



Coverage of Production Chains in Cooperation Industrial Enterprises



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Abstract The complexity of production processes substantiates the need for a joint industrial activity for developing innovative products. According to the common practice, the major source of breakthrough innovative solutions is small and medium-sized enterprises (SME). The intra-corporate transfer of such solutions can significantly reduce the time needed to establish new production facilities and become a key factor in the competitive struggle in the market. The formation of SMEs cooperation networks falls within the framework of industrial cooperation research. Using the case study of Russia, we address the issue of an effective production network of cooperation between SMEs and large companies. The research sample comprised 14 enterprises distributed according to the industries dominating in the Russian economy. The data obtained show that large enterprises partially owned by the state and acting as cooperation centers are assigned a specific “anchor” role. Anchor companies tend to lower the level of production localization. However, this does not have a significant effect on increasing their financial performance and does not depend on the share of state participation. Russia’s experience clearly highlights the weakness of cooperation, albeit with trends towards positive change. In 2015–2019, there was an increase in the share of orders placed by large manufacturers with SMEs. The share of SMEs within the production chains is substantially differentiated and varies between 5.5 and 79.5% for the enterprises under consideration.

Keywords Cooperation · Production chains · SMEs · Production networks

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1 Introduction

Transformations in the economy that occur under the influence of globalization processes encourage enterprises to look for effective forms of organization of production activities. Such forms of integration as subcontracting, franchising, leasing, venture financing, technology parks, joint ventures, tolling, etc. are becoming more and more popular [1]. Cooperation develops along the entire value chain. The system of functional production of cooperative relations has become widely used.

The phenomenon of intercompany network relations attracts researchers who are trying to explain the reasons for its occurrence [2]. The intensive growth of industrial cooperation raises questions about the blurring of lines of the economic agent, the formation of hybrid structures, which are increasingly referred to as networks. In the most general terms, intercompany networks are perceived as a way to regulate the interdependence between companies. It should be taken into account that initially, the definitions of intercompany networks differ both in the terminology used and in the emphasis [3–5].

The development of network production cooperation with the participation of SMEs is presented in the works of many scientists [6–8]. Petrishcheva [9] attempts to set the concept of industrial cooperation and points out the potential for its development. It is generally agreed [10–14] that subcontracting is one of the most promising organizational forms of integration of small, medium, and large enterprises. This form of cooperation is designed to use a wide network of suppliers [9, 15, 16].

In developed countries, cooperation is a tool for improving the efficiency of industrial production and ensuring overall economic growth [17–19]. Since SMEs are initiators of many innovations and provide the basis for sustainable economic development [20], they must be adequately protected in order to survive in the industrial market. This can be achieved through government policies encouraging industrial sectors to increase the pace of production cooperation with SMEs. One of the mechanisms is the regulation of public procurement.

In Russia, this is facilitated by the procurement system of state-owned companies, which obliges large enterprises to purchase from SMEs, which in turn can be carried out by transferring part of the production cycle to a subcontractor (subcontract). The volume of purchases from SMEs, including purchases in which the contractor must engage the SME as a subcontractor, must be at least 20% of the total annual value of contracts concluded by customers based on the results of purchases. At the same time, at least 18% of the total annual value of contracts should be allocated to procurement involving only SMEs [21].

However, these measures have not yet significantly changed the role of SMEs in the economy as a whole. According to the Analytical Center for the Government of the Russian Federation, in comparison with foreign countries, the share of public procurement by SMEs is low—about 1–5% against 20%. The reasons for these discrepancies are both institutional and structural [22]. It is obvious that for sustainable economic development, it is necessary to search for optimal mechanisms for expanding cooperation between industrial enterprises of various levels.

Therefore, the purpose of the study is to assess the effects of cooperation between SMEs and large industrial enterprises in Russia. To do so, the authors analyzed the purchasing activities of large enterprises with state participation in key Russian sectors—oil, gas, minerals and related activities (petroleum products transportation); industrial production, and electric-power supply industry. Preliminary data indicate that the degree of cooperation between enterprises is relatively low. The identified impact factors will allow understanding better the mechanism of forming production chains through cooperation and assessing its potential in the Russian economy.

2 Materials and Methods

To assess the degree of development of cooperation between industrial enterprises and SMEs in Russia, “anchor” large enterprises were selected and divided into key industries: oil, gas, minerals and related activities (petroleum products transportation); industrial production, and electric power (Table 1). The list includes such companies as Bashneft, Vankorneft, Gazprom, Rosneft, Russian Helicopters, NGO Almaz, United Aircraft Corporation (UAC), United Engine Corporation (UEC), Eastern Energy Company (EEC), Mosenergo, Rosseti Moscow Region (MOESK), Rosseti, RusHydro, and Transneft.

The choice of “anchor” companies is contingent on their contribution to the Russian economy. All these companies are among the top-100 largest companies in Russia; their revenue for the last report in 2019 varies from 39 billion to 4.8 trillion rubles. Moreover, all industrial enterprises have a share of state participation. This feature is also an area of research restrictions. In addition to the selection of industrial enterprises with state participation, the analysis of the degree of cooperation with SMEs is carried out only among legal entities (companies); individual entrepreneurs and individuals are ignored (although they perform work, provide services and produce products for “anchor” companies).

The study used the following indicators of enterprises: revenue, cost of production, works (services); the amount and share of revenue of large industrial enterprises attributable to SMEs; the amount and share of the cost of production, works (services) of large industrial enterprises attributable to SMEs. The data panel was supplemented with information on the volume of purchases from SMEs, the share of state participation in the capital of industrial enterprises, and the number of employees. The sources of information were the news agencies SPARK-Interfax and Interfax Corporate Information Disclosure Center [23].

3 Results and Discussion

The level of internal production localization (autonomy) for all the considered enterprises decreased (Table 2), and enterprises increased the share of orders placed with

Table 1 Selected large industrial enterprises of Russia for the analysis of industrial cooperation with SMEs

Enterprise	Share of state participation in the capital, %	Average number of employees, people	Revenue in 2019, million rubles	Cost of sales in 2019, million rubles
<i>1. Production of oil, gas, and minerals</i>				
Bashneft	60.5	9183	703,151	514,467
Vankorneft	0.01	1600	383,329	308,751
Gazprom	50.0	26,691	4,758,712	2,657,654
Rosneft	40.4	4553	6,827,526	4,782,222
<i>2. Production</i>				
Russian Helicopters	85.71	427	39,854	23,885
NGO Almaz	1.16	11,387	101,586	92,535
United Aircraft Corporation (UAC)	8.99	661	54,734	53,083
United Engine Corporation (UEC)	87.45	14,297	94,039	63,188
<i>3. Electric-power supply industry</i>				
Eastern Energy Company (EEC)	0.08	3962	97,746	90,981
Mosenergo	26.4	7922	189,782	172,256
Rosseti Moscow Region (MOESK)	88.4	14,377	160,376	139,861
Rosseti	88.4	642	39,435	4,658
RusHydro	62.2	5396	155,180	93,884
<i>4. Other activities</i>				
Transneft	78.55	1257	960,812	787,368

Source SPARK-Interfax [26], Center for Corporate Information Disclosure Interfax [23]

SMEs in the cost price. However, the degree of localization varied heterogeneously over the period under review.

Based on the collected data, the share of revenue and the share of the cost of “anchor” large industrial enterprises accounted for by SMEs was calculated—separately for medium-sized, small, and micro enterprises according to the classification adopted in Russia [24]. The criteria for a medium-sized enterprise are that the average number of employees is not more than 250, and the annual income is not more than 2 billion rubles. The share of organizations in the capital of medium-sized enterprises that are not related to SMEs should not exceed 49%, the share of the state, regions, or non-profit organizations shall not exceed 25%. The small business criteria are that

Table 2 Production localization degree of large industrial enterprises with state participation in 2015–2019, %

Enterprise	2015	2016	2017	2018	2019
Bashneft	8.42	9.38	6.89	2.92	79.53
Vankorneft	4.09	61.35	0.92	0.35	74.85
Russian Helicopters	10.97	3.13	8.52	33.22	134.75*
Gazprom	0.34	0.57	0.31	0.03	5.50
EEC	0.55	0.65	0.63	0.78	36.01
Mosenergo	1.68	1.56	1.72	0.30	75.15
MOESK	13.63	7.639	8.99	23.76	78.22
NGO Almaz	1.94	1.13	1.13	0.11	73.15
UAC	8.76	3.60	5.07	0.60	67.96
UEC	1.85	1.80	3.99	0.59	51.99
Rosneft	5.43	1.55	0.26	0.02	6.40
Rosseti	16.41	9.86	10.26	1.62	735.63*
RusHydro	17.61	15.44	8.37	4.27	157.79*
Transneft	0.04	0.71	0.32	0.25	7.01

Note *For holding companies, the cost of production, works (services) has a heterogeneous distribution within the group

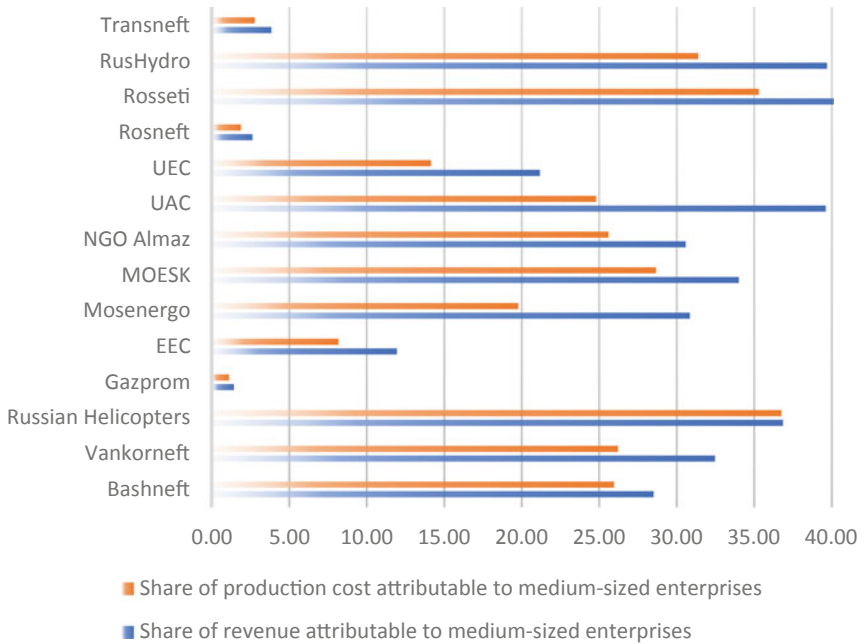
Source Center for Corporate Information Disclosure Interfax [23]

the average number of employees is not more than 100, and the income does not exceed 800 million rubles. The micro-enterprise criteria are the average number of employees—no more than 15, and annual income—no more than 120 million rubles. Restrictions on the structure of the authorized capital are similar.

The largest share of orders for medium-sized enterprises in the revenue of large industrial enterprises in revenue in 2019 was observed in Rosseti (48.48%), UAC (39.6%), RusHydro (39.69%). The largest share of orders for medium-sized enterprises in the cost of large industrial enterprises was observed in Russian Helicopters (36.75%), RusHydro (31.38%), and MOESK. Gazprom, Transneft, and Rosneft placed the smallest share of orders with medium-sized businesses (Fig. 1).

A similar situation is observed for small businesses. The largest share of orders for small businesses in the revenue of large industrial enterprises in 2019 was recorded in Russian Helicopters (39.12%), RusHydro (44.79%), Rosseti (33.28%). Mosenergo (36.95%), RusHydro (32.33%), and Bashneft (26.16%) accounted for the largest share of orders for small enterprises in the cost of large industrial enterprises. Gazprom, Rosneft, and Transneft demonstrated the worst work with small enterprises (Fig. 2).

Gazprom (0.30%), Rosneft (0.19%), and Transneft (0.32%) showed a low share of the revenue from large industrial enterprises attributable to micro-enterprises. Such a low share of micro-enterprise participation is also observed in the cost of these companies (Fig. 3). RusHydro (10.99%), NGO Almaz (7.04%), and EEC (6.16%)



Source: (SPARK-Interfax, 2020; Center for Corporate Information Disclosure Interfax, 2020)

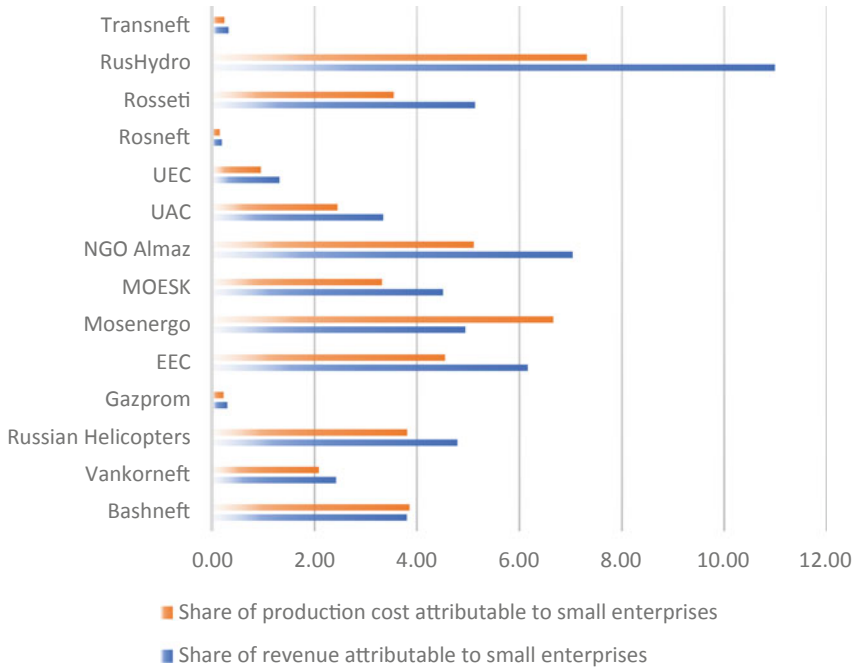
Fig. 1 Shares of revenue and cost of large industrial enterprises attributable to medium-sized enterprises in 2019, %. *Source* SPARK-Interfax [26], Center for Corporate Information Disclosure Interfax [23]

show the best positions in working with micro-enterprises in terms of the revenue share. In terms of cost, the degree of participation of these companies is close—RusHydro (7.32%), Mosenergo (6.66%), and NGO Almaz (5.11%).

In general, the leaders in placing orders for the SME sector in 2019 were such enterprises as RusHydro (95.46% of revenue), Rosseti (86.90% of revenue), Russian Helicopters (80.76% of revenue), Mosenergo (68.21% of revenue), MOESK (68.22% of revenue), NGO Almaz (66.64% of revenue), and UAC (65.91% of revenue). The smallest share of orders attributable to SMEs in revenue is observed in the “anchor” companies in the oil and gas sector.

The average order amount placed with one small enterprise in 2019 was 249,114.9 thousand rubles, with one medium-sized enterprise—943,719.6 thousand rubles, and with one micro-enterprise—30,243.6 thousand rubles. Thus, the structure of the distribution of orders for SMEs is dominated by medium-sized enterprises. Recall that medium-sized enterprises are characterized by the presence of an average number of employees up to 250 people and an annual income (revenue) of no more than 2 billion rubles.

Based on the study, it can be concluded that production cooperation in Russia between “anchor” large industrial enterprises with state participation through the



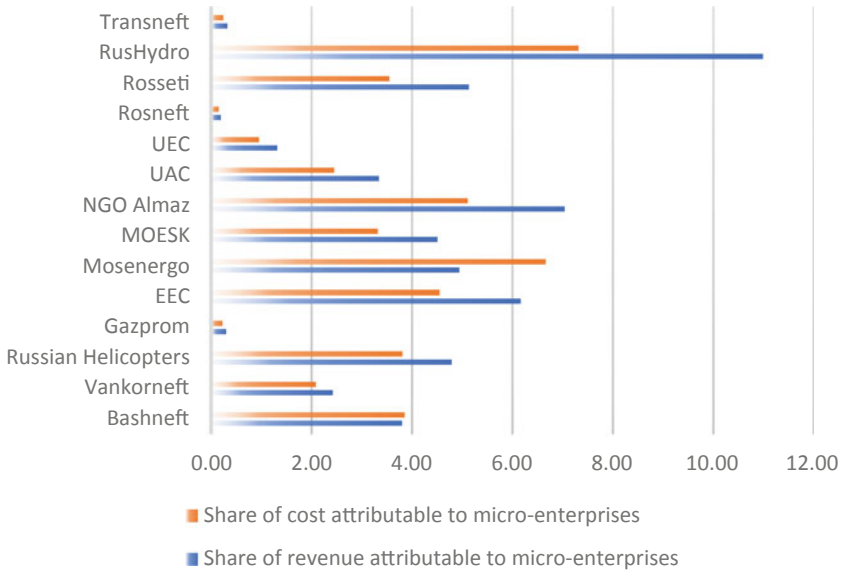
Source: (SPARK-Interfax, 2020; Center for Corporate Information Disclosure Interfax, 2020)

Fig. 2 Share of revenue and cost of large industrial enterprises attributable to small enterprises in 2019, %. Source SPARK-Interfax [26], Center for Corporate Information Disclosure Interfax [23]

use of subcontracting with the SME sector is not carried out effectively. Many of the expected internalities that are characteristic of cooperative relations in developed countries, both for contractors and subcontractors, are not reflected in the specifics of the Russian economy or their manifestation is limited.

4 Conclusion

The development of specialization and cooperation of small, medium and large enterprises in the modern conditions of the global market is becoming an economic necessity and is a consequence of the new competitiveness paradigm [25]. This statement finds convincing arguments in world practice. Production cooperation is formed along the entire value chain and leads to the emergence of a new phenomenon of intercompany relations—production networks. However, the strength and scale of cooperation are not uniform. The Russian experience clearly demonstrates the weakness of cooperative partnership, although with positive trends of change. The results



Source: (SPARK-Interfax, 2020; Center for Corporate Information Disclosure Interfax, 2020)

Fig. 3 Shares of revenue and cost of large industrial enterprises attributable to micro-enterprises in 2019, %. *Source* SPARK-Interfax [26], Center for Corporate Information Disclosure Interfax [23]

indicate that the level of internal production localization (autonomy) of large industrial enterprises with state participation in Russia in 2015–2019 decreased; all these enterprises increased the share of orders placed with SMEs. Therefore, there is an expansion of subcontracting as a form of industrial cooperation. The largest share of orders placed with SMEs is observed in large industrial enterprises in the electric power supply industry, and the smallest—in the oil and gas industry. In terms of the volume of orders placed by “anchor” large industrial enterprises, the leaders are medium-sized enterprises; the number of orders placed with such enterprises is 3.8 times higher than the number of orders placed with small businesses, and 31.2 times—with micro-enterprises.

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