Corruption from a System Dynamics Perspective: A Systematic Literature Review

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Abstract

This research aims to produce a comprehensive corruption eradication model through dynamic system modeling with corruption systemic factor analysis. The method used in this research is systematic literature review (SLR), where SLR is a research method to identify, evaluate and interpret all relevant research results related to certain research questions, certain topics, or phenomena of concern. The results show that dynamic system modeling produces a comprehensive corruption eradication model. This research provides an overview of corruption research with a dynamic system model approach based on causal relationships between variables related to economic, social, political, legal and cultural factors, through causal loop diagrams that provide a broader picture of the dynamics of corruption. The resulting comprehensive policy model must be that all these factors are interrelated with each other.

Keywords: corruption, systemic corruption, dynamic systems, and comprehensive policies

Abstrak

Penelitian ini bertujuan untuk menghasilkan model pemberantasan korupsi yang komprehensif melalui pemodelan sistem dinamis dengan analisis faktor sistemik korupsinya. Metode yang digunakan dalam penelitian ini adalah sistematik literature review (SLR), dimana SLR adalah metode penelitian untuk mengidentifikasi, mengevaluasi dan menginterpretasikan semua hasil penelitian yang relevan terkait dengan pertanyaan penelitian tertentu, topik tertentu, atau fenomena yang menjadi perhatian. Hasil kajian menunjukkan bahwa pemodelan sistem dinamik menghasilkan model pemberantasan korupsi yang komprehensif. Kajian ini memberikan gambaran tentang penelitian korupsi dengan pendekatan model dinamika sistem berdasarkan hubungan sebab akibat antar variabel yang terkait dengan faktor ekonomi, sosial, politik, hukum dan budaya, melalui diagram lingkaran sebab akibat yang memberikan gambaran lebih luas

tentang dinamika korupsi. Model kebijakan komprehensif yang dihasilkan harus semua faktor ini saling eksklusif

Kata Kunci: korupsi, korupsi sistemik, sistem dinamis, dan kebijakan komprehensif

INTRODUCTION

This research attempts to analyze the systemic factors of corruption through dynamic system modeling in order to produce a comprehensive anti-corruption policy. The facts described above show that corruption is a complex problem, because it is related to many factors and is systemic in nature so that a comprehensive policy is needed to handle it. As noted Ackerman(Ackerman, 2018) which states that :

1) Corruption is an economic and political problem, although it has historical and cultural roots
2) Corruption as an economic problem has economic interests and economic inequality
3) Corruption as a Cultural Problem, for example Bribery. Corruption by officials in contract policy making
4) Corruption as a Political Problem: Kleptocracy. Democracy as an electoral system (voting) and a means of campaign financing.

World Economic Forum (WEF) data in the 2018-2019 Global Competitiveness Report shows that corruption is the highest obstacle to doing business in Indonesia with a score of 13.8. This results in doing business in Indonesia at a high cost due to corrupt practices. In addition, factors causing business disruption in Indonesia are inefficiency of the government bureaucracy with a score of 11.2, access to finance with a score of 9.2, and inadequate infrastructure with a score of 8.8. The fifth inhibiting factor is the instability of policies made by the government with a score of 8.6. Meanwhile, government instability and the tax ratio rank next with 6.5 and 6.4, respectively.

With the type of corruption that is systemic and associated with many causes and consequences, the dynamic systems approach is very suitable for use in this study. The advantages of systems thinking and system dynamics approaches are (1) the resulting model can accommodate in detail all important variables both and can be used to solve detailed problems of complexity; (2) can explain the dynamic interrelationship between these important variables, to overcome the problem of dynamic complexity; (3) the resulting variables can describe the activities observed through soft variables, real variables and variables from the results of a calculation into a model simultaneously.(Den Nieuwenboer & Kaptein, 2008).

The resulting model is a comprehensive model, with the application of a system of thinking and a dynamics system in handling corruption. This approach always considers the causality relationship and the dynamic inverse process between variables in the form of an inverse loop(Ullah & Arthanari, 2011). The dynamic process of improvement, as well as other community phenomena, occurs in 3 (three) possible behaviors (systems building blocks), namely (1) reinforcing behavior, (2) balancing behavior, and (3) behavior that describes the existence of delay (delay). Such behavior can be observed dynamically over time(Den Nieuwenboer & Kaptein, 2008).

Comprehension is obtained through combining several policies to achieve goals(Milios, 2018), that a comprehensive policy mix needs to go beyond just combining loosely related or unconnected individual policy instruments to be successful in practice other than that (Frenk, 2015) stated that a comprehensive policy can be obtained by combining several analytical tools and approaches in order to provide solution policy recommendations.

"The attempt to combine, in a herent framework, various analytical tools that have been developed recently, such as a measurement of the burden of disease, cost-effectiveness analysis to integrated packages of essential interventions, national health accounts, assessment of system performance, consumer surveys, and political mapping " (Frenk, 2015: 257).

The system dynamics approach is not only used to test the relationship between variables in a complex and dynamic thinking system, it is also used to simulate a policy before it is implemented, with the help of software namely Vensim and Powersim. This approach is able to minimize policy errors (Liu & Arthanari, 2016).

Therefore, it is necessary to take steps for a more comprehensive eradication of corruption, namely through strengthening the strategy of eradicating corruption that can touch all causes of corruption, either directly, indirectly, individual factors or structural factors in accordance with the existing conditions in Indonesia; as well as encouraging state officials (other than the KPK) to make efforts to improve bureaucratic conditions and governance.

This study develops a system dynamics model based on cause and effect relationships among variables related to economic, social, political, legal and cultural factors, through a causal loop diagram, which provides a broader picture of the dynamics of corruption in Indonesia.

. This research will produce an anti-corruption strategy formulation at the government level. Model simulation with dynamic system provides a comprehensive picture by providing different scenarios for controlling corruption. These results are important in at least two main ways: a) first, this research will be able to define the characteristics of a causal pie chart and its reference mode and how it is distinguished from historical data, both qualitative and quantitative; b) second,

Therefore, in the opinion of researchers, there has been no comprehensive research on corruption eradication strategies, namely concerning economic, social, political, legal and cultural factors as well as those related to strengthening corruption eradication strategies that can touch all causes of corruption in accordance with the existing conditions in Indonesia. Through this research, entitled analysis of systemic factors of corruption through dynamic systems modeling will produce a comprehensive model of corruption eradication.

METHOD

This research was conducted with a literature study or literature review (systemic literature review) to see corruption. Systematic review is a research method to identify, evaluate and interpret all relevant research results related to certain research questions, certain topics, or phenomena of concern (Kitchenham, 2004).

Researchers 'collect relevant publications by conducting electronic searches for the terms "corruption" and "system dynamics" on various international journal sources that researchers conduct through Google search engines, System Dynamics Society Proceedings, and google scholar in keywords, titles, descriptors, and abstracts. In addition, the team consults with reviews of other published literature. Finally, the team conducted a manual review (looking for relevant research by title).

The search returned more than 10 journal articles, reports, and book chapters and dissertations. After scanning the title and abstract of the publication, the team eliminated the obviously irrelevant publication. Then, the team reviews the abstract to assess whether the publication meets the following criteria: (a) empirical research studies (to be considered empirical studies the article must present information about the data collection methods used to inform the claims made); (b) focus on program or policy evaluation or needs assessment (not personnel evaluation, accountability/student assessment studies, data-driven decision making, etc.); (c) focus on corruption issues and the use of dynamic systems as tools; (d) published journal articles, books, publicly accessible evaluation reports, or dissertations (not unpublished works); and (e) the inclusion

of the use or influence of evaluation as at least one of the variables studied.

After the abstract review, the team identifies publications that require a full-text review; This is then filtered again on all five criteria. This process resulted in 25 articles on which this analysis is based. At least two screeners categorize and critique each study using a standard review form developed and refined with input from a supervisor.

RESULT AND DISCUSSION

The theme of corruption which is the focus of this research has indeed been studied by various parties from various perspectives such as economics, law, politics and so on. However, these studies have not discussed all these aspects in one (partial) study and have not specifically discussed the eradication of corruption in an administrative context related to preventive actions that can be taken within the scope of the bureaucracy to prevent acts of corruption. Economists, for example, tend to examine the problem of corruption from the perspective of the impact of corruption on investment, which in the view of economists, corruption is considered to be able to distort the costs incurred by investors so that it affects the level of investment. Meanwhile, legal experts tend to examine the problem of corruption from a juridical perspective related to the fulfillment of the elements against the law of acts of corruption based on applicable regulations. Thus, a significant difference can be seen between Studies that discuss corruption from various perspectives, especially those that discuss in a dynamic systems perspective (1) Ullah, Muhammad Aman et.al (2011) regarding corruption and public perceptions seen from a dynamic systems perspective, (2) Olaya, Camilo (2002) regarding dynamic systems in measuring corruption and reform in Colombia, (3) Liu, Xiojing and Arthanari, Tiru (2016) regarding the use of a dynamic system model in viewing corruption in the flow of funds, (4) Ullah, Muhammad Aman, et.al (2012) regarding the use of the system dynamic in understanding perceptions of corruption, (5) Marinkovic, Milica et.al (2015) regarding corruption in the procurement of public goods in a dynamic systems perspective, (6) Den Nieuwenboer, Niki A (2008)regarding dynamic system analysis in organizational corruption, and (7) Soto-Torres, MD (2007) regarding a dynamic system model in corruption in the form of extortion.

(1) Ullah, Muhammad Aman et.al (2011) regarding corruption and public perceptions from the perspective of dynamic systems. The rationale for this research is to build a dynamic model of the initial system of corruption, so that the model can broaden

our understanding of corruption and act as input for future corruption policy making. Systems dynamics modeling enables researchers to discover 'hidden' dynamics. In addition, system dynamics allows analysts to increase the degree of flexibility, because system dynamics modeling uses theoretical understanding, as well as empirical data collection. Indeed, as a result of this study, it provides explanations that reveal the fundamental factors that address the dynamics of the corruption, social, economic, political, judicial and cultural factors in any developing country, and can be implemented with some modifications for developed countries. This determines the problem of corruption in society by including very complex and different social, cultural and even religious aspects that have largely remained untouched in the study of system dynamics in the past. The corruption system dynamics model developed in this study will be useful for policy makers and non-government organizations in understanding the complex nature of corruption(Ullah & Arthanari, 2011).

(2) Olaya, Camilo (2002) regarding a dynamic system in measuring corruption and reform in Colombia. The aim of this article is to show how system dynamics can complement public policy analysis in Colombia, in particular intergovernmental policy design and decentralization. To achieve this aim, the project developed a system dynamics model around the problems mentioned above, specifically focusing on the financial transfer policy and the problems associated with it. The model is built from several sources and includes several variables such as: local government assets, maintenance expenditures, local government utilities, effective investment in development plans, economic demand to the central government, economic transfers, fiscal adjustments, local government capacity management, credit, salary, salary pressure , regional autonomy, poverty. The end of the model includes 7 main positive feedback loops and 6 negative feedback loops, each with an important name. In this extended abstract I will only count them. Positive feeedback loops: financial quality, structural development, unmet basic needs, prudent spending, corruption and control, civilian oversight (tutela), seizures. Negative feedback loops: public pressure, spending, maintenance, constructive foreclosures, no planning, fiscal laziness. discretionary spending, corruption and control, civilian surveillance (tutela), seizures. Negative feedback loops: public pressure, spending,

maintenance, constructive foreclosures, no planning, fiscal laziness. discretionary spending, corruption and control, civilian surveillance (tutela), seizures. Negative feedback loops: public pressure, spending, maintenance, constructive foreclosures, no planning, fiscal laziness.

This case demonstrates many lessons. First, it provides direct implications and suggestions for Colombia's next decentralization reform. Second, it provides a way to better design policies in this field, a problem that is urgent at this time and which is very critical in developing countries. Perhaps a more promissory lesson could be for public management. This demonstrates the potential to improve policy design skills for public systems managers to restore the recently lost legitimacy and turn them into better public reformers.(Olaya, 2002).

(3) Liu, Xiojing and Arthanari, Tiru (2016) regarding the use of a dynamic system model in viewing corruption in the flow of funds. This article identifies the risk of corruption in the dairy supply chain as a research loophole. This paper describes how corruption changes supply chain risk factors and performance in the dairy sector, and identifies mitigation strategies to safeguard the milk supply chain from risks posed by corruption. By reviewing the literature on milk supply chain risks and corruption risks in the supply chain. It then proposes a research methodology, idea modeling and an initial system dynamic model to lay the groundwork for further studies. Corruption may exist in various links of the milk supply chain, and affects supply chain performance. Two research methods, case study research and systems dynamics modeling, has been introduced and proved conformity. Used to present our initial ideas for developing a system dynamics model.

It's still a work in progress. Further research will be focused on the system dynamics of the model purification for simulation. After gaining access to more dairies, investigators will conduct semi-structured interviews to gather data. Risk factors and risks of corruption in the milk supply chain will be established. More interview data will generalize the variables and their relationship. The causal pie chart and the stock flow diagram on our paper will be refined. After model verification, simulation analysis can be performed. The underlying relationship can illustrate how corruption changes the risk factors for the milk supply chain, and how to safeguard the dairy supply chain from risks resulting from corruption(Liu & Arthanari, 2016).

(4) Ullah, Muhammad Aman, et.al (2012) regarding the use of dynamic systems in understanding perceptions of corruption. This study is mainly focused on specific

characteristics such as: economic problems, legal problems, social propositions, impacts on national development, and those related to economic policies. Systems dynamics modeling enables researchers to discover 'hidden' dynamics. This article has explained the concept of modeling corruption in Pakistan using the Causal Loop Diagram (CLD). The main objective of this study is to develop a theoretical framework that can be used to study corruption dynamics through SD. The methodology used is a case study. Semi structured interviews with key stakeholders such as: government ministries or agencies, donor agencies, judiciary, police departments, non-governmental organizations and the general public. On the basis of social theory which has developed three initial CLD models of corruption. Since corruption belongs to a complex class of social problems, we hope that the insights from this study will apply in new areas. The data for the qualitative system dynamics analysis came from 30 interviews conducted in (Islamabad) Pakistan(Ullah, Arthanari, & Li, 2012).

(5)   Marinkovic, Milica et.al (2015) regarding corruption in the procurement of public goods in a dynamic system perspective. The purpose of this study is to build a model of corruption based on the Dynamic Performance Management approach to broaden the understanding of corruption and the reasons behind it, as well as to provide input for future policy making on the problem of corruption. By using computer simulation modeling to explore how public procurement outcomes in a particular public service provider produce in both the short and long term. Or in other words about how to implement a Dynamic Performance Management system to reduce the effect of corruption on the performance of Public Service organizations - on the one hand, and Public Welfare - on the other.

The system dynamics model of corruption developed in this study will be useful for policy makers and non-government organizations in understanding the complex nature of corruption. This modeling methodology is used in the perspective of a Dynamic Performance Management approach, which provides an opportunity for decision makers to clearly distinguish how performance drivers can be used to reflect the effects on the End Results and Strategic Resources of these public service providers. With this study, we hope to better interpret the main interrelated forces that regulate corruption and design sustainable policies on strategies to limit the negative impact of corruption on the society of Service providers. Furthermore, This paper provides a case study analysis that

can serve as the basis for further examination of the performance of Public Service providers using dynamic modeling. Future findings should focus on the empirical examination of this study to redefine its application, and should provide policy makers and managers with a better position to understand the system and achieve the desired results.(MARINKOVIĆ, BIANCHI, & COSENZ, 2015).

(6)   Den Nieuwenboer, Niki A (2008) regarding the analysis of dynamic systems in organizational corruption. Until recently, theory and research on corruption in organizations has primarily focused on the state of its antecedents of staticity. This article focuses on the spread and growth of corruption in organizations. To this end, three downward organizational spirals were formulated: the norms divergent spiral, the pressure spiral, and the opportunity spiral. Social Identity Theory is used to explain the mechanism of each of these spirals. Our dynamic perspective contributes to a greater understanding of the development of corruption in organizations and opens up promising avenues for future research(Den Nieuwenboer & Kaptein, 2008).

(7)   Soto-Torres, MD (2007) regarding a dynamic system model in corruption in the form of extortion. This article builds a system dynamics model to study the impact of several corrupt public activities on economic growth. The model is articulated around a generic economy in which the public and private sectors take part. Sectors produce different goods using the same available economic resources. Both use labor and can use different criteria for paying their workers. The difference between private and public wages allows a model to justify the introduction and persistence of over time public corrupt activity in the economy. The causal structure collects the decisions and rules of the agent's economic behavior. This reflects normal economic activity and the interactions between them and new causal relationships arising from corrupt activities. The feedback process fully explains why corruption alters public and private production and the wealth of some citizens. After formulating the decision rules of economic actors, calibrating the parameter values and initial conditions of the level, simulation exercises are carried out to characterize the growth achieved by the economy under different scenarios taking into account different levels of corruption and different ways of countering it.(Soto-Torres, Fernandez-Lechon, & Fernandez-Soto, 2007). Various previous studies related to corruption can be summarized in table 1 below.

Table 1. Previous Research Related to Corruption

No	Researcher/ Title	Result
1	Ullah, Muhammad Aman et.al (2011)/ Using a qualitative system dynamics approach to investigate perceptions of corruption.	Develop a theoretical framework that can be used to study the dynamics of corruption through SD.
2	Olaya, Camilo (2002)/ A system Dynamics model for a new perspective to the Colombia Decentralization Process Reform .	The model provides direct advice for Colombia's next decentralized reform. Provides a way to design better policies to improve policy design skills for public systems managers to recover lost legitimacy and turn them into better public reformers.
3	Liu, Xiojing and Arthanari, Imitate (2016)/ A system dynamics model for managing corruption risks in dairy supply chains.	Identification of milk supply chain risk factors and risk impacts; corruption changes the performance of the milk supply chain through modification of supply chain risk factors; and constructing an introductory system dynamics model to lay the foundation for the final model.
4	Ullah, Muhammad Aman, et.al (2012)/ Enhancing the understanding of corruption through system dynamics modeling.	The factors that underlie the dynamics of corruption are social, economic, political, judicial and cultural factors in developing countries, which can also be applied to developed countries. The corruption system dynamics model produced in this study will be useful for policy makers and non-government organizations in understanding the complex nature of corruption.
5	Marinkovic, Milica et.al (2015)/ Designing Outciome-Based Performance Management Systems Through System Dynamics Modeling to Frame Corruption in Public Procurement.	The complexity of corruption in public procurement is greatly helped by the use of a systemic and dynamic framework.
6	Den Nieuwenboer, Niki A (2008)/ Spiraling down into corruption: A dynamic analysis of the social identity processes that cause corruption in organizations to grow	This dynamic perspective contributes to a greater understanding of the development of corruption in organizations and opens promising avenues for future research.
7	Soto-Torres, MD (2007)/ System dynamics model about public corruption: the influence of bribes on economic growth.	Building a system dynamics model to study the impact of several public corruption activities on economic growth.

Source: researcher analysis (2020)

Based on a search of a number of literature as described above, it can be seen that the theme of corruption which is the focus of this research has indeed been studied by various parties from various perspectives such as economics, law, politics and so on. However, these studies have not discussed all these aspects in one (partial) study and have not specifically discussed the eradication of corruption in an administrative context related to preventive actions that can be taken within the scope of the bureaucracy to prevent acts of corruption. Economists, for example, tend to study the problem of corruption from the perspective of the impact that corruption has on investment which in the view of economists, corruption is considered to be able to distort the costs incurred by investors so that it affects the level of investment.

Meanwhile, legal experts tend to examine the problem of corruption from a juridical perspective related to the fulfillment of the elements against the law of acts of corruption based on applicable regulations. Thus, it can be seen that a significant difference between this study and a number of similar studies that have been conducted before.

Compared to other research on the theme of corruption, this study is one of the very few studies on the theme of corruption that uses the dynamics system as an analysis tool, so far the researcher has only found 2 studies published online in other journals and websites, namely the research of Ullah (2011), and Ullah (2012) which took the theme of corruption with a dynamic systems approach. Even then, researchers see that they only examine a few factors in their research, namely economic, legal and ethical factors. While this research tries to involve all the factors that cause corruption for a careful researcher, namely economic, cultural, legal, ethical, political, moral, etc. in this research which is then examined in a dynamic systems perspective.

CONCLUSION

Based on the explanation above, it can be seen that the results of this study are expected to provide a new repertoire of corruption research using a dynamic system as an approach/tool, with a litereture review conducted it can be concluded that the theme of corruption which is the focus of this research has indeed been widely studied by various parties from various points of view such as, economics, law, politics and so on. However, these studies have not discussed all of these aspects in one (partial) study and have not specifically discussed the eradication of corruption in an administrative context related to preventive actions that can be taken within the scope of the bureaucracy to prevent acts of corruption as this study did.

Recommendation

The suggestion that can be put forward is that it is necessary to carry out further research to examine the evaluation of corruption eradication policies in a dynamic system perspective so that a more empirical and concrete model of policy recommendation is found.

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