

Factors Influencing the Implementation of IT Governance

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Abstract: IT governance in organizations plays strategic roles in deciding on whether IT strategies and investments in both private and public organizations could be efficient, consistent and transparent. IT governance is potential to be the best practice that could improve organizational performance and competency. In conjunction to that this study is carried out to determine the factors influencing the implementation of IT governance in public sector. The study involves qualitative and quantitative approaches where data were collected through questionnaire, observation, interview and document study through a sample of 367 respondents. The collected data were analyzed using Structured Equation Modeling (SEM) for validating the model and testing the hypotheses. Besides, semi-structured interview, observation and document study were also carried out to obtain the management's feedback on the implementation of IT governance and its activities. The findings reveal that policy has a significant direct influence on system planning, the management of IT investment, system realization, operation and maintenance and organizational culture. Besides, monitoring and evaluation process also significantly affects the system planning, the management of IT investment, system realization, operation and maintenance and organizational culture.

Key words: IT governance process, public organizations, realization, maintenance, operation, planning

INTRODUCTION

IT governance has emerged into public sectors of various countries. As an example, it has been the main component in government in Australia (Jones, 2005; Rozemeijer, 2007) which has been used as the main framework for the government to assess, govern and monitor IT implementation in public organization. IT governance is done to ensure effective and efficient actions are in place in improving the organization's operation through a structure that integrates process, resource and IT information towards the organization's direction and strategy (Sarno, 2009). Further, the right governance enablers can ensure the transparency of IT supply and assists in decision making regarding the demands and priority in conveying values to organizations (ITGI, 2011).

Although, studies regarding the roles and effectiveness of IT governance has been carried out in various countries, the understanding among organizations especially in public sector in Indonesia on IT governance and its impact is still vague. When viewing from leadership aspect, there are weaknesses in IT

leadership, lack of innovation and there is an inability in realizing innovation in the form of IT initiative into reality. The public organization's understanding on IT governance is also vague which could be seen through the knowledge on good IT governance and IT process is highly lacking, until each unit of work tend to develop IT separately (Detiknas, 2011; Gorontalo, 2008; Wibowo and Yuwono, 2009). There are various views on the weaknesses of IT governance in Indonesia. As an example, it is caused by the weaknesses in formal IT planning (Wibowo and Yuwono, 2009). Hence, they propose that organizations incorporate best practices in IT governance.

IT governance in public organization in Indonesia is important. In conjunction, (ITGI, 2008; Weill and Ross, 2004) that it has potentials to be the best practice in uplifting the performance and competency in organization. Besides, it is required because in average, organizations invest a big amount of money (greater than 4.2% of the income) in IT field including estimated IT and hidden expenditure (Weill and Woodham, 2002). In overall, IT investment contributes to >50% of the total organization's estimated capital (Weill and Broadbent, 1998). Since, the

IT investment is huge, IT governance is required to optimize its benefits. It could be achieved because IT governance could improve service quality, a mechanism that moderates and controls various information system as well as technological infrastructure more efficiently (Gomes and Ribeiro, 2009). In conjunction with that (Pereira and Silva, 2012) discovered that IT governance is a factor that overcomes the complexities in IT implementation.

Meanwhile, ITGI (2008) found that 80% of organizations have acknowledged the IT governance concept as a potential solution or the framework for implementing governance. It agrees with Bodnar (2006), Korac and Kakabadse (2001) and Lackovic (2013) who found that the benefits of IT governance is important in ensuring competency, improving services, ensuring returns on IT investment and minimizing risks which eventually reduces failures in IT projects. While those studies were carried out in various countries, this study is carried out in Indonesia, particularly in Gorontalo. Gorontalo, located in Sulawesi is one of provinces in Indonesia that have implemented IT governance in their practice. It is important because current literatures have not revealed any study carried out in Indonesia. Hence, it has to be urgently initiated.

Theoretical and research model

IT governance: IT governance as the ability of a top management and IT management in strategizing and implementing IT strategies in supporting their organization (Grembergen, 2013). Meanwhile, IT governance is the responsibility of executives and the board of directors and consists of the leadership, organisational structures and processes that ensure that the enterprise's IT sustains and extends the organisation's strategies and objectives (ITGI, 2007). Although, every definition differs in certain aspects, all definitions focus on the same issue which is the roles of IT in merging IT with organizational operations in minimizing risks. In overall, the aspect to be looked into is ensuring the IT system maintains and expands organization's objectives and strategies. Thus, IT governance has been important in governing organizations.

ITGI found that majority of organizations 58% in global market have considered to or in the process of considering the implementation of IT governance (ITGI, 2008). Specifically, 18% of them have implemented the IT governance, 34% are in the process of implementing and 24% are considering it. ITGI also found that the maturity among organizations in implementing IT governance is 2.67 (using a scale between 0 and 5).

Additionally, organizations in IT/telecommunication, finance and public sector are highly positive in considering and implementing IT governance in their operations. This shows a positive sign for future implementation of IT governance in organizations.

Besides, IT governance has been an attention among practitioners and researchers (Dahlberg and Kivijarvi, 2006; Nastase and Unchiasu, 2012). This could be seen through the ability in improving the accountability in the use of IT resources and in the initiatives in ensuring IT benefits organizations in line with their goals. This explains that a proper implementation of IT governance could be understood and defined as an important part in organizations in which continuous improvement and achievement is their strategic goals. The understanding of IT governance is important because it determines appropriate functional boundaries and scope. This enables organizations to obtain better perspectives over activities in IT governance and further lead the attention of their top management. Not only low-level managers but also senior executives and top management need to be clear about IT governance in enabling them to develop their IT infrastructure and further use them together.

Hypotheses: In ensuring the implementation of IT governance successful, it has to be it is necessary to studied the implementation of the IT governance (Lee *et al.*, 2008). Accordingly, recommends organizations to determine the influence of certain factors, especially the framework, policy, process, organizational structure and organizational culture in supporting the implementation of a comprehensive system in governing IT and managing it.

The implementation of IT governance in Indonesia, specifically Gorontalo has been a major concern in public services. Regarding that Kominfo (2011) found that it has been an urge as a need in public services especially those that serve others, since, the roles of IT is getting more and more important in improving the quality of service in government agencies. This is supported with some legal acts in regulation Minister of Communication and Information of the Republic Indonesia (No. 41/per/men.kominfo/11/2007) that outline some guidelines for IT governance in public organizations. To supports objectives of the government, requires to pay attention to proficiency of the effectiveness of resource usage and risk management which leads to the critical implementation of IT governance (Depkominfo and Detiknas, 2007).

The use of IT in government departments in Gorontalo is equipped with a reference center that caters the planning for a structured and continuous IT

infrastructure and its development. Not only it focuses on technology usage but also human capacity development as well as the procedure in utilizing those infrastructure. To ensure it works as intended, a policy has been made available as the foundation to all planning and utilization works in the province. Such policy refers to regulation Minister of communication and information of the Republic Indonesia, It will lead to the implementation of good governance that ensures a transparent, efficient and effective public services of government (Depkominfo and Detiknas, 2007).

The policy in IT governance in Indonesia is the decision by the leaders who also set the direction and boundaries including expected achievement (Depkominfo and Detiknas, 2007; Gorontalo, 2008). Meanwhile in Gorontalo, a decision by leaders that provides guidance direction and boundaries on the IT resource management. It includes the procedures of managing IT resources particularly on planning, maintenance and operation. The policy includes the alignment of IT strategies, risk management and resource management. Meanwhile, the governance of resource management focuses on the management of IT processes through a mechanism for directing and monitoring and evaluating IT governance.

The process in IT governance includes processes to ensure that the goals of IT governance are achievable and these processes are related to the accomplishment of organizational goal, resource management and risk management (Depkominfo and Detiknas, 2007). This agrees with ITGI who details that IT governance begins with determining the organizational goals, followed with performance assessment to determine whether the objectives have been accomplished and re-arrangement of the goals appropriately. Further, effective IT management requires certain knowledge regarding the process normally utilized and organized in line with the planning, delivery, implementation and monitoring (ITGI, 2007). Generally, IT governance process consists of system planning, the management of IT investment, system realization, system operation and maintenance and organizational culture (ITGI, 2007; Depkominfo and Detiknas, 2007).

Policies regarding IT governance process are imposed to ensure all IT governance process in public organization obey to the to roles and method related to IT. Accordingly, monitoring and evaluating have to be imposed over the credibility of of regulatory compliance management in IT governance (ITGI, 2007; Depkominfo and Detiknas, 2007). Further, monitoring and evaluating discuss about continuous performance assessment (Gheorghie, 2010). Through this process, the weaknesses in the internal control is determined and analyzed for

improvement and further continuously made better. The monitoring and evaluating in the implementation of IT governance is very important in enabling organizations determine whether their IT management is effective to maximize the benefit to the society besides minimizing the risks (Lorences and Avila, 2013). Hence, the relationship between monitoring and evaluating with IT process including systems planning, the management of IT investment, system realization, system operation and maintenance and organizational culture need to be monitored and evaluated periodically. It is important in gaining the benefits of IT and guaranteeing the quality of service as well as ensuring the strategic plan is achieved (Pereira and Silva, 2012; Grewal and Knutsson, 2005).

In this study, four domains of COBIT (plan and organise, acquire and implement, deliver and support and monitor and evaluate) are adapted. To support the requirement of this study, the influencing factors in IT governance have been merged with COBIT. Hence, hypotheses of this study that involve IT policy and monitoring and evaluating as independent variables (exogenous) and six dependent variables (endogenous) system planning, the management of IT investment, system realization, system operation and maintenance and organizational culture. This study synthesizes 10 hypotheses as stated as:

- H₁: the implementation of policies significantly positively contributes to system planning process
- H₂: the implementation of policies significantly positively contributes to management of IT investment process
- H₃: the implementation of policies significantly positively contributes to system realization process
- H₄: the implementation of policies significantly positively contributes to system operation and maintenance process
- H₅: the implementation of policies significantly positively contributes to organizational culture process
- H₆: monitoring and evaluating process significantly positively contributes to system planning process
- H₇: monitoring and evaluating process significantly positively contributes to the management of IT investment process
- H₈: monitoring and evaluating process significantly positively contributes to system realization process
- H₉: monitoring and evaluating process significantly positively contributes to system operation and maintenance
- H₁₀: monitoring and evaluating process significantly positively contributes to organizational culture process

MATERIALS AND METHODS

Study plan: As a strategy, this study combines quantitative and qualitative approaches (mixed methods strategies). Quantitatively, this study studies the achievement in the implementation of IT governance and survey. Meanwhile, interview, observation and document study were used to qualitatively verify the implementation of IT governance. The general procedure that study will be carried out as shown in Fig. 1.

Population and sample: This study utilized non probability sampling, using saturated sampling technique. Non probability sampling with saturated technique is selected because each element is coincidentally selected and it could satisfy other factors that have been planned earlier. Besides, the results of study could also be generalized with very slim mistakes (Dooley, 2001; Sekaran and Bougie, 2013). The population of this study is the staff of all 135 public organizations in Gorontalo. For every organization, 3 senior managers who are responsible for IT department in their organizations were eligible to participate in this study. Having considered the non probability sampling using saturated technique, a sample of 405 respondents was involved in data collection.

Development and procedure of the instrument: Each question is measured using likert scale, between 1 (the least score) and 5 (the highest score). In ensuring the validity and reliability of the instrument (questionnaire), a pilot study has been carried out (Zikmund, 2003). The questionnaire has been distributed in two rounds. The first round involved experts, specially to improve the contents and the clarity of the questionnaire. At the end of this round, the instrument has been verified by experts in IT fields. Meanwhile, in the second round, the pilot study was carried out to determine the reliability of the instrument. SPSS Version 16 was utilized in testing the gathered data. In the end, it was found that the cronbach's alpha for all variables are >0.8 .

Further, SEM has been used to analyze the gathered data in AMOS and SPSS Version 16. Procedures in SEM were followed through, including testing on data normality, determining outlier, testing on multicollinearity and testing on convergent and discriminant. This emphasize that on this procedure to ensure that the data are complete, true and fit for advanced analysis (Sekaran and Bougie, 2013). Further, data were analyzed to gather index value or Goodness of Fit index (GoF) to determine the fitness of the model, testing on the

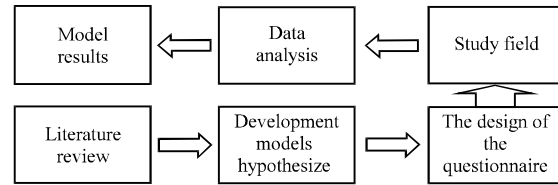


Fig. 1: Research procedures

significant value or factor loading to determine the relationship between the indicators and variable and testing the hypothesized model in SEM.

RESULTS AND DISCUSSION

Test of data: Data analysis in SEM requires data to be normally distributed to ensure the results are bias-free. The skewness value must be <3 and kurtosis <10 (Kline, 2011). Mahalanobis distance is used to test for outlier, at alfa $p<0.001$ (Tabachnick and Fidell, 2007). Meanwhile, multicollinearity with standard tolerance of greater than 0.10 and VIF of less than 10 are good values (Sekaran and Bougie, 2013). For this study, the results show that the gathered data satisfy all conditions. This explains that the data are good for further analysis.

Measure of variable fitness: SEM is used to analyze the results that involve the overall structured model. This analysis is carried out by analyzing the measurement model and structured model as recommended (Hair *et al.*, 2010). The difference between measurement model and structured model could be identified in the Confirmatory Factor Analysis (CFA) Model (Hair *et al.*, 2010). For measurement model, all constructs are related among each other but in structured model, the correlation relationship is switched with determination relationship, either directly or indirectly. Since, this study adapts the COBIT framework which is combined with the theoretical framework of IT governance in Indonesia, the CFA analysis is used in assessing the measurement model. The results of analysis and testing of CFA over the variables in this study reveal that the measurement model for each variable has good GOF index. Besides, the CFA also reveals good indicators that every variable has good convergent validity in which their factor loading are at average >0.50 .

Validity and reliability test for measurement model: After CFA measurement, this study needs to prove a high validity and reliability before proceeding to correlation analysis (Awang, 2012). Besides factor load in, other measurements for construct validity are construct

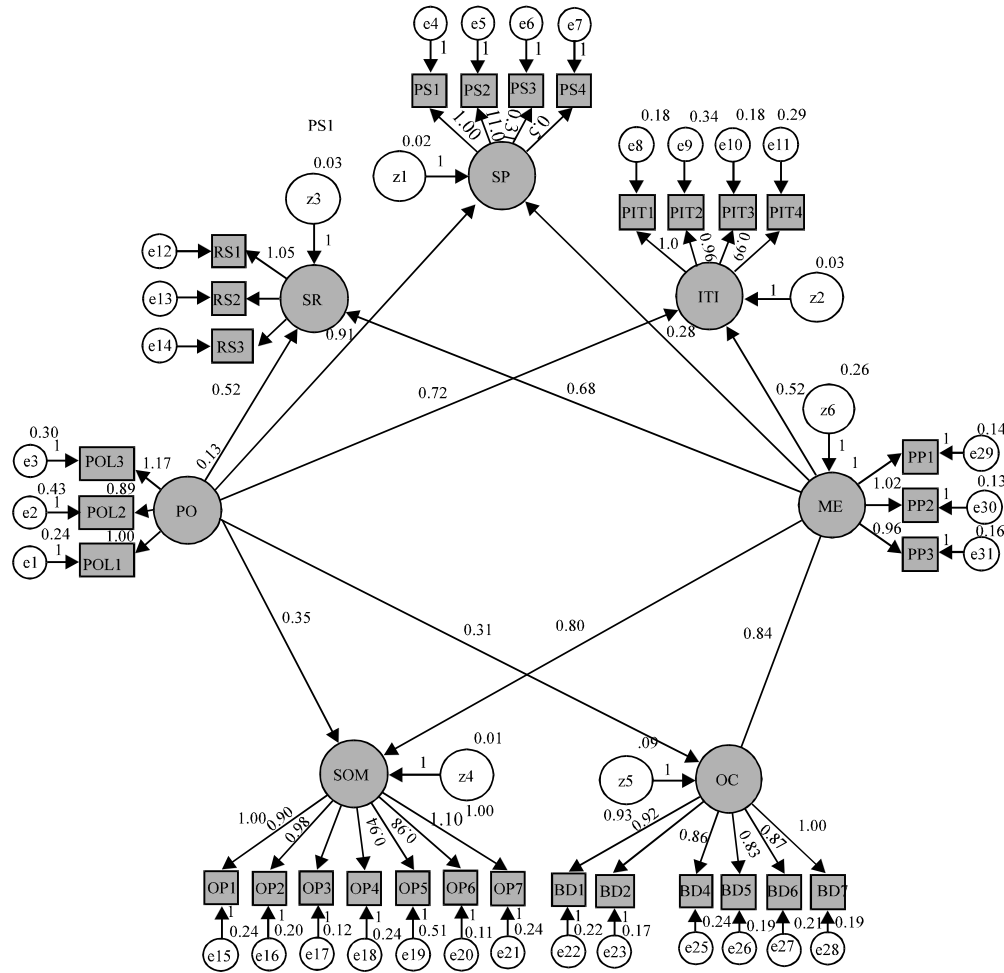


Fig. 2: The results of research model; PO: Policy, SP: System Planning, ITI: the management of IT Investment, SR: System Realization, SOM: Operation and Maintenance, OC: Organizational Culture, ME: Monitoring and Evaluation

Variables	CR (above 0.6)	AVE (above 0.5)
Policy	0.794	0.565
System planning	0.874	0.635
The management of IT investment	0.855	0.597
System realization	0.890	0.730
Operation and maintenance	0.907	0.583
Organizational culture	0.903	0.607
Monitoring and evaluation	0.914	0.779

reliability and discriminant validity (Hair *et al.*, 2010; Awang, 2012). The test for construct reliability is carried out by measuring composite reliability, meanwhile, discriminant validity is measured through AVE. Having run the tests, the results are detailed in Table 1. Having tested the convergent validity, construct reliability and discriminant validity, each indicator represents all variables. For reliability testing, it is found that the average is >0.8 in which according to Hair (2007), it is very

strong. Hence, each indicator could be trusted. Meanwhile, the results of validity tests show that each indicator is significantly correlated and valid.

Figure 2 show cases the hypothesized model after CFA testing. It is constructed based on the measurement model of all variables with only indicators tested with CFA. In detail, the results show that the model fits the criteria with $\chi = 747.464$. Besides, GOF index is also good with TLI = 0.934 and CFI = 0.940. Although, GFI = 0.885 and NFI = 0.882, however, values >0.7 or 0.8 are sufficient for measuring a model (Marsh *et al.*, 2004). While RMSEA = 0.050 is far smaller than the cut-off value (≤ 0.08), CMIN/Df is also similar with 1.892 (cut-off value ≤ 5). Besides, AGFI value (>0.8) also satisfies the condition. Based on those conditions, this study deduces that the hypothesized model for IT governance in public organizations fits the data nicely.

Table 2: The results of hypothesis testing

Hypothesis	Var	Path	Var	CR	p-values	Results
H ₁	SP	<--	PO	08.411	0.001	Supported
H ₂	ITI	<--	PO	07.324	0.001	Supported
H ₃	SR	<--	PO	06.541	0.001	Supported
H ₄	SOM	<--	PO	05.734	0.001	Supported
H ₅	OC	<--	PO	04.521	0.001	Supported
H ₆	SP	<--	ME	06.246	0.001	Supported
H ₇	ITI	<--	ME	10.230	0.001	Supported
H ₈	SR	<--	ME	11.890	0.001	Supported
H ₉	SOM	<--	ME	13.152	0.001	Supported
H ₁₀	OC	<--	ME	13.733	0.001	Supported

The results of hypotheses testing (H₁₋₁₀) prove that all hypotheses are significant. This indicates that in both situations, the effect of policy over the IT processes and the effect of monitoring and evaluation over the IT processes are significant. Referring to the results of study in Table 2, policy significantly positively contributes to the systems planning, the management of IT investment, system realization, operation and maintenance and organizational culture at p<0.01 significant level with respective Critical Ratio (CR) 8.411, 7.324, 6.541, 5.734 and 4.521. On top of that it also explains that monitoring and evaluation significantly affect systems planning, the management of IT investment, system realization, operation and maintenance and organizational culture at p<0.01 significant level with CR 6.246, 10.230, 11.890, 13.152 and 13.733, respectively.

Further, the weight (β) regression value for policy over systems planning, the management of IT investment, system realization, operation and maintenance and organizational culture are exhibited in Table 3 which are 0.845, 0.634, 0.432, 0.289 and 0.228. They are paired with respective effect size which are 0.714, 0.402, 0.187, 0.084 and 0.052. This indicates that 71.4% of the change in the system's strategic planning, 40.2% of the change in the management of IT investment, 18.7% of the change in system realization, 8.4% of the change in operation and maintenance and 5.2% of the change in organizational culture could be explained by policy (the independent variable). Meanwhile, the weight value for monitoring and evaluation over systems planning, the management of IT investment, system realization, operation and maintenance and organizational culture are 0.361, 0.645, 0.797, 0.918 and 0.865 with effect sizes 0.130, 0.416, 0.635, 0.843 and 0.748, respectively. This indicates that monitoring and evaluation highly credible in explaining the changes in systems planning, the management of IT investment, system realization, operation and maintenance and organizational culture. The ability to explain changes in monitoring and evaluation in terms of system planning is 13.0%, the management of IT investment is 41.%, system realization is 63%, operation and maintenance is 84.3% and organizational culture is 74%.

The results among others explain that the implementation of IT governance is affected by policy,

Table 3: Standardized regression weights

Variables	Path	Variables	Estimate
System planning	<---	Policy	0.845
The management of IT investment	<---	Policy	0.634
System realization	<---	Policy	0.432
Operation and maintenance	<---	Policy	0.289
Organizational culture	<---	Policy	0.228
System planning	<---	ME	0.361
The management of IT investment	<---	ME	0.645
System realization	<---	ME	0.797
Operation and maintenance	<---	ME	0.918
Organizational culture	<---	ME	0.865

systems planning, the management of IT investment, system realization, operation and maintenance, organizational culture and monitoring and evaluation. Additionally, the most affecting factor in policy over IT governance implementation process is systems planning ($\beta = 0.845$). It is followed with the management of IT investment ($\beta = 0.634$), system realization ($\beta = 0.432$), operation and maintenance ($\beta = 0.289$) and organizational culture ($\beta = 0.228$). Meanwhile, the most affecting factor in in monitoring and evaluation over the IT governance implementation process is operation and maintenance ($\beta = 0.918$). It is followed with organizational culture ($\beta = 0.865$), system realization ($\beta = 0.797$), the management of IT investment ($\beta = 0.645$) and systems planning ($\beta = 0.361$).

Through interviews, observation and document study, it is also found that the IT governance model in public organization fits the implementation of IT governance. This explains that IT governance model does exist in public organizational context in government agencies and the model could be adapted in any government agencies that implements IT governance. This finding is in line with (KBUMN., 2013) that the existence of policy over the IT governance is highly critical in organizational IT implementation in which the detailed IT policy could be inherited into standards or procedures. This indicates that policy implementation significantly affects IT processes. ITGI (2007) and KBUMN. (2013) further state that the obedient will increase when the cycle of IT implementation is in place (policy). This could further explain that when an IT process has no policy, the obedient will not fulfill the concept of IT governance and as a result the IT implementation will not be effective for the organization. Hence, it is critical that the policy regarding the management of IT investment requires firm commands and direction from the top management.

IT governance is part of policy, process or activity and procedure in supporting IT operation, so that, it works in line with the organizational strategy and operation (Oltsik, 2003). This agrees with (Oltsik, 2003) that IT governance is a trend by the authorized party or policy on IT activity/process. This trend among others builds-up the policy and the management of IT

infrastructure, the effective use of IT for the users and effective management. This means that the policies on IT activities/processes such as systems planning, the management of IT investment, operation and maintenance and organizational culture are related with organizational strategy, resource management and risk management. Meanwhile, effective IT management requires certain knowledge regarding IT processes which are commonly managed to suit the planning, delivery, implementation and monitoring domains (ITGI, 2007).

IT process involves the formation of cases for IT business, priority, justification and permission from the IT investment, the implementation of IT monitoring and evaluation and IT performance (Sambamurthy and Zmud, 1999; Henderson and Lentz, 1996; Luftman and Brier, 1999). Consequently, ITGI (2007) address that all IT process need to be evaluated periodically to ensure the quality and suitable with the control mechanism. In fact, Simonsson *et al.* (2010) recommends that monitoring is made an internal activity to determine the feedback of each progress including all advantages and drawbacks. This agrees with Hewitt and Michael (1986) who propose to analyze what have been achieved, assesses and take action over the weaknesses, so that, the objectives are achieved.

For this IT governance model, the direct effect of policy over IT processes is high. This shows that the obedient level of policy has met the condition and that the implementation of IT governance is effective. Previous findings (Jones, 2005; KBUMN., 2013; Oltsik, 2003; Sambamurthy and Zmud, 1999) also support that policy in IT process is very important in the implementation of IT governance in organizations and it happens perfectly if satisfies the current roles. Meanwhile, monitoring and evaluation process highly affects IT processes in which it determines the level that monitoring and evaluation imposed and practiced over the IT processes have functioned and taken place well in improving the quality of service of any program. Each program should be monitored and assessed. It is important in gathering data to ensure the program is well-developed and effective, besides improving the management aspect, making decision and planning for future resource (Mockler, 1970; Frankel and Gage, 2007).

CONCLUSION

This study determines the factors influencing the implementation of IT governance. Further, it assists organizations, especially, IT committee and decision makers. Finally, in the good implementation of IT governance, IT committee or decision makers should consider the development of IT governance, especially those related to factors influencing the implementation of

IT governance including policy, system planning, the management of IT investment, system realization, operation and maintenance, monitoring and evaluation and organizational culture.

RECOMMENDATIONS

This study would like to recommend that future studies further detail the policy and IT governance models specifically in public organization besides other factors that influence. It is very important because such evidences are too lacking in current literatures.

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