

Does E-Procurement Prevent Corrupt Activity in Public Procurement Process?

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Article Info

Abstract

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Corruption is an extraordinary crime that occurred in every country. The United Nations Office on Drugs and Crime (UNODC) reported in 2013 that about 10-25 percent of the value of public procurement in the whole world, including Indonesia, was corrupted. Based on the data of Indonesia's Corruption Eradication Commission (KPK), corruption cases in public procurement is in the highest rank compared to the others. Using a game theoretical approach, this study aims to analyze the procurement process of public goods and services of the Indonesian Government, which has adopted the electronic system, called e-procurement. The game is played sequentially by two representative agents, namely the organizer (government) and the provider. It is assumed that the organizer has a non-corrupt nature. This study results that e-procurement is not significantly able to reduce corrupt behavior. It happens because, although the procurement process is conducted electronically, both sides still have the possibility to meet for negotiation, which can lead to corruption. Therefore, the key to preventing corrupt practices in public procurement is to avoid the two players' meeting.

Abstrak

Korupsi adalah kejahatan luar biasa yang terjadi di setiap negara. Organisasi PBB untuk Narkoba dan Kejahatan (UNODC) melaporkan pada 2013 sekitar 10-25 persen dari nilai pengadaan publik di seluruh dunia, termasuk Indonesia, rusak. Berdasarkan data Komisi Pemberantasan Korupsi Indonesia (KPK), kasus korupsi dalam pengadaan publik berada di peringkat tertinggi dibandingkan yang lain. Dengan menggunakan pendekatan teori permainan, penelitian ini bertujuan untuk menganalisis proses pengadaan barang dan jasa publik dari Pemerintah Indonesia yang telah mengadopsi sistem elektronik, yang disebut e-procurement. Permainan ini dilakukan secara berurutan oleh dua agen perwakilan, yaitu penyelenggara (pemerintah) dan penyedia. Diasumsikan bahwa penyelenggara bersifat tidak korup. Hasil dari analisis ditemukan bahwa pengadaan elektronik secara matematis tidak dapat mengurangi perilaku korup. Hal itu terjadi karena meskipun proses pengadaan dilakukan secara elektronik, kedua belah pihak masih memiliki kemungkinan untuk bertemu untuk bernegosiasi sehingga menimbulkan potensi terjadinya korupsi. Oleh karena itu, kunci untuk mencegah praktik korupsi dalam pengadaan publik adalah menghindari pertemuan dua pihak yang bermain dalam proses pengadaan.

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INTRODUCTION

Becker (1968), in his seminal paper, argued that any attempts to increase either the probability of conviction or the severity of punishment or both would reduce the likelihood of potential offenders to embark on offending behavior. Becker's argument is not without criticism. Tsebelis (1989) proposed that using decision theory to analyze the relationship between potential offenders and police is not appropriate as both players are rational. To analyze the decision of both parties, Tsebelis proposed a game theoretical method to analyze it. Tsebelis (1989, 1990, 1991) analyzed phenomena in criminal justice as a one-shot 2x2 inspection game, which is played simultaneously. On the contrary, Tsebelis (1989) proposed that any attempt to increase the severity of the penalty would reduce the likelihood of police to enforce the law and the attempt does not affect the likelihood of potential offenders to commit illegal activities. There are many applicative studies in Indonesia concerning law enforcement of crime activities using a game theoretical approach, for instance Nugraha (2012) who modeled law enforcement mechanism of tackling money laundering in Indonesia, Handoyo and Kautsar (2016) who identified the corruption eradication strategies in Indonesia, and Abbas (2017) who analyzed the tax evasion phenomenon in Indonesia.

In 2010, the Indonesian government issued the rules concerning public goods and services procurement through "the President Rules number 54 year 2010". In the rule, it is mentioned that, by 2012, all ministries and government agencies had to conduct the electronic public-procurement process, named e-Procurement. The e-Procurement is performed in order to reach an efficient transaction, to make the competition fair, and to deter corrupt activities in the public procurement process (Han et al., 2012). Lewis-faupel et al. (2016) concluded that the manufacturing procurement in Indonesia has reached the effectiveness but not efficient (the costs of procurement process remain high). The high competition causes high costs. This situation was exploited by the organizers to extort the (potential) provider so the (potential) provider could win the competition. It is confirmed by Büchner et al. (2008) that although the organizer is known as an honest organizer, the (potential) provider still tends to commit an illegal act by bribing the organizer.

The public procurement process refers to the government's goods and services spending activity (Kashap, 2004; Burquet, 2017). The OECD (Organization for Economic Co-operation and Development) states that on average, a country spent 5-30 percent of its GDP to provide public goods and services. Unfortunately, illegal and corrupt activities often occur in the process of procurement of public goods and services. The form of corrupt activities on the process of procurement is bribery and/or extortion (Auriol, 2004; Compte et al., 2005; Büchner et al., 2008). Bribery occurs when a potential provider pays a certain amount of money to the organizer (government), whereas extortion happens when the organizer asks the provider to pay a certain amount of money so the organizer can still participate in the procurement process. The social cost of corruption in the public procurement process is quite high. The UNODC (United Nations Office on Drugs and Crime) shows that about 10-25 percent of the procurement contract value in all countries has been corrupted (UNODC, 2013).

Indonesia's GDP, according to the Statistics Indonesia (BPS) in 2015, is approximately 10,542.69 billion rupiahs. In the same year, according to the Agency of Policy of Public Goods and Services Procurement (LKPP), the government of Indonesia spent 828.3 billion rupiahs to provide public goods and services. It means, at least 82.83 billion rupiahs or 10 percent of the budget spent had been corrupted. Another evidence of the corruption activities is that during 2004-2014 according to the data generated from Indonesia's Corruption Eradication Commission (KPK), the corruption activities in public goods and services procurement is ranked 2 of the most corruption cases. Compte et al. (2005) revealed that in accordance with a competition, the corruption makes the procurement process unfair while it makes the price of the goods and services higher than the market price (be marked up).

Han et al. (2012) remarked that one of the ways to reduce corruption in public goods and services procurement is by making the process of public procurement online/electronic. Actually, since 2010 Indonesia has been regulating the public procurement process electronically and the regulation had been implementing since 2012. It means, by 2012, all ministries and government agencies had to perform the public procurement process electronically, called e-procurement.

Nevertheless, the data from KPK shows that there are still corruption cases in the public goods and services procurement in and after 2012.

Concerning corruption, the game theory is able to explain the individual decision to commit corruption. The model in this study is formed from the interaction of strategies between procurement agents and it is assumed that the agents are rational. Rational agents would choose the strategy that generates optimum payoff. The behavior of procurement actors, the government as an organizer and the good and service providers in making a decision is an interesting thing to be analyzed using game theory. There are rarely found researches on how the mechanism of corruption in the procurement of goods and services in Indonesia, especially by using the game theory approach. Therefore, this study is aimed at helping the prevention and eradication of corruption from a different perspective than the existing one so that it could help Indonesian stakeholders formulate policies in combating corruption.

METHOD

This study builds a model of corruption in public procurement mechanism in Indonesia, which has been conducted electronically into a game. Using the game theoretical approach, the optimum solution of the model will be found mathematically (Cerqueti & Coppier, 2016). The element of payoff, by assuming the agents/players follows Von-Neumann – Morgenstern Expected Utility Function, is generated based on literature and legal reviews and the author's experience as an organizer and a provider. The optimum solution will be generated by the backward-induction method (Arieli & Aumann, 2015; Dimant & Schulte, 2016). By using the backward-induction method, the game will generate a mathematical theory of the mechanism of the corruption in the public procurement process in Indonesia.

Arieli & Aumann (2015) stated that the backward-induction method in game theory is based on the following: the last player who has to choose the game's outcomes will choose the strategy maximizing his payoff; taking it given, the previous player also maximizes his payoff; and so on, until the beginning of the game is reached. In other words, in applying this backward-induction method, we start with the last period and go backward trough successive nodes until we reach the beginning of the game. Assuming a perfect information game and no player is indifferent between two options at any point of the game, then this principle will give us a unique prediction, which we call it the sub-game perfect Nash Equilibrium. The illustration of the principle is provided in figure 1.



Figure 1. The Backward-Induction Principle

Figure 1 illustrates the method of backward-induction to get a Nash Equilibrium of a game. We start with the last period, and it means we have two nodes. Player B has to choose whether or not to enter regarding player A's decision. At the first node, player A has decided to enter and so player B will either generate a loss of 10 (in figure 1, we see -10) if enters, or break-even (0) if stays out. This situation makes the impossibility of A and B to choose 'enter' together which is shown by crossing out the corresponding payoff (-10, -10). In the second node, player A stays out and so B will earn either 50 if he enters, or nothing if he chooses staying out. In this situation, B will enter and we can rule out the possibility of both staying out. Again, we cross out the payoff (0, 0). Moving backward to the initial node, A decides whether or not to enter. A knows that B is rational, so A knows the game will never reach the excluded payoff that has been crossed out. Therefore, A will either earn 50 if he enters or nothing if stays out. Given this reasoning, we can rule out the possibility that A will stay out and so cross out the payoff (0, 50). The remaining payoff (50, 0) is the optimum payoff, corresponding to player A entering and player B staying out.

RESULTS AND DISCUSSION

The game is played sequentially. The organizer plays first by launching a procurement package that can be conducted manually or electronically. In this paper, we will only analyze the procurement conducted electronically (e-procurement). The procurement launched is divided into two, the procurement at a reasonable price, and with unreasonable price. Not only by the corruptnatured organizer, is the unreasonable procurement price also, sometimes, conducted by the organizer with no corrupt nature. This is due to the lack of information about the market price of the goods and services, thus enabling the existing procurement value to be far greater than the reasonable price in the market or smaller—which could result in the failure of the procurement. The organizer whose nature is corrupt will launch the unreasonable price procurement, which the price is higher than the market/reasonable price—or we can say that the organizer marks the price up. The value of procurement will be published by the organizer in order to make the provider interested in following the procurement.

The game is modeling the phenomenon by the assumption of perfect information because the game is played sequentially and the provider is assumed to have any information about the organizer's nature and vice versa. Also, the game is assumed to be a non-cooperative game which means that the two players do not make an agreement on what decisions will be made by each side. Another assumption of the game is that the players are rational, meaning that they would choose strategies to optimize their payoffs. The figure 2 is the extensive form of the game.



Figure 2. Game of e-Procurement (Extensive form)

Whereby,

RP	= Reasonable Price
NP	= Non-Reasonable Price
F	= Follow
NF	= Not Follow
Ν	= Negotiate
NN	= Not Negotiate
А	= Accept
NA	= Not Accept
Т	= Take
NT	= Not Take
A (110)	= Organizer's Payoffs
B (110)	= Provider's Payoffs

1. Stage 1

The game begins with the organizer possess the 'no corrupt' nature. The organizer has two strategies—conducting procurement with the unreasonable price (NP) or with reasonable price (RP) (see figure 2). When the organizer decides the strategy RP, the provider has two possibilities to follow (F) it or not to follow (NF) it. If the provider chooses not to follow (NF), the procurement is failed. The organizer would gain the payoff of Reservation Utility when the procurement fails to be conducted (\tilde{U} f). In spite of the failure, the organizer still would earn a utility of honorarium (UHf). Still, this honorarium is smaller than the honorarium of the succeed procurement (UHs)—UHf < UHs. From the provider perspective, the condition of fail procurement would also give him the Reservation Utility (\tilde{U} g). It can be concluded that the payoffs earned by both the organizer and the provider are:

 $\begin{array}{ll} A1 & = \tilde{U}f + UHf \\ B1 & = \tilde{U}g \end{array}$

Note that the payoff A belongs to the organizer, and B to the provider.

After (assumed) accepting the provider's offer, the organizer continues the procurement to the process of verification. In this process, the organizer not only verifies the provider's qualification documents but also, optionally, can negotiate with the provider (N)—or not negotiate (NN). When the organizer chooses NN, the payoffs earned would be the reputational utility of conducting not-corrupted procurement (URs), the utility of conducting procurement (Us), the reputational utility of conducting e-procurement (URes) and the utility of honorarium for success procurement (UHs). From the provider's perspective, when the organizer chooses not to negotiate he would generate the experience utility of being accepted as a public procurement's provider (UEb), the reputational benefit (URb), and utility of reasonable profit earned (UPrb) because of procurement with Reasonable Price (RP). The conclusion of each payoffs is:

A2 = Us + URs + URes + UHs

B2 = UEb + URb + Uprb

Another option for the organizer, after accepting the provider's offer, is to negotiate (N). The negotiation performed aims to raise the quality of the procurement, including price negotiation or technical negotiation. Then, the provider has two strategies to respond to it, 'accept' or 'not accept' the negotiation. If the provider accepts the negotiation, the payoff gained by the organizer is the same as he does not negotiate while the provider would gain the difference profit because the negotiation creates smaller profit (UPnrb), where UPnrb < UPrb.

A3 = A2 = Us + URs + URes + UHsB3 = UEb + URb + Upnrb

When the provider chooses 'Not Accept' the negotiation, the payoffs earned by two players are the same with A2 (for organizer) and B2 (for the provider).

$$A4 = A2 = Us + URs + URes + UHs$$

 $B4 = B2 = UEb + URb + Uprb$

2. Stage 2

Now, let us analyze what happens when the organizer conducting procurement with the unreasonable price (NP). Büchner et al. (2008) state that the information gap about the transaction cost between the two players could make the providers have the tendency to bribe the organizers, although the organizers do not have the nature of corruption. In the procurement with unreasonable price, we will see the process of bribery.

Because the nature of the organizer is 'no corrupt' in this stage, the bribery committed by the provider is in secret, for instance, by giving a shopping voucher or bonus in the form of goods. In this paper, the term 'no corrupt' shows that there is no intention from the government (organizers) to conduct corrupt procurement. Therefore, the bribery situation would also happen in this 'no corrupt' nature game.

In a real situation, the unreasonable-priced procurement—meaning that there is a difference that is too big between the value of procurement and market prices—will raise doubts for the providers and will decrease the credibility of the organizers. The difference is often seen as an additional transaction fee and by the providers. That is when the information gap arises. The providers will give an offer close to the value of procurement in order to anticipate the corruption practice that probably arises because of the unreasonable-priced procurement. The anticipation done by the providers is bribing the organizer which creates Cb. Cb is the function of the price offered by providers, the price of goods and services, and the reasonable profit (Pbr).

Cb = f(price offered, the price of goods, Pbr) Cb = Price Offered - (Price + Pbr)Cb = Price Offered - Price - Pbr

The Cb forms the new utility UCb.

Remember, the nature 'no corrupt' means that the government (organizer) actually does not expect the corruption practice to occur. The difference between real market prices and the value of procurement happens because of the government's ignorance of market prices. Hence, if the provider does not make a bribe the organizer would not eliminate the provider's offer which resulted in the failure of procurement.

When the provider chooses not to follow (NF), the procurement is failed. The payoff earned would be:

 $\begin{array}{l} A5 = \tilde{U}'f + UHf \\ B5 = \tilde{U}'g \end{array}$

Which is the same as A1 and B1.

If the provider chooses to follow the procurement, the two options for the organizer are to negotiate (N) or Not Negotiate (NN). Suppose, the organizer decides not to negotiate. If that so, the provider would get the same payoff as B2 and B4 with UCb as an additional payoff.

A6 = Us + URs + URes + UHsB6 = UEb + URb + UPrb + Ucb

The responses (belongs to the provider) to respond the strategy N (belongs to the organizer) are accept, Not Accept, and bribe.

a. Assuming that the provider chooses 'accept', the payoffs are:

A7 = Us + URs + URes + UHsB7 = UEb + URb + UPrb + UCnb

UCnb is the utility created from the negotiation of Cb. It indicates that UCnb < UCb. b. If the provider chooses 'Not Accept', the payoffs are:

A8 = Us + URs + URes + UHsB8 = UEb + URb + UPrb + Ucb

c. When the provider chooses 'bribe', it would be responded by the organizer. The organizer could take or no take the bribe. When the organizer takes the bribe, he would get an additional payoff UCb – UCnb and negative reputation (-URs) while the provider would get an additional payoff, the utility of bribe (Ubri) and negative reputation for bribing (-URb).

A9 = Us + URes + (UCb - UCnb) + UHs - URsB9 = UEb + Ubri + UPrb + UCnb - URb

But if the organizer decides no take the bribe, the payoffs are same with A7 and B7 because the organizer naturally doesn't abuse his power for private gain. Although the provider doesn't bribe, the organizer will not eliminate the provider.

A10 = A7 = Us + URs + URes + UHsB10 = B7 = UEb + URb + UPrb + Ucb

3. The Optimum Strategy

As we describe previously, the optimum strategy will be generated by using backwardinduction. First, we will generate the optimum strategy in stage 1, the reasonable-priced procurement (RP). This backward-induction method finds the best strategy from the last sub-game.

Accept	:	Not Accept
B3	:	B4
UEb + URb + UPnrb	:	UEb + URb + UPrb

Because UPnrb < UPrb, so B4 > B3 and the organizer would get A4 as the optimum payoff of deciding 'negotiate'—the best response for the provider is to 'Not Accept' when the government chooses to negotiate.

Next step is to compare the payoff for 'negotiate' and 'Not Negotiate',

Negotiate	:	Not Negotiate
A4	:	A2
Us + URs + URes + UHs	:	Us + URs + URes + UHs

It indicates that the organizer can choose both strategy because there is no difference between A4 and A2 (A4 = A2). However, the organizer will get B4 or B2 which are the same.

Then,

Follow	:	Not Follow
B2	:	B1
UEb + URb + UPrb	:	Ũġ

The optimum strategy of stage 1 is the provider follows the procurement, the organizer chooses to negotiate or Not Negotiate (both are the same), and the provider chooses 'Not Accept' if the organizer chooses 'negotiate'. To generate the optimum strategy of stage 2 (NP), it begins with comparing payoff between 'take' and 'no take' strategy when the provider commits bribe.

Take:No TakeA9:A10Us + URes + (UCb - UCnb) + UHs - URs:Us + URs + URes + Uhs

Because the organizer is naturally 'no corrupt', the reputational effect (URs) is the biggest payoff element compared to the others. It makes A10 > A9 and means that 'no take' is the best strategy of this sub game. At the same condition, B10 is payoff earned by the provider.

We continue to the next step. After getting the best strategy of bribery game (No Take), we will go back to the game of negotiation which could be responded by the provider with three possibilities—accept (negotiation), Not Accept, or Bribe that we have found its best strategy.

Accept	:	Not Accept	:	Bribe
B7	:	B8	:	B10 (the best strategy of the sub game = no take)
UEb + URb +	UPrb -	+ UCnb: UEb	+ URb	+ UPrb $+$ UCb: UEb $+$ URb $+$ UPrb $+$ UCb

It is shown above that B8 = B10 while B7 < B8 or B10 because UCnb < UCb. The reasonable strategy applied by the provider is 'Not Accept' although it has the same payoff with strategy 'bribe'. In this situation, B8 is the provider's payoff and A8 would be the payoff for organizer. Let's go backward,

-			
Neg	ntiate		

Negotiate	:	Not Negotiate
A8	:	A6
Us + URs + URes + UHs	:	Us + URs + URes + UHs

The two strategies generated the same value of payoff. So, there is no difference if the

organizer chooses to negotiate or not. The strategy 'Not Negotiate' is the more reasonable option. A6 is the best payoff for organizer while B6 is optimum for the provider.

The last sub game in stage two shows that, still, 'follow' is the best response to the provider.

Follow	:	Not follow
B6	:	B5
UEb + URb + UPrb + Ucb	:	Ũg

After finding the best strategy of two stages, we will compare the optimum payoff of RP and NP,

RP	:	NP
A2	:	A6
Us + URs + URes + UHs	:	Us + URs + URes + UHs

Because A2 = A6, It can be concluded that corruption in public procurement process in Indonesia, although it uses an electronic system, still has a probability to occur—'Unreasonable Price' (NP) could make the bribery game happens.

In procurement with an organizer that has a non-corrupt nature, the negotiation process is a non-credible process. With or without the negotiation process, the result is the same. It is because, according to the procurement rules, the government is not able to abort the provider if the provider rejects the negotiation. The negotiation process can make the government and providers meet directly, which in turn can lead to corrupt practices. Another thing that would affect the existence of corrupt practices is the information gaps regarding the value of procurement. This information gap can lead to unreasonable procurement value (NP). In procurement with (NP) there is an opportunity for corruption. This NP creates the element UCb which can be used by both sides to commit corruption practices. The information gap that occurs because the prices are determined by the organizer (government). It can be seen in the model that the first "step" of the game is started by the organizer (government) by issuing the value of procurement to be bid by the provider who wants to take part in the procurement. The procurement value issued by the government is unknown to the provider, whether it is free from the possibility of corrupt practices or not. The gap is anticipated by the provider through the UCb value.

These findings are contradictive with Leuwis-Fapel et al. (2014) and Han et al. (2012). Both acclaimed that e-procurement is the best way to minimize the likelihood of corrupt activity in public procurement. Our game also shows that although there is a non-corrupt organizer, this e-procurement would still have a likelihood of bribery situation which contradictive with Compte et al. (2005). Our study finds that the best way to prevent corrupt activity in public procurement process is avoiding the corresponding parties meet.

CONCLUSIONS AND SUGGESTIONS

Principally, the fail procurement tends to be avoided by two parties because it leads to a loss or disadvantage. Rational agents will try to make the procurement successful. Payoff received by each player when the procurement is successful will always be greater than when it fails. In procurement with an organizer that has a non-corrupt nature, the negotiation process is a noncredible process. With or without the negotiation process, the result is the same. It is because, according to the procurement rules, the government is not able to abort the provider if the provider rejects the negotiation. The negotiation process can make the government and providers meet directly, which in turn can lead to corrupt practices. In non-corrupt organizer procurements, the first to take the initiative to commit corruption is the provider.

This study is a straightforward model of the e-procurement mechanism. This needs to be perfected by, for example, adding a new stage which the organizer has a corrupt nature. The new stage will perfect the analysis of corruption in public procurement and draw the new perspective of the procurement mechanism.

Policy Recommendation

According to the analysis, we suggest that the procurement process should not provide an opportunity for organizers (in this case, the government) and the prospective provider to meet before signing the contract. One of the ways is to maximize procurement electronically and eliminate the stages that require the meeting of the two sides directly (for instance, the Qualification Verification stage, negotiations, signing contracts, and etc.). E-procurement actually does not need direct meetings between the organizer and the provider in the process. The second suggestion is the government should have a database about credible providers to follow procurement. So, the government can verify the existing providers centrally and periodically. The verification is done by state institutions that have a task as a regulator of government procurement (in Indonesia, we call it LKPP). Hopefully, the government can minimize the possibility of dealing with less credible providers that leads to the meeting of government and provider to verify the provider's qualification. Therefore, the government should make the rules to avoid the provider and the procurement organizer meeting directly.

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