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## **WAYS TO INCREASE INSTRUMENT MAKING ENTERPRISES COMPETITIVENESS**

### **ШЛЯХИ ПІДВИЩЕННЯ КОНКУРЕНТОСПРОМОЖОСТІ ПІДПРИЄМСТВ ПРИЛАДОБУДУВАННЯ**

*The general problems of the competitiveness of high-tech enterprises (in particular, instrument-making enterprises) which exist at the country level and can be solved by means of active implementation of the development strategy at the national level are analysed. The main problem areas that hinder the construction of a strong field of instrument-making are: unstable economic situation, poor political and economic situation, non-compliance with the constitutional principle of rule of law, high level of corruption, unfair distribution of tax burden, emigration of highly skilled personnel (or brain drain problem) unfavourable investment climate, currency instability, other restrictions. Using the M. Porter's Diamond of national benefits, we have found*

*the group of factors for conducting research, in particular: human resources, natural resources, financial resources, technology, infrastructure. Accordingly, to each factor there was formulated a number of problematic issues that require an urgent solution for increasing the competitiveness of instrument-making enterprises. A general list of problematic issues that hinder the business of high-tech enterprises in Ukraine is presented. Problem-related issues at the level of human resources are: low living standards and wages, corruption at all levels, low-quality of medical care, high unemployment, political instability and the availability of alternatives in the field of employment in foreign corporations with relatively higher salary. Problems of natural resources are the unfavourable military-political situation, the use of natural resources in violation of rules and norms, as well as the provisions of the current environmental legislation, the sharp increase in tariffs for heat and electricity, the purchasement of key resources at unreasonably high tariffs for comparisons of possible alternatives. Problems at the level of financial resources: lack of own financing at enterprises, relatively large bank interest rates, unfavourable investment climate in Ukraine. Problems related to the scientific potential are the lack of financing of scientific activity, the emigration of highly skilled personnel from Ukraine. At the enterprise level, key issues are: complicated business, unjustifiably high taxes, withdrawal of funds offshore zones, government corruption, government pressure, low level of economic freedom, currency instability, lack of support of domestic producers from Ukrainian consumers and government customers, political and economic instability, weak property rights protection systems. The study provides ways to solve problems through action at the country level and at enterprise level.*

**Keywords:** problems of enterprises of instrument making, increase of competitiveness of high-tech enterprises, ways of solving problems of co-ability.

*Проаналізовано загальні проблеми конкурентоспроможності високотехнологічних підприємств (зокрема, підприємств приладобудування), що існують на рівні країни та вирішуються за допомогою активного впровадження стратегії розвитку на національному рівні. Основними проблемними аспектами, що заважають побудові сильної галузі приладобудування, є: нестабільна економічна ситуація, незадовільна політико-економічна обстановка, недотримання конституційного принципу верховенства права, високий рівень корупції, несправедливий розподіл податкового навантаження, еміграції висококваліфікованих кадрів (або проблема «відтоку мізків»), несприятливий інвестиційний клімат, валютна нестабільність, інші обмеження. З використанням ромбу національних переваг М. Портера знайдено групи факторів для проведення дослідження, зокрема: людські ресурси, природні ресурси, фінансові ресурси, технології, інфраструктура. Відповідно, до кожного фактору сформульовано ряд проблемних питань, що потребують нагального вирішення для підвищення рівня конкурентоспроможності приладобудівних підприємств. Проблемними питаннями на рівні людських ресурсів є: низький рівень життя та заробітних плат, корупція на всіх рівнях, низькоякісне медичне обслуговування, високий рівень безробіття, політична нестабільність, наявність альтернативи у вигляді роботи у іноземних корпораціях з порівняно вищим рівнем заробітної плати. Проблемами природних ресурсів є несприятлива військово-політична ситуація, використання природних ресурсів з порушенням правил і норм, а також положень чинного природоохоронного законодавства, різке підвищення тарифів на тепло- та електроенергію, закупівля ключових ресурсів за нераціонально високими тарифами порівняно можливих альтернатив умов. Проблемами на рівні фінансових ресурсів: відсутність власного фінансування на підприємствах, порівняно великі банківські відсотки, несприятливий інвестиційний клімат в Україні. Проблемами, що пов'язані з науковим потенціалом, є недостатнє фінансування наукової діяльності, еміграція висококваліфікованих кадрів з України. На рівні підприємств ключовими проблемами є: ускладнене ведення бізнесу, невиправдано високі податки, виведення коштів в офшорні зони, корумпованість державних органів, тиск з боку державних органів, низький рівень економічної свободи, валютна нестабільність, відсутність підтримки вітчизняного*

*виробника з боку українських споживачів і державних замовників, політична та економічна нестабільність, слабка системи захисту прав власності. У межах дослідження надано шляхи вирішення проблем за допомогою дій на рівні країни та на рівні підприємств.*

**Ключові слова:** приладобудування, конкурентоспроможність високотехнологічних підприємств.

**Introduction.** The company competitiveness is a key indicator that determines the opportunities for achieving and maintaining certain competitive positions in the international and global markets. The field of instrument making is one of the most promising in the economy of our state, because it involves the complex process from the use of raw materials to high-precision production. That is why in this work the international competitiveness is investigated on the example of the aforementioned branch of economy. In the presence of significant potential for development, the vast amount of industrial enterprises of Ukraine is incapable of competing with other domestic ones, and especially with foreign producers. Therefore, within the framework of this work it is proposed to investigate the competitiveness problems of domestic instrument making and possible ways to overcome them.

Problems of international competitiveness of enterprises were investigated by I. I. Beleckaya [1], T. Hryn'ko [2], V. B. Nyemtsov, L. E. Dovgan' [3], I. O. Piddubnyy, A. I. Piddubna [4], M. Porter [5], S. M. Synytsya L. V. Hryniv, O. M. Krupa [6], R. A. Fathutdinov [7] and other specialists. Problems and development of machine building (instrument making) have been investigated in the works of the following specialists: I. H. Mirens'kyi [8], K. V. Korol' [9], N. P. Karachyna [10], V. O. Zanora [11], O. M. Chupyr [12], I. Ye. Aleksandrova [13], Kh. M. Bepalyuk [14], K.V. Bezverkhyy [15]. In the works of scientists there is a detailed analysis of the problems hindering the development of instrument-making in Ukraine and, accordingly, the ways of their solution are omitted.

**Setting objectives.** The aim of the study is identification of the main problems that hinder the development of instrument-making enterprises and increase the competitive position, as well as provide ways to solve them.

**Methodology.** Economic analysis and factor analysis are used to identify the main problems of the enterprises in the field of instrument making and identify ways to overcome them. The method of generalization was used to formulate conclusions and recommendations.

**Research results.** According to a research carried out by the author on the basis of Porter Diamond [16], it's possible to identify the following problems in the field of instrument making.

Block A. Problems at the country level that hinder the development of instrument-making:

1. The unstable economic situation (for example, the fluctuation of the GDP per capita over the past 10 years was rather sharp (Figure): peak periods occurred in 2008 (USD 3.9 thousand) and in 2013 ( 4 thousand USD - the maximum), and the recession - in 2009 (2,5 thousand USD) and 2015 (2,1 thousand USD - the minimum), which in percentage terms means that in 2008-2009 a sharp drop in per

capita GDP fell by 65%, then it was a gradual increase from 2009 to 2013 in aggregate by 58% and a fall in the indicator from 2013 to 2015 by 53%).

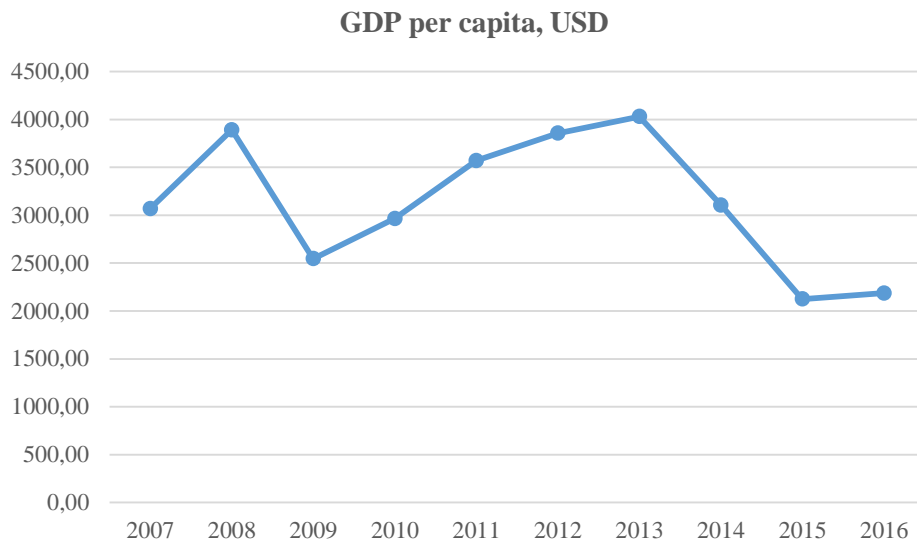


Figure - Fluctuations of GDP in Ukraine over 10 years [17]

2. Poor political and economic situation (the index of state weakness in Ukraine reaches 74 out of 120 and ranks 90th out of 178 analyzed countries in 2017 [18]).

3. Incompatibility with the constitutional principle of the rule of law, which is enshrined in Art. 8 of Constitution of Ukraine. This principle characterizes the rule of law in terms of its formal sources supremacy - Constitution and laws in the system of normative legal acts of state authorities and local self-government [19]. In fact, this principle is violated since the violation of the restrictions on concurrency and conciliation, ending with the absence of convictions for criminals. These facts significantly impair business and investment climate.

4. High level of corruption (according to the level of perception of corruption, Ukraine ranks 131 out of 176 countries analyzed in 2016, which corresponds to the availability of this problem at all levels of the economy and politics [20]).

5. Unfair distribution of tax burden. On average, the tax burden paid by the average non-tax entity (legal entity) is approximately 53% of the profit (including the overall average tax burden on wages - 41.5% (22% of the ECU, 18% of the CPA and 1.5% of the military salary). At the same time, a private entrepreneur gives a relatively small share of income as a tax (the first and second groups set a clear amount of tax per month (10% of the minimum subsistence minimum for the first group and 20% of minimum wage for the second one) but the size of the income tax and the third set of 5% of revenue. On January 1, 2017 the 2nd and 3rd groups FOP have to pay a single social contribution of more than 704 hryvnas per month, even if temporarily entrepreneurs have no income [21]). It should be noted that this trend is more widespread in the IT field: specialists working for foreign companies, pay relatively small deductions to the budget. At the same time, they do not create jobs

(or they create an order of magnitude lower than in industrial enterprises), while producers of high-tech "physical" products carry a full tax burden.

6. The problem of "brain drain", which leads to a reduction in the number of highly skilled professionals, focused on production and increase of the labor cost, because of the uneven income distribution (IT professionals receive wages that are equal to or higher than the payment of the work of top managers and directors of companies) for a Ukrainian company is a significant cost to attract programmers who can develop new software or product, which is an important factor in maintaining competitive positions of high-tech enterprises (including instrument-making).

7. Unstable investment climate (fluctuations in volumes of total capital investments from 2010 amounted to UAH 180 billion in 2010 to UAH 359 billion in 2016, taking into account the decline from 2013 and growth from 2015, which was caused by adverse economic and political situation) [22].

8. Currency instability and currency restrictions that impair the export and import capabilities of enterprises.

9. Other problems of the national economy that may directly or indirectly influence the development of instrumentation.

In order to stabilize and develop high-tech industries, which includes instrument making, Ukraine's "Strategy for the Development of High-Tech Industries by 2025", approved by the Cabinet of Ministers of Ukraine, is being implemented. It includes such factors of high-tech industries development as economic regime, development of education, development of innovations, and development of ICT infrastructure [23].

For complex consideration of the competitiveness problem, it's necessary to refer to the factor components of the instrument-making field in Ukraine. It is a quantum analysis of instrument-making below using the Romanian National Advantages [16].

Factorial conditions can be divided into the following subgroups according to M. Porter's classification: human resources, natural resources, financial resources, technology, infrastructure.

**1. Human resources** are a decisive factor for instrument-making enterprises, since the industry is a science-intensive and labour-intensive industry. Without qualified workers, the creation of high-tech products will be complicated.

For the analysis of this factor, it is proposed to apply the presentation in the form of problems and ways to solve them, as follows.

**Problems:**

- 1) low standard of living, resulting in emigration in search of better living conditions;
- 2) low wages (UAH 7,377 per month as of October 2017 in Ukraine and UAH 11,454 in Kyiv [24]), which is 50% lower than the minimum average wage in the EU (Albania has 419 EUR per month [25]);
- 3) corruption is an illegal method, which provides an opportunity to increase earnings in the absence of sufficient wages (domestic corruption of civil servants with low paid work);
- 4) low-quality medical care;

- 5) high unemployment (10,0% according to official data, about 30% - according to informal ones) [16];
- 6) political instability, a threat to the lives and well-being of citizens;
- 7) availability of an alternative in the form of work in foreign corporations with a relatively higher salary.

The following solutions are offered:

- a) active measures aimed at increasing employment (state benefits in the form of benefits for enterprises that create new jobs);
- b) improving the quality of medical care (including reducing the level of corruption in the field of medicine). An important step is also to increase staff salaries and technical re-equipment of workplaces;
- c) an active anti-corruption program aimed, first of all, at the top of the government (raising wages and monitoring compliance with anti-corruption legislation);
- d) assistance to the state to increase the welfare of citizens.

Important indicators of competitiveness for this group are indicators of migration, quality of life, safety of life, employment.

The use of opportunities and benefits is also an important step for improving competitiveness. This group is characterized by a high level of education, and a strong staffing potential, consequently. When stimulating the economic activity of enterprises in need of highly skilled personnel, the possibility of applying their skills to specialists will increase, and the payment of their work will be fixed at an adequate level. This will reduce emigration and become a lever that will help to shape a positive attitude of citizens towards their country and increase the ability of enterprises to find highly skilled workers.

**2. Natural resources** are a specific kind of resources that are actually independent of politics, economics, etc. Having a fixed amount of natural resources, the rational and purposeful use of natural resources is the primary task of economic entities. At the same time, the situation with regard to access to natural resources, their logistics, contractual relations with regard to import of raw materials can be solved at the state level for strategically important resources, as well as at the enterprise level, with regard to specific types of resources. Products of the metallurgical complex (including non-ferrous metals, which are components of electronic circuits), as well as construction materials, which produce light, chemical, woodworking industry, are necessary for the devices manufacture.

In view of the above, there are the following **problems of natural resources** that can be solved in Ukraine:

- 1) unfavourable military-political situation, which complicates (in some cases it is impossible) to supply raw materials from the regions that are now occupied;
- 2) inappropriate use and misuse of natural resources;
- 3) the use of natural resources in violation of the rules and norms, as well as the provisions of the current environmental legislation;
- 4) a sharp increase in tariffs for heat and electricity (393% in 2017 relative to 2016 [26]);

5) procurement of key resources for irrationally high tariffs of relatively possible alternative conditions.

Ways of solving problems:

- a) promotion of the targeted use of natural resources through conducting qualitative inspections of methods of use and the state of resources;
- b) replacement of resources supplies from the Russian Federation to contractual relations with other countries on the most favourable terms (today the customs value of imported gas to Ukraine is 6392.63 UAH or 239.53 USD per 1 thousand m<sup>3</sup>, while the cost of gas for enterprises is comparatively with the same period in 2016 increased by 17% (taken into account the latest data for June 2016 and June 2017) [27; 28; 29]).

**3. Financial resources.** Ways of attracting financial resources are divided into own financing, attracted funds (investments) and borrowed (through the bank or otherwise).

Accordingly, **the problems** of financial resources are:

- 1) lack of own financing at enterprises;
- 2) relatively large bank interest (in the EU countries, on average, 2-10%, in Ukraine on average 20% and above [30]).

3) unfavourable investment climate in Ukraine;

In particular, for investors (local and foreign, there are additional problems [30]:

- 1) instability (economic, political, financial, social);
- 2) high risks of investments non-return;
- 3) unpredictability of the economic and political situation;
- 4) high indebtedness to international organizations;
- 5) vulnerability of investors;
- 6) low development of the system of protection of rights own
- 7) non-compliance with the current legislation by entrepreneurs;
- 8) the need for reform of the taxation system.

In order to solve problems, it is necessary to introduce a comprehensive program to improve the investment climate and solve business problems.

**Ways to solve** the above problems can be:

- a) attraction of funds (including from abroad) through NEFCO, IQ-Energy, ESCO programs, etc., and participation of Ukrainian enterprises in these programs using foreign partnership (within the programs there are high financial guarantees (make up 50-100% of the total amount of the contract), which are too large for most domestic enterprises, and a foreign investor partner could eliminate this problem);
- b) granting financial incentives to investors and returning technological parks;
- c) providing bank loans for high-tech enterprises on preferential terms.

**4. Scientific potential.** The state of science has a significant impact on its socio-economic development. According to national statistics, in Ukraine there are 5.1 researchers per 1,000 people of economically active population. It is inferior to the EU countries (6.0 for the first 15 EU countries). At the same time, the number of scientific staff in Ukraine, unlike the vast majority of European countries, is

decreasing. According to the data of 2017, the number of scientific staff was 98 thousand people, which is 20% less than in 2016 [16].

**Problematic issues remain:**

- 1) insufficient financing of scientific activity, which leads to its reduction and decrease in the number of studies (expenditures on basic research in 2016 fell by 10% [22]);
- 2) emigration of highly skilled personnel from Ukraine as a result of unfavourable political situation and low wages.

**The ways to solve these problems are:**

- a) the introduction of state programs for the development of science and increase of research expenditures (in particular, the amount of research expenditures increased by 5% relative to the previous year in the area of applied scientific research and scientific and technological (experimental) development, and reached 11.53 billion USD for 2016 [16]);
- b) approval of development costs within the enterprise, introduction of a system of incentives for workers implementing scientific developments, know-how, utility models, etc. (these incentives are regulated by the current legislation, but workers and employers often do not know about their existence).

Separately, we can highlight a number of problems faced by entrepreneurs (involved in the field of instrument making and accompanying industries and potential investors in high-tech areas of the economy):

**For entrepreneurs** (domestic and foreign, doing business in Ukraine or having partners in it, the main **problems** are:

- 1) problematic business due to instability of the economy and uncertainty in the legislation;
- 2) unjustified high taxes and a large number of them, which complicates the procedure for their payment. In Ukraine, average taxes account for 55% [17] of commercial profits. Despite the fact that taxes in Ukraine are in average lower than average European, it is necessary to take into account the amount of profit. European companies, having received sufficiently high profits and after deductions, usually have far more financial advantages than similar Ukrainian ones. After taxation of funds remaining at the disposal of domestic enterprises, it is often not sufficient for the development and achievement of equal competitive opportunities with foreign enterprises;
- 3) funds withdrawal in offshore zones;
- 4) corruption of state bodies, tender committees;
- 5) pressure from public authorities (for example, unplanned inspections, tax inspections, etc.);
- 6) low level of economic freedom;
- 7) currency instability;
- 8) the lack of support of domestic producers by Ukrainian consumers and government customers (for example, the supply of "Hyundai" trains, which do not correspond to the qualities of the Ukrainian tracks and are more expensive, instead of the trains of the Kryukiv carriage plant);



- 9) political and economic instability;
- 10) the absence of international treaties with certain countries, which increases the taxation and complicates trade;
- 11) weak system of property rights protection, including intellectual.

Problems can be solved by following:

- a) reduce taxation to 30% of profits with increased control over tax payments and make it unprofitable to withdraw money from the country;
- b) provide state support to agriculture, metallurgy and innovative enterprises (creation of an innovation commission for control and reduction of taxes);
- c) give to entrepreneurship more economic freedom;
- d) eliminate corruption;
- e) use positive aspects of the Ukrainian economy and rational use of resources, in particular labour (relatively cheap skilled labour), infrastructure, and intellectual potential;
- d) establishing partnerships with other states.

**Conclusions.** The scientific novelty is the improvement of the methodological approach using the Diamond of M. Porter's national advantages in the context of identifying problems of high-tech industries and ways of their solution.

The theoretical one is that the study indicated ways to increase the competitiveness of Ukraine through factor analysis of the Porter Diamond, the problems of instrument making in Ukraine were identified. For ease of analysis, several narrow groups of factors are considered: human resources, natural resources, financial resources, technologies, infrastructure.

The solution of the problems (practical value) for each group of factors provides an opportunity to increase the competitiveness of the instrument making industry in Ukraine and other high-tech industries, improve the investment climate and the state of entrepreneurial activity. What is more, the above steps provide an impetus for improving the socio-economic situation, which will mean an increase in international competitiveness.

Further scientific developments in the given direction may be the formation of an alternative strategy for the development of high-tech industries, expansion of the scope of research (for example, conducting a similar analysis for the most promising industries, etc.).

The results of the study can be used to supplement the programs of economic development of Ukraine, enterprises, institutions, organizations to improve the competitive position in the local and international markets.

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