

Original Research Paper

# Analysis of Benefits and Barriers as a Critical Success Factor in IT Governance Implementation by Using Interpretive Structural Model

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**Abstract:** This study aims to identify and analyze the key sub-factors of benefits and barriers as critical success factors for the implementation of IT Governance. The hope of the research is that the results of this identification and analysis can provide a high value of benefits in order to stakeholders in implementing IT Governance. In addition, it is expected to also give a real contribution to the development of theory or concept in the field of IT Governance especially related to critical success factor. The method used in this research is the interpretive structural model, where this method is very suitable to find the key sub-factor with a well-structured hierarchy structure. The first step of this research begins with a literature review, survey and interviews by involving three experts in the field of IT Governance and then the information is processed according to the rules. The final result shows that sub-factors improve customer service and overall responsiveness is a key sub-factor in benefit factors, whereas the lack of financial and human support becomes a key sub-factor in barriers. These results are empirical because depending on the data obtained through expert interviews involved, therefore the quality and capacity of experts greatly affect the results obtained. This study demonstrates how benefits and constraints as a critical success factor in the application of IT Governance are interrelated. The interpretive structural model provides an understanding of how various benefits and barriers interact with each other. This is important because policymakers typically focus on one or two sub-factors only.

**Keywords:** Critical Success Factor, IT Governance, Interpretive Structural Model

## Introduction

IT Governance (Information Technology Governance) is a branch of corporate governance that focuses on information technology systems, performance management and risk. IT Governance is structured IT management and collection of processes that aim to ensure the suitability of IT implementation towards achieving organizational goals, by optimizing the benefits and opportunities offered by IT, controlling the use of IT resources and managing IT-related risks by involving all stakeholders to ensure the success of IT. Therefore IT Governance has a very strategic role in the sustainability of an organization, especially in planning to overcome and reduce the risks that occur (Alreemy *et al.*, 2016).

IT Governance and IT Management are two different things both in terms of the actors or responsible people, their activities and the goals of each (Ali *et al.*, 2015).

From the side of the person in charge, the person in charge of IT Governance is at the level of the board of directors and commissioners. Whereas IT Management is in charge of executive management and line management. IT Governance ensures that all the needs and expectations of the organization's stakeholders have been evaluated when it sets goals that must be achieved by the organization. Then IT Governance provides direction related to priorities and important decisions that need to be taken so that organizational goals can be achieved (Kuusk and Gao, 2015). Then finally, IT Governance monitoring the performance and achievement of the targets and directives that have been set. Whereas IT Management doing the directives given by the board of directors or commissioners to actions that the organization needs to take in order to achieve its intended goals. Based on the directives and guidance from the board of directors or commissioners, the executive management conducts

from the planning, development of initiatives, service operations, to monitoring its alignment with the directives set by the board of directors or commissioners. All activities of executive management are monitored by the board of directors or commissioners to ensure that executive management performs its duties and responsibilities well in harmony with the direction of the board of directors or commissioners (Alreemy *et al.*, 2016; Ali *et al.*, 2015; Kuusk and Gao, 2015). So that it can be expected that the organizational goals that have been set can be achieved.

IT Governance has a scope among others: IT strategic alignment, value delivery, risk management, IT resource management and performance measurement (Alreemy *et al.*, 2016; Ali *et al.*, 2015). In IT strategic alignment an information technology strategy will be designed that refers to the overall information strategy of an organization and must be in accordance with the business objectives of the organization. Value delivery covers the scope that will target the quality of IT services that are right based on budget and time. Risk management includes good risk management in order to achieve the organization's business goals. Risk management starts with identifying risks and then managing them to be controlled. In addition to the risk of resources, it must also be managed in order to achieve organizational business goals, while one of the resources that must be managed is IT infrastructure (Kuusk and Gao, 2015). Performance measurement includes measurement of performance that is in accordance with the board and senior management.

To implement IT Governance, businesses can take advantage of a range of practices related to decision-making structures, processes and relational mechanisms (Henrique *et al.*, 2014; Kuusk and Gao, 2015; Yudatama *et al.*, 2017a). However, the specific contributions of these various practices are still poorly understood (Henrique *et al.*, 2014). While the role of IT Governance is very important (Henrique *et al.*, 2014; Hamid and Sulaiman, 2016; De Haes *et al.*, 2017), many organizations have not been fully aware of the benefits obtained (Yudatama *et al.*, 2017a). Many still use conservative or traditional methods to implement Information Technology Governance (Rychkova and Zdravkovic, 2017). Because of a lack of understanding of the benefits and obstacles to the implementation of IT Governance (Yudatama *et al.*, 2017b), their performance cannot reach the optimum level as expected (Yudatama and Sarno, 2015).

The benefits and obstacles are very basic to know because it can affect the success of IT Governance (Ali *et al.*, 2015; Yudatama *et al.*, 2017a; Al Qassimi and L. Rusu, 2015; Sayogo and Gil-Garcia, 2015). In addition, this also affects the performance of the organization because it deals directly with the user especially in response to accepting or rejecting

something given to him well or not (Yudatama *et al.*, 2017b-c). Therefore, the benefits and barriers are very important that can determine success which is often referred to as a determinant of success (Yudatama *et al.*, 2018).

Although there are several studies that look at the problems of benefits and obstacles in adopting the implementation of IT Governance in developing countries, in general only a few have succeeded (Yudatama *et al.*, 2017c; Shelly *et al.*, 2015; Yadav and Barve, 2015). These challenges include a lack of understanding of benefits and barriers (Jayant and Azhar, 2014; Zou *et al.*, 2014). The main problem often faced by top management is the lack of understanding of the main factors and sub-factors that influence the successful implementation of IT Governance (De Haes *et al.*, 2017; Yudatama and Sarno, 2015; Shelly *et al.*, 2015; Tokta *et al.*, 2014; Badewi, 2016; Sabry, 2014; Denolf *et al.*, 2015), making it less appropriate to make decisions or policies (Tokta *et al.*, 2014; Hatsu and Ngassam, 2015). Therefore, how to find out the main factors and sub-factors becomes something very important and significant to be known and understood by top management (Hamid and Sulaiman, 2016; De Haes *et al.*, 2017; Badewi, 2016; Sabry, 2014; Denolf *et al.*, 2015).

This study aims to identify and analyze the key sub-factors of benefits and barriers that become Critical Success Factor in the application of IT Governance with using Interpretive Structural Model (Rychkova and Zdravkovic, 2017; Jayant and Azhar, 2014). Where Interpretive Structural Model is a modeling technique capable of synchronizing the opinions of experts to give a concrete description of the sub-factors hierarchy structure and can find the key sub-factor of each factor (Rychkova and Zdravkovic, 2017; Jayant and Azhar, 2014; Tokta *et al.*, 2014), as a useful knowledge base for strategy planning (Al Qassimi and Rusu, 2015), so that it will provide high benefit value (Yudatama *et al.*, 2017a). Interpretive Structural Model is a comprehensive and systematic model of various elements that are directly or indirectly related to each predetermined problem (Rychkova and Zdravkovic, 2017), where decisions between these interdependent variables are based on evaluations from experts (interpretative) (Jayant and Azhar, 2014). In addition, another goal of using Interpretive Structural Model is to analyze complex problems using systematic and logical thinking supported by expert judgment (Tokta *et al.*, 2014). Interpretive Structural Model has been successfully practiced in the field of green supply chain management (Jayant and Azhar, 2014) and for industry 4.0 adoption challenges (Karadayi, 2019).

In this study, it has been discussed about important factors and sub-factors using the Interpretive Structural Model beginning with the introduction containing the background of the research carried out, then proceeding with the literature which is the support in this study,

followed by research methods as work directions and stages. The next discussing the research methodology, continued by discussing the results and discussion. The last section closes with conclusions and research into the future by providing future research suggestions and input.

Expectations from the results of this study provide discourse about important sub-factors, both in terms of benefits and obstacles in the implementation of IT Governance. In addition, it provides a clear picture of how relationships are structured and interrelated so that this can be a valuable inspiration for all parties involved in implementing IT Governance to make it better. Or the results of these findings can be used as a first step to develop a model in the future.

## Literature Study

This research has observed the critical success sub-factors towards the implementation of IT Governance. There are two important factors that are observed in this literature study, that is, everything related to the benefits and barriers in the implementation of IT Governance. Some credible databases such as Science Direct, IEEE and Scopus have a number of highly qualified articles we collect for making into reference. By considering the literature relating to the theme, especially about the basic concepts of benefits and barriers as a critical success factor, other than that with slightly considering the year (5 years back/2014) and using the PRISMA meta-analysis model.

PRISMA is a model used to search for basic literature relating to the topic of research that will be done. With this model, we will find it easier to get literature because it is guided through several structured and systematic

stages so that the results can be in accordance with what we expect. We chose to use PRISMA, because this model is easy to understand and follow which consists of several structured and systematic stages, making it easy to do, if these steps are followed correctly and well, then we will get a quality reference (İnci and Griffiths, 2019).

We have identified 85 articles according to the topic of this study, 6 articles were found to be duplicates, so we removed them from the list. Our next step is screening, 79 articles are filtered by referring to the title and abstract, found 70 suitable articles. From these 70 articles, we double check to see the feasibility of each paper. The final results, 37 articles were used as the main study literature. Fig. 1 shows a flow diagram of the literature search process.

### Benefits

To support the routine of activities in an organization, IT Governance has a very important role. Routine work will be easier and faster to do because it is assisted by using information technology and its application, this is the right solution because it can improve quality better. Some literature that discusses benefits has been found and shown in Table 1.

### Barriers

The implementation of IT Governance cannot all work well as expected. This is because there are several things that can affect the implementation. Therefore, it is necessary to know and identify what things are hindering it. Table 2 shows the things that can hinder the success of the implementation of IT Governance that we have obtained through a literature review.

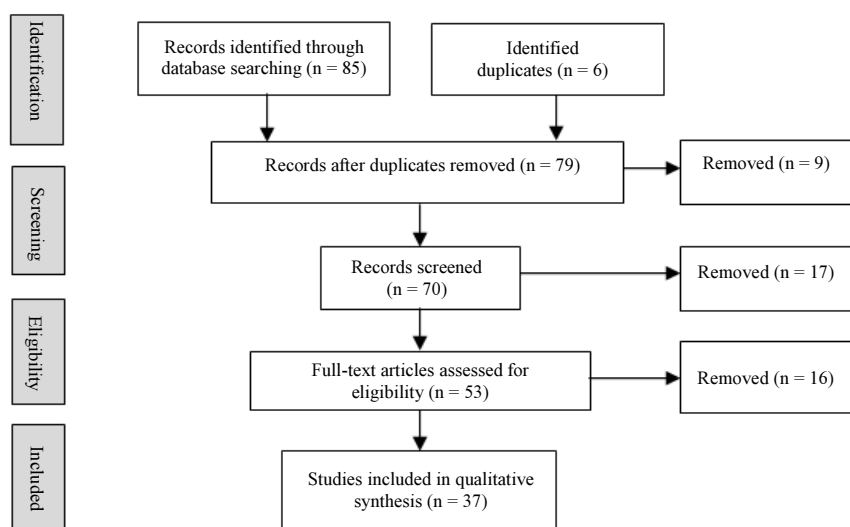


Fig. 1: Flowchart of the article search process

**Table 1:** Result of study on benefits reference

Benefits	Reference
Aligning business priorities and IT investments (M1)	Ali <i>et al.</i> (2015; Henrique <i>et al.</i> , 2014; Hamid and Sulaiman, 2016; De Haes <i>et al.</i> , 2017; Al Qassimi and Rusu, 2015; Yadav and Barve, 2015; Bianchi and Sousa, 2016; Altemimi and Zakaria, 2015)
Manage and monitor funds more consistently (M2)	Ali <i>et al.</i> (2015; Yudatama <i>et al.</i> , 2017a; Hamid and Sulaiman, 2016; Yudatama <i>et al.</i> , 2018; Shelly <i>et al.</i> , 2015; Yudatama and Sarno, 2016; Ali <i>et al.</i> , 2015; Smits and Hillegersberg, 2018; Majid <i>et al.</i> , 2015; Pau <i>et al.</i> , 2016; Bobbert and Mulder, 2015; El-mekawy <i>et al.</i> , 2015)
Managing resource and assets in a responsible manner (M3)	Ali <i>et al.</i> (2015; Henrique <i>et al.</i> , 2014; Yudatama <i>et al.</i> , 2017c; De Haes <i>et al.</i> , 2017; Al Qassimi and Rusu, 2015; Teh and Corbitt, 2015; Yudatama <i>et al.</i> , 2017c; Shelly <i>et al.</i> , 2015; Yadav and Barve, 2015; Jayant and Azhar, 2014; Zou <i>et al.</i> , 2014; Badewi, 2016; Sabry, 2014; Denolf <i>et al.</i> , 2015; Hatsu and Ngassam, 2015; Bianchi and Sousa, 2016; Altemimi and Zakaria, 2015; Smits and Hillegersberg, 2018; El-mekawy <i>et al.</i> , 2015; Yudatama <i>et al.</i> , 2017d; Safdar <i>et al.</i> , 2015)
Ensuring that IT delivers on plans, budgets and commitments (M4)	Kuusk and Gao (2015; Hamid and Sulaiman, 2016; De Haes <i>et al.</i> (2017; Yudatama and Sarno, 2015; Teh and Corbitt, 2015; Yudatama <i>et al.</i> , 2018; Yudatama <i>et al.</i> , 2017c; Shelly <i>et al.</i> , 2015; Jayant and Azhar, 2014; Zou <i>et al.</i> , 2014; Badewi, 2016; Sabry, 2014; Denolf <i>et al.</i> , 2015; Hatsu and Ngassam, 2015; Majid <i>et al.</i> , 2015; Bobbert and Mulder, 2015; El-mekawy <i>et al.</i> , 2015; Safdar <i>et al.</i> , 2015)
Establish and clarify accountability and decision rights (M5)	Ali <i>et al.</i> (2015; Kuusk and Gao, 2015; Paper, 2015; Yudatama <i>et al.</i> , 2017a; Hamid and Sulaiman, 2016; Al Qassimi and Rusu, 2015; Sayogo and Gil-Garcia, 2015; De Haes <i>et al.</i> , 2017; Bianchi and Sousa, 2016; Altemimi and Zakaria, 2015; Smits and Hillegersberg, 2018)
Managing risk, change contingency proactively (M6)	Kuusk and Gao (2015; Henrique <i>et al.</i> , 2014; Yudatama <i>et al.</i> , 2017a; Hamid and Sulaiman, 2016; Rychkova and Zdravkovic, 2017; Sayogo and Gil-Garcia, 2015; Yudatama <i>et al.</i> , 2018; Jayant and Azhar, 2014; Sabry, 2014; Bianchi and Sousa, 2016; Smits and Hillegersberg, 2018; Bobbert and Mulder, 2015)
Improve customer service and overall responsiveness (M7).	Badewi (2016; Altemimi and Zakaria, 2015; Yudatama <i>et al.</i> , 2017d)

**Table 2:** Result of study on barriers reference

Barriers	Reference
Lack of understanding of the regulation (P1)	Paper (2015; Teh and Corbitt, 2015; Shelly <i>et al.</i> , 2015; Hatsu and Ngassam, 2015)
Inadequate regulation (P2)	Hamid and Sulaiman (2016; De Haes <i>et al.</i> , 2017; Zou <i>et al.</i> , 2014; Tokta <i>et al.</i> , 2014; Sabry, 2014; Hatsu and Ngassam, 2015; Yudatama <i>et al.</i> , 2017d; Safdar <i>et al.</i> , 2015)
The lack of persuasive communication (P3)	Ali <i>et al.</i> (2015; Yudatama <i>et al.</i> , 2017a-b; Yudatama and Sarno, 2015; Teh and Corbitt, 2015; Shelly <i>et al.</i> , 2015; Zou <i>et al.</i> , 2014; Yudatama and Sarno, 2016; Denolf <i>et al.</i> , 2015; Bianchi and Sousa, 2016; Altemimi and Zakaria, 2015; El-mekawy <i>et al.</i> , 2015)
Top management less committed (P4)	Zou <i>et al.</i> (2014; Badewi, 2016; Sabry, 2014; Hatsu and Ngassam, 2015; Bobbert and Mulder, 2015)
Lack of financial support and human (P5)	Ali <i>et al.</i> (2015; Henrique <i>et al.</i> , 2014; Yudatama <i>et al.</i> , 2017a; De Haes <i>et al.</i> , 2017; Yudatama and Sarno, 2015; Sayogo and Gil-Garcia, 2015; Zou <i>et al.</i> , 2014; Yudatama and Sarno, 2016; Denolf <i>et al.</i> , 2015; Altemimi and Zakaria, 2015; Majid <i>et al.</i> , 2015; El-mekawy <i>et al.</i> , 2015)
There is no perspective of business and IT integration (P6)	Kuusk and Gao (2015; Yudatama <i>et al.</i> , 2017a; Hamid and Sulaiman, 2016; De Haes <i>et al.</i> , 2017)
IT staff lack business-oriented (P7)	Kuusk and Gao (2015; Henrique <i>et al.</i> , 2014; Al Qassimi and Rusu, 2015; Teh and Corbitt, 2015; Yudatama and Sarno, 2016; Badewi, 2016; Denolf <i>et al.</i> , 2015; Pau <i>et al.</i> , 2016)

## Research Methodology

The implementation of this research is divided into six stages, namely (1) Determination of research topic, (2) Literature study and review it to become reference material related to critical success factor, (3) Identify critical success factor on IT Governance implementation based on benefit and barriers, (4) Data collection is done by using descriptive method which is explored from survey and interview through questionnaire filling by competent experts, (5) Data processing with Interpretive Structural Modeling method. (6) Conclusions the complete stages of the study are shown in Fig. 2.

The data collected consisted of secondary data and primary data, secondary data obtained through literature review related to the implementation of IT Governance

especially related to critical success factors. While for primary data is data directly obtained and done directly by the researcher, in this study primary data among them is knowledge data owned by experts in the field of practitioners and academics and government in the field of IT Governance. To obtain this data will be arranged tool in the form of questionnaires that have been designed in accordance with the purpose.

We have interviewed 3 experts, in this case, people who have very special knowledge, experience and abilities in the field of IT Governance. This person was chosen based on recognition by many parties, has a good reputation and has produced several works of innovation in the field of IT Governance. Why do we only involve 3 experts, this is because we are more focused and serious about getting data.

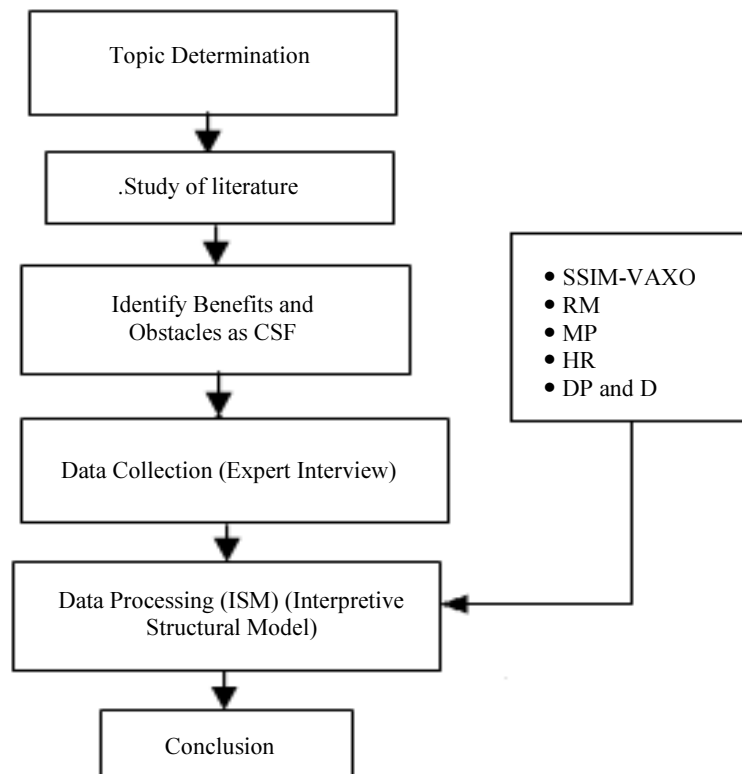


Fig. 2: Stages of research methodology

The sample size that we use involves 3 experts, this in accordance with the Karadayi (2019) statement, that in order to obtain accurate information, at least involve 3 experts who are competent in their fields. An expert is someone who has the knowledge, experience, abilities and skills in his field that has been proven by the results of his work and credibility recognized by others. Experts have the knowledge, experience and abilities so that they can provide input relating to information that is important in this study. The profiles of the experts involved in this study all have experience working over 25 years with an educational background in S3 Computer Science in IT Governance. We have interviewed by meeting and communicating experts directly at the object of the research, by asking some questions that had been prepared. The results of our interviews noted and if we find an ambiguous or contradictory answer between experts, we ask for clarification, so we get the same answer.

The data have been obtained from the knowledge of 3 experts drawn from practitioners, academicians and government through questionnaires which are then processed by data processing using Interpretive Structural Model method determine the key sub-factors for the formulation in the development strategy of

benefit factor and barriers as critical success factor In the application of IT Governance. The steps in the Interpretive Structural Model method are divided into 5 stages: (a) Preparation of Structural Self-Interaction Matrix-VAXO (SSIM-VAXO), (b) SSIM-VAXO Transformation into Reachability Matrix (RM) binary numbers, (c) Matrix Position (MP), (d) Preparation of Hierarchy based on sub-element Rankings (HR) and (e) Sub-element classification/cluster diagram based on Driver Power (DP) and Dependence (D).

## Results

This section discusses the results of research related to what has been obtained from this study. There are two parts that are the focus in this section, namely the benefit factor and the barrier factor.

### *Benefit Factor Analysis*

The data obtained from the experts is then processed into SSIM-VAVO as shown in Table 3.

Initial Data Reachability Matrix from Table 3 (SSIM-VAXO), then converted to binary Reachability Matrix (RM), as shown in Table 4. A transitive test for the consistency of the Reachability Matrix (RM) is required to obtain the Final Reachability Matrix as shown in Table 5.

From Table 5 above, it can be seen that the sub-factor M7 with has the smallest value Driving Power value (DP = 1 but Dependence = 7) and sub-factor M1 with has the biggest value Driving Power (DP = 7 but Dependence = 1).

Table 6 shows that the first iteration process begins with respect to the smallest Driving Power value (DP = 1) resulting in M7 sub-factors as level 1.

Table 7 shows the second iteration process taking into account the rather large Driving Power value (DP = 6), resulting in the M2, M3, M4, M5 and M6 sub-factor as level 2.

Table 8 showing the third iteration process with into account the largest Driving Power value (DP = 7), resulting in M1 sub-factor as level 3.

**Table 3:** Self structural interpreting model (SSIM-VAXO)

Variable	M7	M6	M5	M4	M3	M2
M1	0	V	V	V	V	V
M2	0	V	A	A	X	
M3	0	X	X	X		
M4	V	V	X			
M5	V	X				
M6	V					

**Table 4:** Reachability matrix of benefits factor

Variable	M1	M2	M3	M4	M5	M6	M7
M1	0	1	1	1	1	1	1
M2	0	1	0	0	1	1	0
M3	0	1	1	1	1	1	0
M4	1	1	1	1	1	1	0
M5	1	1	1	1	1	1	0
M6	1	1	1	0	1	0	0
M7	1	0	0	0	0	0	0

**Table 5:** Final reachability matrix of benefits factor

Variable	M1	M2	M3	M4	M5	M6	M7	Driving Power	Rank
M1	1	1	1	1	1	1	*1	7	III
M2	0	1	1	*1	*1	1	*1	6	II
M3	0	1	1	1	1	1	*1	6	II
M4	0	1	1	1	1	1	1	6	II
M5	0	1	1	1	1	1	1	6	II
M6	0	*1	1	*1	1	1	1	6	II
M7	0	0	0	0	0	0	1	1	I
<b>Dependence</b>	1	6	6	6	6	6	7		

**Table 6:** Iteration of benefits factor level I (M7)

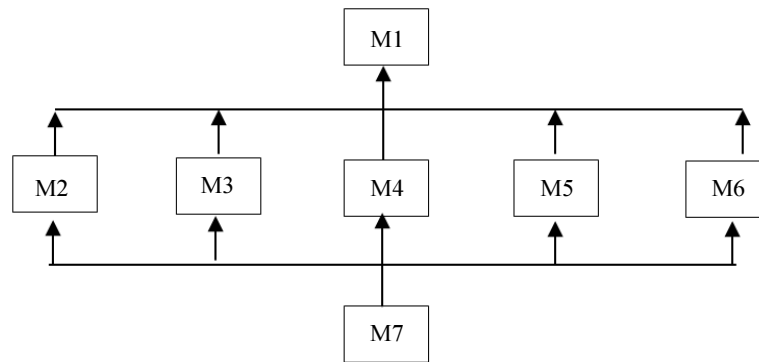
Variable	Reachability set	Antecedent set	Intersection set	Level
M1	1, 2, 3, 4, 5, 6, 7	1	1	
M2	2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	
M3	2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	
M4	2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	
M5	2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	
M6	2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	
M7	7	1, 2, 3, 4, 5, 6	1	I

**Table 7:** Iteration of benefits factor level II (M2, M3, M4, M5, M6)

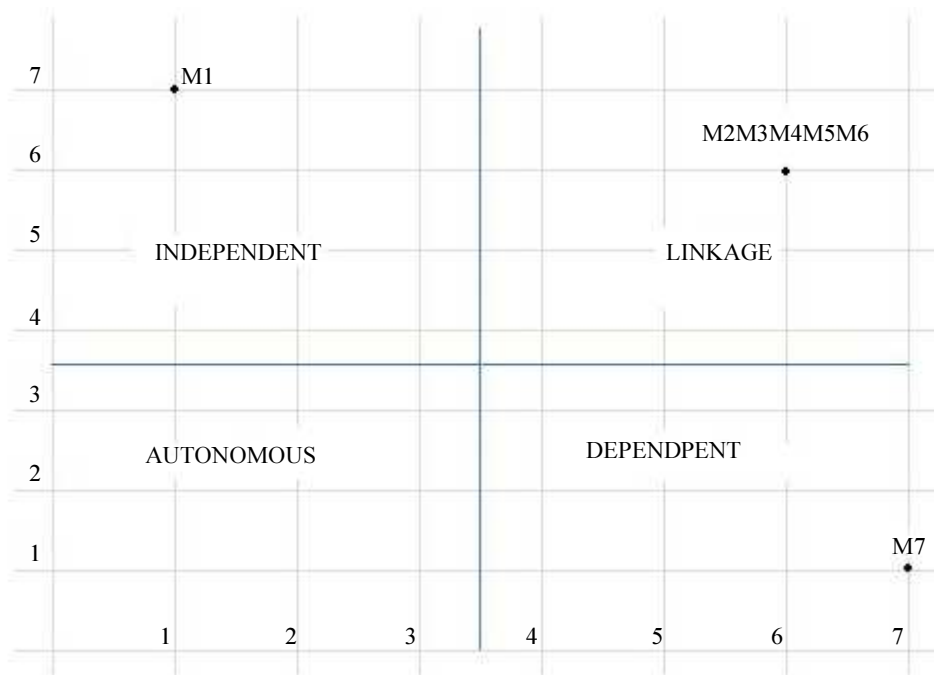
Variable	Reachability set	Antecedent set	Intersection set	Level
M1	1, 2, 3, 4, 5, 6	1	1	
M2	2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	II
M3	2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	II
M4	2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	II
M5	2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	II
M6	2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	2, 3, 4, 5, 6	II

**Table 8:** Iteration of benefits factor level III (M1)

Variable	Reachability set	Antecedent set	Intersection set	Level
M1	1	1	1	III



**Fig. 3:** Structural model hierarchy of Benefits Factor



**Fig. 4:** Cluster diagram of Benefits Factor

Figure 3 shows the Structural hierarchy of Benefits Factor models while in Fig. 4 shows the Cluster diagram of Benefits Factor.

*Barriers Factor Analysis*

The data obtained from the experts is then processed into SSIM-VAVO as shown in Table 9.

Initial Data Reachability Matrix from Table 9 (SSIM-VAXO), then converted to binary Reachability Matrix (RM), as shown in Table 10. A transitive test for the consistency of the Reachability Matrix (RM) is required to obtain the Final Reachability Matrix as shown in Table 10.

From Table 11 above, it can be seen that the sub-factor P5 with has the smallest value Driving Power value (DP = 1 but Dependence = 7) and sub-factors P1,

P2, P3 and P4 with have the biggest value Driving Power (DP = 7 but Dependence = 4).

Table 12 shows that the first iteration process begins with respect to the smallest driver power value (Driving Power = 1) and has dependence =7, resulting in P5 sub-factors as level 1.

Table 13 shows the second iteration process taking into account the rather large Driving Power value (DP = 2), resulting in the P6 sub-factor as level 2.

Table 14 showing the fourth iteration process with into account the large Driving Power value (DP = 3), resulting in P7 sub-factor as level 3.

Table 15 showing the fourth iteration process with into account the largest Driving Power value (DP = 7), resulting in P1, P2, P3 and P4 sub-factor as level 4.

Figure 5 shows the Structural hierarchy of Barriers Factor models while in Fig. 6 shows the Cluster diagram of Barriers Factor.

**Table 9:** Self structural interpreting model VAXO

Variable	P7	P6	P5	P4	P3	P2
P1	V	V	V	A	X	A
P2	V	V	V	V	V	
P3	V	V	V	X		
P4	V	V	V			
P5	A	A				
P6	X					

**Table 10:** Reachability matrix of barriers factor

Variable	P1	P2	P3	P4	P5	P6	P7
P1	1	1	1	0	1	0	1
P2	1	1	1	1	1	1	1
P3	1	0	1	1	1	0	1
P4	1	0	1	1	1	0	0
P5	0	0	0	0	1	0	0
P6	0	0	0	0	1	1	0
P7	0	0	0	0	1	1	1

**Table 11:** Final reachability matrix of barriers factor

Variable	P1	P2	P3	P4	P5	P6	P7	Driving power	Rank
P1	1	1	1	*1	1	*1	1	7	IV
P2	1	1	1	1	1	1	1	7	IV
P3	1	*1	1	1	1	*1	1	7	IV
P4	1	*1	1	1	1	*1	*1	7	IV
P5	0	0	0	0	1	0	0	1	I
P6	0	0	0	0	1	1	0	2	II
P7	0	0	0	0	1	1	1	3	III
<b>Dependence</b>	4	4	4	4	7	6	5		

**Table 12:** Iteration of barriers factor (P5)

Variable	Reachability set	Antecedent set	Intersection set	Level
P1	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P2	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P3	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P4	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P5	5	1, 2, 3, 4, 5, 6, 7	5	I
P6	5, 6	1, 2, 3, 4, 6, 7	6	
P7	5, 6, 7	1, 2, 3, 4, 7	7	

**Table 13:** Iteration of barriers factor (P6)

Variable	Reachability set	Antecedent set	Intersection set	Level
P1	1, 2, 3, 4, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P2	1, 2, 3, 4, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P3	1, 2, 3, 4, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P4	1, 2, 3, 4, 6, 7	1, 2, 3, 4	1, 2, 3, 4	
P6	6	1, 2, 3, 4, 6, 7	6	II
P7	6, 7	1, 2, 3, 4, 7	7	

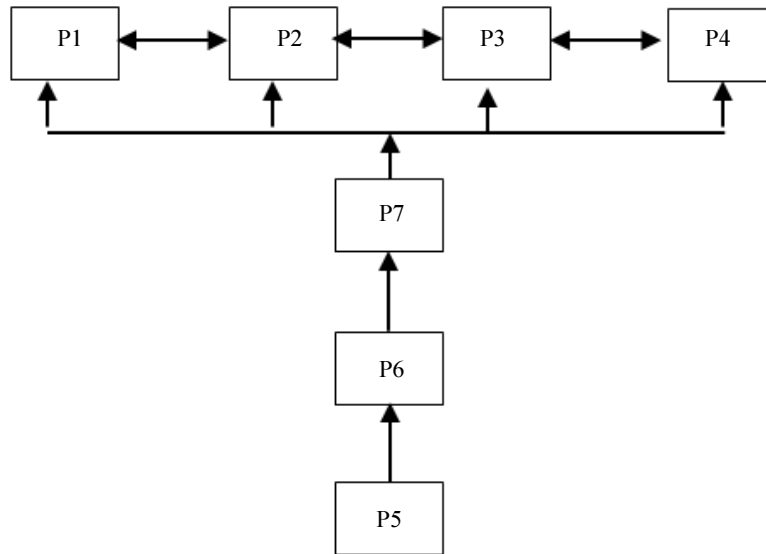
**Table 14:** Iteration of barriers factor (P7)

Variable	Reachability set	Antecedent set	Intersection set	Level
P1	1, 2, 3, 4, 7	1, 2, 3, 4	1, 2, 3, 4	
P2	1, 2, 3, 4, 7	1, 2, 3, 4	1, 2, 3, 4	
P3	1, 2, 3, 4, 7	1, 2, 3, 4	1, 2, 3, 4	
P4	1, 2, 3, 4, 7	1, 2, 3, 4	1, 2, 3, 4	
P7	7	1, 2, 3, 4, 7	7	III

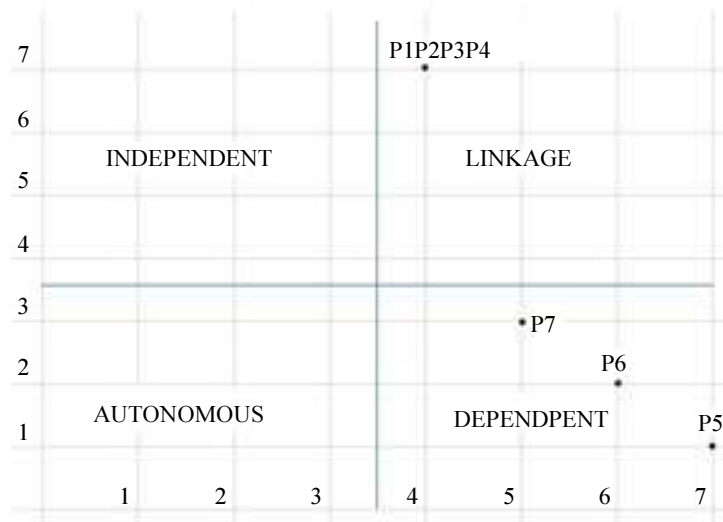
**Table 15:** Iteration of barriers factor (P1, P2, P3, P4)

Variable	Reachability set	Antecedent set	Intersection set	Level
P1	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	IV
P2	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	IV
P3	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	IV
P4	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	IV





**Fig. 5:** Structural model hierarchy of the barriers factor



**Fig. 6:** Cluster diagram of barriers factor

## Discussion

From Fig. 3 it can be seen that M7 located at the bottom, this means that M7 can be said to be the foundation of the other sub-factors and is also a key sub-factors. As the key sub-factors, of course, this needs serious attention because it has a great influence and as a driving force of other sub-factors. Unlike the M1 that occupies the top position supported by five sub-factors namely; M2, M3, M4, M5 and M6. Although M1 is sub-factors that are considered less important than others, M1 should not be ignored. M1 will be achieved well if sub-factors below it can also work and run well too.

Figure 4 it is clear that M1 is Sub-factors located in independent quadrants meaning that these sub-factors are sub-factors independent of other sub-factors. Therefore the success of this sub-factors the trigger for the success of other sub-factors such as the M7 sub-factor included in the dependent quadrant.

From Fig. 5 it can be analyzed that P5 is a key sub factors compared to other sub factors. It is the foundation as a buffer above it. Therefore, it should get very serious attention from all parties involved so that barriers in the implementation of IT Governance can be minimized as possible. The interesting thing about these findings is that at level IV there are 4 sub-factors that occupy it, namely P1, P2, P3 and P4. These four sub factors seem

to be sub-factors that often become a barrier to almost all organizations, So it would be better if all parties involved together to solve this problem, especially at the top level of management, should be focused and committed to addressing this issue.

Figure 6 shows that sub-factors such as P5, P6 and P7 are included in the dependent quadrant, which means that these sub-factors are dependent on the other sub-factors. This sub factors has something to do with the P1, P2, P3 and P4 sub-factors that fall within the linkage quadrant, which means that these sub-factors have instability properties and can affect other sub-factors. Therefore it is necessary to be careful that other sub-factors are not affected.

## Conclusion

The result of identification and analysis of using the interpretive structural model method found that sub factors improving customer service and responsiveness as a whole (M7) Become a key sub-factor of the benefits factor. Sub factors Aligning business priorities and IT Investments (M1) is the most independent sub-element, meaning that this sub-element is a sub-element that does not depend on other sub-elements. Therefore the success of this sub factors may be the trigger for the success of the sub factors of the other. As for barriers, sub-factors of lack of financial and human support (P5) are key Sub-factors, while P5, P6 and P7 are included in the dependent quadrant, meaning that this sub factors are dependent on other sub factors. Therefore there is a need for caution in sub-factors such as P1, P2, P3 and P4 because this sub-factors belongs to the linkage quadrant, it means that in this sub-factor has the nature of instability and can affect the sub-factors another.

## Research Future

In this study, 7 benefits and 7 barriers have been found, maybe in the future more of these factors will emerge, besides this research is more qualitative, especially in obtaining data obtained through interviews and opinions of experts. Therefore, in the future, it is necessary to develop and conduct quantitative research, for example by using the Structural Equation Model, where this model involves more people so that the results may be different from the research that has been done. Statistical analysis and graphs on future research can be used to measure sub-factors at the benefits and barriers.

## Implications

This model shows how benefits and constraints as critical success factors in the implementation of IT Governance are interrelated. Interpretive Structural Model provides an understanding of how the various benefits and barriers interact with each other. This is

important because in general policymakers typically focus on only a few sub-factors (Hamid and Sulaiman, 2016; Yudatama *et al.*, 2018; Altemimi and Zakaria, 2015). The Interpretive Structural Model used in this study will enable to provide a clear picture to policymakers to better understand the benefits and barriers in implementing IT Governance (Rychkova and Zdravkovic, 2017; Jayant and Azhar, 2014; Tokta *et al.*, 2014). Decision makers should be aware of the relative importance of benefits and constraints in implementing IT Governance, even if the model is based on the opinions of experts (Hamid and Sulaiman, 2016; Rychkova and Zdravkovic, 2017; Jayant and Azhar, 2014). The results of this study will certainly help a lot in implementing better, more effective and efficient future IT Governance. It can also assist strategic and tactical decisions for policymakers within an organization. Benefits are encouraged to be optimized as long as the barriers are kept to a minimum so there will be great results (Yudatama *et al.*, 2017a).

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## Ethics

This article is the original contribution of the authors and is not published elsewhere. There is no ethical issue involved in this article.

## Author's Contributions

**Uky Yudatama:** Selected the topic and analyzed the literature along with proposing and implementing the methods.

**Achmad Nizar Hidayanto:** Supervising the research by reviewing the manuscript iteratively and giving suggestions and recommendations.

**Bobby A.A Nazief:** Coordinated the data-analysis and contributed to the review of the manuscript.

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