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MICRO BUSINESSES PARTICIPATION IN PUBLIC PROCUREMENT: EVIDENCE FROM UKRAINE

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ABSTRACT. The purpose of this study is to test 3 hypotheses concerning the participation of private entrepreneurs in a procurement made via Ukrainian online procurement system ProZorro. The research based on the ProZorro professional analytics module which is an online instrument for aggregation, sorting and other processing of machine-readable data on public procurement in Ukraine and uses data as of 2017 (the first year of ProZorro operations). The article uses the methods of systematic scientific literature analysis, general and logical analysis, comparison, summation and abstraction as well as mathematical and statistical processing methods. Situation analysis is based on the data of ProZorro professional analytics module and the State Statistics Service of Ukraine and the results of statistical calculations. The first hypothesis suggests that private entrepreneurs are most active in sub-threshold (small) procurement procedures and this hypothesis was refuted by the results of the study. We found that private entrepreneurs are the full-scale participants of competitive procurement procedures and are actively involved in over-threshold (large) competitive procedures. The second hypothesis assumes that participation of private entrepreneurs in public procurement would increase the competitiveness of procurement procedures, and this has been fully confirmed by the obtained results. The third hypothesis concerns territorial localization of private entrepreneurs' activities. It was suggested that private entrepreneurs are more active locally, i.e. more involved to the procurement procedures conducted by government authorities within their own region, and this hypothesis has been confirmed only for the simplest procurement procedures namely contract reporting.

JEL Classification: H57, I26,
M21

Keywords: public procurement, private entrepreneurs, open tenders, competitive procedures, ProZorro.

Introduction

SMEs participation in public procurement has received increasing interest from the scientific community in recent years. The OECD study (Hill, K. et al., 2016) analyzes the main measures to facilitate the access of SMEs to public procurement underlined in the 2014 Public Sector Directive (European Union, 2014). Thus, in order to reduce the documentary evidence required to participate in public procurement procedures the standard self-declaration form (European Single Procurement Document, ESPD) was introduced that an economic operator completes and submits to the contracting authority. Moreover, the EC has developed a free web service for contracting authorities, economic operators and other parties to assist in the completion of the ESPD electronically. E-Certis system supplements ESPD and provides a guide to the various documents and certificates required from companies tendering for public contracts. These measures greatly facilitate the participation of SMEs in public procurement.

Brief (Hill, K. et al., 2016) also considers the division of contracts into lots as a valuable measure to facilitate the participation of SMEs in public procurement and in this way to increase the competitiveness of public procurement. Varying by division into lots and limiting the number of lots for which an economic operator can tender can allow the contracting authority to preserve competition and ensure the reliability of supply, while also facilitating SMEs participation.

Regarding the principle of proportionate selection criteria, it is noted that the selection criteria to be applied must be proportionate to the size, nature and complexity of the contract. For example, the minimum turnover requirement should normally not exceed, at the most, twice the estimated contract value. The selection criteria may relate not only to the economic and financial standing but also to the technical and professional abilities of the supplier as well as suitability to pursue the professional activity. Compliance with these principles helps to eliminate discriminatory obstacles for SMEs participation in public procurement.

To perform large and complex contracts Hill, K. *et al.* (2016) offer economic operators to group together in order to respond to high qualification levels and financial requirements. Also, another opportunity for SMEs participation in large government contracts can be subcontracting which may provide good opportunities to SMEs.

An important measure for increasing innovation provided SMEs (Hill, K. et al., 2016) proposes setting technical specifications in terms of functional or performance-based requirements which describe the desired level or target to be achieved, but without prescribing the way in which that level/target is to be reached. Openness in creativity and avoiding technical/technological constraints open up wide opportunities for SMEs to new innovative solutions.

A very important tool for the involvement of SMEs in public procurement is electronic procurement systems. EU legislation removes the barriers that often discourage SMEs involvement and requires that the tools and devices to be used for e-communication, as well as their technical characteristics, must be non-discriminatory, readily available and interoperable with the information and communication technology products in general use. They must not restrict economic operators' access to the procurement procedure. (Hill et al., 2016).

Some papers are considering certain areas of public procurement. Thus, the work of German scientists investigates the influence of dividing contracts into smaller lots as a tool for attracting SMEs to government purchases. The research uses data from the German defence sector and determines the percentages of SMEs participating in and winning public tenders as well as the specific factors that influence award decisions. The main result is that an increase

in lot-wise calls will normally not lead to an increase in successful SME participation in public procurement processes. This largely does not correspond to policies of a number of states, including Germany, regarding the SME support. Other results of the study are: (1) the size of business is important in the defence sector due to the complexity and scale of contracts; (2) increased competition has a positive impact on the SMEs' success in public procurement due to the involvement of SMEs is able to enhance the innovativeness and flexibility of proposed solutions (Eßig & Glas, 2015).

This study of Croatian scientists empirically evaluates the role and perspectives for SMEs to success fully compete at public procurement markets. Their case study investigates business sector in two post-transition countries, Croatia and Bosnia and Herzegovina, in order to explore competitiveness and entry barriers specifically for SMEs to participate at the public procurement market in terms of availability of resources, corruption risks, transparency and fairness of procedure, clarity of documentation, principles and standards achieved, price, deadlines and other dimensions of public procurement (Slijepčević *et al.*, 2015).

Some papers examine the methodology for success bidding, for example, Plečić *et al.* (2018) propose a possible multi-criteria methodology for selecting the optimal of the submitted bids within the public procurement tender.

The EBRD study provides a detailed analysis of SME participation in public procurement in a number of countries, including Ukraine. The research team explored different types of policies and measures employed by governments of Cyprus, Italy, and Ukraine to promote participation of small business in public tenders in the context of the general principles of public procurement with regard to transparency, open competition and non-discrimination. In particular, they studied e-procurement systems e-Agora in Cyprus, MePA in Italy and ProZorro in Ukraine. The most distinctive common features of SME programs in Cyprus, Italy and Ukraine are (1) clear understanding of the proportionality principle in public procurement regulations in the way of aligning the complexity of public procurement regulations with the value and type of public contract; (2) all systems support competition in public procurement, without any preferences to SMEs. All tools were designed to restrict uncontrolled direct awarding but to offer a simple, easy, quick but transparent competitive procedure; (3) a clear focus to embrace innovative IT ideas and to update public procurement policies to create breakthrough electronic procurement solutions for the public sector (European Bank for Reconstruction and Development, 2017).

As a recipe for success in SME support programs in public procurement, the EBRD research based on the study of electronic procurement systems in Cyprus, Italy and Ukraine suggests using the following tools: creating competitive public procurement markets; removing barriers to entry to public procurement markets; retaining a balance between centralized and decentralized public procurement; and, safeguarding considerate centralized purchasing practices (European Bank for Reconstruction and Development, 2017).

Various aspects of public procurement system in Ukraine are discovered by the numerous studies of Ukrainian scientist. Kolosok *et al.* (2017) analyzed the state of accomplishment the long-term goals, which were established during the reform of the public procurement system in Ukraine. It has studies the level of corruption, transparency and accessibility as well as the reliability, cost-effectiveness and elasticity of the public procurement system after implementation of the ProZorro system. As a result, this study identified the systemic problems in the procurement process and underlined the directions for improving the public electronic procurement system in Ukraine, namely: (1) decentralized procurement system in Ukraine cause the differences in filtering and delivery the procurement announcements to participants who registered at the different trading platform. The legislative inconsistency of the client support issues and the diversity in trading platform requirements

can affect the unequal opportunities for business participants, which disimprove the competition in the procurement market; (2) the number of non-competitive trades increased significantly since ProZorro implementation. From the authors' point of view such situation can be caused mainly not by ProZorro defects or problems but the improper performance of functions by supervisory authorities; (3) weak ensuring the reliability and cost-effectiveness of functioning the authorized body for Ukrainian public procurement the state enterprise "ProZorro".

The study Romanenko and Shchokin (2016) summarizes a number of important trends of Ukraine's obligations in the framework of the EU "Association Agreement" and grounds the main vectors for the development of ProZorro. Article Miniailo and Kostenko (2016) highlights the issues of the public procurement system operating in Ukraine and other countries, examines key innovations and unresolved issues at the framework of the Law of Ukraine on Public Procurement.

Olefir (2017) conducts a detailed analysis of the existing practice of public procurement in Ukraine and notices its main shortcomings in terms of corruption schemes and ways for its possible solutions through the applying of European experience. For example, (1) verification participants' offers for compliance with qualification and technical requirements according ProZorro rules is made after choosing the auction winner, and it can open the opportunities for abusing by contracting authorities; (2) concealment the tender in the way, for example, incorrect definition of items for purchase so that only predetermined suppliers can take part at the tender; (3) online auctions do not always provide the lowest price, as some high-quality suppliers are not inclined to participate in the electronic procurement system for various reasons; (4) the right for the government authorities to cancel the bidding results for a number of formal reasons is another method for rejecting unwanted suppliers; (5) discrepancy of the products, which is supplied by the auction winner, to the declared documentation; (6) inactive and/or incorrect use of non-price criteria when generating the qualification requirements to the subject of purchase and/or supplier; (7) the legal regulation for the qualification selection of suppliers let the government authorities diverse opportunities to put discriminatory conditions for unwanted suppliers. Olefir (2017), taking into account the statements of the European Union (2014), suggests the following: (1) evaluation of bids after their qualification verification; (2) usage the government (municipal) enterprises as priority suppliers (if available); (3) aggregation the orders of various government institutions to achieve the economies of scale; (4) granting customers independence in setting the timeframe for tender procedures; (5) correct usage the non-price criteria based on the best price/quality/cost ratio; (6) the democratic nature of drawing up technical specifications in order to develop the innovativeness of the bidding proposals; (7) stimulating the environmental and social standards implementation.

The Ukrainian branch of global anti-corruption NGO Transparency International Ukraine constantly highlights ProZorro achievements. Thus, the first report on the performance of the e-procurement system ProZorro covers five months: from August 2016 (when the new law on procurement entered into force) until December 2016 (Transparency International Ukraine, 2017). In this study, the new methodology of monitoring public procurements in Ukraine was presented. The methodology is based on best practices of civic society monitoring from countries with a comparable level of corruption, such as Armenia and Paraguay. Also, the potential of big data is combined with in-depth cases of procurement violations. Much of the report is devoted to the discussion of the changes in the procurement sector and ways to improve it. For example, further improvement of legislation is proposed, in particular in the field of regulation of sub-threshold procurement, since local authorities abuse the contract reporting procedure. Potential reasons for spending such substantial amounts via

contract reporting may include the unwillingness of contracting authorities to go for a sub-threshold procurement, supplier's unpreparedness for competition, splitting the subject of procurement to avoid open tenders, and contracting authority setting expected value nonconformant with market prices. Another problem is that the system's key risk indicators are not defined at the bylaw level. The government must undertake to monitor of procurements based on these indicators, and the public would have a basis for constructive criticism (Transparency International Ukraine, 2017).

The monitoring report (Transparency International Ukraine, 2018) summarizes ProZorro results for the second half of 2017 and the main changes that influenced on conducting procurements during this period. First of all, the State Audit Service of Ukraine was legislatively defined as controlling authority and it got a regulated procedure for monitoring of tenders, in particular on the basis of automatic risk indicators. The ProZorro public and professional analytics modules were improved, which allow deepening civic monitoring opportunities. The expert group on improving the system of public procurement started its work, DoZorro monitoring portal united a number of civil organizations, pilot versions of risk indicators and index of best practices began to work. Very crucial events were the beginning of the work of the Expert Group on the improvement of public procurement system, bringing together 22 public organizations at the framework of online platform for public control of public procurement DoZorro as well as launching the pilot versions of risk indicators and best practice index of the contracting authorities (Transparency International Ukraine, 2018).

Transparency International Ukraine (2018) report calls the expansion of non-price criteria for evaluation of the tender as the pressing issue for the development of the procurement system in Ukraine. Such expansion would allow the contracting authorities to select more cost-efficient and innovative solutions. Another problem is the lack of legislative regulation of sub-threshold procurement, their regulation is necessary to improve competition and enable the participants to protect their interests. In addition, the pressing issue is the implementation of complex measures to improve the quality of data in ProZorro system, especially the data fields that contracting authorities fill in manually. They contain many errors and are not suitable for the analysis (Transparency International Ukraine, 2018).

Thus, the reform of public procurement has been extensively studied in recent years. Although a considerable amount of research has been devoted to this topic, few attempts have been made to investigate SMEs participation in public procurement, especially in developing countries. From this point of view, further investigation is needed to study the participation of SMEs, and in particular of micro businesses, in public procurement in Ukraine.

2. Methodological approach

The research methodology includes assessment of EU and Ukrainian strategic documents on the field of public procurement highlighting the support and activity of SMEs. The research methodology includes such methods as systematic analysis of the procurement related documents, statistical data comparative analysis, research analysis, critical analysis etc. To test the dependence between the private entrepreneurs' activity at ProZorro and economic "power" of the region we apply the correlation analysis.

Situation analysis is based on the data of ProZorro professional analytics module and State Statistics Service of Ukraine and the results of statistical calculations.

3. Hypotheses and database

In this study, we analyze the data on procurement made by micro businesses via ProZorro system during 2017. This year was the first full year of ProZorro operation (it was fully implemented at August, 01, 2016).

According to the legislation of Ukraine, the micro businesses are defined as individuals or companies employing during the reporting period (calendar year) ten people or fewer and having a turnover less than 2 million Euros (based the average annual rate of the National Bank of Ukraine) (Legislation of Ukraine, 2018).

At this moment, the capabilities of Prozorro professional analytics module make it possible to automatically mark out only private entrepreneurs as representatives of micro business (further we will call them as "private entrepreneurs"). Beyond the study, there are companies belonging to the category of micro businesses (Legislation of Ukraine, 2018). Transparency International Ukraine and professional community work on detailed identification of Prozorro participants depending on their size.

The data of State Statistics Service of Ukraine make it possible to recognize this constraint to be representative, at least in terms of the number of enterprises, since over the years more than 80% of micro businesses are private entrepreneurs (see *Table 1, Column 2*). Moreover, this sample can be extended with a certain degree of confidence to the category of small enterprises, since almost all small businesses can be attributed as a micro business (see *Table 1, Columns 3-4*).

In terms of an indicator of the volume of products sold the percentage of private entrepreneurs is much lower (see *Table 1, Column 5*), which indicates the insignificant "market power" of private entrepreneurship and, therefore, determines the particular importance of study the private entrepreneurs' participation in public procurement.

Table 1. Indicators of small businesses, 2010-2016¹

Period	Percentage of private entrepreneurs in the total number of micro businesses	Percentage of micro businesses in the total number of small businesses	Percentage of private entrepreneurs as a micro business' entity in the total number of private entrepreneurs as a small business' entity	Percentage of private entrepreneurs in the volume of products sold by micro businesses
1	2	3	4	5
2010	0.86	0.97	0.99	0.51
2011	0.82	0.96	0.99	0.49
2012	0.81	0.96	0.99	0.51
2013	0.81	0.96	0.99	0.53
2014	0.85	0.97	0.99	0.53
2015	0.85	0.98	1.00	0.54
2016	0.86	0.97	1.00	0.55

Source: State Statistics Service of Ukraine (2018a), own calculations.

The data on procurement made via ProZorro system during 2017 show that proportion of low value (sub-threshold) procurements are reasonable high (83% of the total number of procedures), but in the context of the amounts of transactions and savings are only 19% and 24% respectively (see *Table 2*).

¹ Excluding data on banks and budget organizations, the temporarily occupied territories of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation zone.

Table 2. Data on procurement made via ProZorro system depending on the types of procedures, 2017

Procurement procedure	Number of procedures		Expected value		Savings	
	KU	%	Thous, UAH	%	Thous, UAH	%
Over-threshold procurements	174 432	17	627 389 874	81	20 902 188	76
Sub-threshold procurements	276 537	27	71 613 159	9	6 723 600	24
Contract reporting	576 083	56	78 837 386	10	0	0

Source: ProZorro (2018), own calculations.

We suggested that private entrepreneurs are most active in sub-threshold procurement (Hypothesis No.1). This assumption is based on the fact that private entrepreneurs do not have sufficient experience and staff to competently prepare large-scale tender documentation and professionally participate in large competitive tenders. Moreover, for sub-threshold transactions can be applied the procedure for contract reporting (non-competitive procedure), which is easier and more affordable for private entrepreneurs.

Further, we assumed that the participation of private entrepreneurs in public procurement will increase the competitiveness of auction procedures (Hypothesis No.2). The next hypothesis concerns the territorial localization of private entrepreneurs' activities. We assumed that private entrepreneurs are more active at the local level, in other words, they are more involved in the procedures conducted by regional authorities (Hypothesis No.3).

To test formulated hypotheses we use the data from ProZorro professional analytics module. Since ProZorro system considers the lot as the unit of purchase², we select the lots with status "Completed" and do not take into account the lots with statuses "Unsuccessful" and "Canceled", as well as with status "Active", which is not relevant for the purchases for the previous year. In order to clear data from irrelevant records, we also apply the status of "Completed Purchase" and do not count the statuses "Purchase did not take place", "Purchase is cancelled" and other statuses which indicate the tender's activity (that cannot be correct because relate to the previous year purchases).

3.1. Activity private entrepreneurs depending on the value of purchases

The activity of private entrepreneurs in public procurement via ProZorro, expressed by the percentage of total activities of all participants, is presented in Table 3.

The data from the Table 3 show that private entrepreneurs are really most active in sub-threshold purchases (43.58% of all "small" competitive procedures were performed by private entrepreneurs that constitute 9.80% of the total expected value of all purchases made in the framework the ProZorro system). From the other side, private entrepreneurs are also active in non-competitive "small" purchases (25.75% and 9.76%, respectively).

We consider it important to emphasize that private entrepreneur actively participate in over-threshold competitive bids (25.86% of all open tenders and 20.51% of negotiation procedures for defence needs). Moreover, the scale of private entrepreneurs' participation in competitive procurement procedures is comparable to their activity in sub-threshold procurement made outside the ProZorro system (the procedure of contract reporting).

² Lot is a contracting authority-designated part of goods, work or services for which bidders may submit tender offers within single procurement procedure or proposals during negotiations (Transparency International Ukraine, 2018).

Table 3. Indicators of private entrepreneurs' activity on procurement made via ProZorro system depending on the types of procedures, 2017

Procurement procedure	Percentage of private entrepreneurs in the activities of all participants of ProZorro, by indicators, %				Average number of participants	
	number of tenders	number of lots	expected value	savings	all participants	private entrepreneurs
Sub-threshold procurements	43.58	43.30	9.80	12.65	2.10	2.56
Contract reporting	25.75	25.75	9.76	n/a	1.00	1.00
Open tenders	25.86	26.72	9.65	15.34	2.68	2.82
Open tenders with English- language publication	4.93	9.56	0.90	1.35	2.76	2.62
Negotiation procedure	6.14	6.11	1.02	n/a	1.00	1.01
Negotiation procedure on urgent needs	0.59	0.48	0.12	n/a	1.00	1.03
Negotiation procedure for defense needs	20.51	17.08	6.89	14.29	2.14	2.70

Source: ProZorro (2018), own calculations.

Thus, this study found that private entrepreneurs are active not only in sub-threshold purchases, as suggested by hypothesis No.1, but are full-scale participants of competitive bidding. In other words, the assumption of hypothesis No.1 was not confirmed.

From the other side, the participation of private entrepreneurs in public procurement is able to add competitiveness to the bidding process. The data from Table 3 show that in purchases where private entrepreneurs took part the average number of participants is higher than generally in the ProZorro system. Moreover, it is true both for sub-threshold and some types of over-threshold purchases (open bidding, negotiation procedure for defence needs).

Additionally, the procedures where private entrepreneurs took part bring higher savings for the Ukrainian society (for the sub-threshold purchases – 12.65% of total savings, with a procurement value of only 9.80% of the total value of all purchases; in the case of open tenders – 15.34% against 9, 65% , in the case of negotiation procedure for defense needs – 14.29% against 6.89% respectively).

Thus, the obtained data allow us to confirm the thesis No.2 about the positive effect of private entrepreneurs' participation to the competitiveness of public procurement.

3.2. The activity of private entrepreneurs depending on the procedure's competitiveness

Considering the activity of private entrepreneurs in terms of competitive procedures, we can state that non-competitive procedures are more popular for the private entrepreneurs (60.66%), but their expected value is almost 2 times less than for the competitive procedures (see Table 4).

Almost 100% of noncompetitive purchases in which private entrepreneurs participated are procedures for contract reporting, the sub-threshold procurements are the most popular type of procedures for private entrepreneurs among competitive ones (32.69%), but in terms of expected volume open tenders are more valuable (39.91% of all procedures with private entrepreneurs participation). These findings confirm once again the importance of micro business' participation in over-threshold purchases.

Table 4. Indicators of private entrepreneurs' activity on procurement made via ProZorro system depending on the competitiveness of procedures, 2017

Procurement procedure	The percentage in the total number of procedures with private entrepreneurs' participation, by indicators, %		
	number of tenders	number of lots	expected value
Competitive, incl.	39.34	40.86	66.66
Sub-threshold procurements	32.69	32.36	16.02
Open tenders	6.46	8.07	39.91
Open tenders with English-language publication	0.09	0.29	6.80
Negotiation procedure for defense needs	0.10	0.14	3.93
Non-competitive, incl.	60.66	59.14	33.34
Contract reporting	60.04	58.42	31.19
Negotiation procedure	0.58	0.68	1.94
Negotiation procedure on urgent needs	0.04	0.04	0.21

Source: ProZorro (2018), own calculations.

3.3. Territorial localization of private entrepreneurs' activities

Next study aims to explore the territorial localization of private entrepreneurs' activities. We assumed that private entrepreneurs' are more active at the local market, i.e. take greater part at the procedures conducted by regional authorities (hypothesis No.3). For this purpose we studied the procedures where private entrepreneurs from the certain region of Ukraine took part from the point of view of region of public procurement authorities who organized these procedures. There are 24 regions in Ukraine, and at this moment regional economic statistics are available up to 2016, so we use demographic statistics for the same period for comparability reason (Table 5). In order to increase the scope of the study we used both relative indicators of the regional development (share in the total population and gross domestic product) and absolute values (gross regional product per person).

It should be noted that these indicators have close interdependence between each other (the correlation coefficient between the arrays of X1 and X2 is 0.79, between X1 and X3 is 0.59, and between X2 and X3 is 0.91).

For the purposes outlined above we made the following calculations. For example, for the Odessa region we evaluated the participation of private entrepreneurs who are registered in this region at public procurement in ProZorro, and allocated the percentage of these purchases, which were organized by government authorities from the Odessa region. In order to make the data comparable, we used relative values, i.e. identified procedures in which private entrepreneurs registered in the target area took part, and determined part of them that took place in their "local" areas.

This study was conducted in terms of specific procurement procedures (Tables 6, 8, 10). The analysis was carried out only for the main procurement procedures (sub-threshold, contract reporting, and open tenders) because other types of procedures are limited in terms of volume and territorial dissemination, so they can be ignored by this study.

Table 5. Indicators of regional statistics, 2016³

Region	Percentage in the average population of Ukraine, %	Percentage in the gross national product of Ukraine, %	Gross regional product per one person, mln. UAH
	X1	X2	X3
Cherkasy	2.90	2.49	48.03
Chernihiv	2.44	1.82	41.73
Chernivtsi	2.13	0.89	23.37
Dnipropetrovsk	7.60	10.25	75.40
Donetsk	9.97	5.76	32.32
Ivano-Frankivsk	3.24	2.15	37.22
Kharkiv	6.35	6.49	57.15
Kherson	2.48	1.62	36.59
Khmelnyskyi	3.02	2.05	37.88
Kyiv	10.90	28.83	147.92
Kirovohrad	2.27	1.93	47.47
Luhansk	5.16	1.31	14.25
Lviv	5.94	4.81	45.32
Mykolaiv	2.70	2.42	50.09
Odessa	5.60	5.02	50.16
Poltava	3.36	4.87	81.15
Rivne	2.72	1.65	33.96
Sumy	2.60	1.94	41.74
Ternopil	2.49	1.30	29.25
Vinnytsia	3.74	3.12	46.62
Volyn	2.44	1.50	34.31
Zakarpattia	2.95	1.36	25.73
Zaporizhia	4.09	4.37	59.73
Zhytomyr	2.92	2.01	38.52

Source: State Statistics Service of Ukraine (2018b), own calculations.

Table 6 presents data on the activity of private entrepreneurs in sub-threshold purchases.

Table 6. Indicators of private entrepreneurs' activity on sub-threshold procedures made via ProZorro system, 2017

Region	Percentage of sub-threshold procedures organized in the target region among the same procedures where private entrepreneurs registered in this region took part, by indicators, %		
	number of tenders	expected value	savings
	Y1	Y2	Y3
Cherkasy	35.93	38.65	32.20
Chernihiv	45.88	72.59	71.79
Chernivtsi	68.56	67.06	51.59
Dnipropetrovsk	69.13	70.73	65.55
Donetsk	79.97	88.32	83.42
Ivano-Frankivsk	56.59	73.68	57.78
Kharkiv	17.38	32.70	19.52
Kherson	24.18	32.25	36.82
Khmelnyskyi	25.85	28.94	22.32
Kyiv	55.83	62.43	238.62
Kirovohrad	31.11	42.60	36.78
Luhansk	66.13	57.55	45.76

³ Excluding data on the temporarily occupied territories of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation zone.

RECENT ISSUES IN ECONOMIC DEVELOPMENT

Lviv	76.19	83.06	73.83
Mykolaiv	56.43	51.50	55.18
Odessa	55.22	63.76	58.66
Poltava	9.57	32.50	30.68
Rivne	38.50	39.90	34.79
Sumy	62.91	65.27	54.67
Ternopil	69.87	66.78	57.38
Vinnitsia	69.52	79.64	69.35
Volyn	65.66	59.93	55.67
Zakarpattia	50.31	70.49	65.15
Zaporizhia	62.55	71.62	63.89
Zhytomyr	65.89	60.06	55.16

Source: ProZorro (2018), own calculations.

The correlation analysis did not reveal any relationship between the private entrepreneurs activity in sub-threshold procurement and the “capacity” of their region (Table 7).

Table 7. Correlation between the activity of private entrepreneurs in sub-threshold procurement and regional indicators

Y/X	X1	X2	X3
Y1	0.27	0.05	-0.08
Y2	0.33	0.10	-0.02
Y3	0.33	0.14	0.03

Data about the activity of private entrepreneurs in the procedures of contract reporting are given in Table 8. Since these procedures are not competitive, parameters of savings are not calculated for them.

Table 8. Indicators of private entrepreneurs' activity on procedures of contract reporting made via ProZorro system, 2017

Region	Percentage of contract reporting procedures organized in the target region among the same procedures where private entrepreneurs registered in this region took part, by indicators, %	
	number of tenders	expected value
	Y1	Y2
Cherkasy	92.56	83.12
Chernihiv	95.74	90.28
Chernivtsi	88.27	79.14
Dnipropetrovsk	86.80	82.72
Donetsk	97.03	96.75
Ivano-Frankivsk	89.34	84.94
Kharkiv	77.40	83.73
Kherson	93.35	90.15
Khmelnyskyi	89.96	85.30
Kyiv	73.71	61.27
Kirovohrad	92.68	87.43
Luhansk	97.12	96.06
Lviv	85.31	88.10
Mykolaiv	88.21	88.08
Odessa	96.56	96.22
Poltava	90.83	90.66
Rivne	96.79	93.97
Sumy	91.40	91.21

RECENT ISSUES IN ECONOMIC DEVELOPMENT

Ternopil	94.43	93.05
Vinnitsia	91.95	90.83
Volyn	71.98	65.40
Zakarpattia	97.92	98.13
Zaporizhia	84.84	82.18
Zhytomyr	92.22	85.92

Source: ProZorro (2018), own calculations.

The degree of colligation between selected parameters reveal the significant level of relationship (according to the Chaddock scale) between the activity of private entrepreneurs at the contract reporting procedures and the "power" of their region in terms of gross regional product (Table 9).

Table 9. Correlation between the activity of private entrepreneurs in contract reporting procedures and regional indicators

Y/X	X1	X2	X3
Y1	-0.30	-0.53	-0.55
Y2	-0.22	-0.57	-0.63

Table 10 presents data about the activity of private entrepreneurs in open tenders.

Table 10. Indicators of private entrepreneurs' activity on procedures of open tenders made via ProZorro system, 2017

Region	Percentage of open tenders procedures organized in the target region among the same procedures where private entrepreneurs registered in this region took part, by indicators, %			
	number of tenders	expected value		savings
	Y1	Y2	Y3	
Cherkasy	55.97	54.31	56.86	56.86
Chernihiv	53.92	68.32	63.17	63.17
Chernivtsi	72.36	81.41	77.88	77.88
Dnipropetrovsk	66.15	67.55	58.44	58.44
Donetsk	83.85	86.26	79.52	79.52
Ivano-Frankivsk	65.94	67.59	74.22	74.22
Kharkiv	60.94	64.47	58.08	58.08
Kherson	71.12	63.11	64.88	64.88
Khmelnitskyi	61.34	66.25	60.20	60.20
Kyiv	59.74	66.51	74.71	74.71
Kirovohrad	60.16	64.23	64.90	64.90
Luhansk	71.33	69.55	77.83	77.83
Lviv	82.62	87.45	84.86	84.86
Mykolaiv	72.94	76.07	83.01	83.01
Odessa	72.56	76.29	76.63	76.63
Poltava	52.99	53.07	52.39	52.39
Rivne	57.76	63.46	68.28	68.28
Sumy	65.33	70.53	69.18	69.18
Ternopil	61.09	69.92	57.74	57.74
Vinnitsia	61.01	77.32	76.81	76.81
Volyn	44.74	41.77	35.69	35.69
Zakarpattia	77.97	82.37	81.43	81.43
Zaporizhia	62.95	65.91	72.42	72.42
Zhytomyr	61.72	62.11	60.98	60.98

Source: ProZorro (2018), own calculations.

Correlation analysis did not indicate any dependence between the activity of private entrepreneurs in open tenders and the “power” of their region (Table 11).

Table 11. Correlation between the activity of private entrepreneurs in open tender procedures and regional indicators

Y/X	X1	X2	X3
Y1	0.33	-0.04	-0.20
Y2	0.29	0.01	-0.13
Y3	0.27	0.10	0.03

Thus, the results of the study indicate a significant correlation, according to the Chaddoc scale, between the private entrepreneurs' activity and regional indicators only for the procedures of contract reporting. Moreover, the correlation was revealed only for indicators related to the level of regional domestic product (Table 9). In other words, the closeness of private entrepreneurs to their local regional market were found only for the simplest procurement procedures, which are (1) non-competitive; (2) low value (for goods – from 50,000 to 200,000 UAH.); (3) do not demand the complex documentation; (4) require only an elementary level of computer literacy. It is important that there is a negative correlation between mentioned parameters – with the growth of the “capacity” of the region the private entrepreneurs' activity which localized at the local regional market decreases.

4. Conclusions

This paper presents the study of Ukrainian E-procurement system ProZorro in terms of the activity of private entrepreneurs in public procurement. During this study, we analyzed data obtained from professional analytics module to test 3 hypotheses. The first hypothesis suggested that private entrepreneurs are most active in sub-threshold (small) procurement procedures and this hypothesis was refuted by the results of the study. We found that private entrepreneurs are the full-scale participants of competitive procurement procedures and are actively involved in over-threshold (large) competitive procedures.

The second hypothesis assumed that the participation of private entrepreneurs in public procurement would increase the competitiveness of procurement procedures, which was fully confirmed by the obtained results.

The third hypothesis studied the territorial localization of private entrepreneurs' activities. It was suggested that private entrepreneurs are more active locally, i.e. more involved in the procurement procedures conducted by government authorities within their own region. We discovered the negative correlation between the economic "power" of the region (namely, the level of the regional domestic product) and the private entrepreneurs' activity in contract reporting procurement procedures organized by local authorities. These procedures are noncompetitive and require only the publication of report about contract concluded. This fact, from our point of view, indicates that the Ukrainian private entrepreneurs are became mature and open as well ready for participation at the complex competitive procedures organized by government authorities regardless of their location.

As practical recommendations for supporting and enhancing the SMEs participation in public procurement, we can propose number of measures:

1) for more accurate determining the status of the enterprise by its size (large, medium, small or micro enterprises) apply the relevant identification field at the stage of registering at ProZorro system and / or at the step of performing actions at the system (for example, submitting a bid for a tender, publishing a contract reporting, etc.). From our point of view,

since the assignment of an enterprise to a certain group by its size may vary and according the Law is determined on the basis of its performance indicators for the previous calendar year (Legislation of Ukraine, 2018), it is reasonable to indicate the status of the enterprise at the first contact of the supplier with the ProZorro system in the current calendar year.

2) Based on this data, it will be possible more accurately analyze the behavior of different suppliers groups and therefore generate a set of measures to enhance their participation in public procurement. Some of the possible tools for assisting SMEs participation in public procurement are presented below.

- The activity can be given as an example of defining the right size of public procurement contracts like division of contracts into lots, joint bidding by grouping economic operators together in order to participate as tenderers in procurement procedures. Ukraine does not have a separate strategy for SMEs participation in public procurement, but they are mentioned in the adopted Strategy for Public Procurement Reform (Legislation of Ukraine, 2016 a) which encourages division into lots in order to create better conditions for the participation of SME in public procurement.
- From our point of view, the procedure of participation in public procurement in Ukraine is quite clear and transparent. However, there are tools that can help suppliers especially SME, for example, one way that government can help the economic operators is by standardizing procurement documents through the use of templates.
- An important and constantly relevant tool of strengthening of SME participation in public procurement is offering the training program for the rationalization of public procurement, improving their familiarity with ICT tools, providing training in the use of e-procurement tools, and supporting them in qualifying and operating on the legal and technical expertise to prepare bids or understand public procurement procedures.
- Concerning increasing SME's chances of winning public contracts through preference programs like putting certain share of government procurement contracts for targeted category of bidders we consider that this is a premature measure for the Ukrainian economy, because it can open up the possibility for different kind of illegal actions like corruption schemas. For our mind this tool can be used only after the accumulation the experience in public procurement in our country.

5. Limitation of research

The limitations of this study are:

- ProZorro has been operating only since August, 2016, that is why 2017 was chosen for the research;
- there are very few scientific studies about the ProZorro operation, existing ones are given in the literature review section.

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