Smerichevskyi Serhii
Doctor of Economic Sciences, Professor,
Head of Department Marketing
National Aviation University

Klimova Olena
Candidate in Economics,
Senior Lecturer of Marketing Department
National Aviation University

Kniazieva Tetiana
Doctor of Economics,
Professor of International Economy Department
National Aviation University

MECHANISMS TO ENSURE THE ACTIVATION OF THE MARKET OF PRODUCTS OF AIRCRAFT BUILDING BASED ON CLUSTERING AND OUTSOURCING

Annotation. To activate the market of aircraft products based on market cooperation mechanisms, it is necessary to perform the formation and development of clusters and restructural outsourcing. The development of clusters increases the interaction between industries and thus contributes to the multiplication of growth. One of the most important directions of reforming domestic enterprises in modern conditions is diversification, the purpose of which is to increase the stability and efficiency of the enterprise. The mechanism of implementation of diversification of production is outsourcing. The application of restructural outsourcing involves the refusal of the outsourcing customer to perform the business process on its own, accompanied by the closure of its division, the release of property and personnel.

Introduction. When implementing the strategic transformation of aircraft manufacturing enterprises, it is necessary to take into account that the modern market in the field of high-tech goods should have a well-established mechanism of cooperation, which ensures the competitiveness of the final products.

In contrast to the centralised economy, when cooperation between enterprises was targeted and generally closed, in market conditions realised the right of the buyer to order and buy goods that meet his needs.

As the experience of leading foreign countries shows [1], the formation of the mechanism of cooperation is based on long-term strategy, which is carried out by potential participants in cooperative relations under the auspices of public authorities (at national and regional levels) with funding agencies and universities.

Cooperation can significantly improve the quality of products of aircraft manufacturers, reduce the cost of its development, production and marketing, activate innovative processes and increase the competitiveness of enterprises and the industry as a whole.

The condition for cooperation is the development of specialisation of enterprises, the development of outsourcing, as well as the development of small and medium-sized businesses.

When establishing and developing cooperation relationships, the customer needs to determine which strategy should be followed: ensure long-term relations based on cooperation at all stages of product development and production; work based on short-term contracts, guided by the rules of price competition.

In the process of concluding contracts for cooperative deliveries in market conditions, the choice of the manufacturer is made on a competitive basis.

One of the mechanisms for managing the competitiveness of products, which contributes to cheaper components and improvement of their quality, is to stimulate competition between suppliers-partners. A reasonably standard measure in this area is the organisation of deliveries of the same part (assembly, unit) by different suppliers. To ensure the competitiveness of aircraft manufacturers' products, it is recommended at the stage of product development to choose suppliers based on competitive prices, and then conclude a contract only with those of them who will achieve the required quality and price.

For example, Japanese firms buy a greater variety of components from fewer suppliers than their American competitors. They have closer contacts with suppliers, including the integration of suppliers in the system of production organisation “just in time”, intensive information exchange and cooperation in the development of components [2, p. 364].

1. Development of cooperation ties in the aircraft industry through clustering

Research of practical experience of the organisation of the system of development of cooperative communications in PJSC “Motor Sich” and SE “PA Yuzhny Machine-Building Plant named after A. Makarov” showed

that at these enterprises formed specialised services on the organisation of purchase of materials and components, organised their technical and technological control and together with suppliers realised the development of programs of improvement.

At the same time, the analysis of technological maps of engine Assembly in PJSC "Motor Sich" and SE "PA Yuzhny Machine-Building Plant named after A. Makarov" has shown that on control terminal technical operations the deviation of quality of accessories from requirements of design documentation still makes 13 – 17%. The low level of components is the main reason for the low competitiveness of domestic engines and equipment. Activation of the market of aircraft products largely depends on the system of relations with industries-monopolies, the annual investment potential of which varies in the amount of 73 – 77 billion UAH [3, p. 56].

The most crucial difference between the industries related to natural monopolies (SE "Antonov", SE "IA Borispol", LLC "Dnipropetrovsk International Airport", UE "Zaporizhzhia International Airport", JSC "Ukrainian Railway"), is that competitive mechanisms do not operate in them or are practically not developed since the manufacturer (supplier) in this market is usually the only commercial organisation. The lack of competition means that natural monopolies can abuse their dominant position in the market, impose unfavourable business conditions on consumers, distribute public wealth and obtain monopoly profits. The possibility of such behaviour of natural monopolies is enhanced by the fact that in this case, large and ultra-large enterprises opposed by much smaller and less organised consumers.

All these circumstances emphasise the need for state regulation in the areas of natural monopolies to create such economic and legal conditions in which the balance of interests of consumers and producers of goods (services) is maintained. The consumers should be able to meet their needs for regulated goods (services), and the producers should be able to reimburse their costs for the production of such products (services) and develop their capacity. Thus, the state has to assume the functions of finding economic equilibrium, which, in this case, the market can not realise on its own. Decisions on the methods of regulating the activities of natural monopolies should be carried out by state price regulation through the establishment of tariffs or their limit level, the definition of consumers who are subject to mandatory service, and the establishment of a minimum level of their provision, as well as state control over large transactions.

To activate the market of aircraft products based on market cooperation mechanisms, it is necessary to perform the following:

technical re-equipment of enterprises for the production of components for various sub-sectors of the aircraft industry;

changing the credit policy of the state for the availability of cheap and long credit funds for updating products;

development of the mechanism of participation of representatives of the management of assembly plants in management at plants on delivery of components;

development of the mechanism of outsourcing and financial support of enterprises by the customer;

reduction of customs duties on equipment and components manufactured outside the country;

participation of state executive bodies together with business in consideration of inter-sectoral and interstate programs of quality improvement and development of new types of materials and components;

development of state support of leasing for technological renewal of production;

development of the system of cooperation with natural monopolies.

For the development of industrial cooperation in 2015, the Cabinet of Ministers of Ukraine included SE "Antonov" in the structure of UkrOboronProm group of companies. Since then, the company has implemented a program of import substitution of Russian components in the production of its equipment, has deepened cooperation with Western partners [4].

According to the calculations of the Ukrainian Research Institute of aviation technology, to ensure sustainable development of the aviation industry, Antonov has to mass-produce 30-40 aircraft per year. The state should play a critical role in this issue through state orders, which are practically absent today. Now on "Antonov" stored ten unfinished aircraft An-148/An-158, which can be completed. In their production, Russian components are used, but the experience of modernisation of the An-132D transport aircraft showed that Ukraine could successfully work in cooperation with other countries [5].

After the beginning of the Russian aggression, Ukraine stopped supplying most aircraft parts to Russia. These are components related to weapons, engines, and avionics (electronic systems of aircraft: communication systems, navigation, data display and control of various devices, and the like). Instead, Ukrainian suppliers had to search and find alternative markets. For

example, in 2015, India became the leading consumer of Ukrainian aircraft components ($13.46 million). In October 2015, SE "Antonov" ordered PW150A engines from Pratt&Whitney, a Canadian subsidiary, which is one of the world leaders in the production of aircraft engines to be installed on the new An-132D. The Warsaw Technical Institute of the Polish air force is developing a light multipurpose aircraft Grot-2, which will be equipped with the engine of PJSC "Motor Sich" [6].

SE "PA Yuzhny Machine-Building Plant named after A. Makarov" and Yuzhnoye design bureau successfully participate in the Canadian space program, the Brazilian space program, the American space program for the production of an upgraded Antares launch vehicle, the Sea launch cosmodrome, and cooperation in space projects with South Korea. Several Ukrainian companies have also entered the orbit of those enterprises that have already been involved in international space programs, including the company FED, which produces innovative products for future promising space flight objects together with the "Thales Alenia Space" company [5].

One of the directions of development of cooperation is the state support of formation and development of clusters.

A cluster of enterprises usually defined as a group of industry companies located in the same territory. A typical cluster consists of medium-sized companies, each of which does not receive significant benefits from the competition with another company in the cluster, but receives a profit from a compact location associated with the use of specialised resources (qualified personnel and specific infrastructure needed to do business). Cluster enterprises have additional competitive advantages due to the possibility of internal specialisation and standardisation, minimising the cost of innovation. The development of clusters increases the interaction between industries and thus contributes to the multiplication of growth (for example, concerning technology transfers, employment, etc.).

The state policy aimed at the development of clusters is as follows: removing barriers to local competition; stimulation of attracting investment in clusters; promotion of export of cluster products; support for training of specialised personnel; establishment of research work in local institutions of higher education on the development of technologies related to the cluster; support for the collection and processing of information related to the activities of the cluster.

It is believed that the creation of systems of interrelated aircraft industries in some areas of the country is difficult because of the very fractional

specialisation of the industry and its enterprises. For example, PJSC "Motor Sich" has more than 100 subcontractors, which supply it with more than 500 components and 300 items of materials. They account for more than 30% of the production cost of aircraft engines [7]. However, there are other examples. Thus, at the end of 2015 in Kharkiv, an innovative aerospace cluster "Mechatronics" was created. The cluster includes the leading enterprises of the aerospace industry of Ukraine. The main task of the cluster is to consolidate the efforts of aerospace enterprises of Ukraine [5].

In 2016, the state Concern "UkrOboronProm" in its structure created an aircraft cluster – the Ukrainian Aircraft Corporation. The concern consolidates all aircraft manufacturing capacities of the country, the foundation of which was the "Antonov" state enterprise. The Corporation consists of SE "Antonov", JSC "UKRNDIIAT", SE "Novator", SE "Kharkiv Machine-Building Plant "FED", SE "Kharkiv Aggregate Design Bureau", PJSC Plant "Mayak", etc. It is expected that the cluster will make the Ukrainian aviation industry a single powerful mechanism with precise coordination of development, deeper integration into the world market and implement international standards. The founders hope that such a step will accelerate the process of import substitution will give a new impetus to scientific and technical development and the economy of the state as a whole [8].

One of the main factors of success of Airbus Corporation is the mechanism of cooperation. Created based on French law, Airbus is not so much a corporation as an association of societies to promote their economic activities. The state is also involved in the ownership of the Consortium. The management of the American company Boeing is currently reviewing its competitive strategy, paying attention to the compliance of the characteristics of the products offered by the company with the requirements of the market based on the need to introduce new technologies in the production of its aircraft. The company focuses on high-yielding activities such as integrated systems and systems engineering while reducing the amount of design work. Boeing is also expanding cooperation with foreign suppliers of equipment, parts and even engineering services. Boeing's strategy is to save the project, to transfer most of the work to subcontractors, and to carry out only the final assembly of the aircraft. This strategy is used to reduce the level of production and associated costs, the distribution of risks associated with new aircraft construction programs. To maintain its market share, Boeing is increasingly entering into international outsourcing agreements, transferring part of the production work directly to countries that are buyers of aircraft [9].

The study of international experience shows that cooperation between enterprises can be carried out both without the unification of property and with its unification (full or partial). In the organisational and economic sense are distinguished: contractual forms of cooperation, usually not providing for the formation of common management links; corporate, when cooperation partners are united in legal kinds of corporations of various types [10].

In practice, several forms (models) of contractual cooperation are used. The simplest of them is contract cooperation, in which the contractor under a contract with the customer produces intermediate or final products for the latter and usually on its documentation [11]. This form of cooperation is the most common but also risky. It makes the contractor dependent on the customer. Under certain conditions, the latter may refuse to roll over orders, find another partner and thereby put the contractor in an awkward position.

Production cooperation is the establishment of long-term production links between enterprises, each of which focuses on the production of individual parts of a single product. In this case, the customer and the supplier are linked by a single production process. Contract agreements, as a rule, provide independent development of designs of the cooperated units and parts according to technical documentation of the customer. At the same time, agreements usually stipulate the transfer of licenses and know-how by the contractor. Such cooperation aims to reduce production costs while improving the quality level and increasing production volumes.

Of course, in the context of the new economy, traditional forms of cooperation are losing their effectiveness. One of the most important directions of reforming domestic enterprises in modern conditions is diversification, the purpose of which is to increase the stability and efficiency of the enterprise. It is carried out by separating various non-core activities from specialised highly concentrated production, as a result of which multiple types of the inter-sectoral output, the product range are expanded, the creation of products (services), which usually are not even technologically related to the primary production, is adjusted. The mechanism of implementation of diversification of production is outsourcing.

2. Restructural outsourcing as an activation mechanism of the aircraft industry market

Outsourcing can be divided into two types – outsourcing of workpieces and components and outsourcing of functions and operations to ensure the production of products. In the first case, it is about production

outsourcing – the transfer to a third-party organisation of the production function or part of the tasks associated with the production of products. In the second case, it is a question of transfer to the party of the function of transportation, repair of the equipment, preparation of production, actual production process (outsourcing of services) [12].

In terms of the degree of influence of outsourcing on the current activities of the enterprise, there are two forms of outsourcing:

restructural outsourcing is a form of outsourcing that involves the customers' refusal to outsource the execution of the business process (a set of different activities that use one or more types of resources at the input, and at the output, as a result of this activity, a product is created that has value for the consumer) on their own, which is accompanied by the closure of its subdivision the release of property and personnel;

transformational outsourcing is a form of outsourcing that does not provide for the customer's refusal to implement the business process; the contractor involved in the implementation of part of the functions or reorganisation of the subdivision, the development of new systems. Transformational outsourcing differs from restructural outsourcing in that after its completion, the customer retains control and responsibilities for the management of the subdivision. Currently, restructural outsourcing is the most relevant for the enterprises of the aircraft industry of Ukraine.

For the implementation of decisions on transfer of business processes of the enterprise within the framework of the program of restructural outsourcing the complex of organisational measures developed including activities for the organisation of interaction with the outsourcing contractor – development of a contract scheme between the customer and the outsourcing contractor, the formation of technical regulations and standards, legal management of relations; restructuring activities of the enterprise-customer – management of property and personnel of the liquidated unit, adaptation of the organisational structure of the enterprise.

When ranking business processes to manage restructural outsourcing, two criteria are used that classify the entire set of activities of an industrial enterprise by two indicators:

1) strategic importance – the degree of influence of the process on the final product of the enterprise. From this position, there are two groups of business processes: basic and non-core;

2) comparative effect of outsourcing – assessment of the growth of the integral economic impact when comparing two options for the same

calculation period: the organisation of production remains unchanged, that is, the program of restructural outsourcing is not implemented; the organisation of production is changing due to the implementation of the restructural outsourcing program.

To classify business processes into core and non-core, different analysis methods can be used: strategic analysis models, process approach, functional analysis, etc. The essence of these methods is to identify the activities of the enterprise, which determine its competitiveness (form the value chain) – the main activities. All other activities for the company are non-core and may be transferred to a third-party supplier. In this case, the decomposition method is used to move to the analysis of specific subdivisions. In practice, the approach of classification of activities on the technological principle usually used, which allows obtaining similar results. For example, the traditional classification of business processes of aircraft manufacturing enterprises is aggregate-assembly production, storage, galvanic production, auxiliary production.

A significant disadvantage of the second indicator for decision-making purposes is that it is often proposed to consider it only based on current performance indicators of business processes, for example, the purchase price from an external supplier and the cost of own production. This approach is not appropriate, as it does not take into account the factors affecting the effectiveness of the restructural outsourcing program: the number of additional investments required for the implementation of the restructural outsourcing program; terms of implementation of the restructural outsourcing program; the estimated value of the unit's property that can be sold (leased) during the implementation of the outsourcing program; the impact of the restructural outsourcing program on the change in the risks of the enterprise.

At the same time, the effectiveness of the outsourcing program can not be estimated using the indicator of integral economic effect or net discounted income, since the project does not create a separate gross income, but only changes the organisation of production and provides for the establishment of cooperative supplies of an intermediate product or service from a third-party contractor [13]. Therefore, it is proposed to consider the rationale for restructural outsourcing projects based on the calculation of the comparative economic effect. The comparative economic effect is calculated for a particular calculation period equal to the life of the outsourcing project, with this period breakdown by calculation steps. The choice of project life depends on which product or service is outsourced. The connection between the object of outsourcing and the primary production of the

enterprise is also essential. For example, a part or assembly of a manufactured machine is subject to outsourcing. In this case, the project life is equal to the production period of this machine model before its withdrawal from production. If the equipment repair service must be outsourced, then its lifetime corresponds to the service life of the equipment under repair.

When implementing the restructural outsourcing program, risk events are associated with the choice of the outsourcing company; these are the so-called commercial risks. With this, such risks as political, force majeure and others do not affect the decision on outsourcing, because they are unchanged. Financial risk is associated with the failure of the contractor to comply with the essential terms of the contract, for example, price changes, delivery of components of inadequate quality, etc.

The amount of losses associated with the occurrence of risk events depends on two factors: the probability of a risk event; the number of losses arising as a result of the occurrence of a risk event determined by the formula:

$$Rc = P_{risk} * RP_{risk}, \quad (1)$$

P_{risk} – the probability of occurrence of a risk event;

RP_{risk} – the number of losses arising as a result of the occurrence of a risk event.

The probability of occurrence of a risk event depends on the degree of development of the market of implementing companies. In general, the more outsourcing companies there are, the less likely a risk event is to occur. For example, the probability of occurrence of a risk event in the competitive market of implementing enterprises will be much lower than in the monopoly market.

The procedure for analysing the effectiveness of outsourcing consists of the following stages: analysis of the outsourcing market for the selected business process; calculation of the comparative effect of outsourcing.

The first stage is the analysis of the outsourcing market for the selected business process. The methods of such analysis are: benchmarking and market research of third-party suppliers. Benchmarking methods are used to obtain information about the organisation of the activity processes of industry leaders. In parallel, the degree of development of the supplier market in the region of the enterprise for information on the presence or absence of external performers, technological capabilities of suppliers, and financial terms of settlements studied. The obtained information allows dividing the whole group of business processes analysed into two groups:

1) types of activity of the enterprise for which there are no suppliers who provide production of necessary products (services) or existing suppliers cannot meet the technical requirements offered by the enterprise to products (services);

2) activities of the enterprise for which there are third-party suppliers in the market. For these activities, further analysis of the effectiveness and risks of outsourcing is carried out.

The second stage is the analysis of the comparative effect of the restructural outsourcing program. The most common error of the analysis is the comparison of the internal price of the product (service) with the market price of similar products. The main reason for this is the following factors: incomplete accounting of costs for the implementation of a process of activity associated with the use of accounting data for analysis; incorrect use of cost allocation rates in determining the value of the business process.

Aviation companies spend too much money on paying contractors: 70% of Boeing 787 components are outsourced, and for the Airbus A380, the number of parts that are manufactured directly by the manufacturer is only 4%. Such a high level of outsourcing leads to dependence on suppliers and extraordinary financial costs [14].

In Ukraine, there are examples of how industrial outsourcing eliminates inefficient and non-core business processes (distribution, personnel hiring, equipment repair, etc.), frees up capital for the development of core activities, reduces product development time and accelerates adaptation to changes in the external environment.

The main task of companies that have chosen an outsourcing strategy should be to overcome existing restrictions. At the moment, we can identify the following factors that affect the development of outsourcing in Ukraine:

inability to calculate full cost price. Often the calculation shows that own production is more profitable, but this calculation does not include the costs of repair and maintenance of equipment, heating costs, electricity, garbage collection. If count altogether, the result may change;

lack of reliable suppliers. The main arguments against the use of outsourcing are that domestic suppliers are usually not able to provide the necessary level of quality;

reducing the level of efficiency. It is reasonably believed that the outside production takes more time than at home;

high switching barriers or potential monopoly by the supplier. Objective barriers that make outsourcing economically unprofitable are the absence of

manufacturers of such products in the region, large dimensions of products, which makes it impossible to transport them, etc.;

the lack of flexibility of suppliers. Suppliers of parts and components are small entrepreneurs who use production assets to squeeze everything out of them, and they are not interested in investment and long-term development at all. These are the central claims of large manufacturers to their suppliers. However, the experience of the world aircraft industry proves that the engine of progress is suppliers of components and assemblies and not well-known aircraft manufacturers.

In industrialised countries, most small and medium-sized enterprises work as outsourcers producing components for large enterprises. In Ukraine, currently, most small and medium-sized enterprises of the aircraft industry perform the functions of the general contractor, carrying out the development, production and promotion of final demand products. The reason for this is that due to the underdevelopment of the mechanism of protection of innovations and the inability to profitably sell scientific and technical development, developers are forced to create productions with crucial changes. Besides, the inability to provide full guarantees to small and medium-sized enterprises does not allow them to attract the necessary amount of borrowed funds, and the lack of experience and funds for marketing promotion significantly limits the markets of these enterprises.

It is evident that without a change in strategy, for example, in the direction of specialisation in the performance of a limited number of production operations (e.g. machining parts on machines with numerical control), such enterprises will not be competitive.

To support outsourcing, the government should pay due attention to the development of a system of subcontracting centres, which are the coordinating link in the search for partners in the field of industrial cooperation. Subcontracting centres collect information about the production capabilities of enterprises, help to find the necessary suppliers, organise the supply chain, and hold a tender. The activity of subcontracting centres allows industrial enterprises to significantly reduce transaction costs associated with the establishment of new cooperative relationships, which is confirmed by many examples. The classifier of technological processes, used in the EU, allows finding the necessary partners quickly.

Conclusion. Thus, the main mechanisms of activation of the market of goods of the aircraft industry are the formation of aircraft clusters and restructural outsourcing. The first provides the benefits of a compact location of

companies in the industry, included in the cluster, associated with the use of specialised resources (qualified personnel and specific infrastructure necessary for doing business). The application of restructural outsourcing involves the refusal of the outsourcing customer to perform the business process on its own, accompanied by the closure of its division, the release of property and personnel. The effectiveness of restructural outsourcing is determined for a specific calculation period based on the calculation of the comparative economic effect.

References:

1. Quintana Cocolina C. et al. The Power of Cooperation. Cooperatives Europe Key Figures 2015. Brussels : Cooperatives Europe Brussels, 2016. 128 p.

2. Кіндзерський Ю.В. Державна політика структурно-технологічної модернізації промисловості : дис. … д-ра екон. наук : 08.00.03. Київ, 2015. 531 с.

3. Огляд економіки України-2018. Київ : Американська торговельна палата в Україні, 2018. 162 с.

4. Кооперація «Укроборонпрому» з Азербайджаном закладе модель співпраці з іншими країнами. Офіційний сайт ДК «Укроборонпром». URL: https://ukroboronprom.com.ua/uk/pro-golovne/en-kooperatsiya-ukroboronpromu-z-azerbajdzhanom-zaklade-model-spivpratsi-z-inshymy-krayinamy

5. Іванченко Ю. Український авіапром : як його врятувати? I-UA.tv. Ч. 1. 2018. URL: https://i-ua.tv/society/14413-ukrainskyi-aviaprom-iak-ioho-vriatuvaty-i-chastyna

6. Крамар О. Інстинкт виживання. *Тиждень.ua*. 24 березня. 2016. URL: https://tyzhden.ua/Economics/160886

7. Офіційний сайт ПАТ «Мотор Січ». URL: http://www.motorsich.com/

8. В Україні з'явився перший літакобудівний кластер на базі «Антонова». 5.ua. 10 червня. 2016. URL: https://www.5.ua/ekonomika/v-ukraini-ziavyvsia-pershyi-litakobudivnyi-klaster-na-bazi-antonova-116699.html

9. Огляд авіабудівної галузі України за І півріччя 2014 року : аналітичний огляд. URL: http://credit-rating.ua/img/st_img/AS/2014/10.10.2014/AVIA_CR_I_pol_2014.pdf

10. Калиновський А.О., Горбаль Н.І., Калиновська Н.Л. Тенденції та стратегії розвитку авіаційної галузі України. *Бізнес Інформ*. 2016. № 8. С. 88–94.

11. Литовченко І.Л., Хмелярова Я.А. Дослідження поняття «субконтрактація» як сучасної форми виробничої кооперації. *Науковий вісник Херсонського державного університету. Сер. : Економічні науки.* 2015. Вип. 11(3). С. 75–79.

12. Буторіна В.Б. Пріоритети розвитку авіабудівної та космічної галузей економіки України. *Вісник Хмельницького національного університету*. 2012. № 6. Т. 1. С. 297–302.

13. The Benefits of Outsourcing for Small Businesses. *The New York Times*. January 1. 2008. URL: https://archive.nytimes.com/www.nytimes.com/allbusiness/AB5221523_primary.html?ref=smallbusiness

14. Злиття гігантів авіапромисловості: UTC та Rockwell Collins. URL: http://www.pidpryemec.com/news/merge-of-utc-and-rockwell-collins/