance indicators are research, teaching, service and financial [25]. Based on *Undang-UndangRepublik Indonesia Nomor 12 Tahun 2012* (Republic of Indonesia Constitution Number 12 Year 2012) states that Higher Education in Indonesia are required to implement *Tridharma*, which includes research, teaching and public service. The Constitution only states minimum requirements of performance measurements. In order to provide a dissertation that would help improve and advance higher education in Indonesia, this dissertation will use the international requirements to measure higher education performance. Thus, the performance indicators used are research, teaching, service, and financial measurements.

It is essential for top management to ensure an optimal teaching and learning environment, Zollo (1998) stated that implementation of e-learning mechanisms is vital to evolving an organization's learning capabilities and can significantly impact institution's climate and culture. This is also supported by other researchers that proves significant impact to institution's values, climate and culture when e-learning is implemented systematically [27].

The implementation of e-learning system itself is a change in institutional culture, by successfully implementing and establishing institutional e-learning culture an institution will have a more effective method of teaching and learning [28]. Therefore, this dissertation would assume e-learning systems will ultimately lead to changes in institutional culture.

H1: There is a positive relationship between successful implementation of Information and Communication Technology (ICT) and institutional culture.

E-learning is a type of ICT system that has been widely used in Higher Education to help minimize cost, as well as ease communication and sharing of information [13]. Maria, Wijaya, & Fibriani (2013) stated in their study that implementation of ICT, in academic (e-learning) and administration, will greatly impact the measurement of performance. This is due to nature of ICT in aiding institutions to build awareness, information transparency, as well as time and reliable information sharing. In addition, e-learning has also increase customer satisfaction rate, which leads to increase of performance [11]. Thus, it is rational to assume that ICT (e-learning) has a positive relationship with higher education performance.

H2: There is a positive relationship between Information and Communication Technology (ICT) and higher education performance.

The strong positive relationship mentioned between e-learning and culture, Higher Education and culture, as well as culture and performance may be well discussed previously. These facts have brought into attention that culture plays a big role in the relationship between the dependent variable and independent variables. Yunis, et. al. (2017) found that in order to successfully promote organizational performance, a mediating variable such as innovation plays a big role. In order to manage and cultivate innovation, institutional culture is vital as it would help minimize any possible barriers [20].

H3: Information and Communication Technology when mediated through culture will highly impact higher education performance.

IV. RESEARCH METHODS

The population of respondents in this dissertation include university students that are currently still active, based on the data taken from *www.forlap.dikti.go.id*, on September 2017, the total amount of population is 14,510

students. This is taken based on the characteristics of Universities, as stated form the previous chapter. Due to the large amount of population, this dissertation will take samples from each university.

Table 1. Number of Reseach Population

No.	University Name	Number of Students
1.	UniversitasPuteraBatam	5 736
2.	Universitas Riau Kepulauan	2 550
3.	UniversitasBatam	2 724
4.	UniversitasInternasionalBatam	3 844

Source: *www.forlap.dikti.go.id*

Sample size can be calculated using the following equation:

$$\textbf{Necessary Sample Size} = (\textbf{Z-score})^2 * \textbf{StdDev} * \frac{(1-\textbf{StdDev})}{(\textbf{marginoferror})^2},$$

where: Z-score = confidence level [29]. Thus, with a confidence level of 95%, based on Smith (2013) equation, the sampling size would be 385 respondents.

TheInstruments used in this research is a questionnaire that are distributed to the respondents. The development of the questionnaire is based on operational definition of the variables.The following are the dimensions of the variables used in this dissertation; ICT dimensions are e-learning system stakeholders, pedagogical models, instructional strategies, and learning technologies.Institutional culture uses these dimensions; goal orientation, innovation orientation, participation in decision making, structured leadership, supportive leadership, shared vision, and formal relationships.Higher Education performance is measured based on the following dimensions; research, teaching, service, and financial measurements.

V. RESEARCH FINDINGS

The demographic data of this research is shown through Table 2, as follows:

Table 2. Respondent Demographic Data

No.	Description	Frequency	Percentage (%)
1.	Sex		
	Male	206	53.5
	Female	179	46.5
2.	Age		
	20 years old	56	14.5
	21 years old	110	28.6
	22 years old	91	23.6
	23 years old	47	12.2
	24 years old	46	11.9
	25 years old	16	4.2
	26 years old	12	3.1
	27 years old	7	1.8
3.	Semester		
	Semester 6	385	100
4.	Major		
	Accounting	57	14.8
	Law	39	10.1
	Government Knowledge *(IlmuPemerintahan)*	12	3.1
		124	32.2
	Management	15	3.9
	English Literature	17	4.4
	Information System	18	4.7
	Industrial Engineering	103	26.8
	Information Technology		

Next, a full model of SEM parameter testing λ (loading factor / coefficient indicator) measurement on exogenous and endogenous models is presented through Figure 4. This test is an initial test intended to determine the latency of each variable's indicators (construct). LISREL 8.8 will help measure t-value and coefficient of structural equations of the construct, and to estimate the significance parameter, it is essential for t-value to be greater than 1.96.

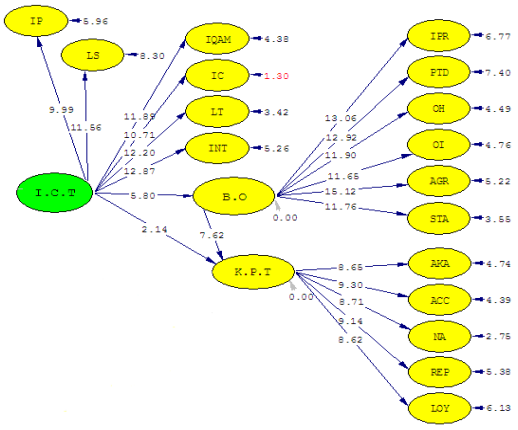


Figure 4: Structural Model (t-values)

Source: results from LISREL 8.8

Fig. 4 shows a complete model trajectory of t-value of each corresponding variable. Based on the figure, all t-values are greater than 1.96, which indicate the significance of all the variables construct.The calculated t-values will then be used to test the proposed hypotheses. Table 3 will provide information on the evaluation of structural modelcoefficient.

Table 3. Evaluation of Structural ModelCoefficient

Path	Estimasi	*t-value*
Information and Communication Technology positively impactsinstitutional culture	0.46	5.80
Information and Communication Technology positively impacts higher education performance	0.12	2.14

Source: results from LISREL 8.8

Table 4. Results on Influence

Variable	**Influence**			
	Direct	**Indirect**	**Description**	**Total**
Information and Communication Technology	0.12	0.37	ThroughInstitutional Culture	0.49 (t=4.84)

Table 5. Results on Hypothesis Testing

Hipotesis	**Description**	**Conclusion**
H1	*Information and Communication Technology*significantlyimpact Institutional culture	Accepted
H2	*Information and Communication Technology*significantly impacts higher education performance	Accepted
H3	*Information and Communication Technology* when mediated by institutional culture significantly impact higher education performance	Accepted

VI. CONCLUSION

This research is intended to find the factors that affect higher education performance by using survey method, which aims to know the general description of Information and Communication Technology and Institutional Accreditation's impact on Institutional Culture and its implications to higher education performance. Based on the results of hypothesis testing and discussions in the previous chapter, this research results can be concluded as follows:

1. Information and Communication Technology affects Institutional Culture at universities in Batam. The Impact of Information and Communication Technology on Institutional Culture is positive and significant. This suggests that improvements in Information and Communication Technology will lead to an increase in

Institutional Culture.

2. Information and Communication Technology affects higher education performance at universities in Batam. The Impact of Information and Communication Technology on higher education performance is positive and significant. This suggests that improvements in Information and Communication Technology will lead to an increase in higher education performance.
3. Mediating effect of Institutional Culture increases the impact of Information and Communication Technology on higher education performance at Universities in Batam. This suggests that positively improving the effectiveness of Institutional Culture will lead to increased impact of Information and Communication Technology on the higher education performance.

Implications

This research will have implications towards the increase in knowledge about the current situation and higher education issues in Batam. It will build awareness as to the importance of building a willing to change culture in institutions will greatly impact their performance. This study has also found the importance of implementing e-learning to a higher education institution. Implementation of e-learning may lead to a better reputation and increase the level of learning, as well as ease exchange of information between students and lecturers. In addition, e-learning will also help lecturers in monitoring learning outcome. These will greatly affect higher education performance in the long run.

Further Studies

The researcher is aware as to the limitations of this research. The following are suggestions of further research in order to enhance higher education performance in Batam, as well as Indonesia:

1. Further research can be done by taking into consideration other variables such as higher education accreditation.
2. Higher education managerial level can be included as the respondents the research in order to look into the research in another perspective.
3. Information and Communication Technology is a vast topic, other types of ICT can be researched in order to see its impact to higher education performance, such as, administrative systems used in universities.
4. Demographically, this research has potential to be expanded as to differentiating higher education in Batam, Singapore, and Malaysia, where this comparison could bring mutual improvements to stakeholders and higher education alike.

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