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MANAGEMENT OF THE ENGINEERING INDUSTRY IN THE FACE OF A SOLVENCY CRISIS AND AN INCREASED RISK OF BANKRUPTCY

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Abstract. There is an increase in the risks of crisis in the industrial sector and especially engineering in the conditions of the 2020 solvency crisis and the strengthening of the impact of the crisis on the activities of all sectors of the economy of Ukraine. The purpose of the article is to substantiate the solvency of industrial and machine-building enterprises of Ukraine on the basis of statistical quantitative analysis of enterprises in the industry.

The following signs of reduced solvency were identified being based on the statistical analysis of macroeconomic indicators: the decrease in delivery in foreign markets; reduction of the share of mechanical engineering in the volume of sales of industrial products; reducing the growth rate of the industry; reduction of the current liquidity level; a high level of dependence on external sources and a higher level of bankruptcy risk in the long run.

The main management methods in such conditions are: cost reduction, enterprise restructuring, re-equipment, modernization of production, innovative development, debt restructuring.

Key words: bankruptcy of machine - building enterprises, crisis of machine - building industry, solvency crisis of machine - building enterprises, machine - building.

A problem statement. There is an increase in the risks of crisis in the industrial sector and especially engineering in the conditions of the 2020 solvency crisis and the strengthening of the impact of the crisis on the activities of all sectors of the economy of Ukraine. In addition, machine-building enterprises face problems of attracting additional financial and material resources and increasing competitiveness in

international markets in the context of European integration.

The instability of the market economy, the growth of crisis phenomena causes an increase in the level of insolvency of machine-building enterprises. So, machine-building enterprises face the challenge of maintaining market positions, increasing competitiveness, stabilizing the financial situation.

Analysis of the latest research and publications.

Kavtysh O. P. and Pogrebnyak, A. Y. [6], Lisnichuk, O.A. [7], Mishchenko V.A., Shapran E.M., Kubrak M.O. and Mindra K.G. [8], Pakhomova I.G. and Mamonova O.I. [9-10], Pokrovskaya N.M. [11], Solomyanova-Kirilchuk K.O. [12], Solomyanova-Kirilchuk K.O. and Grebenikova O.V. [13], Trots I.V. [14], Shvets Y. [15] are devoted to the study of bankruptcy of machine-building enterprises and their adaptation to the conditions of crisis.

However, researchers are investigating the risks of insolvency at the micro level, studying the financial condition of enterprises based on the analysis of ratios. This means a lack of researches and macro-levels to assess solvency and bankruptcy risk. It is necessary in

order to formulate governance recommendations at the national level.

This article aims to substantiate the current condition of solvency of industrial and machine-building enterprises of Ukraine on the basis of statistical quantitative analysis of enterprises in the industry.

The main part. In general, the volumes of sold industrial products and machine building in Ukraine are growing (Table 1). The share of machine building products remains at the same level in 2014-2019, but the growth rate decreased in 2019. Sales growth occurred in 2015-2018 during the period of economic growth. It means that the industry depends on economic stability and market conditions.

Table 1

Dynamics of volumes of sold industrial products and machine building in Ukraine in 2014-2019 [2]

Indicator	2014	2015	2016	2017	2018	2019	Absolute deviation (2019-2014), +/-
Industry, UAH million	1195592	1496013	1767093	2153031	2508580	2480804	1285211,8
Mechanical engineering, UAH million	94088,4	103708,1	116367,3	150417	182103,1	188082,3	93993,9
Specific weight of mechanical engineering, %	7,87	6,93	6,59	6,99	7,26	7,58	-0,29
Growth rate of mechanical engineering, %	-	10,22	12,21	29,26	21,07	3,28	-

Twice less machine-building products were sold outside Ukraine than within Ukraine (Table 2). So, the ratio of sales to products sold outside Ukraine was 0.54, in 2015 - 0.49 in 2014, in 2016 - 0.44, in 2017 - 0.34, in 2018 - 0.28, in 2019 - 0.27. We can conclude that the domestic market of Ukraine is the main market in the global economic downturn. Therefore, companies are more vulnerable to the risk of insolvency and crisis situations during periods of economic downturn.

As it was noted by Pakhomov I.G., Mamonov O.I. [10] "the state does not have a well-funded development strategy, so the vast majority of machine-building enterprises are forced just to survive. The result was the loss of existing market positions, the bankruptcy of many enterprises, the serious the obsolescence of technology and equipment.

Table 2

Dynamics of industrial production and machine building in Ukraine in 2014-2019 that was sold outside the country [2]

Indicator	2014	2015	2016	2017	2018	2019	Absolute deviation (2019-2014), +/-
Industry, UAH million	323085	418791	466752	596313	682022	649212	326127,1
Mechanical engineering, UAH million	50861,1	57608,6	55125	68810,2	79212,9	78408,8	27547,7
Specific weight of mechanical engineering, %	15,74	13,76	11,81	11,54	11,61	12,08	-3,66
Growth rate of mechanical engineering, %	-	13,27	-4,31	24,83	15,12	-1,02	-

At the same time, enterprises sold a higher share of machine-building products outside Ukraine than in industry as a whole (12.08% in 2019). The growth rate

of sales decreased in 2019 after a long growth in 2015, 2017-2018.

Tendencies in the machine-building industry in Poltava region are similar to the general trends in the

Ukrainian market: sales are growing, the share in total sales is declining due to the economic downturn and growth rates are declining in 2019 compared to 2016-2018 (Table 3).

Table 3

Dynamics of volumes of sold mechanical engineering products in Poltava region in 2014-2019 [1]

	2014	2015	2016	2017	2018	2019	Absolute deviation (2019-2014), +/-
Industry, thousand UAH	86730247	111375144	144233254	193298613	212813635	193160967	106430719
Mechanical engineering, thousand UAH	8114777	6830533	7153463	10506839	13501277	14549334	6434556
Specific weight of mechanical engineering, %	9,36	6,13	4,96	5,44	6,34	7,53	-1,82
Growth rate of mechanical engineering, %	-	-15,83	4,73	46,88	28,50	7,76	-
The share of mechanical engineering of Poltava region as a whole in the industry, %	8,62	6,59	6,15	6,99	7,41	7,74	-0,89

The share of mechanical engineering in the industry in Poltava region decreased by 0.89% in 2014-2019. These tendencies indicate that mechanical engineering in Poltava region is one of the leading industries that depends on the external world and domestic markets. Therefore, companies in the economic downturn are exposed to the risks of insolvency, reduced liquidity and bankruptcy.

The main factors reducing the sales of machine-building enterprises are: reduction of demand in the domestic and foreign markets and this situation is associated with a decrease in the purchasing power of consumers; lack of working capital to develop production; reduction of world investment activity, and therefore a decrease in external demand for Ukrainian

engineering products which led to the loss of foreign markets [6].

Demand began to fall in the country in 2012–2013. Russia was the main consumer of mechanical engineering products. This situation had a negative impact on the price level. This also led to a negative impact on sales in 2014-2019. The largest losses were suffered by factories - manufacturers of cars and car equipment. It was a consequence of the aggravation of political relations and the general oversaturation of the car market [8].

The reduction in sales affected the level of solvency of industrial enterprises, which began to decline in early 2019 (Table 4).

Table 4

Dynamics of indicators of the balance of Ukrainian industrial enterprises in 2019-2020 [3]

Balance sheet account	on January 1, 2019.	on 30 September	on January 1, 2019	on June 30, 2020	Absolute deviation (01.01.2020-01.01.2019), +/-	Growth rate (6/2),%
1	2	3	4	5	6	7
Non-current (fixed) assets, UAH million	1454926,9	1518163,8	1549542,8	1545540,1	94615,9	6,50
Current assets, UAH million	1562720,5	1567096,0	1532133,0	1574933,2	-30587,5	-1,96
Non-current assets and disposal groups, UAH million	1000,6	775,7	646,5	1257,7	-354,1	-35,39
Equity, UAH million	791108,7	864621,2	859977,5	779366,4	68868,8	8,71
Long-term liabilities and collateral, UAH million	480836,1	464403,1	456301,9	485462,9	-24534,2	-5,10
Current liabilities and collateral, UAH million	1746698,5	1757009,6	1766033,9	1856893,3	19335,4	1,11
Liabilities related to non-current assets and disposal groups and net asset value of non-state pension fund, UAH million.	4,7	1,6	9,0	8,4	4,3	91,49
Balance sheet, UAH million	3018648,0	3086035,5	3082322,3	3121731,0	63674,3	2,11
Current ratio	0,89	0,89	0,87	0,85	-0,03	-3,03
Coefficient of financial stability	0,42	0,43	0,43	0,41	0,01	1,35

The current liquidity ratio directly indicates an increase in the risk of bankruptcy of industrial enterprises of Ukraine: on January 1, 2019 the indicator was less than 1 - 0.89, as of June 30, 2020 - 0.85 (Table 5). A value less than 1 indicates solvency problems. As a result, current assets do not cover 100% of current liabilities, so businesses may face a lack of funds to

finance accounts payable. As Pokrovskaya N.M. notes, [11] "The consequences of low liquidity are reduced competitiveness of enterprises, their inability to pay current debts and liabilities, which leads to the mandatory sale of long-term investments and assets. And the worst thing - reduction of profitability and bankruptcy."

Table 5

Dynamics of solvency indicators of Ukrainian machine-building enterprises in 2014-2020 [4]

Indicator	2014	2015	2016	2017	2018	2019	2020 (на 30.06)	Absolute deviation (2019-2014), +/-
Industry								
Current ratio	0,98	0,93	0,89	0,89	0,88	0,87	0,85	-0,11
Coefficient of financial stability	0,52	0,45	0,39	0,36	0,36	0,43	0,41	-0,09
Engineering								
Current ratio	1,11	1,00	1,00	1,04	1,00	0,94	0,93	-0,17
Coefficient of financial stability	0,43	0,32	0,31	0,32	0,29	-	-	-

Industrial enterprises are characterized by a significant risk of loss of solvency in the long run, as it is evidenced by the coefficient of financial stability of 0.41-0.43 during 2019-2020. This means insufficient financial stability and high risks of bankruptcy. This

requires attracting long-term borrowed resources, reinvesting profits, obtaining loans from banks or other enterprises. So, in January-June 2020, industrial enterprises suffered a loss of -45928.7 million UAH, in

particular in the mechanical engineering - -7558.7 million UAH (Fig. 1).

This means that there is no possibility of reinvesting profits. As a result, innovative activities based on self-financing are available only to some enterprises in the industry. Due to the high cost of credit

resources and the low level of investment climate, machine-building enterprises refuse to implement innovative strategies and development programs. In fact, production potential and competitive positions in foreign and domestic markets are lost.

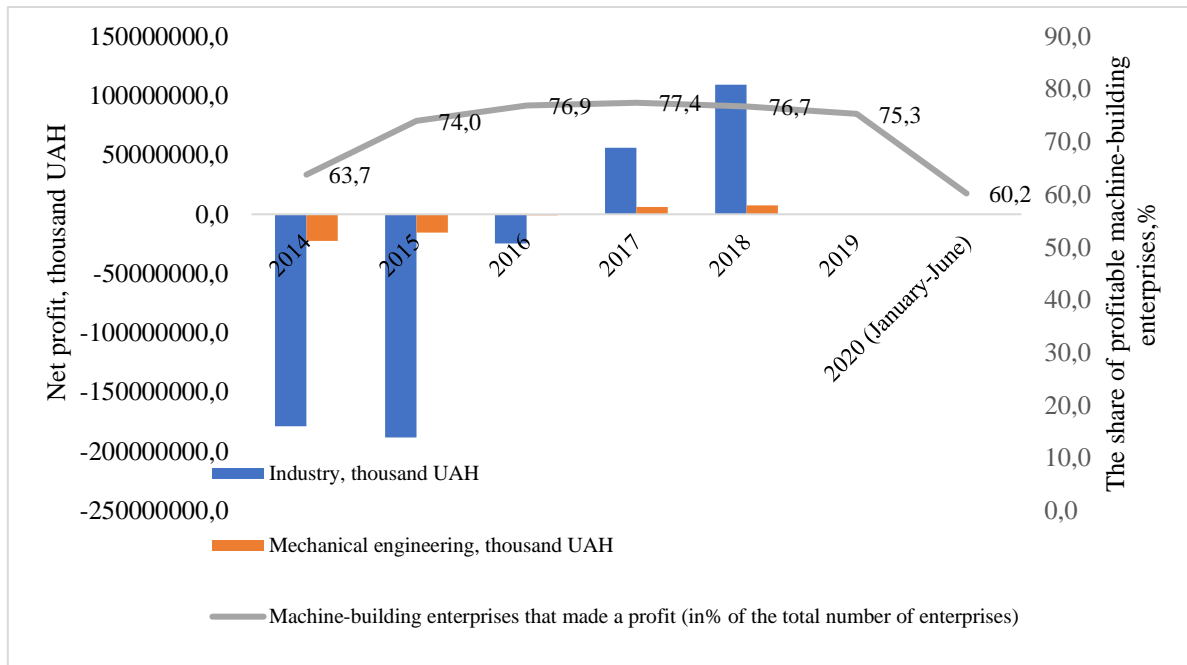


Figure 1. Dynamics of net profit (loss) of industrial and mechanical engineering enterprises in 2014-2020, thousand UAH [5]

The structure of the balance sheet of industrial enterprises as of June 30, 2020 is following: non-current (fixed) and current assets occupy 49.51% and 50.45% of the balance sheet, equity - 24.97%, long-term liabilities and collateral - 15.55%, current liabilities and collateral - 54.48%. This means a high level of dependence on external sources and a higher level of bankruptcy risk in the long run.

Resource management in the context of aggravation the solvency problems of machine-building enterprises should include: optimization of human resources in accordance with the planned volumes of production and sales; optimization of material and technical resources and their operation in accordance with the planned volumes of orders; emphasis on key and stable customers. "Machine-building enterprise and its management should be aimed at increasing the inflow of financial resources and reducing current costs in a crisis [10]".

Shvets Y. [15] provides the following measures to improve the management of operational activities of machine-building enterprises: improving the efficiency of operational staff; rational usage of resources; rationalization of the usage of operating assets; improving the quality of materials; intensification of production and economic activity; introduction of modern technologies; expansion of sales channels; production of a new type of product; automation and mechanization of production; optimization of operating costs; improving the quality of products and services; improving relations with suppliers and customers;

creating safe working conditions; strengthening competitive positions; increasing the competitiveness of products; application of motivation methods in order to reduce operational risks; increase in operating profit.

The most effective management measures, systematized by Mishchenko V.A., Shapran, E.M., Kubrak M.O. and Mindra K.G. [8] are the creation of a total production cycle; consolidation of shares and assets; placement of shares of additional issue of enterprises; creation of a coordination committee with representatives of the largest creditor banks of Ukraine; approval of the loan repayment plan; restructuring; cost reduction due to the abolition of certain positions; steps to reduce illiquid products; introduction of the "Lean Production" methodology.

For example, the main methods used by "Azovmash", "Dniprovagonmash" and "Luhanskteplovoz" during the crisis of 2008-2009 were cost reduction, enterprise restructuring, re-equipment, modernization of production, innovative development and debt restructuring. Simultaneous usage of strategic (re-equipment of production, innovative development) and tactical methods (cost reduction due to reduction of internal production structures, staff, restructuring of the enterprise and debt) of anti-crisis management was called "Protective tactics".

Its use has allowed companies to overcome the risk of bankruptcy and to take a leading position in the market. Innovative development, as a result of which "Azovmash" and "Luhanskteplovoz" provided diversification of production, leveled the reduction of

orders for major products and prevented the second wave of the crisis [8].

OJSC "Karlovysk Machine-Building Plant" (KMZ Industries) is a leading manufacturer of equipment for grain processing in Ukraine. It offers design, development, production and installation of a range of equipment for the elevator industry. The company supplies equipment, performs commissioning work, conducts staff training and provides after-sales service.

The positive dynamics of the company's development in recent years is confirmed by the growth of income (revenue) from sales of 2.5 times for the period 2016-2018. However, in 2019 the dynamics of revenue growth slowed down (264 753 thousand UAH in 2017, 395 181 thousand UAH in 2018 and 293 329 thousand UAH in 2019). As of December 31, 2019, KMZ Industries had long-term and current liabilities in

the amount of 4,156.6 thousand UAH and 32,956.00 thousand UAH.

To obtain loans, the company secures obligations and claims against creditors through the pledge of land and buildings (32,234.00 thousand UAH without VAT at appraised value), production equipment (27,193.00 thousand UAH) and vehicles (741.70 thousand UAH). Therefore, at the beginning of 2019 the coverage ratio was 1.44, at the end - 1.17; term liquidity ratio - 0.34 and 0.21, respectively; absolute liquidity ratio - 0.07 and 0.03 [16]. Liquidity risk is one of the most controlled in a crisis (Table 6).

Risk concentration arises when several counterparties carry out similar economic activities in one geographical region. Additional risk is the similar geographical characteristics of counterparties that determine their ability to meet debt obligations.

Table 6

Risk management methods in OJSC "Karlovysk Machine-Building Plant" [16]

Risk	Management methods
Credit risk	"To reduce credit risks, the company pursues a policy according to which all counterparties are thoroughly analyzed for creditworthiness" [16].
Liquidity risk	"The company usually ensures that cash is available on demand in an amount sufficient to cover the expected operating costs within 30 days. This does not take into account the potential impact of exceptional circumstances. The occurrence of these circumstances could not reasonably be predicted. It might be natural disasters, military action or creditworthiness" [16].
Market risk	"Market risk may be caused by changes in foreign exchange rates if receivables and payables are denominated in a currency other than the functional currency, which is hryvnia in Ukraine, or the liability has a variable interest rate creditworthiness" [16].
Capital management risk	"Maintaining sufficient creditworthiness and own funds in order to maintain the company's ability to continue its activities. Capital risk management mainly concerns compliance with the requirements of Ukrainian creditworthiness legislation" [16].

Risk reduction occurs due to constant innovation activity. Every year about 40 studies are conducted in order to improve the existing products of the plant, the release of new developments. 2 innovative developments were implemented in 2019:

1. Use of KMZ Industries coated material "zinc + magnesium" for the manufacture of silo roofs - an innovative metal coating to provide long-term protection against deterioration. This provided a higher corrosion resistance of the material by 7 times compared to galvanized steel.

2. Production of a new drum separator with five sieves. Its productivity is 200 t / h after preliminary cleaning. At the end of 2019, KMZ Industries extended the warranty period of manufactured equipment due to confidence in the high quality of manufactured products. KMZ Industries made the emphasis on professional installation of elevator equipment.

Conclusion

The study shows the following signs of reduced solvency and increased risk of bankruptcy of machine-building enterprises: reduced sales in foreign markets; reduction of the share of mechanical engineering in the volume of sales of industrial products; reducing the growth rate of the industry; reduction of the current liquidity level.

Industrial enterprises are characterized by a significant risk of loss of solvency in the long run,

which indicates the presence of insufficient financial stability and high risks of bankruptcy. This requires attracting long-term borrowed resources, reinvesting profits, obtaining loans from banks or other enterprises. However, the lack of opportunity to reinvest profits leads to a low level of innovation due to the inability of self-financing in the industry.

Due to the high cost of credit resources and the low level of investment climate, machine-building enterprises do not implement innovative strategies and development programs. In fact, production potential and competitive positions in foreign and domestic markets are lost. This means a high level of dependence on external sources and a higher level of bankruptcy risk in the long run. The main management methods in such conditions should be: cost reduction, enterprise restructuring, re-equipment, production modernization, innovative development, debt restructuring.

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USE OF THE CLUSTER APPROACH TO IMPROVE ENERGY EFFICIENCY IN THE REGIONS OF RUSSIA

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