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# IT Innovation: Improving Competitive Advantages of Higher Education Institutions

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**ABSTRACT**

This research particularly aimed to examine mediating roles of Information Technology (IT) innovation under the influences of IT governance to improve competitive advantages of institutions. For this primary goal, it was conducted both quantitatively and qualitatively. Apart from an empirical survey with active participation of 85 private schools of informatics management and computing in Indonesia, Focus Group Discussions (FGDs) were applied. Heads of respective schools became the informants. Quantitative data results emphasize that IT governance has indirect influences on competitive advantages. Mediating roles of IT innovation, however, positively and significantly improve such advantages. This paper suggests the essence of IT governance and IT innovation in improving higher education institutions in developing and developed countries.

**Key words :** IT Innovation, IT Governance, Competitive Advantages, Indonesia.

## 1. INTRODUCTION

Indonesia is currently in the era of industrial revolution 4.0 (Satya, 2018; Suwardana, 2018). A higher education sector crucially supports the nation's economy and increases its competitiveness. Hence, it becomes a challenge for universities in digital, industrial era 4.0 (Lian, 2019; Yalina & Rozas, 2018). A university must be able to strengthen its competitive advantages and competitiveness in order to maintain its existence (Boscor, 2015; Mainardes, et al., 2011, Panda, et al., 2019). It is also expected that higher education institutions continue improving the program quality so that great graduates can be produced (Ambarita, 2017; Anwar & Pane, 2019; Rusmini, 2015). They should maintain their identity in order to compete (Ivy, 2001). Educational excellence strategy is needed in achieving competitive advantages (Al Shobaki & Naser, 2017, De Haan, 2015).

Ranking of higher education quality is the first priority of the strategic plans of the Ministry of Research, Technology, and Higher Education in 2015–2019 period. Improving the quality of higher education covering institutional governance, academic processes, and graduate outputs becomes a necessity (Kurniasih, et.al. 2018). Any efforts to apply this activity can produce certain strengths or advantages so that an institution becomes better than the others (Prasetyo, 2014).

Based on the data provided by the Ministry of Research, Technology, and Higher Education in Indonesia, the number of private schools in Indonesia is increasing (Sugiono, 2019). The status of higher education accreditation is of great concern to the public in describing quality, relevance, and efficiency (Raditya, et al., 2016). At present, there are still few private schools receiving grade A in terms of institution accreditation in Indonesia (27 out of 3,181). Others are accredited with grades B (396) and C (714) (Source: Dikti, 2018). In fact, based on the latest information, there are still 3,738 study programs of state and private schools without accreditation. There are 144 active private schools of informatics management and computing in Indonesia. Nonetheless, only 43 of them have been accredited with grades B (10.42%) and C (19.44%) (Source: BAN-PT.Kemdiknas.go.id, February 2018). None of them receive grade A, the best one by the National Accreditation Board for Higher Education. Therefore, currently, grade B is the best (Kosasi, 2019). A current condition has an unfavorable impact on these schools in Indonesia since prospective students are apt to choose universities with accreditation grade A or B (Prasetyo, 2014). It has impacts on the views of outsiders pertaining to the quality of study programs and higher education institutions (Raditya, et al., 2016).

Having observed existing conditions, universities are required to strengthen their competitive advantages. In this case, capabilities to empower IT for the management of higher

education programs are inseparable. Innovation abilities become a critical aspect in improving the performance and competitiveness of an institution (McGrath, 2013). IT innovation of organizations seems more challenging. It is viewed as the key enabling university changes (Huda & Hussin, 2016).

IT innovation is implemented based on exploratory analysis of its persistence (Stratopoulos & Lim, 2007). It develops and is in relation to the network of ideas (Tsui, et. al., 2009). Organizations must consistently innovate with IT (Peppard & Marston (2011). Viewing IT innovation as a process noting that IT will be adopted, spread, and assimilated in organizations, technical skills, communication, and other particular skills are required in a number of business cases (Gillon, et.al., 2012). Other studies focused on influences of such the innovation of company performance (Ko & Clark, 2008, Chung, et.al. 2014).

Research on the planning of IT governance has been carried out through evaluation of the application of IT in private schools in Yogyakarta using a Cobit framework model and, as a result, maturity processes which are above scale of 3 (defined) are mapped (Setiawan, 2008). IT as a competitive advantage includes roles of human resources, businesses, and technology resources (Powell & Dent-Micallef, 1997).

This research aimed to develop IT innovation theories by studying influences of IT governance, IT excellence, and IT innovation on competitive advantages of private schools of informatics management and computing in Indonesia. IT excellence is in relation to where and how to disseminate information effectively and profitably to realize IT innovation. Conversely, IT governance is an essential part of university strategy dealing with IT to realize IT innovation. The respective schools must be able to integrate IT innovation adoption and IT governance readiness. Nevertheless, in reality, they still have weaknesses in terms of IT governance (Kosasi, 2019). The trend of this governance is complicated to implement. It is noted that numerous failures happen when integrating IT services among platforms of all application portfolios to deliver information services for stakeholder needs (Kosasi, 2019).

Previous research states that IT governance has positive influences on competitive advantages (Damianides, 2005; Aziz & Samad, 2016; Miozzo & Dewick, 2002). This relationship model is further used to analyze how competitive advantages are influenced in terms of innovation (Aziz & Samad, 2016). Previous findings are ambiguous on the problem whether mature IT governance processes help or hinder innovation. An inconsistent study indicates that IT governance hinders innovation (Horne & Foster, 2013). The research conducted by Carraway (2016), conversely, affirms that IT governance supports innovation. Winkler (2012) proves a theoretical relationship between IT governance and IT innovation-based adoption. The former influences IT innovation through the supports of product innovation and process innovation (Borja, et.al. 2018) further positively influencing competitive advantages (Anning-Dorson & Nyamekye, 2020; Linda, et.al. 2020). IT governance is specifically described as responsibilities for IT functions in organizations. Innovation adoption in this context refers to an organization decision to take advantages of technological innovation. This study, thus, filled the gaps of existing knowledge through literature review and examination of interaction of IT governance and IT innovation. IT maturity in this research was set as a moderating variable. None of the previous research has involved it in this way. In the previous article, conceptually, it is stated that it is a driver of global competitiveness (Yunis, et.al. 2011).

The problem of this research was on the gap extent of IT governance in strengthening competitive advantages of private universities in current and expected conditions as well as suggesting a new model of IT governance and IT innovation with expected IT maturity moderation. This study aimed to determine current and expected IT governance gaps. Moreover, models of IT governance and IT innovation with moderation of new IT maturity refer to recommended indicators of goals and competitive advantages. This study also discussed the implications of managerial aspects and process models based on indicators of goals and competitive advantages of private universities in Indonesia..

## 2. RESEARCH METHOD

The research design used in this research was an explanatory-mixed method model. The goal is to obtain more comprehensive data so that the research conclusion is more accurate (Creswell & Clark, 2017). More comprehensive data can also be obtained.

More particularly, a sequential explanatory model was in use. It is characterized by data collection and analysis of quantitative data at the first stage, and strengthened by those of qualitative data in the second stage (Creswell & Clark, 2017). In accordance with this definition, therefore, this research was implemented by collecting and analyzing both types of data in different stages. Conclusion was finally drawn from the data analysis.

A survey method was conducted. Analysis units in this research involved schools of informatics management and computing. Hence, the respondents in this study were heads of schools, deputies (deputy heads I, deputy heads II, and deputy heads III), and heads of study programs. There are 131 respective schools spread across 14 service institutions of higher education (LL Dikti) (forlap.dikti.go.id).

Due to the use of a sequential mixed method, the qualitative data was collected through FGDs. The survey was conducted by sending online questionnaires to all heads working at the research site. SmartPLS quantitative analysis became an analytical tool for processing and analyzing the collected data. SmartPLS is a powerful analysis tool because it is not

based on numerous assumptions. Also, the data used does not have to be normally distributed. Even category, ordinal, interval, and ratio scales can be used in the same model and the number of samples can be small. A sample of 30 data was used (Ghozali & Latan, 2015).

Simple random sampling was applied. Here all members of the population were selected. In this study, the population was schools of informatics management and computing with grades B and C, and no grade in terms of institution accreditation. Another criterion was that they should become members of CORIS (Cooperation Computer Research Inter University), NERIS (Networking Research Inter University), and APTIKOM (Higher Education Association of Informatics and Computing).

The questionnaire instrument is declared to be valid if it has a loading factor value ≥ 0.7 (Hair, et.al. 2010). The results of Confirmatory Factor Analysis (CFA) with Structural Equation Modeling (SEM) interpret the loading factor as well as large correlation among indicators and latent constructs. There are three most important outputs requiring interpretation, namely the Critical Ratio value (CR), the significance value (p), and the estimated value (Estimate). The CR value is the result of division between an estimated parameter and standard error (Byrne, 2013). The CR value is 1.96 for regression weighting with the significance of 0.05 for the path coefficient (Byrne, 2013).

To test the reliability of research instruments, the Cronbach's alpha was computed. It shows average correlation among items measuring the same construct. The standard is that this value should be greater than 0.70 for acceptable reliability (Ghozali & Latan, 2015).

Table 1 presents the item reliability. In this study, the consistency of items was measured by using Cronbach's Alpha.

**Table 1:** Constructs of Reliability and Validity

| Constructs | Items | Cronbach's Alpha | Composite Reliability (CR) | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Competitive Advantages | 5 items | 0.8756 | 0.9101 | 0.6704 |
| IT Governance | 8 items | 0.9093 | 0.9274 | 0.617 |
| IT Innovation | 7 items | 0.8862 | 0.9111 | 0.5946 |

Based on the Cronbach's Alpha coefficient, all items related to IT innovation, IT governance, and competitive advantages have excellent reliability which is greater than 0.80. Test results of questionnaire reliability are indicated by values of Composite Reliability (CR) and Average Variance Extracted (AVE) which are respectively greater than 0.70 and 0.50.

## 3. RESULTS OF DATA ANALYSIS

The results of data analysis regarding relationships among variables in the study were presented in Figure 1. Attempts were made to carry out path analysis to measure direct influences of IT governance and IT innovation on competitive advantages. It is the evidence that IT innovation influences competitive advantages (0.86). On the other hand, IT governance influences IT innovation (0.669); however, not influence competitive advantages (0.061). This indicates that governance is important indeed but is not really influential for competitive advantages. More crucially, influences of IT innovation should exist. The results emphasize the importance of IT innovation for competitive advantages.

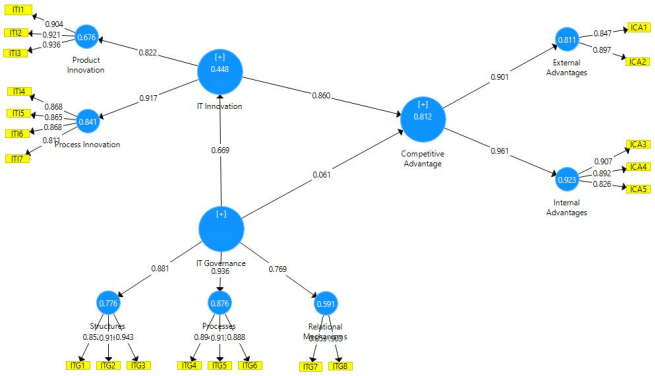


**Figure 1:** Results of Structural Model Analysis

Besides, IT governance indirectly has positive influences on competitive advantages (path coefficient (0.669 * 0.850) = 0.568). It is proven that the former has indirect influences on the latter and a good value (path coefficient = 0.061). Such the governance is, consequently, still required to assist and facilitate implementation through IT innovation to strengthen competitive advantages. Based on the computation on significance values in Table 2, the p-value of IT governance -> competitive advantages is 0.4147.

**Table 2:** Significance Test of Indicators

| Path Significance Test | Original Sample (O) | T Statistics | P Values | Note |
|---|---|---|---|---|
| IT Governance -> Competitive Advantages | 0.0605 | 0.8163 | 0.4147 | Insignificant |
| IT Governance -> IT Innovation | 0.669 | 9.7803 | 0 | Significant |
| IT Innovation -> Competitive Advantages | 0.8598 | 17.2204 | 0 | Significant |

Significance of IT innovation is admitted by several key informants as follows:

"… Universities should both rely on both IT and innovation to have competitive advantages. …" (Key Informant 1)

"... I think that IT innovation and competitive advantages are both intertwined in two directions. I see that human cooperative abilities in those fields will be the key to success in the future ..." (Key Informant 2)

"... It seems to me that IT innovation will be fully needed for competitive advantages ..." (Key Informant 3)

"... Talking about IT innovation and competitive advantages, the end goal is how we improve the quality of our universities to produce a large number of students ..." (Key Informant 4)

"... I think that IT innovation and competitive advantages are essential for technological development in higher education ..." (Key Informant 5)

**Table 3:** R-Squared

| Variable | R-Squared | Adjusted R-Squared |
|---|---|---|
| IT Innovation | 0.4476 | 0.4409 |
| Competitive Advantages | 0.8125 | 0.8079 |

Source: Data Findings Processed through SmartPLS, 2020

Based on the data presented in Table 3, the R-squared value of IT innovation is 0.4476. Meaningfully, the percentage of IT innovation can be explained by IT governance (44.76%). The one of the competitive advantages is, however, 81.25% representing that this variable can be explained by IT governance and IT innovation. In order to finding out the R-squared predictive relevance, a formula: Q2 = 1 - (1 - R2 Competitive Advantages) * (1 - R2 IT Innovation), 0.7282 or 72.82% appear, meaning that this research model is very good since it has good predictive relevance.

## 4. DISCUSSION

Previous research has explored the relationship between IT innovation and IT governance. Its findings are ambiguous on the problem whether mature IT governance processes help or hinder innovation. An inconsistent study states that IT governance hinders innovation (Horne & Foster, 2013). The research conducted by Carraway (2016), conversely, affirms that this governance supports innovation. Moreover, Winkler (2012) proves a theoretical relationship between IT governance and IT innovation-based adoption. This proof is strengthened by another finding by Fattah & Setyadi (2019) conducting a study in higher education organizations.

The evidence suggests that IT governance has positive, significant influences on innovation of products and processes (Borja, et.al. 2018) when there are high experiences. Contrarily, when there are low experiences, it has negative influences (Borja, et.al. 2018).

This finding also supports research by Moghavvem et.al. (2012) and Abd Aziz & Samad (2016). It is noted that there are strong, positive influences of IT innovation on competitive advantages. Innovation can be a strategic tool in competitiveness for business enhancement to create equal or better competitive advantages and realize sustainable development (Distanont & Khongmalai, 2018; Chiu & Yang, 2019).

The novelty of this study pertains to measurement of direct and indirect influences of IT governance and IT innovation on competitive advantages. Most of the previous studies only focus on measurement of direct, weaker influences of IT governance on competitive advantages. It is proven in this research that if mediated by IT innovation, they can become greater.

## 5. CONCLUSION

Based on the results of this study with a mixed method, it can be concluded that IT governance and improved competitive advantages are strongly influenced by IT innovation. The implementation of this governance is in accordance with the principles, work methods, frameworks, and mechanisms of schools of informatics management and computing in Indonesia. It is expected that competitiveness, performance, ease, speed, efficiency, and effectiveness of activities at back and front offices can be improved. Even to certain limits, the implementation of IT governance can offer and open up a number of opportunities of transforming services, markets, work processes, teaching-learning relationships, research, and various stakeholder interests, and can strengthen competitive advantages globally. To possess IT governance, universities should notice and apply basic principles, mechanisms, and frameworks. Also, they should determine and select appropriate prototypes based on specific needs. Roles of IT in the world of education must be supported by proper IT governance. Even a small mistake can have impacts on universities. Furthermore, the application of IT in education requires a large amount of money. However, it is accompanied by significant risks of failures. To support IT governance structures, an appropriate method or standard is needed.

IT governance in universities is like the foundation for all forms of IT utilization. Once it is well managed, IT system can be developed to apply various IT-based services and support business processes at campuses. It should be emphasized that the development of such the system must be based on clear, measured needs, not on the fancy to have.

Making the program accountable, schools of informatics management and computing in Indonesia should have obvious indicators of achievements and performance, and can describe results and contributions. In realizing independence, they should at least consider improvement of governance,

academic reputation, quality, accreditation grades, research, innovation, leadership, and relevant human resources.

The most critical facet is successful implementation of new ideas to earn added values or better positions. In universities, IT innovation can be applied dissimilarly. The most familiar way is updates related to business processes. In this case, IT innovation is associated with IT alignment and business processes, or internalization of IT into operation activities of higher education. In fact, there is still a room where innovation can be conducted. For example, how IT effectively improves the quality of the learning processes and help provide services can be observed.

This study finally shows the fundamentality of the dimension of IT innovation including top management supports, institutional readiness to use IT, and experiences in an IT field. It is implied that in order to strengthen competitive advantages in higher education, there should be a focus on IT innovation and IT governance. More specifically, an emphasis should be placed on management of strategic planning of information system and establishment of IT steering committee. More importantly, higher education institutions need to notice IT governance that is relevant to the management of IT leadership roles. A strong recommendation is that future research should cover a new research scope including state higher education institutions.

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