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Determinants Effectiveness Information Technology Governance in Higher Education Institution (HEI) using partial least squares structural equation modeling approach (PLS-SEM)

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Abstract. Information technology supports the achievement of business organization objectives. The Higher Education institution is a business organization engaged in the field of education. Effective IT governance will ensure alignment between IT and business goals. Organizations with ineffective IT governance will suffer due to poor performance of IT resources such as inaccurate information quality, inefficient operating costs, runaway IT project and even the demise of its IT department. This study seeks to examine empirically the individual IT governance mechanisms that influence the overall effectiveness of IT governance. Furthermore, this study examines the relationship of effective IT governance and IT Innovation within the Higher education organizations. The sampling technique to be carried out in this study is a multi-stage purposeful random sampling. In sequence, researchers will combine surveys through online. The quantitative data were analyzed by the smallest partial quadratic structural equation method (PLS-SEM) using Smart PLS 3.0. The results obtained from this dataset show a positive significant relationship between effective IT governance and the following mechanisms: IT Steering Committee, Involvement of Senior management in IT, and Organizational Communication System. Also a positive relationship between ITG Effectiveness within IT Innovation. Organizational Communication System and IT Innovation have a positive significant relationship, and negative relationship with insignificant for Organizational Performance Measurement System.

1. Introduction

Higher education institutions, in special universities from many countries, have increasingly recognized the importance of IT governance [1]. To control this heterogeneous set of technologies, effective IT governance is critical creating use of structures, processes and relative mechanisms. According to [2] Complex and decentralized organizations, such as universities, should frequently review their IT governance mechanisms to deal with innovation and changes in their environment and adapt to new technologies. A framework of IT governance may be deployed with a set of the mechanisms such as structures, processes, and relational mechanisms [3]; [4]; [5]; [6].

The effective and efficient use of IT at universities to support research, teaching and management requires appropriate ITG [1], [2], [7]–[9]. Effective ITG in universities is strongly associated with a high level of maturity of IT governance mechanisms. Moreover, the adoption of formal practices at the highest level of the organization for governing IT, as claimed by [6], [10], is expected to bring benefits and improve organizational performance.

Effective IT governance is crucial for an organization to achieve its corporate performance goals. To implement IT governance effectively, a set of IT governance mechanisms is required (e.g., IT steering committee, IT organizational Structure) that encourages behaviors congruent with the organization's mission, strategy, values, norms and



culture [6], [11] Previous studies examining the effectiveness of IT governance mechanisms have produced interesting results [11]–[13].

A mechanism that may be suitable for an organization in the financial industry may not be suitable for an organization in another industry [14]–[16] have identified a baseline of IT governance mechanisms for Belgium's financial industry. Pereira et al. provided ITG mechanisms for the Portuguese financial industry [17] and healthcare industry [18]. . These outcomes show that baseline mechanisms differ across industry sectors. The need to address the analyze of effective ITG mechanisms in different contexts encourages further studies especially Higher education sector.

2. Literature Review

2.1. Information Technology Governance (IT Governance)

IT Governance is a structure of relationships and processes that enables to direct and control an organization in achieving its goals by providing benefit when balancing risk by adjusting IT and business processes of the company [15]. IT Governance emerged as a bridge between business scope and IT that enables to narrow gap between the applied technology and accordance with the expected. IT governance is not a separate management, instead of a part of corporate management. The benefits of IT Governance itself are essentially very difficult to quantify because it involves in handling the intangible assets ..

2.2. Information Technology Governance (IT Governance) Mechanism

ITG involves a set of high-level definitions, such as principles, values and goals, operationalized through mechanisms [19]. An ITG framework may be deployed using a set of mechanisms including structure, processes, and relational mechanisms [3]–[5], [12], [20]. Our research [3]–[5] Propose that IT Governance can deployed enterprise governance of IT by using a holistic mixture of various structures, processes, and relational mechanisms

2.3. Information Technology Governance (IT Governance Higher Education)

IT governance has been implemented by higher education in Indonesia, based on best practice of several previous colleges and without a model that could be used as a to properly implement such IT governance. To be able to implement good IT governance Universities must implement the IT Governance framework to suit its needs.[21] .and also ITG must be alignment with business IT alignment model. [24]

Looking at the role of IT in education, it must be supported with The right and good IT governance. The slightest mistake about IT Governance can be affect the institution. In addition, the implementation of IT in education requires a cost Large enough risk of failure.

To support the implementation of the IT governance structure required appropriate methods or standards[16]. Good IT governance is necessary from the start of planning to its implementation, and IT management That will be applied should refer to the standard that has gained widespread recognition.

After evaluating some standards or methods that the college can use The most widely used height is COBIT, but does the COBIT fit the needs Universities need to review the existing governance components of the college, the following Methods or tools that can be used by higher education institutions in managing IT according to [22]: ITIL, COBIT, ASL,7CMM/CMMI, Six Sigma, SAS70, ISO 14550, Weil & Ross IT Governance Model, and ITGAP Model.

There are several model effectiveness IT Governance for higher education from [8] and [23]. The model need to evaluation mechanism IT Governance [3] that suitable for higher education

2.4. IT Governance and IT Innovation.

IT innovation does not require effective IT governance. Universities at all levels of IT governance maturity and effectiveness innovate and often do so deliberately. Funding innovation is a common and successful practice. However, effective IT governance can support innovation. A mature and effective IT governance process can provide a means for

universities to prioritize innovative ideas and projects while ensuring that they align with the institution's strategic objectives.

In higher education, stakeholder groups include participants unique to academia, particularly faculty and students. Faculty occupy a unique role in the institution. They are more than rank-and-file employees, as the institution's mission includes support for their work in teaching and research. When it comes to information technology, faculty both create innovative technologies and consume IT resources. Because of their role as value creators and innovators, the faculty's priorities often carry more weight than the voices of other staff. As such, they are an important stakeholder group that should be included in IT governance

Possible for organizations to create structures that encourage innovation. Good institutional leadership that fosters a culture of innovation is important. By assigning responsibility for innovation to a decision-making body, an organization can ensure support for innovation, whether that body resides inside or outside the organization's established governance structure. Some have found that when an organization formalizes its procedures, incremental innovation is supported but radical innovation [25]. Good IT governance is important for the successful implementation of innovation

2.5. Information technology governance Effectiveness

Effective IT governance is crucial for an organization to achieve its corporate performance goals. To implement IT governance effectively, a set of IT governance mechanisms is required (e.g., IT steering committee, IT organizational structure) that encourages behaviors congruent with the organization's mission, strategy, values, norms and culture [11], [12]. According to [12] to achieve effective IT governance, an organization needs to employ well-designed, well-understood, and transparent governance mechanisms. However, good governance arrangements will fail to yield the expected results if mechanisms to support it are implemented inadequately. [12], surveyed CIOs of 256 firms from 23 countries, and identified fifteen of the most common IT governance mechanisms. [12] categorized these into three broad types in general: decision-making structures, alignment processes, and communication approaches.

[3] ran a case study in a major Belgian financial firm, examining how the mechanisms, processes and structures of IT governance contributed to the implementation of IT governance. The case study revealed that the firm used governance mechanisms effectively; for example, an executive committee composed of business and IT people, service-level agreements (SLAs), and charge-back systems were used to regulate IT resources.

3. Research Method.

Preliminary data were obtained through literature studies. From the literature studies obtained later developed into questionnaire. The survey questionnaire was chosen because it was considered the most preferred technique because of its many advantages and good quality [26]. The sampling technique of this study is a multi-stage purposeful random sampling. In the quantitative data collection phase, the Google Docs questionnaire was sent randomly via email, while the paper-based questionnaire was distributed directly by invitation to site to institutions all regions of Indonesia, as many as 100 copies of questionnaires are included, through a selection and feasibility process taken only 92 copy (92%).

To meet the quality feasibility, this data is then analyzed by considering the values: Cronbach's Alpha (0.6), Composite Reliability (0.7), AVE (0.5) and loading Factor (0.7) [27], [28]. To determine the level of significant path coefficient the bootstrap and T-Statistic processes are used above 1.98 at 95% confident Interval. The measurement accuracy data can be seen in table 1 and the structural model can be seen in Fig.1. As the last data table 3 display output model analysis data.

Research model shown in figure 1. Research model Adoption from [23] study effective of IT governance evaluation model used by organizational management in the Higher Education Institutions (HEI). The study identifies the factors that contribute to effective IT governance based on past literatures on this domain. Propose this model researcher continue to be tested through empirical study. Expand this study relationship between Effective IT

Governance and IT innovation also relationship between Organizational Communication System and IT innovation.

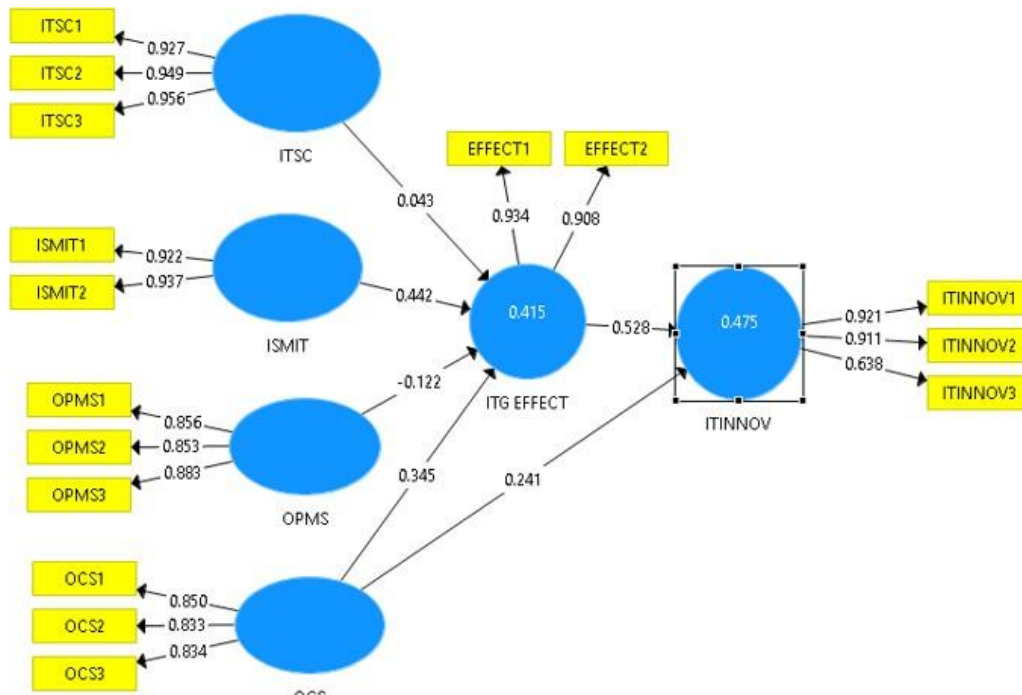


Fig. 1 : Measurement and structure model results.

- ITSC : IT Sterling Committee
- ISMIT : Involment senior management IT
- OPMS : Organizational Performance Measurement System
- OCS : Organizational Communication System
- IT Innov : IT Innovation
- ITG Effect : IT Governance Effectiveness

4. Results and Findings.

The model proposed by the researcher must be tested for validity from proposed model and to determine whether data, which has been collected in the field, matches the proposed conceptual model. The quality of the measurement model is determined based in its validity and reliability [27], [28]. The result the validity and reliability of the data is shown in Table 1.

Table 1

Measurement accuracy assessment

Research Constructs	PLS code item	Cronbach's Alpha Value	Composite reliability	Average variance extracted (AVE)	Factor loading
ITSC	ITSC1	0.939	0.961	0.891	0.927
	ITSC2				0.949
	ITSC3				0.956
ISMIT	ISMIT1	0.843	0.927	0.864	0.922
	ISMIT2				0.937
OPMS	OPMS1	0.830	0.898	0.746	0.856
	OPMS2				0.853
	OPMS3				0.883
OCS	OCS1	0.795	0.877	0.704	0.850
	OCS2				0.833

	OCS3				0.834
ITG EFFECT	EFFECT1	0.822	0.918	0.848	0.934
	EFFECT2				0.908
ITINNOV	ITINNOV1	0.770	0.870	0.695	0.921
	ITINNOV2				0.911
	ITINNOV3				0.638

Table 2

Outcome of structure equation model analysis

Path	Hypothesis	Path coefficient (β)	T-Statistic	Decision
ITSC ->ITG Effect	H1 (+)	0.043	0.331	positive and insignificant
ISMIT ->ITG Effect	H1 (+)	0.442	3.640	Positive and significant
OPMS -> ITG Effect	H1 (+)	-0.122	0.672	Negative and in significant
OCS -> ITG Effect	H1 (+)	0.345	1.980	Positive and significant
ITG Effect -> ITINNOV	H1 (+)	0.528	4.078	Positive and significant
OCS -> IT INNOV	H1 (+)	0.241	2.495	Positive and significant

5. Lesson Learned and Discussion

The data presented table 2, in this article have implications for academics, for example, ITG Effectiveness directly influence the IT Innovation in positive and significant way as indicated by the path coefficient ($\beta = 0.528$).

Therefore, for academic in the field of IT Governance this discovery can enhance their understanding of relationship between mechanism IT Governance and Effectiveness IT Governance in higher education institution. This is a useful contribution to be used ad literature. On practitioner's side, the management higher education institution can benefit from the implications of discovery. For Example, strong relationship between Involment senior management IT (ISMIT) and Effectiveness IT Governance ($\beta = 0.442$), management see the importance Involment senior management IT help in implementation application IT governance.

6. Conclusion

As emphasized by researchers such as [23] the effective IT governance related to individual and organizational level of unit analysis. One of the more significant findings to emerge from this study is that evaluate the mechanism ITG impact to effective IT governance that focus on higher education institution (HEI). This study already examines a validation of evaluation model and collecting data in particular higher education institution (HEI) as a single case study.

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