

Research article

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DIGITAL TRANSFORMATION OF THE INFORMATION-ANALYTICAL SYSTEM FOR CRISIS MANAGEMENT IN ENTERPRISE REHABILITATION PROCEDURES

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Abstract

The problem considered in this article is relevant owing to the inevitable digital transformation of the crisis management of enterprises in bailout procedures, which is associated with a new technological shift and the growing competition between countries for the markets of Industry 4.0 technologies. The introduction of high-tech solutions has led to changes in the format and content of crisis management, with a focus on solving the optimisation tasks of operational management in bailout procedures and rethinking approaches to develop digital development strategy scenarios that include mobile and cloud-based analytical solutions. The digital transformation of the formats of system and comprehensive analyses in bankruptcy institutions has become a natural step in the development of crisis management. This article considers the problem of developing an effective information and analytical system for crisis management in bailout procedures for domestic enterprises in the new economic conditions. The study demonstrates the need to introduce digital tools in building an effective information system for crisis management. Actively developing the market for information products and services offers many opportunities for enterprises to solve problems in the transition to automated and digital technology crisis management.

Keywords: crisis management, analysis, digital transformation, bailout, efficiency, resource

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ЦИФРОВАЯ ТРАНСФОРМАЦИЯ ИНФОРМАЦИОННО-АНАЛИТИЧЕСКОЙ СИСТЕМЫ АНТИКРИЗИСНОГО УПРАВЛЕНИЯ В ПРОЦЕДУРАХ САНАЦИИ ПРЕДПРИЯТИЙ

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Аннотация

Проблема, рассматриваемая в данной статье, актуальна в связи с неизбежной цифровой трансформацией антикризисного управления предприятиями в процедурах спасения, что связано с новым технологическим сдвигом и растущей конкуренцией между странами за рынки технологий Индустрии 4.0. Внедрение высокотехнологичных решений привело к изменениям в формате и содержании антикризисного управления с акцентом на решение задач оптимизации оперативного управления в процедурах санации и переосмысление подходов к разработке сценариев стратегии цифрового развития, которые включают мобильные и облачные аналитические решения. Цифровая трансформация форматов системного и комплексного анализа в институтах банкротства стала естественным шагом в развитии антикризисного управления. В данной статье рассматривается проблема разработки эффективной информационно-аналитической системы антикризисного управления в процедурах санации отечественных предприятий в новых экономических условиях. Исследование демонстрирует необходимость внедрения цифровых инструментов при построении эффективной информационной системы для управления кризисными ситуациями. Активно развивающийся рынок информационных продуктов и услуг открывает перед предприятиями множество возможностей для решения проблем при переходе на автоматизированные и цифровые технологии антикризисного управления.

Ключевые слова: антикризисное управление, анализ, цифровая трансформация, санация, эффективность, ресурсы

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1. Introduction

Transitioning to a digital economy entails a large-scale restructuring of socio-economic institutions and causes changes in the way social and economic relations are organised in society (Avdeeva et al., 2019). Today, anti-crisis management in enterprises undergoing bailout procedures cannot keep up with technological progress. The business processes of bankruptcy institutions lag behind the pace of technological development. The adaptation of anti-crisis management to new conditions and environmental factors implies the need to meet the key criteria for the strategic and operational plans for enterprise bailout, the emergence of new business areas, and opportunities for communication (Shakhmametova, 2012). Within the subprogram “Information Analytical, Organizational and Technical Support of Digital Development” of the 2021–2025 State Program for Digital Development of Belarus, it seems relevant to transform the analytical processes of anti-crisis management. The prerequisite for this research study is the negative growth dynamics in the number and proportion of unprofitable industrial enterprises in the Republic of Belarus. The share of unprofitable industrial organisations in 2015 significantly increased but showed a downward trend by 2018.

In the structure of unprofitable organisations by type of economic activity, the mining and manufacturing enterprises had the largest shares (24.3% and 22.3% in 2018 and 12.5% and 20.9% in 2020, respectively). In addition, a significantly growing share of unprofitable industrial organisations was observed in 2015, with a downward trend achieved by 2020 (profile of the indicator for 2015–2020: 23.5%, 20.6%, 16.7%, 17.3%, 14.7%, and 16.4%, respectively). The proportion of unprofitable organisations in the production of automobiles and equipment was 10.0% in 2020, which is 14.8 percentage points lower than that in 2018 and corresponds to the trend common for industrial enterprises¹.

The digital transformation strategy for the analytical systems of anti-crisis management of enterprises in bankruptcy proceedings implies that the existing economic potential is effectively and proactively managed using a system of prescriptive analytics (Abdullaev et al., 2019). Analytical processes on a digital platform can improve the use of the economic potential of an enterprise in bailout procedures, cut costs, reduce unplanned standstills, and ensure that all resources are applied in the best way possible in space and time. The goal of predictive and prescriptive analytics as digital transformation tools is effective anti-crisis management of all blocks of the economic potential of the debtor’s enterprise.

The aim of this study was to develop an efficient information and analytical system (IAS) for restoring debtors’ solvency based on digital transformation tools and given the potential of the infrastructure of the business processes in the enterprise. The main objective of this research was to form the theoretical foundation and put into practice the analytical justification of anti-crisis management in the bailout procedures of industrial enterprises, taking into account the architecture of the IT services it uses.

2. Literature Review

Researchers such as I.L. Avdeeva et al. (2019), G.R. Shakhmametova (2012), N.S. Abdullaev and E.S. Sabina (2019), L.S. Lapidus et al. (2019), A.V. Kostikova et al. (2021) pay much attention to the issues relevant to the digital economy that is developing in the economic environment.

I.L. Avdeeva et al. consider the need for digital transformation in the manufacturing industry and emphasise the importance of sustainable development. The authors identified the fundamental factors of this process, highlighting that digital transformation mechanisms play the central role because they create the image of an organisation and call for significant resources. At the same time, the macro-level of digital transformation is considered without specifying or adapting it to the level of industrial organisations, particularly in bankruptcy proceedings.

In her paper, G.R. Shakhmametova considered individual tools for information support in anti-crisis management (information modules of anti-crisis management) given the life cycle of an enterprise. The study lacks mechanisms for building an information and analytical environment that would support anti-crisis management and help develop measures for debtor bailout.

The article by N.S. Abdullaev and E.S. Savzikhanova contains materials on the results of digital transformation in Russia according to the international digital competitiveness rankings. The authors focused on the regional imbalance in the advancement of digital technologies and highlighted an acute shortage of IT industry specialists. The paper does not consider the issues of how digital potential is used by enterprises in a crisis. It lacks information on one of the most important problems of digital transformation that is related to business processes in the systems of product distribution logistics.

In their research article, L.V. Lapidus et al. discussed the ‘minimal digital basket of Russian regions’, which, if monitored systematically, can be useful for the prompt building of an effective platform for the sustainable development of regions and for reducing the digital divide between them. This paper takes into account the existing approaches to the study of digital transformation to develop an effective IAS for restoring debtor solvency using digital transformation tools and given the potential of the infrastructure for business processes in the enterprise.

Many scholars, particularly O.I. Dolganova, E.A. Deeva (2019), M.P. Galimova (2019), I.A. Brusakova (2019), and D.V. Kuzin (2019), have studied the prerequisites and readiness of industrial enterprises for digital transformation. Their studies relied on the methods suggested by foreign authors as evaluation criteria, with the foreign experiences being summarised when digital platforms for the development of business processes are formed.

A group of scholars from the Analytical Center and Financial University of the Government of the Russian Federation and the National Research University Higher School of Economics, including E.P. Kochetkov, A.A. Zabavina, and M.G. Gafarov (2019), conducted research on forming a theoretical basis for the assessment of efficiency.

The conceptual approaches to anti-crisis management were considered by E.A. Buranova (2019). According to the researcher, these approaches include measures of adaptation to the changing conditions of the external and internal institutional environments, and an increase in the level of corporate social responsibility as part of a company’s sustainable development strategy.

According to I.V. Ilyin et al. (2019), the IT architecture of an enterprise should be designed in accordance with the level of digital transformation of production and management processes.

The macro-level aspects of developing a strategy and models of digital transformation were discussed by M.K. Tsenzharik et al. (2020), N. Zhargalsaikhan (2021), B.M. Garifullin, V.V. Zyabrikov (2018), and I.V. Tarasov (2019).

T.V. Aleksandrova (2019) considers digital technologies as a tool for improving the efficiency of management in production enterprises.

Matters related to the increase in the efficiency of accounting operations based on digital transformation are discussed in the papers of I.N. Dmitrieva, A.F. Chernenko (2018), A.L. Fedorishina and K. Popovich-Zubchinskaya (2020).

By using the methods of accounting, probability theory, financial management, and financial analysis, authors such as T. Mulyk and Y.V. Mulyk (2016) proposed a critical analysis of the essence of risks in financial statements and accounting.

Foreign researchers such as V.L. Da Silva, J.K. Kovaleski, R. Negri Pagani, J. De Matos Silva, and A. Corsi (2020) have discussed technological and scientific achievements that provide new opportunities for smart industries. The concept of Industry 4.0 is considered by expert groups as an important approach to industrial configuration. The researchers highlighted that this study is especially relevant to developing countries. Empirical studies on Industry 4.0, company cases, and other materials were considered. However, the data presented were not related to specific enterprises or anti-crisis management systems. Thus, our study is relevant in this respect.

The abovementioned scientific works discuss the theoretical aspects and need for developing and applying digital transformation tools, the prerequisites and readiness of industrial enterprises for digital transformation, and the assessment of the effectiveness of digital transformation procedures. However, these research studies do not present any mechanisms for developing an information and analytical environment to support anti-crisis management and elaborate measures for debtor bailout, given the industry affiliation of a specific organisation.

3. Materials and Methods

The effectiveness of anti-crisis management in the bankruptcy proceedings of industrial enterprises is largely determined by the quality of the financial and economic IT-based analysis, which simplifies operations, relationships, and exchange of information. The IAS, built in the format of modern digital platforms, can be used by those involved in the trial to objectively assess the causes of the debtor's bankruptcy and the debtor's potential for restoring solvency. The present authors believe that the digital analytical platform for anti-crisis management is a business model of analytical procedures integrated into a single digital space at all levels of the management hierarchy that actively works in the system of the debtor's enterprise stakeholders.

The basic configuration of the digital analytical platform for anti-crisis management includes all blocks of analytical research on narrow regulatory and legislative state diagnoses of a crisis situation and an extended field of bailout and restoration of the debtor's enterprise solvency. Anti-crisis financial and economic analysis (FEA) is a tool for anti-crisis management in bankruptcy proceedings that is useful in resolving conflicts of interest between stakeholders during bankruptcy proceedings. The use of analytical software in the anti-crisis management system increases the likelihood of saving the business from destruction, while digital transformation tools act as drivers of efficiency, consistency, complexity, and objectivity, and are useful for setting company goals to recover solvency.

This study applied analytical methods for studying production systems, particularly analysis, synthesis, abstraction, generalisation, induction, deduction, analogy, and modelling.

With regard to an industrial enterprise involved in a bankruptcy procedure, the proposed concept of anti-crisis FEA based on a digital platform includes analytical calculations for the following blocks of analytical procedures:

- economic substantiation of the parameters and criteria for system and comprehensive analyses in separate blocks of decomposition of the economic potential in the procedures for the bailout of the debtor's enterprise;
- economic analysis of the main indicators for the use and development of resource potential in the blocks, including analysis of the technical state and efficiency of the fixed assets, analysis of the quantitative and qualitative indicators of workforce planning, and analysis of the material resources used;
- analysis of the dynamics, factors, and reserves in the system of costs for the production and sale of products, profits, and profitability of the debtor's enterprise;
- prospective analysis of the possibility of loss-free production and measures aimed at restoring the enterprise's solvency.

Given this concept, an information-analytical platform was built for monitoring and controlling the anti-crisis management system of an enterprise involved in bankruptcy proceedings based on a digital platform. The research involved several sequential analytical blocks that allow for the following:

- express analysis of the solvency of the enterprise involved in bankruptcy proceedings that is aimed at substantiating the gravity of the crisis, including financial analysis of the economic activity of the enterprise, such as analysis of a series of financial and economic indicators;

- analysis of the structure and dynamics of the assets and liabilities in the balance sheet, including the monitoring of structural dynamics as a factor in the sustainable financial status of the enterprise;
- analysis of the financial stability and solvency of the enterprise, including a coefficient analysis of financial stability and solvency according to the bankruptcy criteria;
- analysis of the production capacity;
- analysis of the technical condition and efficiency of the fixed assets;
- analysis of human resources.

The abovementioned research methods were chosen to solve the problem in the context of a systematic and integrated approach towards forming the information and analytical platform for anti-crisis management of the enterprise in the process of bailout. The methodological tools for FEA were used for the standard analysis to provide analytical support for management decision-making. The initial analytical material was arranged in accordance with the database of the enterprise used in the course of the study.

The empirical, statistical, financial, and operational information of JSC ‘Pinsk Shipyard’, which was studied in this research, was processed using qualitative and quantitative analyses and a correlation analysis. The results were synthesised in the plan for the rehabilitation of the debtor’s enterprise, as elaborated by the present authors.

At present, a two-level system of legal regulation exists, according to which the FEA of organisations involved in bankruptcy proceedings is performed: at the state level, the Law of the Republic of Belarus ‘On Economic Insolvency (Bankruptcy)’, dated 13 July 2012 (No. 415-Z), with amendments and additions dated 24 October 2016, and at the level of by-laws adopted for implementing the provisions of the above document. The Resolutions of the Council of Ministers of the Republic of Belarus Nos. 140/206 and 1672 provide the guidelines for calculating the indicators and criteria for recognising an organisation as insolvent and the structure of the balance sheet as unsatisfactory. Proactive anti-crisis management implies performing a detailed analysis of the production activities of the debtor’s enterprise in terms of the decomposition blocks of the economic potential, that is, objects of retrospective and prospective analytical processes, namely production capacity, production and human resources, costs, profits, profitability, and turnover. The research subject is the formation of an effective IAS for anti-crisis management of the fixed assets of the debtor’s enterprise.

This paper presents the results of the IAS built using a block of methods for managing the financial stability, solvency, and resource potential of the debtor’s enterprise.

4. Results

The results of the relevant analytical procedures based on digital platforms are presented in the IAS format and subsequently used for introducing measures for the financial recovery of Pinsk Shipyard. The material used in the study was based on the information support of this plant, which is currently in the process of reorganisation. Pinsk Shipyard is located in the centre of the city of Pinsk, in the coastal zone of River Pina. It has a floor area of 6.4 Ha; the plant grounds include buildings, essential and auxiliary facilities, and engineering infrastructures. Road and river transport is used for cargo turnover, and the plant has a railway line.

Since 2017, the plant has had no orders for the construction of motor ships. Today, the key problem of the plant is the lack of demand and funding for shipbuilding and repairing the water transport facilities owned by water transport enterprises. Hence, to meet other types of demand, the enterprise produces and sells a wide range of non-core products (services). Principally, it is about the repair of the internal combustion engines of D6 and D12, and V-46 diesel engines, which are used in military machines, fuel pumps, starters, generators, structural steel, and so forth. Starting from 2018 and throughout 2019–2020, the plant experienced a significant decrease in output in the context of individual types of production (down to 50%), while the share of give-and-take raw materials processed at production sites was capa-

cious. The main reason for the decline in production is the decreasing demand from the river transport organisations operating in the republic.

In 2017–2019, the output of current prices showed a steady downward trend, which was also consistent with the decreasing volume indicators in comparable prices. The base rates of the decline in 2018 and 2019 were respectively 48.15% and 43.18% in the current assessment and 43.86% and 35.36% in comparable prices.

The relative growth in 2019 compared with 2018 was 10.33%, which, provided that the inflationary factor is excluded, corresponds to a decrease of 19.36%. At the moment, the plant is closely cooperating with JSC “Kuzlitmash” in Pinsk to produce metal brackets and stands used in the production of JSC “Belaz” under a 1-year contract. For 8 months, marketable products were produced under this contract in the amount of 151.1 thousand rubles, which is 22.9% of the total output. Within the period of January to August 2020, the plant facilities were used for minor scopes of ship repair work performed for some water transport organisations in the amount of 88.0 thousand rubles, which is 13.3% of the total output. In recent years, the water levels were low during the navigation period, which stopped water transport organisations from conducting cargo transportation with maximum draft. Hence, there is need to design and build new types of transport vessels that consider the hydrological conditions that have been common in recent years for the inland waterways of the Republic of Belarus.

Express analysis of the solvency of JSC “Pinsk Shipyard” in the context of understanding the gravity of the crisis. The financial statements of the plant were studied and used to analyse the financial coefficients of solvency and financial stability according to the current legal regulation of bankruptcy institution. The results of the calculations are shown in Table 1.

Table 1. Analysis of unsatisfactory balance sheet structure

Indicator	30.09. 2019	31.12. 2019	31.03. 2020	30.06. 2020	30.09. 2020	Standard values
Current liquidity ratio (K_1)	0.44	0.37	0.38	0.34	0.31	≥ 1.3
Working capital ratio (K_2)	-1.25	-1.72	-1.62	-1.97	-2.20	≥ 0.20
Debt-to-asset ratio (K_3)	0.77	0.89	0.92	1.01	1.12	≤ 0.85

The dynamics shows a negative trend towards a decrease in the current liquidity ratio and the increasing deficit of the company’s own working capital and the level of coverage of the working capital with the company’s own working assets. The ratio K_2 characterises the lack of working capital, which is formed with the enterprise’s own funds and essential for ensuring its financial stability. Since the second quarter of 2020, the enterprise’s liabilities exceeded the value of its assets. In the third quarter of 2020, liabilities kept reinforcing this negative trend: as of September 30, 2020, the long- and short-term liabilities of Pinsk Shipyard exceeded the currency level of the balance sheet by the negative amount of its equity or by 12.3%.

The balance sheet of the plant has an unsatisfactory structure. The company is insolvent and is classified as a permanently insolvent enterprise.

Analysis of the structure and dynamics of the balance sheet assets and liabilities. The total fund of the enterprise as of 31 December 2019 amounted to 781 thousand rubles and was reduced compared with that at the beginning of the year by 120 thousand rubles or 13.32%. The absolute decrease in the value of long-term assets as of 31 December 2019 was 9 thousand rubles or 1.66%; the decrease in the value of short-term assets amounted to 111 thousand rubles or 31.01%. At the beginning of the period, long-term assets accounted for 55.05% in the balance structure, while at the end of the period,

this figure was 62.74%. The structural dynamics was defined in the amount of 7.69%, which indicates a rather ‘rigid’, non-mobile structure of the balance sheet assets. The distribution of funds between long- and short-term assets as of 31 December 2019 was 62.74% and 36.27%, respectively (Figure 1).

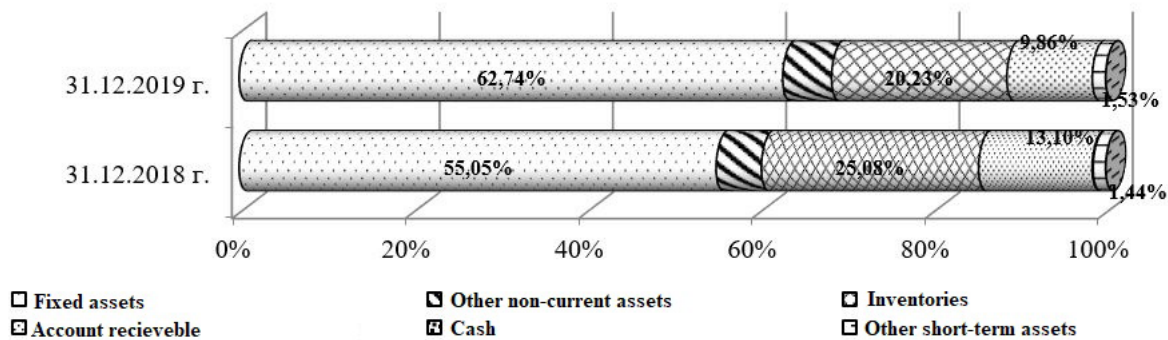
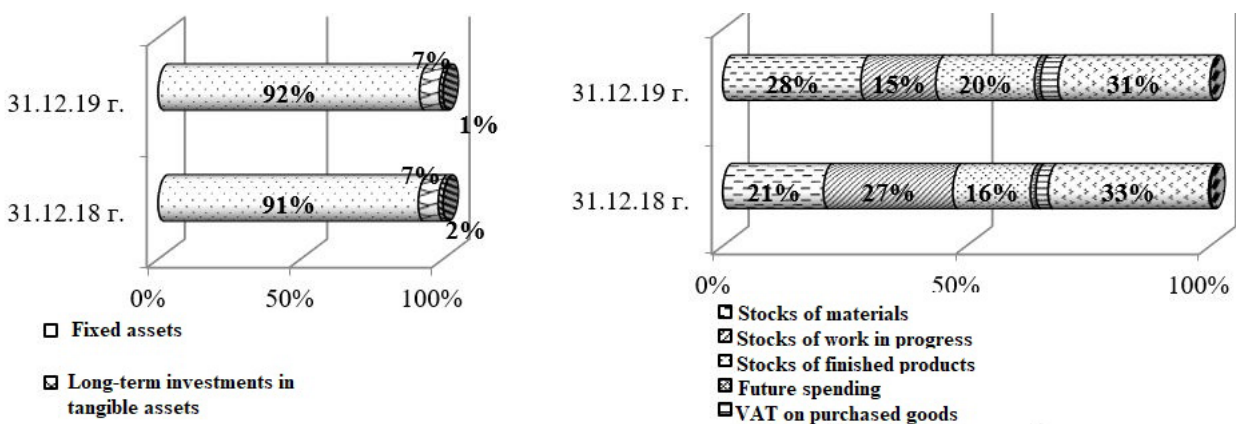


Figure 1. Dynamics of the asset structure of the balance sheet

In 2019, the redistribution of funds was in favour of the long-term assets (with an increase in the asset structure of 7.69 percentage points). The share of tangible short-term assets (stocks) decreased by 4.85 percentage points, including 5.68 percentage points for work in progress. The following elements of the short-term assets illustrate negative structural dynamics: the share of accounts receivable decreased by 3.24 percentage points, and that of cash decreased by 0.11 percentage points. The share of deferred expenses was 0.38% as of 31 December 2019, which corresponds to a structural decrease in dynamics by 0.06 percentage points. The share of taxes on purchased goods increased by 0.15 percentage points. As of 31 December 2019, the value of the long-term assets decreased by 9 thousand rubles, which was due to a decrease in the value of the fixed assets by 6 thousand rubles, or 1.21%, compared with the level at the beginning of 2019.

In the structure of long-term assets, the fixed assets had the largest share (91.34% and 91.76% in 2018 and 2019, respectively). In 2019, the share of this item in the long-term assets increased by 0.42 percentage points (Figure 2).



a) structure of long-term assets

b) structure of short-term assets

Figure 2. Structural dynamics of the property complex

The following conclusions can be made for the block of short-term assets: the plant had the largest share of short-term assets in the period under consideration in terms of stocks and accounts receivable, which were 63.97% and 31.17%, respectively, which corresponds to an increase in the structural dy-

namics of stocks by 0.84 percentage points and a decrease in the accounts receivable by 1.79 percentage points. The increase in the reserves was the result of the growing share of raw materials and finished products, by 7.67 and 4.32 percentage points, respectively. Significant funds of the enterprise were diverted to accounts receivable. As of 31 December 2019, these funds reached are 77 thousand rubles or 31.17% of the total working capital, which corresponds to a decrease in the amount and proportion of short-term receivables by 41 thousand rubles or 1.79 percentage points.

The factors that reduced the sources of property financing include a significant decrease in the equity of the enterprise, which, as of 31 December 2019, declined by 428 thousand rubles or 83.76%. The long-term liabilities reduced by 12 thousand rubles or 31.58%, whereas the short-term liabilities increased by 320 thousand rubles or 90.91%. The equity decreased as a result of significant accumulated losses amounting to 553 thousand rubles, which led to the losses increasing in dynamics by 417 thousand rubles or exceeding the losses at the beginning of 2019 by 3.1 times. The share of the short-term liabilities in the structure of the balance sheet liabilities increased by 46.98 percentage points (Figure 3), which is 320 thousand rubles in absolute terms. This was due to the increase in short-term credits and loans by 12 thousand rubles (80.0%), while accounts payable increased by 328 thousand rubles (113.89%).

The high debt in taxes and duties observed was the result of the accumulated land tax debt (calculated given the high values of regionalised local coefficients and the size of the occupied area [6.4 Ha in the centre of Pinsk]) and real estate tax. The increasing share of borrowed funds reduced the financial stability of Pinsk Shipyard, which was aggravated by its lack of profit and equity.

The ratio of the accounts receivable to the accounts payable as of 30 June 2020 was 0.132 (with optimal values ranging from 0.9 to 1.0, which implies that the accounts payable should not exceed the accounts receivable by more than 10%).

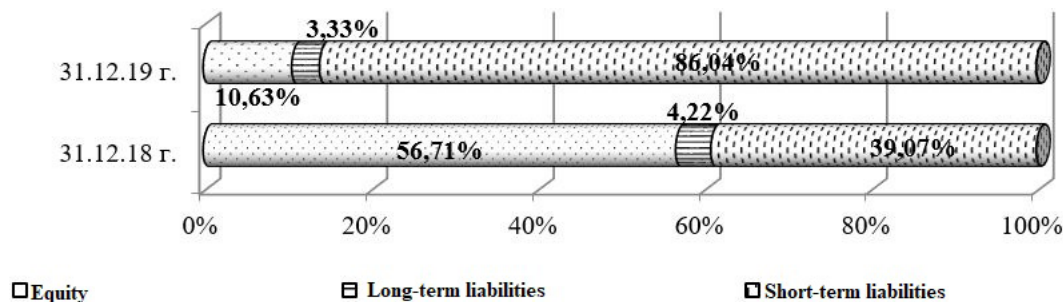


Figure 3. Structure of property financing sources

As of 30 June 2020, the net assets of the enterprise amounted to –6 thousand rubles and decreased by 89 thousand rubles relative to the beginning of 2020, which reflects the grave financial crisis of the plant. The overdue credit debt was incurred by Pinsk Shipyard because of the lack of financial resources, which was caused primarily by declining production volumes and shrinking sales markets. The fact that the short-term liabilities were bigger than the working capital means that the company could not pay off its short-term liabilities and had no reserves for expanding its activities.

Analysis of the financial stability and solvency of the enterprise. According to the analytical calculations, Pinsk Shipyard lacked its own working capital in 2019: as of 31 December 2018, the working capital of the plant amounted to 6 thousand rubles. As of 31 December 2019, the deficit was 425 thousand rubles, and as of 30 June 2020, it was 243 thousand rubles (42.82% reduction). As of 30 June 2020, the plant lacked its own working capital, with a deficit in working capital amounting to 510 thousand rubles, which corresponds to its growth in dynamics by 85 thousand rubles (20% growth). These data correspond to the structural imbalance and low financial stability of the enterprise, with the company remaining highly dependent on external creditors.

The financial dependence ratio increased by 7.646 points, which corresponds to an increasing proportion of the borrowed capital in the property complex of the enterprise. As of 31 December 2019, the equity concentration ratio was 10.6%. It decreased by 46.1 percentage points, while the concentration ratio of the borrowed capital increased by the same amount. These figures indicate a growing dependence of Pinsk Shipyard on the borrowed capital market. As of 31 December 2018, the enterprise borrowed funds equivalent to 0.763 rubles for each ruble of its own assets, and as of 31 December 2019, this figure was 8.410 rubles, with the increase amounting to 7.646 rubles. The current debt ratio increased by 0.470 points. The equity flexibility ratio at the end of 2019 was -5.120 and decreased in dynamics by 5.132 points. The equity ratio (the ratio of the company's own short-term assets to short-term assets) also decreased by 1.737 points, which confirms the conclusion about the falling financial stability of the plant. The irrational structure of the assets and liabilities in the balance sheet provoked an imbalance in the financial stability indicators and criteria and their negative dynamics.

Analysis of production capacity. The level of production capacity used in the ferrous structural steel manufacturing section in the current period of 2020 decreased by 49.50 percentage points relative to the level observed in 2019 (Table 2).

In the engine repair section, the level of production capacity used for 9 months in 2020 was reduced to 33.33%, which is 10.0 percentage points lower than that in 2019. The lack of demand and orders for manufacturing special vehicle bodies for transportation of gas cylinders in 2019–2020 resulted in the exclusion of this stock item from production. The percentage of the production capacity used for the conversion and reconstruction of ships and other watercrafts and services in ship building for 9 months in 2020 was 44.0%, which is significantly lower than the level observed in 2011–2017 but higher than the utilisation rate of the production capacity in 2018–2019.

Table 2. Analysis of capacity utilisation in dynamics

Indicator	2011	2016	2017	2018	2019	6 months 2020	9 months 2020
Production capacity utilisation, %							
Ferrous structural steel manufacturing	58.40	40.91	13.00	19.50	54.00	4.50	4.50
Production of special vehicle bodies for transportation of gas cylinders	27.27	80.00	91.11	24.44	0.00	0.00	0.00
Engine repair	88.00	26.67	43.33	36.67	43.33	23.33	33.33
Services on converting and reconstructing ships and other watercraft and services in the shipbuilding industry	63.82	57.45	93.45	3.82	3.82	43.45	44.00

In dynamics, a decreasing level of production capacity utilisation is observed for all the items of the production plan of Pinsk Shipyard (with a low workload in 2018–2019). In 2017–2018, the production declined in all production departments of the plant.

As of September 30, 2020, the percentage of the production capacity used for ferrous structural steel was 4.50%, having decreased by 53.90 percentage points compared with that in the base year

(2011); that used for the production of special vehicle bodies for the transportation of gas cylinders was 0%, having decreased by 27.27 percentage points; and that used for engine repair amounted to 33.33%, having decreased by 54.67 percentage points. For 9 months in 2020, the output and production capacity used for providing services for converting and reconstructing ships and other watercrafts and ship-building services increased.

Regarding the data as of 30 September 2020, the levels of production capacity utilisation for the stock items under consideration were as follows: for ferrous structural steel, 4.50%; for engine repair, 33.33%; for services on converting, reconstructing ships and other watercrafts and ship-building services, 44.00%.

In this study, a negative trend was observed in the declining output of products, services and work of Pinsk Shipyard. This can be explained by the lack of orders for the core activity and the fulfilment of orders for non-traditional types of products, work, and services. Given the abovementioned results and to preserve the specifics of the enterprise, it is advisable to load the production capacity of the plant according to its main area of specialisation to meet the growing demand from water transport organisations. The 2018–2021 State Program for the Development of the Transport Complex of the Republic of Belarus envisages measures that could be partially implemented at the facilities of the plant. In this way, ship repair work planning and implementation could be improved in the long term.

Analysis of the technical condition and efficiency of the fixed assets. The production activity of the plant is concentrated in three main sections: case welding, mechanical, and power-mechanical sections.

The production capacity of the sections is determined by the available complex of equipment. The initial (replacement) cost of the company's fixed assets as of 30 June 2020 was 2,094.4 thousand rubles (Table 3).

Table 3. Analysis of the structural dynamics of fixed assets

Fixed assets	1 January 2020		30 June 2020		Change	
	amount, thousand rubles	share, %	amount, thousand rubles	share, %	amount, thousand rubles	share, %
Buildings	1 058	49.91	1058.4	50.53	0	0.63
Structures	465	21.93	464.9	22.20	0	0.26
Transfer devices	11.0	0.52	11.3	0.54	0	0.02
Machines and equipment	477	22.50	448.7	21.42	–28	–1.08
Vehicles	89	4.20	67.8	3.24	–21	–0.96
Tools, inventory and accessories	17	0.80	16.6	0.79	0	–0.01
Other types	3	0.14	26.7	1.27	24	1.13
Total fixed assets	2 120	100.00	2094.4	100.00	–26	0.00
Fixed assets	01.01.2020		30.09.2020		Change	
	amount, thousand rub.	share, %	amount, thousand rub.	share, %	amount, thousand rub.	share, %
Buildings	1 058	49.91	1058.4	50.57	0	0.66
Structures	465	21.93	464.9	22.21	0	0.28
Transfer devices	11.0	0.52	11.3	0.54	0	0.02

Machines and equipment	477	22.50	447.4	21.37	-30	-1.13
Vehicles	89	4.20	67.8	3.24	-21	-0.96
Tools, inventory and accessories	17	0.80	16.6	0.79	0	-0.01
Other types	3	0.14	26.7	1.28	24	1.13
Total fixed assets	2 120	100.00	2093.1	100.00	-27	0.00

In the first half of 2020, the value of the fixed assets decreased by 26 thousand rubles or 1.21% owing to a decrease for items such as machines and equipment, and vehicles by 28 and 21 thousand rubles, respectively (5.93% and 23.82%, respectively). At the same time, a 24-thousand ruble increase in the assets for other types was found. In 9 months in 2020, the volume and structural changes also accounted for the decline in machines and equipment, and vehicles. The negative structural dynamics of the decline amounted to -1.13 percentage points and -0.96 percentage points.

According to the decision made by Pinsk Shipyard for 2020, to reduce the expenses included in the cost of products (work and services) and to strengthen the financial condition of the company, depreciation was not accrued for all items of the fixed assets, with the exception of computer equipment and vehicles.

As of 30 September 2020, the value of the fixed assets of Pinsk Shipyard amounted to 2,093.1 thousand rubles, having decreased relative to the beginning of the year by 27 thousand rubles or 1.27%. In 9 months in 2020, minor structural shifts in the composition of the production assets occurred.

Negative structural dynamics were observed for the items machines and equipment, vehicles, and tools: decrease of 1.13, 0.96, and 0.01 percentage points, respectively. Positive dynamics were shown for buildings, structures, and other types of fixed assets. Their shares increase by 0.66, 0.28, and 1.13 percentage points, respectively.

In the time interval considered, a critical level of wear of the active part of the fixed assets was observed, including machines and equipment. Thus, according to the control points, the profiles of the indicators were as follows: 88.52%, 88.26%, 88.86%, and 88.85% (Table 4). A significant degree of wear in 2019 accounted for machines and equipment (88.52% and 88.26%, respectively), which corresponds to the critical technical condition of the equipment (according to international standards, >60%).

Table 4. Analysis of the movement and technical conditions of machines and equipment

Indicator	Indicator level				Change in periods		
	31.12. 2018	31.12. 2019	30.06. 2020	30.09. 2020	2018–2019	6 months 2020	9 months 2020
Growth rate	0.0000	-0.0225	-0.0119	-0.0125	-0.0225	0.0106	0.0100
Wear factor	0.8852	0.8826	0.8886	0.8885	-0.0026	0.0060	0.0059
Acceptance factor	0.1148	0.1174	0.1114	0.1115	0.0026	-0.0060	-0.0059

The degree of validity of the active part of the assets decreased by 0.93 percentage points in 2019 compared with 2018. For the first 6 and 9 months of 2020, the wear of the item under consideration increased slightly, by 0.60 and 0.59 percentage points, respectively, which corresponds to the accrued depreciation of computer equipment and vehicles. In 2019, the wear coefficient for the machines and equipment amounted to 0.8826, having slightly decreased by 0.0026 points, which corresponds to the growing serviceability of the machines and equipment by the same amount. The retirement rate increased by 0.0205 points. The enterprise had assets in operation whose useful lives had expired (fully depreciated fixed assets). The period for renewing the machines and equipment was infinite. The average

age of the equipment was >20 years, which is considered to a critical level in the practice of analysis and marks high levels of physical wear and obsolescence of the equipment.

There is an absolute decrease in the value of the fixed assets, while their wear during operation also decreased, but it is because depreciation was not charged. The pattern of the indicators measuring depreciation and the serviceability of the fixed assets in the considered time interval indicate the need for anti-crisis management based on investments in innovative high-tech projects of Pinsk Shipyard. The technical characteristics of the fixed assets, including the machines and equipment, have deteriorated as a result of increased wear, and the production potential of the plant has to be managed in an investment-oriented way. The financial difficulties and lack of renewal of the machines and equipment determined a significantly growing period of renewal, increasing retirement and depreciation rates. Critical depreciation growth in dynamics is noted.

The intensity and efficiency of the fixed assets of Pinsk Shipyard were analysed. In 2019, compared with 2018, the return on assets decreased for all the items under consideration. The return on fixed assets was reduced by 0.028 rubles, the return on the active part of fixed assets decreased by 0.098 rubles, and the return on machines and equipment decreased by 0.114 rubles. In 2018–2019, a loss on sales of goods was incurred, amounting to 192 to 392 thousand rubles. It corresponds to the calculated loss ratios, whose value increased in dynamics for the module. The actual loss ratio of the fixed production assets for 2019 was –18.443%, which corresponds to an increase in the loss ratio of fixed assets in the considered time interval by 9.437 percentage points (>2 times). Similarly, the loss ratio of sales in 2019 relative to the loss ratio of sales in 2018 increased by 36.499 percentage points (with a twofold increase). In 6 and 9 months of 2020, the return on assets for all items under consideration increased (Table 5).

Table 5. Analysis of the efficiency of fixed assets of the plant

Indicator	6 months		9 months		Change	
	2019	2020	2019	2020	6 months	9 months
Return on production assets (loss ratio), %	-7.90	-2.61	-14.44	-6.08	5.29	8.37
Return on fixed assets r , rubles	0.10	0.26	0.16	0.36	0.16	0.20
Return on active part of assets, rubles	0.37	1.06	0.59	1.44	0.68	0.85
Return on machines and equipment, rubles	0.44	1.24	0.70	1.69	0.80	0.99

The largest increase was observed in the return on machines and equipment. In the first 6 months of 2020, it increased by 0.80 rubles or 179.92%, and in 9 months, it increased by 0.99 rubles or 141.99%. The loss ratio of fixed assets in the abovementioned time interval in 2020 was –2.610 and –6.076%, which corresponds to the decreasing loss ratio of the indicator (positive dynamics to decreasing loss ratio) relative to the loss ratio in 6 months in 2019 (–7.899%) by 5.289 percentage points and 9 months in 2019 (–14.444%) by 8.368 percentage points. The initial intangible assets as of 1 January 2020 amounted to 973.64 rubles. According to the accounting policy adopted by the company for 2020, the depreciation of intangible assets was calculated using the straight-line method. The accumulated depreciation as of 30 June 2020 amounted to 792.24 rubles, and the accrued depreciation for January to June 2020 was 37.32 rubles.

The state of the fixed assets, including machines and equipment, is characterised by a critical degree of wear, lack of renewal, and inefficient use. There was an increase in the utilisation of fixed assets, and the parameters of their efficient use (return on assets, return on capital) in 9 months in 2020. The following were identified as growth factors and reserves: reduction in all-day and intra-shift standstill of equipment due to the loading of the production capacity to the design values and increase in the average

hourly performance of equipment on the platform of active innovation and investment activities.

Analysis of the labour resources used. The average number of employees in the enterprise was 77 people in 2019. It decreased by 18.09% from that in 2017 and by 7.23% from that in 2018. The headcount was reduced because the plant adopted a policy aimed at optimising the headcount. The company's human resources are constant, and their turnover is low. The structure of human resources is characterised by the largest proportion of labour workers: 72.29% and 74.03%, respectively, by years. In dynamics, there is an increase in the share of this category of workers. Similar changes were observed in the category of managers and specialists. Their share in 2019 decreased from that in 2018, from 1.28 percentage points to 0.45 percentage points. The decreasing numbers of managers and specialists were the result of the intensification measures: expanding service areas for line personnel; that is, the manageability factor intensified owing to a growth in official salaries and rates, with new methods of economic leadership being introduced and new managerial competencies being formed by middle managers. In 2019, the total headcount of the enterprise slightly decreased (by 6 people or 7.23%); the structure was redistributed in favour of the direct labour workers (1.91 percentage points), while the share of indirect labour workers decreased by 0.17 percentage points, and those of managers and specialists decreased by 1.28 and 0.45 percentage points, respectively. Analysis of the structure of the plant's personnel by type of economic activity for 2018–2019 shows that the largest share of labour workers were engaged in the following production areas: production of structural steel and its components, 32.53 and 36.36%, respectively (positive structural dynamics of 3.83 percentage points), and repair, maintenance of ships, 36.14 and 44.16%, respectively (positive structural dynamics of 8.01 percentage points). In the shipbuilding section, the number of labour workers decreased by 10 people (by 83.33%), with a simultaneous reduction of 11.86 percentage points in the share in the structure of the enterprise's workers.

The average headcount of the enterprise in dynamics decreased in 2017–2019 (according to the final line, by 94, 83, and 77 people, respectively) with a simultaneous increase in wages. According to the human resources department, in general, the enterprise is dominated by labour workers with 10 to 15 years' work experience. Their share was 35.18 in 2019 and 33.25% in 2018, with the growth amounting to 1.93 percentage points. In addition, the percentage of those who have worked at the enterprise for more than 15 years was fairly high (15.37% in 2019), which corresponds to a 1.87-percentage point decrease relative to the level in 2018. This indicator can be the evidence of stability of the human resource activity of the enterprise, as people with extensive work experience prefer to work in this particular organisation. It should be noted that the company does not attract young professionals: the share of employees with <1 year of experience was only 2.34% in 2019, while in 2018, this figure was 2.75%. The average annual output of the enterprise's employees in 2019 was lower than that in 2018 by 0.242 thousand rubles or by 3.35% (Table 6).

Table 6. Analysis of the dynamics of efficiency of human resources of the enterprise

Indicator	2018	2019	Deviation	Change rate, %
Average annual output of an employee, thous. rub.	7.23	6.99	-0.24	96.65
Average annual output of a labour worker, thous. rub.	10.00	9.44	-0.56	94.39
Average daily output of a labour worker, thous. rub.	0.07	0.05	-0.02	74.44
Average hourly output of a labour worker, thous. Rub.	0.01	0.01	0.00	74.44
Average annual wages, rub.	4 109.64	5 328.57	1 218.93	129.66

The indicator under consideration decreased owing to the decreasing average hourly output of a labour worker, given the offset of the positive influence resulting from the growth factors in the labour workers' share in the structure of the company personnel and the increasing working time fund. In 2019,

the average hourly output per worker decreased in the current estimate by 0.002 thousand rubles (or 25.56%) compared with the output in 2018, which was 0.008 thousand rubles. Taking into account the headcount factor, in 2018–2019, the enterprise's all-day standstill amounted to 2,492 or 581 man-days, which corresponds to the decreasing loss of working time in the reporting year.

The average annual output of a worker engaged in the core activity in dynamics decreased by 0.242 thousand rubles; in 2019, the average annual output of a worker amounted to 9.439 thousand rubles and decreased in dynamics by 0.561 thousand rubles or 5.61%. The decreasing average annual output was due to the influence of the intensive factor of average hourly output, and the presence of standstill and loss of working time caused by not utilising the production capacity to a full extent (the negative influence of extensive factors relative to the pre-crisis period). These dynamics are consistent with the increasing nominal wages of company employees in 2019 relative to those in 2017–2018: the base growth rate was 114.98, and the chain growth rate was 129.66%. These figures show an increase in real wages.

Table 7 shows that the average annual output of a worker of Pinsk Shipyard in 2019 was 0.24 thousand rubles lower than the level in 2018. It decreased by 2.40 thousand rubles owing to a reduction in the average hourly output of a worker by 25.56%; the influence of this factor amounted to –2.40 thousand rubles.

Table 7. Factor analysis of the average annual output of the enterprise labour worker

Factor	Amount of influence, thous. rub.
Share of labour workers in total headcount	0.17
Number of days worked by a labour worker per year	1.98
Working hours	0.00
Average hourly output of a labour worker	–2.40
Total	–0.24

The increase in the resulting indicator is determined by the following parameters: reduced all-day losses of working time ensured an increase in the average annual output of a labour worker engaged in the core activity by 1.98 thousand rubles, and an increasing share of labour workers in the personnel structure contributed to a growth in the average annual output of a labour worker engaged in the main activity by 0.17 thousand rubles. The length of the working day remained the same and did not affect the resulting indicator.

The decreasing average annual output of the enterprise is determined by the intensive factor of reduction in the average daily and average hourly output of workers, which is due to the production from give-and-take raw materials and does not correspond to the strategic development concept of Pinsk Shipyard. The dynamics of labour productivity was studied without adjusting for the inflation index, while the measured indices of decline in labour productivity in real terms take into account the price indices for industrial products in the republic and illustrate an even deeper downward trend in the effective indicator in comparable prices. The index of decline in labour productivity and the index of wage growth show an imbalance in the expanded reproduction indicators at crisis conditions, which determines the overspending in labour costs. The overspending in the dynamics of the wage fund in 2019 was determined in the amount of 1174.13 thousand rubles and considered as a production reserve for increasing production and output efficiency. The qualitative composition of employees in Pinsk Shipyard was characterised by an irrational structure of the plant's personnel: according to the final line, each manager had 6 subordinates (78/13), while the recommendation is 7–9 people.

5. Discussion

This paper presents the adaptation of digital transformation tools in the system of anti-crisis management and the strategies of sustainable development of an enterprise, developed by several scholars. Anti-crisis management conceptual approaches, methods, and models were implemented in Pinsk Shipyard. Given the level of digitisation of the individual business processes at the plant, the author proposes an original model of a bailout plan, which proves to be successful on external examination. The financial plan to restore the solvency of Pinsk Shipyard was devised given the analysis of the current financial condition of the enterprise, the analysis of efficient use of the production potential, and a marginal analysis of costs, profits, and profitability. On the basis of the results of the study, the following areas of anti-crisis management were considered: taking measures to restore solvency, providing the entry of a foreign investor (according to the Pilot List of Belarusian Organizations with preconditions for the entry of Chinese investors into their share capital), and selling Pinsk Shipyard as a unified property complex. Anti-crisis measures that rely on the investment and innovation activities of new owners will ensure economic growth for the plant. The source of repayment of creditors' claims is the sale of the Unified Property Complex of Pinsk Shipyard. In accordance with the analytical data as of 6 January 2021, all creditor claims submitted as of 22 August 2020 can be upheld, and highly profitable operating activities can be ensured.

The proposed vectors of development were devised by the author in a real plan for the bailout of Pinsk Shipyard with access to the projected balance, cash flows, and parameters of financial stability and solvency.

The results obtained for resolving the problem are also presented by several scholars from different countries who showed that digital transformation is an important factor and foundation for economic growth of a country, region, and enterprise.

The study by I.L. Avdeeva, A.V. Polyanin, and T.A. Golovina projects digital transformation in the manufacturing industry as a factor in the sustainable development of economic systems (Avdeeva, 2019). The regional aspects of development of the digital economy are presented in the research materials by N.S. Abdullaev, S.E. Savzikhonova, and L.V. Lapidus, L.S. Leontieva, and A.O. Gostilovich. These authors conclude that there is an imbalance in the level of regional development of digital transformation (Abdullaev, 2019).

Strategic modelling of digital transformation with the prospect of increasing efficiency was studied in the work by M.K. Tsenzharik, Y.V. Krylova, and V.I. Steshenko (Tsenzharik, 2020). This study adopted the conceptual approaches to anti-crisis management, summarised by E.A. Buranova (Buranova, 2019).

G.R. Shakhmametova highlighted information modules of anti-crisis management at various stages of the enterprise life cycle, which is considered as a basis for automated collection and storage of data (Shakhmametova, 2012).

The fact that many enterprises are falling behind in terms of the digital potential they use was investigated in the research study by I.V. Ilyin, A.I. Levina, and A.S. Dubgorn, who came to a conclusion about the constraints on building the IT architecture of bankrupt enterprises (Ilyin, 2019).

The methodological aspects related to the evaluation of the efficiency of digitalisation are discussed in the study by E.P. Kochetkova, A.A. Zabavina, and M.G. Gafarova (Kochetkov, 2019). However, it is reasonable to conclude that the reporting system functioning in domestic enterprises does not reflect digital effects and their impact on the parameters of sustainable development of an enterprise, including those in the system of anti-crisis management of the debtor enterprise.

Foreign scholars V.L. Da Silva, J.K. Kovaleski, R. Negri Pagani, J. De Matos Silva, and A. Corsi obtained some important results on the introduction of digitalisation tools in production processes to

ensure efficiency and flexibility of the information space in the management system, which is relevant in the context of bailout of insolvent enterprises (Da Silva, 2020). Thus, the studied base in the chosen research area is adapted to building the information and analytical environment for anti-crisis management of Pinsk Shipyard.

6. Conclusion

According to the first vector of development, the following developments are identified as priority measures aimed at restoring solvency and supporting the efficient economic activity of Pinsk Shipyard: enhancing production processes related to certain types of products, industries, workshops, and sections, including improving technological processes; applying reusable materials; energy and resource saving; cost reduction; improving production areas and premises, including the best use of rental and leasing opportunities; selling production-intended property that is not used or used inefficiently; improving the marketing policy with marketing mix tools; increasing the production volumes and using the production capacity of the enterprise up to 80%; liquidating accounts receivable; and optimising the personnel structure with a focus on increasing sales and improving technological services of the plant, including organisation of labour and material incentives for human resources. In the bailout procedure, the emphasis should be placed on monitoring and searching for new markets, new consumers of shipbuilding and ship repair work, new types of products, and new areas for the application of traditional products that can provide the enterprise with the highest profits. It is suggested that marketing tools should be used in production and sales management so that the production activities of the enterprise and its structural policy could be organised in the best way possible to meet the demand of the market. The success of Pinsk Shipyard was ensured by its full cycle of shipbuilding and ship repair work, better quality of products and services, their constant improvement and updating, scientifically based pricing, commitment to customers, and suppliers and consumers of work and products. It is expected that the real estate and equipment used inefficiently will be sold at an auction, under direct contracts. The process of implementing the bailout plan of the enterprise is supplemented by recommendations for production and economic activities, actions aimed at reducing the costs of production and sale of products, work and services with simultaneous use of operational and financial leverage tools (currently Pinsk Shipyard is totally unbalanced in terms of these market criteria). Marginal profits should be increased with simultaneous reduction in fixed costs in the unit cost of production in accordance with the guidelines for cutting the most capacious material and labour costs. In this context, it is suggested that the technical capabilities of the plant were used to the maximum extent.

According to the second vector of development, if a foreign investor is not included in the “Pilot List of Belarusian Organizations with preconditions for the entry of Chinese investors into their share capital and if there is an agreement on selling Pinsk Shipyard as a unified property complex approved by the Ministry of Transport and Communications of the Republic of Belarus (Article 100), Pinsk Shipyard can be sold as a unified property complex in accordance with the norms of articles 127, 128, and 130 of the Law of the Republic of Belarus ‘On Economic Insolvency (Bankruptcy)’.

The barrier to the digital transformation of analytical anti-crisis management procedures with a preventive emphasis is the low level of IT architecture of industrial enterprises in bankruptcy proceedings, the difficulty in financing expensive software, and outsourcing services. Another obstacle is the issue of data security and integrity.

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