ABSTRACT

This paper empirically compares procurement outcomes between a full electronic procurement system and a semi-electronic procurement system. The procurement outcomes considered here are the winning bid, the number of bidders, and the winning probability of outsiders. The semi-electronic procurement is the system that provides a process for procurement conducted via an online website except for bidding documents submission. As a result, firms go directly to the government office to submit the bid and thus, the semi-electronic procurement allows bidders to communicate with each other at the time of bidding. In the full electronic procurement system, the presence of face-to-face communication among firms is eliminated, and firms must submit bidding documents via the online system. The analysis uses a data set for 34 provincial governments for the years 2009-2018 in Indonesia. Using the Ordinary Least Square (OLS), this paper presents evidence that the implementation of a full electronic procurement system reduces procurement costs by approximately 7.1% and increases the number of bidders by 138%. However, the presence of online submission documents decreases the winning probability of outsiders by 36%.

Keywords: Electronic Procurement System, Public Procurement, Indonesia

INTISARI

Penelitian ini membandingkan hasil pengadaan barang/jasa pemerintah antara pengadaan yang menggunakan sistem secara full-electronic dan sistem secara semi-electronic. Hasil pengadaan yang dibandingkan dalam penelitian ini adalah harga pemenang, jumlah peserta, dan probabilitas pemenang yang berasal dari luar provinsi. Sistem pengadaan secara semi-electronic adalah sistem yang digunakan dalam proses pengadaan barang/jasa pemerintah yang dalam semua tahapannya menggunakan sistem online kecuali satu tahapan, yaitu pemasukan dokumen penawaran. Oleh sebab itu, penyedia barang/jasa diharuskan datang langsung ke kantor pemerintah untuk memasukkan dokumen penawaran. Sistem ini memungkinkan penyedia melakukan interaksi tatap muka antar sesama dalam proses penawaran. Dalam sistem pengadaan secara full-electronic, penyedia diharuskan memasukkan dokumen penawaran melalui sistem online sehingga interaksi tatap muka antar penyedia ditiadakan. Penelitian ini menggunakan data dari 34 Pemerintah Provinsi di Indonesia dari tahun 2009-2018. Dengan menggunakan Ordinary Least Square (OLS), hasil penelitian ini menunjukkan bahwa implementasi dari sistem pengadaan secara full-electronic menurunkan biaya pengadaan sebesar 7.1% dan meningkatkan jumlah peserta pengadaan sebesar 138%. Akan tetapi, pengunaan sistem pengadaan secara full-electronic menurunkan probabilitas penyedia yang berasal dari luar provinsi untuk memenangkan lelang sebesar 36%.

Kata Kunci: Sistem Pengadaan Secara Elektronik, Pengadaan Barang/Jasa Pemerintah, Indonesia

CHAPTER 1

INTRODUCTION

1.1 Research Background

Public procurement in developing countries accounts for about 20% of the Gross Domestic Product (GDP) (OECD, 2012). In Indonesia, the portion of public-works procurement is about 18% of the GDP (Ministry of Finance of Indonesia, 2018). Public-works procurement accounts for approximately 60% of the overall spending of public procurement in Indonesia. Thus, public-works procurement is important in the Indonesian economy.

In the last 20 years, the system of public-works procurement in Indonesia has developed dramatically. Public works in Indonesia has been procured under three different systems. First, before 2004, the government officers conducted auctions under a manual procurement system. In the manual procurement system, all procurement process requires face-to-face communication among bidders. In 2004, they introduced a semi-electronic procurement system as an alternative to manual procurement. In the semi-electronic procurement system process, some procurement processes were conducted via an online website provided by the government. However, firms still needed to go to the government office to submit a bid document in the form of a hard copy in a sealed envelope. As a result, face-to-face communication among firms still occurred. Finally, in 2010, Presidential Regulation (*Peraturan Presiden*) No. 54/2010 on Public Goods and Services Procurement was established by the Government of Indonesia (GoI). In the regulation, a semi-electronic procurement system was replaced with a full electronic procurement system. Full electronic procurement is the process of choosing a firm in which all the procurement processes are completed online on a website provided by the government. As a result, a full electronic procurement system provides that firms no longer need to go to the government office to submit the bidding documents. The

system eliminates the opportunity for face-to-face interaction among firms. The absence of face-to-face meetings among firms lowers the risk of collusion.

1.2 Research Problem

In Indonesia, there is only one empirical study about the impact of the electronic procurement system on public procurement outcomes. Lewis-faupel, Neggers, Olken, and Pande (2016) examined the effect of semi-electronic procurement on infrastructure provisions in Indonesia using data from 2004 to 2008. They compared contracts procured under the manual procurement and semi-electronic procurement systems. They did not present evidence suggesting that semi-electronic procurement reduces costs paid by the government, but semi-electronic procurement increases quality.

The establishment of a new procurement system called full-electronic procurement in 2010 was a huge change for public procurement in Indonesia. However, there is no clear evidence that the implementation of the system affects procurement outcomes. The procurement outcomes considered here are the procurement cost, the number of bidders, and the winning probability of outsiders. Based on that situation, this paper examines all public works procured by the provincial government, which were procured under the semi-electronic procurement and full electronic procurement systems. The hypothesis presented here is that the implementation of a full electronic procurement system affects some procurement outcomes: reduces winning bid (as the proxy of procurement costs), increases the number of bidders, and increases the winning probability of outsiders (the firm that located outside the province where the procurement is held) compared to semi-electronic procurement.

Before the absence of face-to-face communication among bidders, the collusive firms form a cartel which might adopt ‘rotation’ of winner among them. This collusion reduced willingness of non-cartel firms to participate in the auction because they already know that they cannot win the tender. After the implementation of full electronic procurement, the chance for

form a cartel was eliminated which will make firms have interest to participate in the auction since they will not be worried so much about the 'rotation' of the winner. Before the implementation of full electronic procurement, other firms do not know how many bidders already submit the bid in each auction. Only the officers that can get information about the number of bidders. Officers sometimes manipulate the number of participants in each auction since it cannot be accessed publicly.

1.3 Research Question

Based on the situation above, this paper aims to answer a few basic questions as follow:

1. What is the impact of the implementation of full electronic procurement system on winning bid in Indonesia?
2. What is the impact of the implementation of full electronic procurement system on the number of bidders?
3. What is the impact of the implementation of full electronic procurement system on winning probability of outsiders?

1.4 Research Objective

This paper examines the impact of full electronic procurement system on three procurement outcomes in Indonesia. The objective of this paper is to find the evidence of the implementation of full electronic procurement system which offers the absence of face-to-face communication among bidders during the auctions can affect procurement outcomes.

1.5 Research Motivation

It is believed that the establishment of the new procurement system, namely full-electronic procurement system should affect some procurement outcomes: reduces winning bid, increases the number of bidders, and increases the winning probability of outsiders compared to semi-electronic procurement.

1.6 Research Benefit

This paper provides insights on how government procurement outcomes (winning bid, the number of bidders, and the winning probability of outsiders), especially on public works sector, are affected by a full electronic procurement system.

1.7 Research Contribution

This paper contributes to economic and public policy literature by showing the evidence of the impact of the elimination of face to face meetings among firms during the auction process on public procurement outcomes.

1.8 Research Scope and Limitation

This paper uses a data set provided by the National Public Procurement Agency of Republic Indonesia (NPPA, abbreviated as *LKPP* in Indonesian - *Lembaga Kebijakan Pengadaan Barang/ Jasa Pemerintah*), which covers public works procurement for the provincial government for the years 2009-2018. This paper analyses 82,454 public work auctions for the years 2009 to 2018. This paper only used procurement data from the public works sector, since that sector represented about 63% of all procurement contracts procured by the provincial government.

1.9 Organization of the Paper

The remainder of this paper is structured as follows: Chapter 1 describes the introduction. Chapter 2 shows the related literature. Chapter 3 introduces institutional details that describe procurement practices in Indonesia. Chapter 4 explains the data definition of the variables and empirical strategy. Chapter 5 reports findings and results. Finally, Chapter 6 shows the conclusions.

CHAPTER 2

RELATED LITERATURE

2.1 Procurement Reforms and Procurement Outcomes

There have been some researches done on the effect of procurement reforms on procurement outcomes. Tanno & Hirai (2013) also found that bids and winning bids in electronic bidding system are lower than in conventional bidding system. They use bidding data of public works auctions of an unidentified city in Japan. They compared the winning bid between two periods, collusive and competitive. They found that during the competitive period, the winning bid rate becomes lower than collusive period. During the collusive period, the bid rate and winning bid rate are very high. Municipal officials control elected winning bidder among cartel members based on their backlogs. After an investigation by the authority, the municipality reformed the auction market. The reform successfully assures competition. The entrant firms encourage the incumbents to make lower bids during the competitive period.

Ohashi (2009) examined the impact of improved transparency in the bidder qualification process on procurement outcomes using data of public works auctions in Mie Prefecture, Japan. The results showed that improved transparency reduces procurement cost for about 8% or an annual amount of JPY 200 million. Tsuruoka, (2015) examined the impact of open auctions compared to invited auctions to investigate the effects of relaxing entry regulations in term of price and quality. He used the data from public-works auctions in Japan. The results indicated that open auctions reduce cost overruns and delay in completion by more than 10%. However, open auctions do not worsen the quality of work.

Decarolis, (2014) investigated the difference between First Price Auctions (FPA) method and Average Bid Auctions (ABA) method in public works procurement in Italy. The results showed that the period when FPA was introduced in Italy to procure public works, the

final cost of the project under FPA declines by approximately 8% of the original reserve price. It confirms that FPAs significantly reduced the awarding price. De Silva, Dunne, & Kosmopoulou (2003) explored the difference in the bidding patterns of entrants and incumbents in road construction auctions that took place between January of 1997 and August of 2000 in the state of Oklahoma, USA. They found that entrants bid more aggressively and win auctions with significantly lower bids than incumbents They also found that more efficient firm bid, on average, more aggressively and firms with greater backlogs bid less aggressively. It implies that in the competitive environment, winning bid will be lower.

Onur, Özcan, & Taş, (2012) investigate the effect of the competitive environment (number of participants) on the procurement cost. They use a dataset provided by the Public Procurement Authority (PPA) of Turkey that covers all of the government procurement auctions for the years 2004–2006. They found that the number of bidders significantly and negatively affects the procurement price. Moreover, the existence of a more competitive environment significantly decreases procurement costs in Turkey.

De Silva, Dunne, & Kosmopoulou (2003) investigated the impact of distance from a location of a bidder to the location of the project on winning bid. The result was the distance to project does not influence on winning bid. They measure the exact distance between the project and the bidder's location.

2.2 Electronic Procurement System

There have been some researches done on the electronic procurement system. For example, Tkachenko, Yakovlev, and Kuznetsova (2017) examined the effect of an electronic procurement system using the data set of granulated sugar procurements in Russia from 2011 to 2013. They examined more than 36,000 procurement contracts using e-auction or non-e-auction mechanisms (single-source contracts and requests for price quotations). They found that through the electronic procurement system, the contract prices were lower compared to the

non-electronic procurement system. The result indicated that the use of e-auction leads to lower prices. In contrast, the less transparent non-e-auction procedures result in overpricing within the contracts.

Soudek and Skuhrovec (2016) evaluated the procurement of electricity and natural gas in the Czech Republic from 2008 until 2013. The study analyzed public procurement in the Czech Republic for the same commodities which are electricity and natural gas in 2006. They measured 259 procurements related to 206 electricity projects and 53 gas projects. Those projects were conducted using two types of procurement mechanisms, open and negotiated procedures. They found that the use of electronic procurement can decrease the average cost of electricity and gas commodities by 6% and 17%, respectively.

Nurmandi & Kim (2015) investigated the implementation of initiative electronic procurement in decentralized system on Indonesia's local government system. This research focusses on three local governments in Indonesia – Yogyakarta City, Tangerang City, and Kutaikartanegara Regency. They stated that electronic procurement is an important instrument for preventing corruption in goods and services procurement. They found that human resources are the pivotal factors that determine the performance of local e-procurement in three cities. However, Tangerang City is going the institutionalization phase in e-procurement initiative to ensure its sound local regulation.

However, to the best of my knowledge, there is only one study that analyzes the link between the electronic procurement system on procurement outcomes in Indonesia with a quantitative method. One example is the research done by Lewis-faupel et al. (2016). They developed a dataset of tender projects on national road works in Indonesia and India. In India, the dataset consists of more than 30,000 packages done using manual or semi-electronic procurement mechanisms from 2000 to 2009. While in Indonesia, in the period between 2004 -2008, the study covers more than 14,000 contracts from manual and semi-electronic

procurement procedures. By using difference-in-difference method, the analysis presents that the adoption of e-procurement reduces the final payment in India and contract value in Indonesia, although it is not significant.

Different from the previous study, this paper includes all public works procured by the provincial government, which were procured under the semi-electronic procurement and full electronic procurement systems. The hypothesis presented here is that the implementation of a full electronic procurement system reduces procurement costs, increases the number of bidders, and increases the winning probability of outsiders, compared to semi-electronic procurement. This paper provides insights on how government procurement outcomes (winning bid, the number of bidders, and the winning probability of outsiders) are affected by a full electronic procurement system.

CHAPTER 3

INSTITUTIONAL DETAILS

3.1 Procurement Regulation in Indonesia

This subsection describes the overview of public procurement regulated by the NPPA. The NPPA is responsible for all procurement (including goods, public works, consulting services, and other services) in Indonesia, whereas only public works procurement data will be used in this paper.

Generally, as we see in Table 1, there are three stages to the public works procurement process: contract design, bidder qualification process, and auction process. In contract design, a provincial government representative determines the procurement document, which contains technical specifications and design, reserve price (disclosed publicly), bidder qualification method, evaluation method, and schedule. There is no minimum price in Indonesian public procurement. Bids that are higher than the reserve price will be rejected. Officers should make a schedule for the auction process.

The second stage is the bidder qualification process. There are two types of bidder qualification methods, namely open entry and restricted entry. In the open entry auction, all potential firms can bid. The restricted entry method consists of two kinds of bidder qualifications; invited auction and negotiated. In invited auctions, only firms which selected by procurement officers are allowed to submit bids. Invited auctions are used for complex works. In the negotiated method, only one firm is invited by the procurement officers. We do not include data for the negotiation method in this paper, because it is not categorized as an auction. There are several steps in the procurement process for both open entry and invited entry auction. First, for open auction, the officers announce the name and address of the project, location, and reserve price and upload the procurement documents on the procurement website. The announcement for open auction last for at least seven working days. For the invited

auction, officers do not announce it on the website. They make an invitation only for firms that are included in the shortlist. Second, the firms showing interest in participating in the auction can register and receive the procurement document via the online system. Third, firms submit bidding documents to the officers. Bidding documents are the documents that provide the administrative requirements, technical specifications, and price offered by the bidding firms. Administrative requirements contain business permits, firms' legal establishment, and their work experience on similar projects. A bid passes the administration requirements if the requirements requested in the procurement document are fulfilled. The technical specification contains the materials and equipment information, technical design and drawings, and project implementation schedule plan. The officers evaluate technical specification and price documents only if the firms fulfill administrative requirements.

The third stage is the auction process. Public works are primarily procured through first-price sealed-bid auctions. In first-price sealed-bid auctions, the bidders with the lowest prices are the winners. Scoring auctions are also used when projects need high-level technology and complex construction. In the scoring auctions, the officers not only take into consideration the price, but also the technical specifications. Officers evaluate two documents, price and technical. They use an A+B evaluation; for example, A is the evaluation of the technical specifications and B is the price. Government officials evaluate technical specifications and assign the scores. Elements in technical specifications contain equipment, materials, schedule management, and the level of risk management. The firm that received the highest score consisting of the price and the score of technical evaluation is determined as the winner. The losing bidders have five days to convey objections to officers regarding the determination of the winner. Losing bidders can communicate with officers through the online system.