

Development of Management System of Public Procurement Participation in Supplier Companies

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Abstract

Public procurement is one of the most important elements of partnership between government and business and attracts significant academic interest. However, perspective of suppliers is not widely studied, especially when it comes to how they manage participation in public tenders.

The objective of the paper is, therefore, to examine specifics of management model in supplier companies.

The paper is divided into three primary parts in addition to introduction and conclusion. The first part is dedicated to the overview of trends, problems and management aspects of public procurement to study factors influencing supplier behavior. The second part is focused on the identification and classification of supplier risks. In the last part the authors determine key characteristics and performance indicators of management system of supplier participation in public procurement.

Methods/Analysis: *the research includes analysis of academic literature, legal framework and empirical research of suppliers in Russia, as well as elements of system and process approach to management system modelling.*

Findings: *key risks of procurement participation and characteristics of supplier management system have been outlined in the paper.*

Application/Improvements: *the research is useful to both government agencies and business managers in identification of areas of improvement of supplier participation in public tenders.*

Keywords: *public procurement, supplier, participation, management system, risk, efficiency of procurement.*

1. Introduction

Public procurement is one of the most prominent venues of business-to-government (B2G) interactions with approximately 12-20% of countries GDP worldwide spent on public procurement (OECD.org, 2016) and specifically 12.8% for OECD countries (OECD.org, 2013). Vast number of public needs are satisfied via this method and while as extremely close attention is paid to the issues pertaining to government perspective, such as efficiency of public savings, elimination of corruption, innovation support, the problems of suppliers are often left unexamined.

How well supplier companies perform their duties in public procurement is largely dependent on the quality of management systems that exist in the companies to navigate numerous procurement processes. Low quality management results not only in failure to secure and fulfill contracts but may also lead to loss of companies' own resources. Evidently, such situations are rather common, and especially distinguished among small and medium enterprises (SMEs) where external factors play a more significant role. For example, Loader (2015) argues that SMEs experience noticeable difficulties due to lack of 'resources to engage with a bureaucratic process', that they are 'disproportionately affected compared to larger suppliers' and that these issues have not been properly addressed for several decades. Lack of transparency, issues with identification of exact amount of transactional costs (Man et al., 2014) as well as B2G specific

communication issues (Erridge, Greer, 2000)(Klijn, Teisman, 2003) create further barriers for businesses.

Therefore, business owners and managers face not only the challenges of optimizing their business processes to tackle various organizational aspects of participating in public procurement, but they also must account for environmental risks. The success of performing in supplier role is contingent on administrative and decisional quality of management, and thus there is an evident need for a well-defined management system, the study of which is the main goal of this paper.

The article is structured as follows. Part 2 is dedicated to a review of literature on trends, problems, and management aspects of public procurement from supplier perspective with the purpose of identification of key management areas. Risks and ways to control them are discussed in part 3. The whole management system is then described and characterized in part 4, which is followed by the conclusion in part 5.

2. Trends, problems and management of public procurement

One of the most notable trends when it comes to government procurement is its centralization due to the evident savings potential (Karjalainen, 2011) with the inclusion of professional intermediary companies that assist in communications between supplier businesses and purchaser government bodies

(Heikkinen et al., 2007)(Kanter, 1994). This triad system exists in the state of continual dynamics where roles and relationships between participants constantly change which creates risks of uncertainty for all sides (Gutek, Groth, Cherry, 2002).

Another recognized trend is the increasing importance of government savings over other factors. According to Lian and Laing (2004), in the last 30 years public procurements globally have underwent substantial shift from traditional forms of procurement that focused on transactional operations and building of strong partnerships to the new era of budget limitations and the necessity to satisfy public needs in the context of limited resources. This view is shared by other authors who believe that contract cost became the deciding factor in supplier selection (Hanák et al., 2015) and that purchasers are interested in stimulating a more competitive supplier environment (Hanák, Muchová, 2015).

Public procurement is also remarkably digitalized in most countries, even where it is relatively new (Smeltzer, Ruzicka, 2000). Among various digital procurement procedures, of particular interest are dynamic purchasing systems, that are presented mostly in the format of electronic auctions (Özbilgin, Imamoglu, 2011). The use of artificial intelligence and neural networks is also worth mentioning. For instance, in the study by Ovsyannikova and Domashova, a neural network was used to identify contracts with high level of non-performance among contracts in pipe industry (Ovsyannikova, Domashova, 2020).

Public procurement has been repeatedly linked to the stimulation of innovation activity in business structures (Bresnahan, Trajtenberg, 1995)(Ghisetti, 2017) and is acknowledged as one of the most instrumental influences in that regard, even more efficient than outright grants (Geroski, 1990). Consequently, there is a growing interest in the topic of public procurement of innovation (Edler, Yeow, 2016) especially for those industries and firms that include such science-intensive services as information and communications, management, consulting etc. (Petrenko, Pritvorova, Dzhazykbaeva, 2018) However, there are several barriers preventing realization of innovation potential that all sides must account for, such as strict technical specifications, communication failures, high risks associated with innovative products and services, financial entry barriers for small and medium companies etc. (Uyarra, et al., 2014).

Management system of participation in public procurement needs to account for its problematic areas. Public procurement is criticized for a number of reasons, and inability to provide transparency of its processes is one of them (Kwak, Chih, Ibbs, 2009). For example, Man et al. highlight complexity of calculation of transaction costs associated with public procurement and therefore difficulty in assessing exact value of economic effect (Man et al., 2014). Transaction costs in this context include administration of competition, salaries of independent experts, costs of repeat procedures, legal costs etc. that are especially hard to evaluate in case of complex procurement items. Particular consideration should be given to corruption as one of the crucial problems of public procurement. Many scholars agree that the task of corruption reduction and elimination is of top priority in public procurement worldwide (Locatelli et al., 2017)(Loosemore, Lim, 2015).

Additionally, it is necessary to highlight operational differences of government purchasers in comparison to businesses. Stiff legal framework of operations and organizational culture of government structures leads to the creation of institutional and strategic barriers that cause premature dissolution of partnerships (Erridge, Greer, 2000). There are also issues with collaborate decision-making and division of responsibility between purchasers and suppliers that stem from the principal differences in value systems (Klijn, Teisman, 2003). In general, public procurement is subject to the problems of relationship building and maintenance typical to B2G partnerships (Dyer et al., 1998). Thus, unstable quality of supplier-purchaser relationships is typical to public procurements (Zou et al., 2014) which can also be explained by the traditionally passive reaction

of government agencies to market changes as contrary to the proactive search and initiation of partnerships typical to business environment (Smyth, Edkins, 2007) as well as transition to new models of management, such as adhocracy, sociocracy etc. (Velinov, Vassilev, Denisov, 2018)

In addition to trends and problems it is also necessary to consider papers on management specifics of public procurement. Teng and Liao (Teng, Liao, 2011) studied various roles played by suppliers depending on whether the purchaser's resources are high (sufficient) or low (insufficient) as well as qualification of purchaser (high or low) and concluded that there are four primary supplier segments that require different management systems: operator, professional, agent, and investor. Another look at supplier roles is taken by Keränen (Keränen, 2017). The author suggests that suppliers should change managerial roles in relationships with government purchasers depending on the stages of contract completion.

Management of procurement participation in supplier companies is influenced by the criteria of contract price determination: most economically advantageous tender (MEAT), performance based contracting (PBC), and best value procurement (BVP) (Bruno, Gelderman, Lambrechts, Semeijn, 2018). Suppliers working with MEAT contracts have to consider approaches to handling price competition while the PBC is associated with high level of responsibility but at the same time allows suppliers more flexibility. Information plays crucial role for PBC, while control is executed formally (Kleemann, 2013). Lastly, BVP model also favors information provision, specifically in relation to how it can minimize risks of uncertainty for public purchasers. BVP is a model within Best Value Approach (BVA) introduced in 1991 by Kashiwagi that is aimed at simplicity and transparency and besides BVP, also includes a risk and a project management models (Joudi et al., 2018).

Thus, supplier management system of engaging in public procurement should incorporate mentioned above factors to develop means of efficient participation.

3. Risks of public procurement suppliers in Russian practice

Efficient participation in government procurement correlates with supplier ability to identify optimal contracts with maximum economic returns and minimum risks among all public tenders available at a certain point of time. Failure to do so may not only result in inability to fulfil contract requirements but also in financial, material and reputational repercussions for the supplier.

With the purpose of identification of major risks areas in public procurement we studied 120 Russian companies that performed supplier roles in 2016 for various public needs (Umnova, 2019). Additionally, in-depth interviews were performed with procurement managers or general directors of three small and medium sized businesses that fulfilled government tenders for climate testing and heating, ventilation and air conditioning equipment. Based on the gathered data the following groups of pure risks (only losses or break-even situations are possible without opportunity for gain) have been identified:

- ❑ risks of supplier losing opportunity to apply for participation in public tenders;
- ❑ competition risks at the stage of supplier selection (auction bidding and other forms of qualification process);
- ❑ risks associated with increased financial burden on supplier during contract execution;
- ❑ risks of resource losses (tender security, initial material investments etc.) caused by purchaser actions or external factors;
- ❑ risks of fines and penalties due to failure to meet the deadline or pass expert appraisal during delivery of completed works, products or services. This usually happens

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when suppliers fail to conform with the conditions of tender contract or technical specifications;

- risks of inclusion in supplier blacklist (run by Russian Federal Anti-Monopoly Service).

According to the international standards ISO 31000 related to risk management (ISO 31000) analysis of risks should be

conducted with consideration of the following factors: a) possibility of events and their consequences; b) nature and scale of consequences; c) complexity and interconnectedness of risk factors; d) time-related factors; e) efficiency of existing means of risk control. The above listed risks have been analyzed using ISO guidelines in Table 1 below.

	Risk sources	Risk possibility	Nature and scale of consequences	Complexity and interconnectedness of risk factors	Impact period	Efficiency of existing means of risk control	Total score of risk level
1	Risks of supplier losing opportunity to apply for participation in public tenders						
	Late file of tender participation application	Likely	Lost profit opportunity	No connection with other types of risks	Short-term	Medium	Low
2	Competition risks at the stage of supplier selection and auction bidding						
	Loss due to worse price (higher contract value) or worse quality (insufficient quality according to technical specifications)	Likely	Lost profit opportunity Loss of participation fee imposed by electronic trading platform or facility	No connection with other types of risks	Short-term	Low	Low
3	Risks associated with increased financial burden on supplier during contract execution						
	Tender and contract security	Highly likely (certain)	Temporary change of capital structure and opportunity costs for financial resources impounded as tender collateral	Can cause risks p.5 and p.6	Medium-term	Medium	Medium
4	Risks of materials losses (tender security, initial material investments etc.) caused by purchaser actions						
	Bad practices of purchaser or external circumstances (for example, budget limitations)	Unlikely	Loss of invested capital (mostly materials and/or financial resources)	No connection with other types of risks	Medium- or long-term	High	High
5	Risks of fines and penalties due to failure to meet the deadline or pass expert appraisal during delivery of completed works, products or services						
	Delay in delivery of works, products or services by supplier or non-compliance with technical specifications	Unlikely	Fees, penalties, and ex parte contract rejection by purchaser with subsequent inclusion of the supplier in the blacklist	Can be caused by risks p.3 and can cause risks p.6	Medium-term	High	Medium / high
6	Risks of inclusion in supplier blacklist						
	Supplier avoidance to sign the contract or unsatisfying discharge of contract (related to p.5)	Unlikely	Impossibility of taking part in future tenders for the duration of blacklist ban, reputational losses	Can be caused by risks p.3 and p.5	Long-term	High	High

Table 1. Classification of potential risks of investigated suppliers of public procurement tenders

Source: developed by authors

One common feature of identified risks is that they are associated with primarily material or financial losses, while informational and other immaterial resources are affected to a lesser degree. It is worth mentioning that the risks not only have varying periods of exposure but also occur at different stages of supplier participation in public contracts. A more detailed characteristic of each group of risks follows below.

1. Risks of supplier losing opportunity to apply for participation in public tenders. This type of risks is associated with situations when companies do not file tender participation applications in time. To participate in electronic format, suppliers must first register with an electronic trading platform specified by purchaser; this process may last anywhere from a few hours to several weeks. Another factor to consider is collection of document package for application which is not universal and may contain documents with long periods of preparation. Thus, such risks are of technical nature and are associated with insufficient monitoring of company's readiness for participation in public procurement contracts. They occur in the beginning of participation process, result in lost profit opportunity, have a medium level of probability and short-term consequences in studied companies.

2. Competition risks at the stage of supplier selection. The most common cause of competition risk is on the basis of price. Representatives of studied companies noted that it is not uncommon to encounter rival suppliers with price dumping strategy. Another source of competition risks is quality related (accordance with technical specifications). The suppliers that lose during auction or other forms of qualification process have to deal with not only lost profit opportunity but also with waste of time and financial resources spent on participation fee (non-refundable). These risks occur later in the participation process compared to the previous group, have a medium level of pro-

bability and short-term consequences. However, existing measures of risk control are inefficient due to difficulties of competition prediction for a particular tender.

3. Risks associated with increased financial burden on supplier during contract execution. When suppliers participate in public tenders, according to Russian laws, they must provide collateral for tender security twice: a smaller sum of up to 5% of contract value before qualification process and a bigger sum of up to 30% of contract value after winning (Federal Law No. 44-FZ). While the first collateral is returned a few days or weeks after supplier selection process, the second collateral can be held by purchaser until the date of delivery or even after that for the duration of guarantee period, which in case of studied companies can last for months. Therefore, suppliers have to not only bear with temporary restructuring of assets but also opportunity costs of collateral capital as there is no interest payments provided for the impounded money. Alternatively a smaller sum can be paid to purchase a bank guarantee (non-refundable). The most common risk control measure is adaptation to collateral requirements through fund creation and other means. As collateral requirements are applied to all public procurement renders, the probability of this risk is highly likely (or even certain), its consequences are medium-term, and it is a complex risk interconnected with other risk groups (see points 5 and 6).

4. Risks of resource losses caused by purchaser actions or external factors. With this group of risks, losses of material and financial resources happen due to either bad practices of purchaser company or external factors. For example, in case of reaching budget limits or their external decrease, a purchaser has the right for a one-sided reduction of contract value (RF Government Regulation No. 1090). Corrupt practices may also cause the risks of this category, which is more probable when purchasers operate under a more loosely controlled Federal

Law No. 223-FZ (Federal Law No. 223-FZ). While situations causing this category of risks are rare, they have serious consequences with medium- to long-term impact: for instance, one of the interviewed companies reported losing all invested in contract capital in one such case. Risk control measures include purchaser check-up and are quite effective. Nevertheless, due its impact and unpredictable nature, the risk's final score is high.

5. Risks of fines and penalties due to failure to meet the deadline or pass expert appraisal during delivery of completed works, products or services. These risks are primarily caused by lapses in control of the process of contract fulfillment as well as communication failures with purchaser, subcontractor or other parties. The losses from sanctions and fees have medium-term impact, and probability is low in studied companies due to developed quality management system. The risk is complex as it

can be caused by increased financial burden (point 3), and can in turn cause inclusion of supplier in blacklist (point 6).

6. Risks of inclusion in supplier blacklist. Inclusion in blacklist of suppliers is one of the most severe risks that has far-reaching repercussions, such as loss of reputation and inability to further participate in government procurement procedures (until the end of blacklist duration). Suppliers are included in the blacklist for two primary reasons: avoidance of signing the contract after winning of qualification process, and failure to meet the deadline or pass expert appraisal during delivery of procurement item. As public tenders are an important source of clients for most of the studied companies, the final risk score is evaluated as high.

Thus, identified risks occur at various stages of procurement process, and their consequences have different scale and impact time period, which is shown in Figure 1 below.

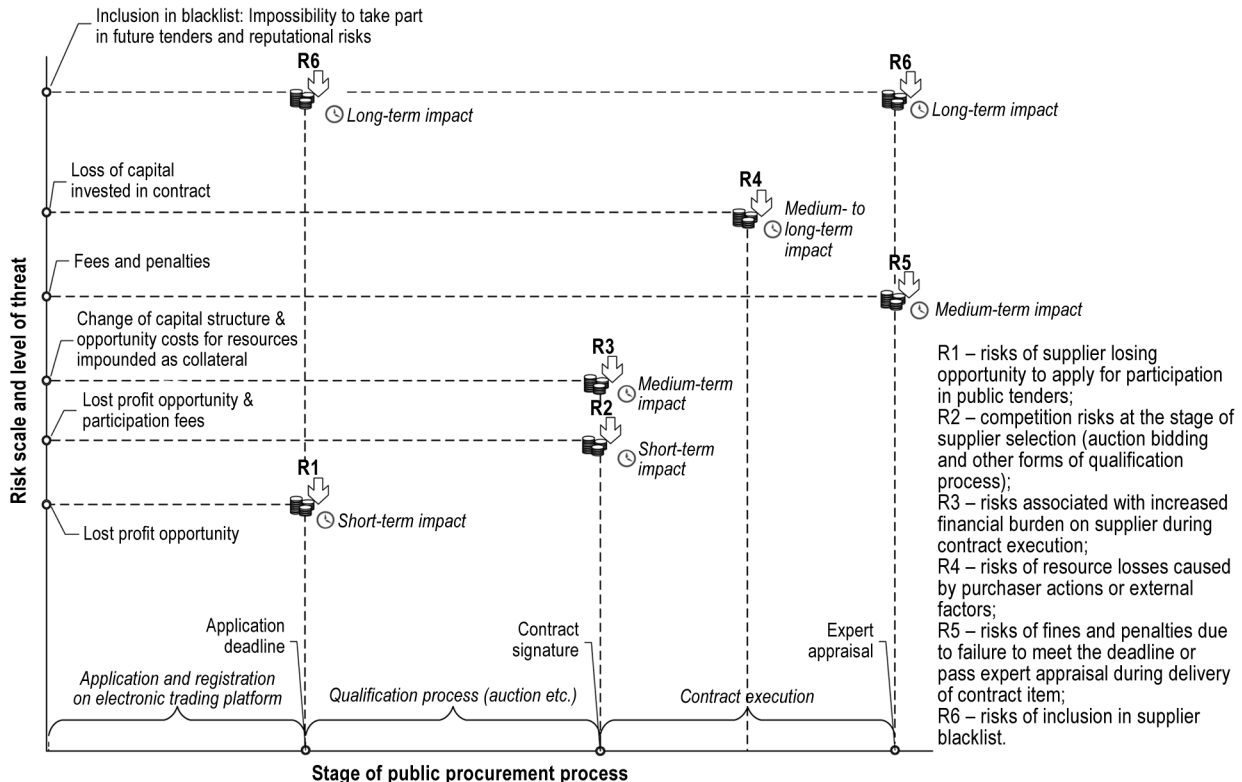


Figure 1. Supplier risks at different stages of procurement process
Source: developed by authors

4. Management system of public procurement participation in supplier companies

Companies that act as suppliers in public procurement have a definitive set of managerial tasks aimed at efficient participation with minimization of risks identified above and increasing of probability of winning optimal contracts with maximum economic returns which are coordinated in the framework of management system of public procurement participation. The system includes such classical functions of management as planning, organizing and control, and a significant part of it is dedicated to decision-making and communications with internal and external parties.

The subject of the management system is the employee(s) responsible for participation in public procurement; in small companies this role is often performed by business owners. The object of the system is participation processes themselves. Efficiency of the examined management system is directly proportional to how well it can identify optimal contracts among all available and how well it can minimize risks and increase quality of decision-making processes. Management system of public procurement participation has following characteristics:

- ❑ is part (subsystem) of general management system of company;
- ❑ its borders include all processes starting from the planning of participation to delivery of procurement items (or until warranty end, if required);
- ❑ the system consists of five primary subsystems: planning and preparation, purchaser analysis, analysis of financial viability, analysis of contract terms and technical specifications, participation in supplier selection processes, and contract execution. The first subsystem (preparation) and the last (participation) play auxiliary or supporting role, while the other three can be viewed as primary or core;
- ❑ its primary functions are document preparation, search and analysis of available contracts, decision-making;
- ❑ the system is open and connected to external parties (purchasers, regulators, subcontractors, banks, trading platforms etc.) as well as internal systems (top-management, production, finance and accounting, legal support, IT etc.).

Based on the description it is possible to visualize management system of public procurement participation, in our case with the use of IDEF0 modelling (see Figure 2).

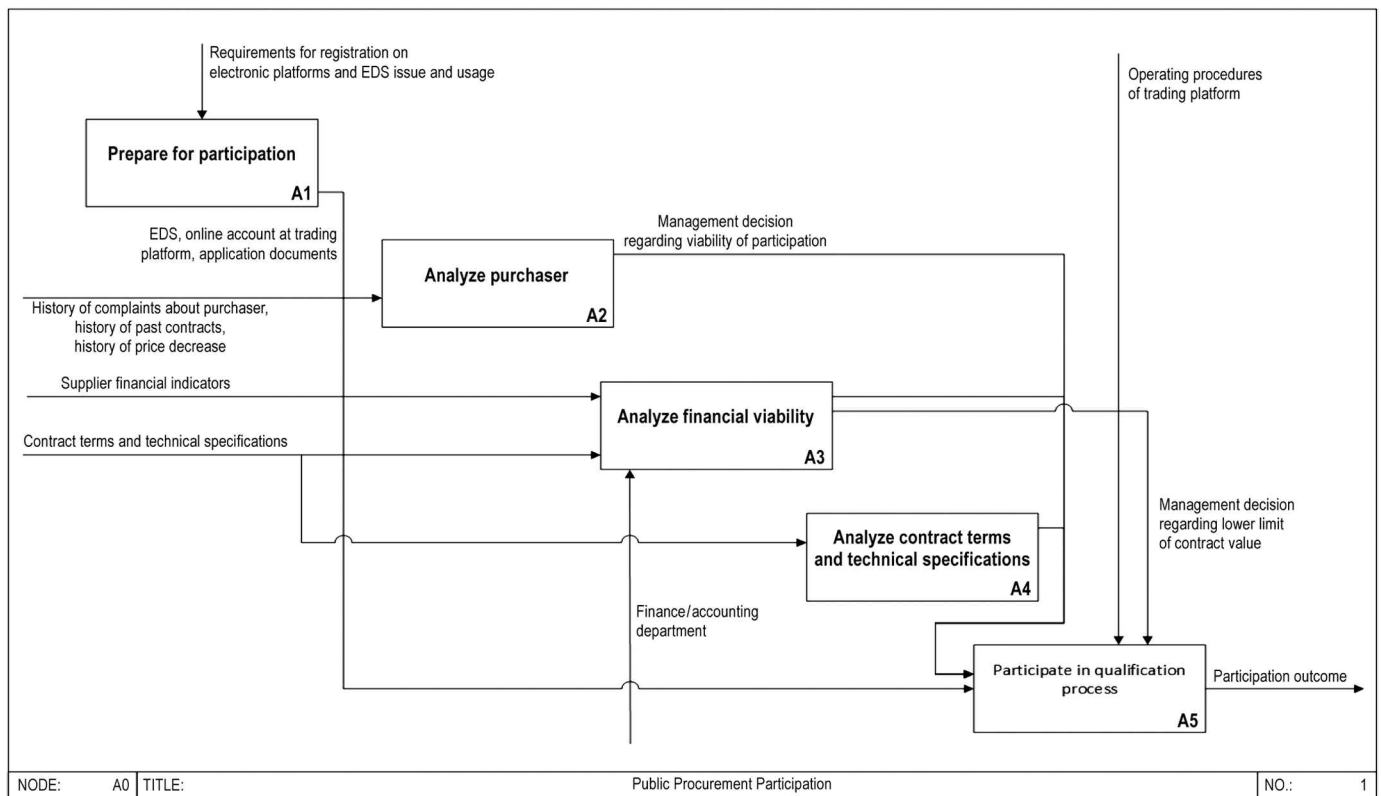


Figure 2. Management system of public procurement in IDEF0 format
Source: developed by authors

The final step of establishing management system of public procurement participation represents identification of key performance parameters used by each subsystem.

1. Preparation for participation. Risks of missing the opportunity to participate in relevant contracts are primarily of technical nature and their control is executed at the stage of preparation. We identified the following KPIs in interviews with Russian suppliers:

- period of electronic digital signature (EDS) validity;
- period of accreditation with electronic trading platforms;
- technical and document readiness, including work with cryptographic facilities.

2. Analysis of purchaser. Similarly to how purchasers compose supplier assessment forms to select the best candidate for a particular contract (Makinde, et al., 2020), suppliers can use their own checklists to assess prospect contractors. One of the first things suppliers should consider is what sort of competitive environment the investigated purchasers tends to create. According to Gupta (2002), increase of suppliers competing in a tender from two to eight can result in decrease of contract value by 12-14% on average, so bidding price going below point of financial viability is quite probable. By examining history of purchaser contracts regarding average number of competing suppliers and whether there are 'favorite' companies who executed a significant portion of contracts in the past it is possible to identify tenders with low probability of winning. Additionally, Russian suppliers consider complaints about purchaser registered with Federal Antimonopoly Service that are in open access in Unified Information System in Procurement as well as current and past arbitration or judicial cases.

3. Analysis of financial viability. Suppliers must take into consideration two financial aspects when applying for tenders: financial state of company's assets and contract terms. The former is key in managing the increased financial burden that was discussed above, and following parameters may be used as KPIs: proportion of liquid assets, cash level, reserves, available credit funds etc. Key contract terms assisting suppliers include provision of advance payment, progress payments, and other risk-reducing conditions.

4. Analysis of technical specifications and contract terms. In addition to financial aspects, evaluation of contract terms by supplier should include time savings and other non-price factors (Jap, 2002). Analysis of technical specifications can be performed with identification of quality loss parameters using Taguchi method of quality control (Antsev, Chernitsova, 2015). This is possible if a base product, work or service exists that can serve as a reference model to compare with individual procurement items. Additionally, government companies' assessment of procurement efficiency relies on a number of factors (Morledge, Smith, Kashiwagi, 2006)(Nicał, Wodyński, 2015) which can be reversely adapted for evaluation of prospect contracts by supplier, such as:

- project characteristics and its importance for parties;
- risk distribution and accountability of parties;
- funding options and market;
- client (purchaser) resources;
- issues of cost change over the project life cycle;
- contract timing;
- quality and performance of procurement item.

Interviews with Russian suppliers highlighted importance of pre-planning of procedures (participation in tenders that were planned and announced in advance) and absence of dubious conditions in procurement or contract terms, such as inflated requirements for supplier qualifications, staff, technical support etc., attempts at concealment of tenders by purchaser through such means as usage of obscure contract titles, as well as errors. It is worth mentioning that this practice of erroneous documentation is not unique to Russian practice (Juszczak et al., 2014).

5. Participation in supplier selection process. After performed analysis of purchaser, financial aspects, technical documentation, and contract terms of prospect tender the management system ensures application and participation in qualification procedures in timely and proper manner. The crucial factors to consider here are amount of remaining days until the end of application deadline, conditions for inquiry requests, and conditions for appeal filing.

5. Conclusion

Public procurement is a highly topical issue, but academic interest is drawn primarily to the study of public purchasers perspective. Suppliers and specifically management of their participation in public procurement is not as well studied. We think that more research is necessary in management practices of government procurement suppliers to not only improve efficiency of fulfillment of public needs but also to make tenders available to a wider number of businesses.

Based on our literature review as well as interviews and study of a sample of Russian suppliers, we were able to identify primary risk groups that occur at various stages of participation process, their scale, impact and control measures. Model of management system of the participation process was then presented with consideration of KPIs that can be used to determine efficiency of the system and its parts.

Risks, model of participation process, and KPIs were examined in the framework of Russian procurement practice which is relatively young and in the state of constant changes. Therefore it is doubtlessly of academic interest to further research supplier management systems in Russia in other countries, and to study management specifics in various areas of economic activities.

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