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**FACULTY OF ECONOMICS AND MANAGEMENT**

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**DEPARTMENT OF ECONOMICS AND ENTREPRENEURSHIP**

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Global Challenges"

Student: 2nd-year student, group EC-24dmi

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VOLODYMYR DAHL EAST UKRAINIAN NATIONAL UNIVERSITY

(Full name of the higher education institution)

Institute, Faculty, Department: Faculty of Economics and Management

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TASK

FOR MASTER'S QUALIFICATION THESIS

Student Name: Wang Hui

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Supervisor: Maslosh Olha Volodymyrivna, Assoc. prof.

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8	Submission of Chapter 3 materials	March 2026	
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## ABSTRACT

Master's thesis:95 p., 27 tables, 19 sources.

The object of the research is the process of managing the economic sustainability of an industrial enterprise in the face of global challenges.

The subject of the research is a set of theoretical, methodological, and practical aspects of improving the management of the economic sustainability of an industrial enterprise, including mechanisms of strategic planning, risk assessment, integrated evaluation, and substantiation of measures aimed at strengthening competitiveness and adaptability.

The purpose of the qualification thesis is the theoretical substantiation and development of practical recommendations for improving the management system of the economic sustainability of an industrial enterprise in the face of global challenges, taking into account financial, resource, technological, and organizational factors.

The theoretical and methodological principles of managing the economic sustainability of an enterprise under conditions of global instability have been studied, and the conceptual foundations of integrating strategic, risk-oriented, and adaptive approaches into the enterprise management system have been generalized. Based on the analysis of INTERPIPE Company, an assessment of financial and economic performance, liquidity, solvency, profitability, business activity, and the level of economic sustainability has been carried out. Strategic directions for strengthening the economic sustainability of the enterprise have been substantiated, a set of measures has been developed, and the economic feasibility of the proposed strategy has been proved, taking into account its financial, production, resource, and organizational effects.

ECONOMIC SUSTAINABILITY, INDUSTRIAL ENTERPRISE, GLOBAL CHALLENGES, STRATEGIC MANAGEMENT, RISK MANAGEMENT, RESOURCE EFFICIENCY, DIGITALIZATION, COMPETITIVENESS, ADAPTABILITY.

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## INTRODUCTION

The current stage of the world economy is characterized by a high level of turbulence, increased geopolitical risks, instability of energy and raw materials markets, acceleration of technological changes and growing environmental requirements. For Ukrainian industrial enterprises, these challenges are complicated by military risks, disruption of logistics chains, limited access to financial resources and the need to adapt to European standards of operation. Under such conditions, the problem of ensuring economic sustainability acquires strategic importance, since it determines the ability of the enterprise to maintain competitive positions, ensure profitability and stable development in the long term.

Industrial enterprises of the metallurgical complex are among the most sensitive to global fluctuations due to high energy intensity, export orientation and dependence on the world market. Therefore, improving the economic sustainability management system of such enterprises requires comprehensive scientific justification, taking into account modern risks and transformation processes. This determines the relevance of the topic of the master's research.

The object of the study is the process of managing the economic sustainability of an industrial enterprise in the face of global challenges.

The subject of the study is theoretical and methodological approaches and practical tools for forming and increasing the economic sustainability of an industrial enterprise using the example of INTERPIPE Company.

The purpose of the work is to develop theoretical provisions and practical recommendations for improving the management system for the economic sustainability of an industrial enterprise in the face of global challenges.

To achieve the set goal, the following tasks were identified and solved in the work:

- to generalize theoretical approaches to determining the essence of the economic sustainability of an enterprise and its structural components;

- to investigate the impact of global challenges on the functioning of industrial enterprises;
- analyze the financial and economic condition and level of economic stability of INTERPIPE Company;
- carry out a risk assessment and form an integrated indicator of economic sustainability;
- develop strategic directions for increasing the economic sustainability of the enterprise;
- carry out economic and investment justification of the proposed measures;
- to form a forecast of financial and economic results and assess the long-term impact of the strategy on the competitiveness and adaptability of the enterprise.

In the process of research, general scientific and special methods of cognition of economic phenomena and processes were used. Theoretical generalization and systematization were used to determine the essence of economic sustainability and its components. The method of analysis and synthesis was used in the study of financial and economic indicators of the enterprise. Comparative and trend analysis was used to assess the dynamics of indicators for 2022–2024.

Methods of economic and mathematical modeling and normalization were used to form an integral indicator of economic sustainability. Methods of investment analysis (NPV, IRR, payback period) were used to assess the effectiveness of the proposed measures. Scenario analysis was used to determine options for the development of the enterprise in conditions of uncertainty. Graphical and tabular methods provided clarity in the presentation of the research results.

The use of these methods allowed us to ensure the comprehensiveness, validity, and practical orientation of the research results.

## CHAPTER 1. THEORETICAL AND METHODOLOGICAL PRINCIPLES OF MANAGEMENT OF THE ECONOMIC SUSTAINABILITY OF AN ENTERPRISE

### 1.1. Theoretical foundations of the economic sustainability of an enterprise

The issue of economic sustainability of an enterprise has become particularly relevant in the context of the growing instability of the global environment, however, its theoretical origins were formed over a long period of time within various economic schools. The category of sustainability initially developed as a derivative of the concepts of equilibrium, stability and financial reliability, but gradually transformed into a multidimensional characteristic that encompasses the adaptability, ability to recover and strategic flexibility of the enterprise.

In classical economic theory, an enterprise was considered as a rational business entity that seeks to maximize profits in a relatively stable market environment. In this context, sustainability was associated with financial balance, that is, with the ability to ensure the continuity of production and fulfill obligations to counterparties. Within the framework of this approach, the main emphasis was placed on maintaining liquidity, solvency and a sufficient level of equity. Sustainability was identified with the stability of financial indicators and the absence of threats of bankruptcy.

Further development of economic thought, in particular the emergence of a systems approach, significantly expanded the interpretation of this category. The enterprise began to be considered as an open system that functions in interaction with the external environment and is under the influence of various economic, social and technological factors. Within the framework of the systems paradigm, sustainability began to be defined as the ability to maintain functional integrity and achieve set goals under conditions of dynamic change. Thus, economic sustainability ceased to be a purely financial characteristic and acquired a complex meaning.

A significant contribution to the development of understanding of long-term sustainability of enterprises was made by the resource approach. According to the concept, based on the works of J. Barney, competitive advantages are formed due to the unique resources and competencies of the enterprise, which are valuable, rare, difficult to imitate and irreplaceable. In this context, sustainability is defined as the ability of the enterprise to preserve and reproduce strategically important resources, ensuring the stability of market positions in the long term. Thus, economic sustainability begins to be considered as a function of resource potential and the efficiency of its use.

Further development of the theory is associated with the formation of the concept of dynamic capabilities, proposed by D. Teece and co-authors. Within the framework of this concept, the key characteristic of an enterprise is its ability to integrate, form and restructure internal and external competencies in response to environmental changes. Accordingly, sustainability ceases to be identified with static stability and is interpreted as the ability to transform and strategic renewal. The condition for economic sustainability is not only the preservation of resources, but also their constant rethinking and development.

At the turn of the 20th and 21st centuries, the concept of organizational resilience is actively developing in scientific discourse. Initially, it was used in ecology and psychology, but later it was integrated into economic and management research. Organizational resilience characterizes the ability of an enterprise to anticipate threats, withstand shocks and recover from crises with minimal losses. Unlike the traditional understanding of stability, resilience involves dynamic adaptation and learning based on previous experience. Research by M. Christopher and H. Peck in the field of logistics systems proves that the resilience of enterprises largely depends on the flexibility of supply chains and the ability to quickly respond to external disturbances.

The current stage of development of the theory is characterized by the integration of economic sustainability with the concept of sustainable development. In this context, the enterprise is considered as an entity responsible not only for

financial results, but also for the social and environmental consequences of its activities. Accordingly, economic sustainability acquires a triune nature, combining economic, social and environmental aspects. This approach emphasizes the need to balance short-term financial goals with long-term strategic guidelines.

To summarize the evolution of scientific approaches to determining economic sustainability, it is advisable to systematize them in Table 1.1.

Table 1.1

Evolution of approaches to interpreting the economic sustainability of an enterprise

Development stage	Dominant approach	The main content of the sustainability category
Classic	Financial	Solvency, no bankruptcy
Systemic	System equilibrium	Maintaining functional integrity
Resourceful	Competitive resources	Ability to hold strategic resources
Dynamic	Dynamic abilities	Transformation and adaptation to change
Modern	Resilience and sustainable development	Adaptability, recovery and long-term viability

Thus, the evolution of scientific approaches indicates a gradual transition from a static understanding of economic sustainability to its dynamic interpretation. If earlier the emphasis was on maintaining financial stability, today the key feature of a sustainable enterprise is its ability to quickly respond to changes, adapt the business model and form new competitive advantages. Economic sustainability is becoming an integral characteristic that combines financial reliability, resource security, innovative potential and strategic flexibility. The modern understanding of the economic sustainability of an industrial enterprise is expediently defined as its ability to ensure continuity of activity, function effectively in conditions of uncertainty, adapt to external challenges and form the prerequisites for long-term development.

The economic sustainability of an industrial enterprise has a complex internal structure, as it is formed under the influence of the interaction of financial, production, innovation and market processes. In contrast to the narrow interpretation of sustainability as exclusively financial stability, modern scientific approaches consider it as a multidimensional characteristic that reflects the ability of an

enterprise to maintain its efficiency in conditions of uncertainty and changes in the external environment. This approach involves the isolation of individual components of economic sustainability, each of which has its own assessment indicators and mechanisms for ensuring.

The financial component is a basic element of economic stability, as it provides a resource basis for the functioning of the enterprise. It reflects the level of solvency, financial independence, the ability to generate profit and maintain stable cash flows. Within the framework of financial stability, the capital structure, the ratio of own and borrowed funds, the level of asset liquidity and the efficiency of working capital management are assessed. An enterprise characterized by a high level of financial autonomy and positive dynamics of profitability has a higher ability to withstand crisis phenomena and attract investments.

The production component reflects the stability of operational activities and technological reliability of the enterprise. For industrial enterprises, it is of particular importance, since the efficiency of the use of production capacities, the level of depreciation of fixed assets and the organization of technological processes directly affect the cost of products and competitive positions in the market. Production stability implies the ability of the enterprise to maintain the continuity of the production cycle even in the event of interruptions in the supply of resources or changes in demand.

The innovative component of economic sustainability is associated with the ability of the enterprise to introduce new technologies, modernize equipment and adapt products to market requirements. In conditions of rapid technological change, it is innovative activity that ensures the preservation of competitive advantages. The theory of dynamic capabilities emphasizes that the sustainability of the enterprise depends on its ability to integrate new knowledge and transform internal processes in accordance with external challenges. Innovative sustainability is manifested in the share of research and development costs, product range renewal and the level of technological renewal.

The investment component characterizes the ability of an enterprise to form and implement long-term investment programs. It is determined by the volume of capital investments, the efficiency of investment projects and access to financial resources. For industrial enterprises operating in capital-intensive industries, investment sustainability is a prerequisite for the modernization of the production base and reducing technological lag.

The export or market component reflects the ability of the enterprise to maintain stable positions in domestic and foreign markets. For enterprises integrated into global supply chains, diversification of sales markets, currency balance and compliance with international quality standards are important. Market stability is determined by market share, the level of client diversification and the ability to adapt pricing policy to changes in the market situation.

The environmental component has gained importance due to the strengthening of international requirements for reducing emissions, increasing energy efficiency and implementing sustainable development principles. Enterprises that implement environmentally friendly technologies reduce regulatory risks and increase investment attractiveness. In modern conditions, compliance with ESG principles is considered a factor of long-term economic sustainability.

There is a close relationship between these components. For example, innovative investments contribute to the modernization of the production base, which increases productivity and has a positive effect on financial results. The growth of financial stability expands the possibilities for the implementation of new investment projects, and environmental modernization reduces the risks of sanctions and fines. Thus, economic stability is formed as an integrated result of the functioning of interconnected subsystems of the enterprise.

It is advisable to present the systematization of the main components of economic sustainability in the form of a generalizing table 1.2.

Table 1.2

## Structural components of the economic sustainability of an industrial enterprise

Component	Content description	Typical indicators
Financial	Solvency and financial autonomy	Liquidity ratio, profitability, equity ratio
Production	Stability of operational processes	Capacity utilization, labor productivity
Innovative	Technological update and development	Share of innovative products, R&D spending
Investment	Implementation of long-term projects	Investment volume, NPV, IRR
Market	Positions in domestic and foreign markets	Market share, export diversification
Ecological	Compliance with sustainable development standards	CO <sub>2</sub> emissions, energy efficiency

The complex nature of economic sustainability necessitates its assessment based on a set of indicators reflecting the state of each component. A one-dimensional assessment does not give a complete picture of the real level of sustainability of an enterprise, since individual positive financial results may be accompanied by technological backwardness or high dependence on external markets. That is why modern research offers integrated assessment models that take into account the interrelationship of financial, production and innovation parameters.

Taking into account the industry specifics of industrial enterprises, the production and technological component, which determines the level of material and energy intensity of products, acquires special importance. In the context of global challenges associated with the instability of energy supply and changes in the world economy, enterprises with higher resource efficiency demonstrate better adaptation indicators. Research on corporate sustainability emphasizes that the integration of environmental and innovative aspects into strategic management has a positive effect on long-term performance.

Therefore, the structural components of economic sustainability reflect various aspects of the functioning of an industrial enterprise, and their balanced development ensures the enterprise's ability to maintain stability and adaptability in a changing environment.

The economic sustainability of an enterprise cannot be considered in isolation from the strategic management system, since it is the strategy that

determines the directions of development, the allocation of resources and the mechanisms for responding to external changes. In modern economic theory, strategic management is interpreted as the process of forming long-term goals, choosing ways to achieve them and ensuring that the internal potential of the enterprise corresponds to the conditions of the external environment. In this context, economic sustainability is an integrated characteristic of the effectiveness of strategic decisions.

In the early stages of the development of strategic theory, in particular in the works of M. Porter, the competitiveness of the enterprise was explained by positional advantages in the industry and the ability to form an effective competitive strategy. However, with the increasing instability of the global environment, it became obvious that competitive positions can be unstable without proper adaptability of the internal management system. As a result, researchers began to consider competitiveness as a dynamic category that depends on the flexibility of strategic decisions and the ability of the enterprise to transform.

Economic sustainability in this aspect acts as a kind of “buffer” between the enterprise and the external environment. It reflects the ability to maintain a strategic course even under adverse factors. If competitiveness characterizes the relative position of the enterprise in the market at a specific point in time, then sustainability determines the duration of maintaining this position and the ability of the enterprise to adapt to new challenges. Thus, competitiveness and sustainability are in a complementary relationship: the first ensures market success, the second - its stability in the long term.

Within the resource theory of strategic management, sustainability is directly related to the ability of an enterprise to form unique combinations of resources that provide long-term advantages. Barney emphasizes that only those resources that are valuable, rare and difficult to imitate can become the basis of sustainable competitive development. However, in practice, the preservation of such resources requires effective strategic management aimed at their maintenance, protection and

development. Accordingly, economic sustainability is the result of the consistency of strategic decisions with the resource potential of the enterprise.

An important element of the relationship between sustainability and strategic management is the concept of dynamic capabilities. Teece notes that enterprises must not only possess unique resources, but also be able to timely restructure their competencies in accordance with environmental changes. This means that strategic management should be focused on constant monitoring of external risks and opportunities, as well as on flexible adjustment of the business model. In this case, economic sustainability manifests itself as the ability to maintain strategic coherence between internal potential and external conditions.

From the perspective of modern corporate sustainability research, it is important to integrate the principles of sustainable development into strategic processes. Enterprises that take into account environmental, social and management factors in the formation of strategy demonstrate more stable financial results and higher investment attractiveness. This is due to the fact that a strategic focus on long-term value reduces the risks of regulatory sanctions, reputational losses and demand fluctuations. In this case, economic sustainability is a consequence of the systematic consideration of risks in strategic planning.

The relationship between economic sustainability and competitiveness can be presented in the form of a logic model (Table 1.3).

Table 1.3

The relationship between economic sustainability and strategic management and competitiveness

Component	Role in the management system	Impact on the result
Strategic vision	Defines long-term development goals	Shapes investment and innovation directions
Resource potential	Provides a basis for competitive advantage	Increases market position
Adaptability	Allows you to respond to environmental changes	Reduces strategic risks
Economic sustainability	Supports stable operation	Ensures the durability of competitive advantages
Competitiveness	Reflects market performance	Increases financial efficiency

In the face of global challenges, strategic management must take into account the high level of uncertainty associated with geopolitical risks, technological changes and fluctuations in world markets. Enterprises that are limited to short-term planning and do not integrate risk assessment mechanisms into the strategic process lose their ability to maintain stable positions. On the contrary, systemic strategic management, based on risk analysis and scenario planning, contributes to strengthening economic sustainability and the formation of long-term competitive advantages.

Therefore, economic sustainability is an integrated characteristic of strategic management effectiveness and at the same time a prerequisite for stable competitiveness. It reflects the ability of an enterprise to combine strategic vision, resource availability and adaptability to changes, ensuring the long-term preservation of market positions and financial performance.

## 1.2. Global challenges for the development of industrial enterprises

Geopolitical risks in the modern economy have transformed from episodic external disturbances into a systemic factor in the formation of the business environment. For Ukrainian industrial enterprises, the military events of recent years mean not only a change in business conditions, but a fundamental transformation of the logic of strategic planning, financial management and production process management. The war has become a multidimensional shock that simultaneously affects the institutional environment, infrastructure, sales markets and investment activity.

In world economics, geopolitical risk is defined as the probability of negative impact of international conflicts, political instability or threat of forceful confrontation on economic processes. Caldara and Iacoviello, analyzing the geopolitical risk index, prove that its growth correlates with a decrease in investment, a fall in industrial production and a decrease in financial activity. For

enterprises, this means increased uncertainty about future income and an increase in the cost of raising capital.

War risks for industrial enterprises are direct and indirect. The direct impact is associated with physical damage or loss of production facilities, warehouses, and transport infrastructure. The indirect impact is manifested in increased logistics costs, disruptions in the supply of raw materials, changes in the structure of demand, and restrictions on access to foreign markets. In addition, martial law is accompanied by changes in currency regulation, tax policy, and financial control, which creates additional administrative restrictions.

A significant consequence of the war is increased macroeconomic instability. Exchange rate fluctuations, inflationary pressure, and reduced domestic demand directly affect the cost structure of enterprises. For import-dependent industries, the devaluation of the national currency means an increase in the cost of production, while exporting enterprises face difficulties in making international payments and insuring risks.

The military factor also transforms the structure of investment activity. Under conditions of high uncertainty, investors demonstrate an increased tendency to be cautious, which reduces the inflow of foreign direct investment. Studies by international financial institutions show that conflicts reduce the volume of investments in production sectors and increase the share of short-term financial transactions. This complicates the modernization of industrial enterprises and limits their capabilities for technological renewal.

An important aspect is the change in the configuration of value chains. As a result of military operations, enterprises are forced to review traditional supply and distribution channels, reorient to new logistics routes and diversify partnerships. Christopher and Peck emphasize that in times of crisis, the stability of supply chains is determined by their flexibility and ability to quickly recover from disruptions. For Ukrainian enterprises, this means the need to form backup logistics schemes and expand the geography of counterparties.

Military risks also have a socio-economic dimension. Large-scale population migration, mobilization processes and changes in the labor market lead to a shortage of qualified personnel. Enterprises are faced with the need to retrain personnel, automate production operations and increase the level of social responsibility. This affects the cost structure and requires adaptation of the organizational management model.

From a strategic management perspective, war risks increase the importance of scenario planning and a risk-based approach. Businesses are forced to consider different scenarios, assess the likelihood of asset loss, production disruption, and changes in the regulatory environment. In this context, economic resilience is seen as the ability to minimize the negative effects of shocks and ensure business continuity.

A systematization of the main areas of influence of military risks on industrial enterprises can be presented in the form of a generalizing table 1.4.

Table 1.4

#### Main manifestations of geopolitical and military risks for industrial enterprises

Direction of influence	Risk content	Economic consequences
Infrastructure	Destruction of production and transport facilities	Production stoppage, costs increase
Financial	Currency volatility, inflation	Increase in cost, shortage of working capital
Investment	Reduction in capital inflows	Modernization limitations
Logistic	Supply chain disruptions	Increased delivery times
Social	Staff shortage	Rising personnel costs

International research has shown that countries experiencing conflict experience lower economic growth rates and higher volatility in industrial production, confirming that geopolitical and military risks are a systemic factor that determines the long-term trajectory of enterprises.

For Ukrainian industrial enterprises, the formation of internal mechanisms of stability, including market diversification, increasing autonomy of resource supply, creation of financial reserves and implementation of risk management systems, is becoming relevant. The ability to adapt to new conditions is becoming a

key characteristic of an enterprise that seeks to maintain competitive positions in the conditions of a war economy.

Geopolitical and military risks are shaping a new configuration of the economic environment, within which the sustainability of an enterprise is determined not only by its financial indicators, but also by the flexibility of strategic decisions, the diversification of the resource base, and the ability to quickly restructure production processes in accordance with changing external conditions.

The transformation of world markets over the past decade has been accompanied by increased instability in the energy, transport and raw materials sectors. For industrial enterprises, especially energy-intensive ones, these processes mean a change in the basic parameters of management, which directly affects the cost structure, pricing policy and competitiveness. If earlier fluctuations in resource prices were considered a cyclical phenomenon, then current trends indicate the formation of a new long-term configuration of the global market, in which energy security and logistical flexibility become strategic priorities.

The energy factor is crucial for most industrial enterprises, as the costs of electricity, natural gas and other energy carriers constitute a significant share of the cost of production. After 2021, global energy markets have experienced unprecedented volatility, which was caused by a combination of geopolitical, economic and climatic factors. Analytical reviews of the International Energy Agency emphasize that the instability of supply and the rise in energy prices significantly reduce the profitability of energy-intensive industries and stimulate the transition to alternative energy sources. For Ukrainian enterprises, this problem is complicated by the destruction of energy infrastructure and power outages.

Energy restrictions have a dual impact. On the one hand, direct financial pressure is increasing due to tariff increases and price instability. On the other hand, technological risks arise associated with forced production stops. This is especially critical for metallurgical and machine-building enterprises, where disruption of the continuity of the technological cycle leads to additional losses and increased product shortages. In such conditions, the modernization of equipment, the introduction of

energy-saving technologies, and the development of autonomous power sources become of strategic importance.

Logistical constraints have become another systemic challenge. The COVID-19 pandemic, and subsequently military events, have disrupted traditional global supply chains. Christopher and Peck in their research prove that excessive dependence on a limited number of suppliers increases the vulnerability of enterprises to shocks. Disruption of transport routes, port congestion, rising freight rates and transit restrictions have led to a significant increase in logistics costs and increased delivery times.

For Ukrainian enterprises, an additional factor was the restriction of sea exports and the need to reorient to alternative routes. This led to an increase in transportation costs, the need to conclude new contracts and change the terms of supply. In many cases, enterprises are forced to increase warehouse inventories, which leads to a freeze of working capital.

Resource constraints extend beyond energy and logistics. A significant challenge is the shortage of raw materials and materials associated with global competition for strategic resources. The growing demand for metals, rare earth elements and other critical materials, driven by the development of green energy and digital technologies, is increasing supply instability. As a result, companies face the risks of delays and increased purchase prices.

The problem of human capital deserves special attention. Migration processes, demographic changes and structural restructuring of the economy cause a shortage of qualified personnel in industry. This forces enterprises to invest in automation, staff training and digitalization of production management.

The impact of energy, logistics, and resource constraints on the activities of industrial enterprises can be summarized in the form of a system characteristic (Table 1.5).

Table 1.5

## Key manifestations of resource constraints in industry

Sphere	Main risk	Economic consequences
Energy	Price volatility, supply disruptions	Rising cost, declining margin
Logistics	Violation of transport corridors	Increased transportation costs, delivery delays
Raw	Strategic materials shortage	Contract disruption, production instability
Labor resources	Lack of qualified personnel	Rising costs for training and automation

Scientific research on supply chain management emphasizes that enterprises with a diversified supplier structure and a developed risk management system demonstrate a higher level of adaptability. Flexibility of logistics schemes, localization of part of production and implementation of digital inventory monitoring systems allow to reduce the negative impact of external shocks.

The current stage of the world economy is characterized by simultaneous intensification of technological competition and environmental regulation. For industrial enterprises, this means the need to operate in conditions of accelerated technological renewal, digitalization of production processes and strict requirements for environmental responsibility. If technological modernization was previously considered as a tool for increasing productivity, now it has become a condition for maintaining market positions and access to international capital markets.

The digital transformation of industry, implemented through the concept of Industry 4.0, involves the integration of cyber-physical systems, production automation, the use of big data and artificial intelligence. Brynjolfsson and McAfee emphasize that digital technologies change not only the cost structure of the enterprise, but also the very logic of creating added value. Enterprises that implement digital solutions are able to optimize production processes, reduce resource losses and increase management flexibility. At the same time, digitalization requires significant investments and highly qualified personnel, which creates additional financial and organizational challenges.

Technological changes are accompanied by increased requirements for cybersecurity and information protection. The growing dependence on digital platforms and automated systems makes enterprises vulnerable to cyberattacks,

which can lead to production shutdowns or loss of confidential data. Thus, technological development combines new opportunities with new risks that require systematic management.

In parallel with the digital transformation, environmental regulation is being strengthened. Global initiatives to reduce greenhouse gas emissions, in particular the European Green Deal and the Carbon Import Adjustment Mechanism (CBAM), are creating new barriers for companies that do not meet environmental standards. For energy-intensive industries, this means the need to modernize technological equipment, reduce the carbon footprint of products and increase energy efficiency in production.

Environmental challenges are directly related to the concept of sustainable development, which involves a balance of economic, social and environmental goals. Porter and van der Linde prove that the introduction of environmental innovations can increase the efficiency of the enterprise by reducing resource costs and stimulating technological innovation. Thus, environmental regulation can act not only as a constraint, but also as a factor in the formation of long-term competitive advantages.

In modern corporate governance practice, the concept of ESG, which integrates environmental, social and management aspects of a company's activities, has become widespread. Eccles, Ioannou and Serafeim in their research established a positive relationship between the implementation of sustainable development principles and the financial results of companies in the long term. Compliance with ESG criteria affects the investment attractiveness of the company, its credit rating and access to international financial resources.

ESG challenges for industrial enterprises cover several areas. The environmental component involves reducing emissions, increasing energy efficiency and rational use of natural resources. The social aspect is related to ensuring safe working conditions, supporting local communities and adhering to ethical standards. The management component includes the transparency of the corporate structure, internal control system and anti-corruption mechanisms.

The impact of technological and ESG factors on the activities of industrial enterprises can be systematized in the form of a general table 1.6.

Table 1.6

#### Technological and ESG challenges of modern industrial development

Direction	The essence of the challenge	Economic consequences
Digitalization	Implementation of Industry 4.0, automation	Productivity increase, investment costs increase
Cybersecurity	Information systems protection	Additional IT infrastructure costs
Environmental regulation	Emission reduction, decarbonization	Equipment modernization, change in cost structure
ESG standards	Transparency and accountability	Increasing investment attractiveness

These factors are shaping new competitive conditions. Enterprises that timely integrate digital technologies and sustainable development principles benefit from increased efficiency and stability of market positions. At the same time, those business entities that ignore environmental and technological changes risk losing access to financial resources and external markets.

Technological, environmental and ESG challenges are interconnected and mutually reinforcing. Digital solutions contribute to the optimization of resource use and reduction of negative environmental impact, while environmental standards stimulate innovative activity. Taken together, these processes form a new model of industrial development, within which economic performance is closely linked to the level of technological modernization and social responsibility of the enterprise.

### 1.3. Methodological approaches to assessing and managing economic sustainability

Assessing the economic sustainability of an enterprise requires a comprehensive approach that takes into account the multidimensionality of this category and the multidirectional influence of internal and external factors. Scientific research emphasizes that no single indicator is able to fully reflect the real level of sustainability, since the enterprise functions as a complex open system. That

is why the formation of a system of assessment indicators should be based on the principles of complexity, systematicity, comparability and adaptability.

Traditionally, the assessment of economic sustainability begins with the analysis of financial indicators. The financial component is basic, as it reflects the ability of the enterprise to maintain the continuity of its activities and fulfill its obligations. The main indicators include the ratios of liquidity, financial independence, solvency, profitability and business activity. The current liquidity ratio characterizes the ability of the enterprise to cover short-term obligations at the expense of current assets, while the autonomy ratio reflects the share of equity in the overall financing structure. The profitability of assets and equity demonstrate the efficiency of resource use, and turnover indicators - the speed of transformation of assets into cash flows.

At the same time, modern approaches emphasize the need to expand the list of indicators beyond the financial sphere. Kaplan and Norton, developing the concept of Balanced Scorecard, proved that financial results are a reflection of previous management decisions and do not always give an idea of the future sustainability of the enterprise. Therefore, along with financial indicators, it is advisable to take into account indicators of production efficiency, innovative activity, market position and human resource potential.

The production component is assessed using indicators of capacity utilization, labor productivity, and the level of material and energy intensity of products. For industrial enterprises, the coefficient of renewal of fixed assets is important, which indicates the intensity of modernization of the production base. A low level of technological renewal may indicate a decrease in long-term sustainability, even in the presence of positive financial results.

The innovative component is measured by the share of research and development expenditures in total expenditures, the share of innovative products in revenue, and the number of technological innovations implemented. The theory of dynamic capabilities, based on Teece, emphasizes that the ability of an enterprise to

integrate new knowledge and restructure its processes is a critically important condition for long-term competitiveness.

A separate group is made up of market stability indicators. These include market share, the level of diversification of the client base, export dependence, and the stability of the contract policy. For enterprises operating in international markets, it is important to assess the currency structure of income and expenses, which allows you to determine the degree of impact of exchange rate fluctuations on the financial result.

In modern conditions, the importance of environmental and social indicators is increasing. The level of energy efficiency, the volume of greenhouse gas emissions, the share of recycled waste, costs of labor protection and social programs form additional characteristics of economic sustainability. Studies by Eccles, Ioannou and Serafeim prove that companies with a high level of integration of ESG factors demonstrate more stable dynamics of financial indicators in the long term.

It is advisable to systematize indicators by functional blocks (Table 1.7), which allows for comprehensive assessment.

Table 1.7

Main groups of indicators for assessing the economic sustainability of an enterprise

Indicator group	Main indicators	Economic content
Financial	Liquidity, autonomy, profitability	Solvency and capital efficiency
Production	Productivity, capacity utilization	Operational stability
Innovative	Share of R&D, product updates	Technological adaptability
Market	Market share, customer diversification	Sales stability
Environmental	Energy efficiency, emissions	Compliance with sustainable development

The complexity of the system of indicators requires ensuring their interconnection and consistency. For this purpose, methods of normalization and reduction of heterogeneous indicators to a comparative form are used. In the practice of economic analysis, coefficient methods, rating assessments, multifactor models and integral indices are used. The formation of an integrated approach allows us to assess not only the current state of the enterprise, but also the trends of its development.

An important characteristic of the indicator system is its adaptability to industry specifics. For metallurgical enterprises, the key indicators may be energy intensity and export dependence, while for machine-building enterprises, the level of technological innovation and diversification of the product portfolio. Therefore, the indicator system should be formed taking into account the peculiarities of the production cycle and the market environment.

Modern approaches also involve the use of forecast indicators that allow assessing the future sustainability of the enterprise. These include interest coverage ratios, forecast cash flows, financial leverage ratios taking into account scenario changes. The use of such indicators increases the analytical depth of the assessment and allows taking risks into account. That is, the system of indicators for assessing economic sustainability should combine financial, production, innovation, market and environmental indicators that reflect various aspects of the enterprise's functioning. Its construction should be based on the principles of systematicity, complexity and adaptation to industry conditions. Only the integrated use of different groups of indicators provides an objective determination of the level of economic sustainability and allows for the formation of sound management decisions.

The multidimensional nature of the economic sustainability of an enterprise necessitates the use of integrated methods for its assessment. If the system of indicators allows for a fragmentary view of the state of individual subsystems, then integrated models are aimed at forming a generalized indicator that reflects the overall level of sustainability. This approach allows for comparison in dynamics, inter-enterprise analysis, and identification of strategic risk areas.

The idea of aggregating indicators into a single index originates from work in the field of multi-criteria analysis and decision theory. Saaty's research on the Analytical Hierarchy Process (AHP) method substantiates the possibility of combining quantitative and qualitative criteria by determining weighting factors. In the context of economic sustainability, this means ranking components according to the degree of their impact on the overall performance of the enterprise.

Integral assessment methods usually involve several sequential stages: selection of relevant indicators, their normalization, determination of weighting coefficients and calculation of a composite index. Normalization is a necessary step, since indicators have different dimensions and scales. The most commonly used methods are linear scaling, standardization or transformation using relative coefficients.

The general formula for the integral indicator of economic sustainability can be represented as a weighted sum of normalized indicators (additive model):

$$I_{CT} = \sum_{i=1}^n w_i \cdot x_i$$

Where:

$w_i$ — weight coefficient of the  $i$ -th indicator;

$x_i$ — normalized value of the indicator;  $n$  — number of indicators in the evaluation system

Weights can be determined by expert methods, the method of hierarchy analysis, or statistical methods, in particular factor analysis. Porter emphasized that the strategic significance of individual factors can vary depending on the industry structure, so it is advisable to adapt the weight coefficients to the specifics of the enterprise.

In addition to additive models, multiplicative integral indices are used, which take into account the relationship between indicators. This approach allows us to reflect situations where a decrease in one of the critical parameters significantly affects the overall level of stability. For example, a critical decrease in liquidity can offset the positive impact of high profitability.

Modern research widely uses economic and mathematical modeling methods. These include regression models that allow determining the impact of individual factors on the level of financial stability, as well as cluster analysis methods for grouping enterprises by level of stability. Teece emphasizes that in a

highly dynamic environment, it is advisable to take into account not only current indicators, but also their ability to change under the influence of strategic decisions.

Among the integral methods, a special place is occupied by rating models that involve the construction of a scale for interpreting the results. For example, the value of the integral index can be classified according to the following levels: high, sufficient, unstable, critical. This approach facilitates management decision-making and allows identifying priority areas for increasing sustainability.

A summary of the main approaches to integral assessment can be presented in Table 1.8.

Table 1.8

#### Methods of integral assessment of economic sustainability

Method	Essence	Advantages	Limitation
Additive index	Weighted sum of indicators	Ease of calculation	Does not take into account the interaction of factors
Multiplicative index	Product of normalized indicators	Reflects the criticality of individual factors	Sensitivity to extreme values
AHP method (Saaty)	Expert determination of weights	Taking into account qualitative criteria	Subjectivity of assessment
Factor analysis	Statistical determination of the influence of factors	Objectivity	Requires a large amount of data

Along with integral indices, scenario modeling is used, which allows us to assess the change in the level of stability under different scenarios. The scenario approach involves the formation of optimistic, basic and pessimistic scenarios, within which key parameters change: sales volume, energy prices, exchange rate, interest rates. Such a toolkit allows us to assess the sensitivity of the integral indicator to external factors.

Modeling the level of economic sustainability can also be based on the use of financial diagnostic indicators, in particular bankruptcy prediction models. Altman proposed the Z-model, which combines several financial ratios to determine the risk of insolvency. Although this model is focused on assessing the risk of bankruptcy, it demonstrates the possibility of constructing a comprehensive indicator based on heterogeneous financial parameters.

An important aspect of the integral assessment is the interpretation of the results. The calculated index should be compared with normative or industry average values, which allows determining the relative position of the enterprise. In addition, the analysis of the dynamics of the integral indicator over several years makes it possible to identify trends in the level of sustainability and assess the effectiveness of management decisions.

Integral methods and economic and mathematical modeling create the basis for the transition from descriptive analysis to formalized measurement of the level of economic sustainability. They allow combining heterogeneous indicators into a single coordinate system, ensuring analytical depth of research and validity of management conclusions.

The modern environment of industrial enterprises is characterized by a high level of uncertainty, which necessitates the transition from traditional reactive management to proactive models based on systematic risk assessment. In this context, a risk-based approach is one of the key tools for ensuring economic sustainability, as it allows for timely identification of potential threats, assessment of their probability and scale of consequences, and development of preventive management measures.

In the theory of risk management, risk is considered as the possibility of deviation of actual results from planned ones due to the influence of internal or external factors. Knight at the beginning of the 20th century distinguished between the concepts of risk and uncertainty, emphasizing that risk is subject to quantitative measurement, while uncertainty does not have a clear statistical basis. In modern conditions, most management decisions are made precisely in conditions of a combination of risk and uncertainty, which increases the importance of analytical tools.

Risk-based management involves integrating risk assessment into all key business processes of the enterprise. According to the Enterprise Risk Management (ERM) concept developed by COSO, the risk management system should be part of strategic planning and operational activities. This means that risks are not considered

in isolation, but are analyzed taking into account their interrelationships and impact on the achievement of strategic goals.

For industrial enterprises, the most significant are production, financial, market, investment, technological and regulatory risks. Production risks are associated with equipment failures, disruptions in technological processes or resource shortages. Financial risks include currency fluctuations, changes in interest rates and instability of cash flows. Market risks relate to changes in demand, the emergence of new competitors or a decrease in product prices. Investment risks are associated with the uncertainty of investment results, while regulatory risks are caused by changes in legislation and tax policy.

Risk identification is carried out using qualitative and quantitative methods. Qualitative methods include expert assessments, brainstorming, SWOT analysis, while quantitative methods include statistical analysis, calculation of variation of indicators, use of sensitivity coefficients. In management practice, the risk matrix (Table 1.9) is widely used, which allows you to rank risks by probability and severity of consequences.

Table 1.9

#### Example of a risk assessment matrix

Probability / Consequences	Low	Medium	High
Low	Negligible risk	Controlled risk	Moderate risk
Medium	Controlled risk	Significant risk	High risk
High	Moderate risk	High risk	Critical risk

The scenario approach complements risk-based management, allowing you to model possible future developments. According to Schoemaker, scenario planning consists of creating several alternative scenarios that reflect different combinations of key environmental factors. For industrial enterprises, typical scenarios are the base, optimistic and pessimistic scenarios, which take into account changes in sales volumes, energy prices, exchange rates and regulatory conditions.

The use of scenario analysis involves assessing the sensitivity of financial results to changes in key parameters. For example, calculating the break-even point under different price scenarios allows you to determine the critical limits of the

enterprise's functioning. Within the framework of financial analysis, the sensitivity analysis method is also used, which shows how a change in one factor affects the integral indicator of stability.

Modern research in the field of strategic management emphasizes that effective risk management should be combined with the formation of dynamic capabilities of the enterprise. Teece notes that enterprises that systematically monitor the external environment and quickly restructure their processes demonstrate a higher level of resilience in turbulent conditions. This means that a risk-oriented approach should be combined with innovative activity and a flexible organizational structure.

An important component of risk management is the creation of reserves and insurance mechanisms. The formation of financial reserves, diversification of the contract portfolio, conclusion of long-term agreements with suppliers and the use of currency risk hedging instruments allow to reduce the negative impact of external shocks.

The combination of risk-based and scenario-based approaches ensures a transition from reactive response to crisis phenomena to systematic uncertainty management. As a result, the company gets the opportunity not only to minimize losses, but also to use crisis situations as an impetus for strategic renewal.

Thus, risk-based and scenario-based approaches form the methodological basis for managing the economic sustainability of an industrial enterprise. They allow you to systematize potential threats, assess their impact on financial and production results, and develop a set of measures aimed at maintaining the stability and adaptability of the enterprise in the face of global challenges.

## Conclusions to Chapter 1

The first section provides a theoretical and methodological generalization of approaches to understanding the economic sustainability of an enterprise and outlines a system of modern challenges that shape the conditions for the functioning

of industrial business entities. The analysis allows us to draw a number of generalizing conclusions.

First, the evolution of scientific approaches to the interpretation of economic sustainability indicates a gradual transition from a narrow financial understanding to a complex multidimensional interpretation of this category. If in the early stages sustainability was identified with the ability of an enterprise to maintain solvency and financial balance, then modern concepts consider it as an integrated characteristic that combines resource potential, adaptability, innovative capacity and strategic flexibility. Within the framework of resource theory and the concept of dynamic capabilities, economic sustainability is associated with the ability of an enterprise to form and transform competitive advantages in the face of environmental changes.

Secondly, the structural analysis of economic sustainability has proven its multicomponent nature. Financial, production, innovation, investment, market and environmental components form an interconnected system in which changes in one subsystem affect the overall level of sustainability. The balanced development of these components is a prerequisite for the stable functioning of an industrial enterprise, while imbalances can create latent threats even in the presence of positive financial results.

Third, the study of global challenges has shown that the modern business environment is characterized by a combination of geopolitical, military, energy, logistics, technological and environmental factors. Military risks cause physical and financial losses, energy and resource constraints change the cost structure and supply chains, and technological and ESG requirements transform the criteria for competitiveness. In such conditions, economic sustainability acquires strategic importance, as it determines the ability of an enterprise to adapt to instability and ensure the continuity of production activities.

Fourth, the need to use a system of indicators for a comprehensive assessment of economic sustainability is substantiated. One-dimensional financial analysis does not allow to adequately reflect the real state of the enterprise, therefore

the assessment should cover a set of financial, production, innovation and market indicators. The formation of integral indicators and the use of economic and mathematical models create the possibility of generalizing heterogeneous parameters into a single analytical system.

Fifth, risk-based and scenario-based approaches are identified as key tools for managing economic sustainability. Identification and ranking of risks, sensitivity analysis, and formation of alternative development scenarios allow an enterprise to reduce the negative impact of external shocks and ensure strategic adaptability. The combination of these approaches with the concept of dynamic capabilities creates the prerequisites for the formation of a proactive management model.

Thus, the theoretical principles of managing the economic sustainability of an industrial enterprise are based on the integration of financial, resource and strategic approaches, taking into account the multidimensionality of the challenges of the modern environment and the application of a comprehensive assessment and modeling toolkit. The obtained theoretical provisions serve as a methodological basis for further diagnostics of the economic sustainability of a particular industrial enterprise and the development of directions for its improvement.

## CHAPTER 2. DIAGNOSTICS OF THE ECONOMIC SUSTAINABILITY OF THE UKRAINIAN INDUSTRIAL COMPANY INTERPIPE

### 2.1. Organizational and economic characteristics of the enterprise

Ukrainian industrial company INTERPIPE, which includes five enterprises for the production of steel, pipe and railway products, occupies a leading position among domestic manufacturers of pipes and railway wheels. Its formation took place in the process of transformation of the metallurgical complex of Ukraine in the conditions of development of a market economy. The company began active development in the early 2000s, uniting a number of production assets of the pipe and wheel industry. Further consolidation of enterprises made it possible to form a vertically integrated production structure focused on the full cycle of product manufacturing - from steel smelting to the production of finished pipes and railway wheels.

A strategic stage in the company's development was the creation of a modern electric steelmaking complex "Interpipe Steel" in the city of Dnipro, which was put into operation in 2012. The launch of this enterprise allowed to significantly reduce the energy intensity of production, reduce the volume of emissions into the environment and ensure technological autonomy in the supply of metal billets for the group's pipe and wheel plants. The abandonment of open-hearth furnaces in favor of electric steelmaking technologies was an important step towards the modernization of production and increasing environmental efficiency.

As of today, the production complex includes pipe and wheel profile enterprises, located mainly in the Dnipropetrovsk region. The main areas of activity are the production of seamless pipes for the oil and gas industry, mechanical engineering and energy, as well as the production of railway wheels and wheel sets for international markets. The company's products are supplied to more than 80 countries around the world, which indicates its high level of integration into global value chains.

The history of INTERPIPE's development is characterized by a consistent focus on export markets and the implementation of modern corporate governance standards. In the context of the instability of the global economy, the company diversified its sales geography, adapting its production policy to the requirements of different regions. A significant share of its products is sold in the countries of the European Union, the Middle East and North America, which necessitates compliance with international technical and environmental standards.

The organizational structure of the enterprise management is built on the principle of a corporate model with centralized strategic management and operational autonomy of production units. Management is carried out through the parent company, which determines the overall development strategy, investment policy, financial planning and control over the implementation of key performance indicators. The group's production enterprises operate as separate legal entities responsible for the implementation of production programs and compliance with quality standards.

Corporate governance is based on a combination of strategic planning, financial control and operational management. The highest governing body is the board of directors, which determines the main directions of development, approves investment projects and monitors the implementation of long-term goals. Executive management is responsible for current activities, the implementation of production programs and ensuring financial stability.

The functional structure of the enterprise includes the following key blocks: production, financial, commercial, investment, logistics and personnel. The production block ensures the continuity of the technological process and product quality control. The financial block is responsible for cash flow management, budgeting and attracting financing. The commercial unit carries out marketing activities and coordinates export operations. The logistics service organizes the transportation of products and the supply of raw materials, which is of particular importance in conditions of limited infrastructure. The personnel block ensures

personnel management, development of competencies and compliance with social standards.

An important characteristic of the organizational model is the focus on integrated risk management and the implementation of modern internal control systems. Given the high export dependence, the company pays significant attention to monitoring currency risks, changes in customs regulations and international certification standards. Within the framework of strategic management, long-term planning of production programs is carried out, taking into account fluctuations in global demand for metal products.

Interpipe's organizational management structure demonstrates a combination of centralized strategic management with the flexibility of operating units. This model allows for consistent investment decisions and at the same time to respond quickly to changes in the external environment. For an industrial enterprise operating in the face of global challenges, such a management configuration creates the prerequisites for maintaining economic sustainability, effective resource allocation and coordination of production processes.

Thus, the history of Interpipe's development reflects the gradual modernization of the production base, strengthening of export orientation and implementation of corporate management standards. The company's organizational structure ensures strategic coordination of activities and forms the basis for the implementation of long-term goals in a complex macroeconomic and geopolitical environment.

INTERPIPE operates in the field of production of seamless steel pipes and railway products, which determines its belonging to the metallurgical and machine-building segments of the industry. The structure of the enterprise's activities is formed taking into account the full production cycle, which includes steel smelting, pipe billet manufacturing, rolling, heat treatment, mechanical treatment and quality control of finished products. Such an integrated model allows minimizing dependence on external suppliers of semi-finished products and ensuring the stability of the technological process.

The main type of product is seamless pipes, which are used in the oil and gas industry, energy, mechanical engineering and construction. The pipe segment is focused on both standard products and specialized solutions with increased requirements for strength and corrosion resistance. Pipe production is carried out using modern technologies of hot deformation and heat treatment, which allows ensuring compliance with international standards API, EN and other technical regulations.

The second strategic direction is the production of railway wheels and wheelsets. The products of this segment are used for freight and passenger rolling stock, including high-speed trains and the metro. The production of wheels involves the use of specialized forging, heat treatment and high-precision machining technologies. The high share of railway product exports indicates its competitiveness in the international market.

The company's production facilities are located mainly in the city of Dnipro and adjacent industrial centers. The key element of the production infrastructure is the electric steelmaking complex, which ensures the production of steel using electric arc furnaces. This technology is characterized by a relatively lower level of energy intensity compared to traditional open-hearth methods and allows reducing emissions into the atmosphere. The capacity of the steelmaking production meets the needs of the pipe and wheel industries, forming the basis of internal raw material autonomy.

The technological base of the enterprise is focused on modernization and automation of production processes. The use of quality control systems, automated rolling lines and modern laboratory equipment ensures that products comply with international standards. Investments in equipment renewal are aimed at increasing energy efficiency, reducing production losses and reducing the proportion of defects.

The geography of the company's sales markets is characterized by a high level of diversification. A significant part of the products is exported to the countries of the European Union, North America, the Middle East and Asia. Export orientation determines the need to comply with the requirements of international certification,

adapt to regulatory norms and flexible pricing depending on currency fluctuations. The share of the domestic market remains significant, especially in the segment of railway products supplied for the renewal of rolling stock and infrastructure projects.

The company's market strategy is based on a combination of long-term contracts with key customers and flexible adaptation to changing market conditions. The presence of a diversified customer base reduces dependence on individual counterparties and increases the stability of cash flows. At the same time, the high share of exports makes the company sensitive to changes in world prices for metal products, trade restrictions and currency fluctuations.

To summarize the characteristics of the main areas of activity, it is advisable to present them in a structured form (Table 2.1).

Table 2.1

#### Main areas of activity of INTERPIPE Company

Direction	Product nature	Main sales markets
Tubular	Seamless pipes for the oil and gas industry, mechanical engineering, and energy	EU, USA, Middle East, Ukraine
Wheeled	Railway wheels and wheelsets	EU, CIS countries, Asia
Steelmaking	Steel billet for domestic consumption	Internal production cycle

The company's production model combines vertical integration and export orientation, which creates both advantages and risks. The advantages include control over the quality of raw materials, reduced dependence on external suppliers, and the ability to optimize costs. The risks include high sensitivity to global conditions and regulatory changes in importing countries.

Thus, Interpipe's main activities, production capacities and sales markets reflect its status as a large export-oriented industrial enterprise with a full production cycle. The combination of a modernized technological base and a wide sales geography creates the potential to ensure economic sustainability, while at the same time requiring systematic management of external risks.

Assessing the company's position in industry and international markets is an important element in diagnosing its economic sustainability, since the competitive environment directly affects sales volumes, profitability levels, and long-term

development prospects. For an export-oriented industrial enterprise, market position is determined not only by the share of the domestic market, but also by the ability to integrate into global value chains.

Interpipe operates in two main industry segments - pipe and wheel. In the Ukrainian market of pipe products, the company is one of the key manufacturers of seamless pipes used in the oil and gas complex, mechanical engineering and energy. At the same time, the domestic market of Ukraine is not decisive for the formation of total revenues, since a significant part of the products is exported. This business model increases sensitivity to the global market, but at the same time allows diversifying the risks of domestic demand.

In the railway products segment, the company is one of the largest wheel manufacturers in the Central and Eastern Europe region. A high level of specialization, compliance of products with international standards and the availability of certification in the European Union countries provide access to developed markets. The company's position in the international market is determined not only by production volumes, but also by technological competitiveness and the ability to adapt products to specific customer requirements.

The industry environment of pipe production is characterized by high competition, cyclical demand and dependence on investment activity in the oil and gas sector. According to Porter's approach, the structure of the industry is determined by the intensity of competition, the threat of new players, the power of suppliers and buyers, as well as the risk of substitutes. In the case of the pipe segment, global energy prices and investments in infrastructure projects have a significant impact. For Interpipe, this means the need for a flexible production policy and cost optimization during periods of reduced demand.

At the international level, the company operates under strict price and non-tariff regulations. Anti-dumping investigations, quotas and customs restrictions create additional barriers to the export of metal products. At the same time, diversification of sales markets allows reducing the impact of regulatory restrictions

in individual countries. The presence of customers in different regions of the world increases the stability of income and contributes to the distribution of currency risks.

An important indicator of market position is the level of added value of products. Enterprises focused on specialized products with high technical characteristics have the opportunity to form a more stable margin compared to manufacturers of standard pipe products. Interpipe in its strategy emphasizes segments with increased quality requirements, which reduces dependence on price competition.

To assess market positions, it is advisable to summarize the key characteristics of the enterprise's activities (Table 2.2).

Table 2.2

#### Characteristics of Interpipe's market positions

Parameter	Characteristic
Industry segment	Pipe and railway products
Export geography	Europe, North America, Middle East, Asia
Product type	Seamless pipes, railway wheels
Level of competition	High, from global manufacturers
Main risks	Price volatility, regulatory restrictions, currency fluctuations

The company's position is also determined by the level of integration into global production chains. Vertical integration of steel production and finished products allows to reduce dependence on external suppliers and control quality at all stages of production. Such a model increases operational efficiency and creates a competitive advantage in conditions of instability of raw material supply.

At the same time, a high share of exports creates dependence on foreign economic conditions. Fluctuations in world steel prices, changes in exchange rates, and the introduction of trade restrictions can significantly affect sales volumes and financial results. In such conditions, the competitive position of an enterprise is determined by its ability to maintain product quality, optimize costs, and adapt to changes in demand.

Thus, Interpipe holds significant positions in the pipe and wheel segments both in the national and international markets. Its competitive advantages are based

on technological modernization, vertical integration of production and diversified sales geography. At the same time, the market model of activity is associated with high sensitivity to global economic and regulatory factors, which necessitates the systematic management of competitive and foreign economic risks.

## 2.2. Assessment of the financial and economic stability of the enterprise

It is advisable to start assessing the economic sustainability of an industrial enterprise with an analysis of basic economic indicators that reflect the dynamics of activity volumes, resource efficiency and business results. It is these indicators that form the initial idea of the enterprise's development trends in an unstable external environment and allow identifying key factors of changes in the financial and economic situation.

Table 2.3 presents the results of the analysis of the main economic indicators of the enterprise for 2022-2024.

A study of the dynamics of net income from sales of INTERPIPE's products gives grounds to state generally positive changes in the volume of its economic activities during 2022-2024. In 2022, net income from sales amounted to 981,330 thousand USD, while in 2023 this indicator increased to 988,706 thousand USD, i.e. by 7,376 thousand USD, or by 0.75%. Despite the insignificant nature of the increase, such dynamics indicates the preservation of the relative stability of the company's sales activities and its ability to maintain sales volumes in a difficult external environment. In 2024, the growth trend became more pronounced: net income from sales reached 1,050,391 thousand USD, which exceeds the level of 2023 by 61,685 thousand USD, or by 6.24%. Compared to 2022, the increase was 69,061 thousand USD. Thus, the above changes indicate a gradual increase in the scale of product sales, the restoration of the enterprise's business activity and the strengthening of its market positions. In general, the growth of net sales income is an important indicator of the company's adaptation to modern operating conditions and confirms the presence of potential for further development.

Table 2.3

## Analysis of the main economic indicators of INTERPIPE company

Indicator	2022	2023	2024	Abs. deviation 2024 from 2022	Abs. deviation 2024 from 2023	Growth rate 2023/2022, %	Growth rate 2024/2023, %
Net sales revenue, thousand USD	981330	988706	1050391	69061	61685	0.75	6.24
Cost of goods sold, thousand USD	630574	527933	648407	17833	120474	-16.28	22.82
Costs per \$1 of sales, USD	0.6426	0.5340	0.6173	-0.0253	0.0833	-16.90	15.61
Gross profit, thousand USD	350756	460773	401984	51228	-58789	31.37	-12.76
Cost efficiency, %	55.62	87.28	62.00	6.37	-25.28	56.91	-28.97
Average annual book value of fixed assets, thousand USD	373590.0	301936.5	356066.0	-17524.0	54129.5	-19.18	17.93
Return on investment, USD/USD	2.63	3.27	2.95	0.32	-0.32	24.66	-9.91
Average volume of current assets, thousand USD	574310.0	559819.5	642452.0	68142.0	82632.5	-2.52	14.76
Current assets turnover ratio, rev./year	1.71	1.77	1.63	-0.07	-0.13	3.36	-7.43
Profitability of production assets, %	37.00	53.47	40.26	3.25	-13.21	44.50	-24.71
Labor costs and related accruals (proxy), thousand USD	82761	85967	102494	19733	16527	3.87	19.22
Average number of personnel, people	8933	7591	9700	767	2109	-15.02	27.78
Average annual labor productivity, thousand USD/person	109.85	130.25	108.29	-1.57	-21.96	18.56	-16.86
Payroll fund (proxy), thousand USD	82761	85967	102494	19733	16527	3.87	19.22
Average monthly salary (proxy), USD/person	772.05	943.74	880.53	108.48	-63.21	22.24	-6.70

The cost of sales shows a growing trend in 2024. Particularly significant is the increase in costs per UAH 1 of sales, which increased from UAH 0.3753 in 2022 to UAH 0.8000 in 2024.

Such dynamics indicate a deterioration in the cost efficiency of production and an increase in the resource intensity of the enterprise's activities.

According to the agreed table, the dynamics of INTERPIPE's profitability in 2022-2024 was characterized by ambiguous, but generally quite stable trends. In particular, gross profit in 2023 did not decrease, but, on the contrary, increased compared to 2022 from 350,756 thousand USD to 460,773 thousand USD, i.e. by 1,10,017 thousand USD, or 31.37%. At the same time, cost profitability increased from 55.62% to 87.28%, which indicates a significant improvement in the ratio between costs incurred and the financial result obtained. In 2024, gross profit decreased to 401,984 thousand USD, i.e. by 58,789 thousand USD. USA, or by 12.76% compared to 2023, and cost profitability decreased to 62.00%. At the same time, despite such a decrease, both indicators in 2024 remained higher than the level of 2022, which gives reason to speak not about a crisis drop in profitability, but about a certain weakening of its pace after the most productive year of 2023. Therefore, the results obtained indicate the presence of fluctuations in the formation of the financial result of the enterprise, due to changes in the cost structure and general business conditions, but do not confirm the loss of profitability in the long term.

Analysis of the efficiency of the use of production assets of INTERPIPE in 2022-2024 indicates the presence of changes in both the cost of fixed assets and the effectiveness of their use. In particular, the average annual book value of fixed assets in 2022 was 373590.0 thousand USD, in 2023 it decreased to 301936.5 thousand USD, and in 2024 it increased to 356066.0 thousand USD. Such dynamics give grounds to assert that in 2023 there was a reduction in the cost of production assets, while in 2024 their partial recovery was observed, although the indicator did not reach the level of 2022. This may indicate difficult conditions for reproducing the production potential of the enterprise and uneven processes of updating the material and technical base.

At the same time, the return on assets indicator showed a different trend. In 2022, \$1 of fixed assets cost \$2.63 of net sales revenue, in 2023 this indicator increased to \$3.27/dollar, and in 2024 it decreased to \$2.95/dollar. Thus, in 2023, the efficiency of fixed assets usage increased, which was due to a combination of a slight increase in sales volume and a reduction in the average annual cost of fixed assets. In 2024, the return on assets decreased slightly compared to the previous year, but remained higher than in 2022. This indicates that, despite a certain increase in the volume of production assets, the growth rate of income was insufficient to maintain the maximum achieved level of their return.

In general, the analysis allows us to conclude that in the studied period INTERPIPE maintained a relatively high level of efficiency in the use of fixed assets, although the dynamics of this process was uneven. Changes in the cost of production assets and the return on assets indicator reflect the adaptation of the enterprise to unstable operating conditions and confirm that the effectiveness of the use of production potential depended not only on the volume of available fixed assets, but also on the overall intensity of economic activity.

Analysis of the efficiency of the use of current assets of INTERPIPE in 2022-2024 indicates a relatively stable, albeit uneven nature of their turnover. In 2022, the turnover ratio of current assets was 1.71 vol./year, and in 2023 it increased to 1.77 vol./year, which indicates a certain acceleration of the capital turnover and an increase in the efficiency of using the mobile part of the resource potential of the enterprise. Such changes give reason to argue that in 2023 the company was able to provide a slightly better return on existing current assets, despite the complexity of the external operating conditions.

In 2024, the turnover ratio decreased to 1.63 vol./year, which is lower both compared to 2023 and relative to 2022. Such dynamics indicate a certain slowdown in the turnover of current assets, which could be due to the growth of their average volume faster than the increase in net sales revenue. In particular, the average volume of current assets in 2024 increased to 642452.0 thousand USD, while in 2023 it was 559819.5

thousand USD. This means that the expansion of the resource base was not accompanied by a proportional acceleration of their turnover.

In the period under study, the enterprise generally maintained a fairly acceptable level of business activity, but in 2024 the efficiency of current assets decreased somewhat. This trend may indicate the need for more rational management of working capital elements, in particular inventories, receivables and other current assets, since it is the speed of their turnover that largely determines the financial flexibility and stability of the enterprise.

The dynamics of the enterprise's labor resources deserves special attention within the framework of the analysis of the main technical and economic indicators, since it is they who make it possible to assess changes in the scale of personnel use and the effectiveness of their work. According to the adopted calculation basis, the average number of personnel in 2022 was 8933 people, in 2023 it decreased to 7591 people, that is, by 1342 people, or by 15.02%, which may indicate the adaptation of the enterprise to difficult operating conditions, revision of the organizational structure and optimization of the use of labor resources. At the same time, in 2024 this indicator increased to 9700 people, exceeding both the level of the previous year and the value of 2022. Such dynamics give reason to speak not about a constant reduction in the number of employees throughout the entire period under study, but about its uneven change, reflecting the transformation processes in the enterprise's activities.

The average annual labor productivity indicator was also characterized by unstable dynamics. In 2022, one employee accounted for 109.85 thousand USD of net sales revenue, in 2023 this indicator increased to 130.25 thousand USD per person, which indicates an increase in the effectiveness of using labor potential in conditions of staff reduction. However, in 2024, the average annual labor productivity decreased to 108.29 thousand USD per person, that is, not only did it yield to the value of 2023, but also turned out to be slightly lower than the level of 2022. This indicates that the increase in the number of employees in 2024 was not accompanied by a proportional increase in sales volumes, as a result of which the income burden per employee decreased.

Separate analysis is required for wage indicators. The wage fund during 2022-2024 demonstrated a steady growth trend: from 82,761 thousand USD in 2022 to 85,967 thousand USD in 2023 and 102,494 thousand USD in 2024. This indicates an increase in the enterprise's total personnel costs, which may be associated with both a change in the number of employees and an increase in the cost of labor. The average monthly wage in 2023 increased from 772.05 USD to 943.74 USD, which indicates a significant increase in wages per employee. In 2024, this indicator decreased to 880.53 USD, but remained higher than the level of 2022. In general, this gives grounds to argue that in the period under study, the enterprise tried to maintain an appropriate level of material incentives for personnel, although the dynamics of individual wages were less stable than the dynamics of the general wage fund.

A comprehensive analysis of the main technical and economic indicators of INTERPIPE's activities in 2022-2024 gives grounds to conclude that the development of the enterprise in the period under study was characterized not by a crisis decline, but by uneven, but generally positive dynamics. The company retained the ability to maintain and gradually increase product sales, as evidenced by the growth of net sales income in 2023 and its further increase in 2024. At the same time, profitability indicators showed a more complex nature of the changes: in 2023, there was a significant improvement in gross profit and cost efficiency, while in 2024 there was a certain weakening of the achieved results. However, even under such conditions, the level of profitability in 2024 remained higher than the indicators of 2022, which indicates that the enterprise retains sufficient potential to generate financial results.

The assessment of the efficiency of the use of production resources also confirms the ambiguity of the identified trends. On the one hand, the enterprise provided a relatively high level of return on capital, and in 2023 the efficiency of the use of fixed assets even increased. On the other hand, in 2024 there was a certain slowdown in the turnover of current assets, which indicates a decrease in the speed of capital turnover and the need for more rational management of the mobile part of resources. No less significant are the changes in the use of labor potential: the reduction in the number of personnel in 2023 was accompanied by an increase in labor

productivity, while in 2024 the increase in the number of employees occurred against the background of a decrease in output per employee. At the same time, the growth of the payroll and the preservation of a relatively high level of the average monthly salary indicate an increase in the role of personnel costs in the overall cost system of the enterprise.

Therefore, the results of the analysis allow us to state that INTERPIPE in the studied period demonstrated sufficient adaptability to difficult operating conditions and the ability to maintain economic activity, however, some negative changes in the area of asset turnover, labor productivity dynamics and a decrease in profitability compared to the most productive year of 2023 indicate the preservation of certain internal and external risks. That is why the obtained analytical results should be considered as a basis for further assessment of the financial condition of the enterprise, identification of key problem areas in its activities and substantiation of directions for improving the efficiency of its operation in the future.

The financial stability of an enterprise is directly related to its ability to meet its obligations in a timely manner, maintain an optimal capital structure, and ensure the stability of cash flows. Assessing liquidity, solvency, and financial independence allows you to determine the level of financial risks and form an idea of the enterprise's long-term ability to function in an unstable environment.

Liquidity characterizes the ability of an enterprise to cover short-term liabilities at the expense of current assets. The most common indicators are the current liquidity ratio, quick liquidity and absolute liquidity. The current liquidity ratio is defined as the ratio of current assets to current liabilities and shows the overall coverage of short-term debts with current resources. The normative value is considered to be not lower than 1.5–2.0, which indicates a sufficient margin of financial strength.

The quick liquidity ratio clarifies the previous indicator by excluding the least liquid elements from the composition of current assets - inventories. Its normative value is usually within 0.8-1.0. Absolute liquidity reflects the share of the most liquid assets (cash and cash equivalents) in covering current liabilities and allows you to assess the instant solvency of the enterprise.

A decrease in liquidity indicators indicates an increase in the risk of insolvency and difficulty in meeting short-term obligations. At the same time, excessively high values may indicate inefficient use of working capital, which negatively affects profitability. Therefore, not only the level of the ratios is important, but also their dynamics and compliance with industry characteristics.

Solvency in a broader sense is related to the ability of an enterprise to service both short-term and long-term obligations. The financial stability ratio, interest coverage ratio, and total debt ratio are used to assess it. The interest coverage ratio is defined as the ratio of profit before interest and taxes to the amount of interest payments and demonstrates the ability of the enterprise to fulfill credit obligations. Its decrease may indicate an increase in the credit load or a decrease in operating profit.

The financial independence of an enterprise is characterized by the structure of financing sources. The key indicator is the autonomy coefficient, which is defined as the ratio of equity to total assets. A value below 0.5 indicates a high dependence on borrowed funds. Increasing the share of equity helps reduce financial risks and strengthen economic stability.

Another indicator of capital structure is the financial leverage ratio, which reflects the ratio of debt to equity. A high level of leverage increases potential profitability, but at the same time increases the risk of loss of financial stability in the event of a decline in revenues.

To systematize the key indicators for assessing liquidity and financial independence, we present a summary table 2.4.

Table 2.4

#### Main indicators for assessing the financial stability of an enterprise

Indicator	Calculation formula	Economic content
Current liquidity ratio	Current assets / Current liabilities	Total solvency
Quick liquidity ratio	(Current assets – Inventories) / Current liabilities	Operational solvency
Absolute liquidity	Cash / Current liabilities	Instant solvency
Autonomy coefficient	Equity / Assets	Financial independence
Financial leverage ratio	Debt capital / Equity capital	Level of financial risk
Interest coverage ratio	EBIT / Interest expense	Debt servicing capacity

The results of the calculations of these indicators are presented in Table 2.5.

Table 2.5

## Liquidity, solvency and financial dependence indicators

Indicator	2022	2023	2024
Current liquidity ratio	2.38	2.71	3.41
Quick liquidity ratio	1.59	1.87	2.56
Absolute liquidity ratio	0.70	1.13	1.41
Net working capital, thousand USD	304372	375880	487402
Autonomy coefficient	0.26	0.48	0.55
Financial dependency ratio	0.74	0.52	0.45
Financial leverage ratio	2.89	1.09	0.83
Equity coverage ratio	0.35	0.92	1.20

Analysis of liquidity and solvency indicators of INTERPIPE in 2022-2024 indicates a significant strengthening of the financial stability of the enterprise and an increase in its ability to timely fulfill current and long-term obligations. During the period under review, there was a consistent increase in the current, quick and absolute liquidity ratios, which indicates an improvement in the structure of current assets and the formation of a sufficient reserve of liquid resources to cover short-term payables. Particularly indicative is the increase in the current liquidity ratio from 2.38 in 2022 to 3.41 in 2024, as well as an increase in the absolute liquidity ratio from 0.70 to 1.41, which indicates an increase in the payment capabilities of the enterprise even without taking into account the sale of inventories. Additional confirmation of positive changes is the increase in net working capital, the volume of which during the analyzed period increased from 304,372 thousand USD to 487,402 thousand USD. USA, which characterizes the expansion of the financial base to support operational activities.

No less important are the changes in indicators characterizing the overall solvency and degree of financial independence of the enterprise. In particular, the autonomy ratio during 2022-2024 increased from 0.26 to 0.55, while the financial dependence ratio, on the contrary, decreased from 0.74 to 0.45. Such dynamics indicate an increase in the role of equity in financing the enterprise's assets and a decrease in its dependence on external sources of funds. At the same time, the reduction in the financial leverage ratio from 2.89 to 0.83 and the increase in the equity coverage ratio from 0.35 to 1.20 give reason to argue that in 2024 the enterprise had a much more

stable capital structure compared to 2022. This means that the risk of loss of solvency due to excessive debt load has significantly decreased.

The results of the analysis allow us to conclude that in the studied period INTERPIPE demonstrated a positive trend towards strengthening liquidity, solvency and financial independence. The improvement of most key ratios indicates an increase in the ability of the enterprise to adapt to changes in the external environment, maintain an appropriate level of current solvency and form a more sustainable model of financing its activities. In general, the identified trends create a favorable basis for further assessment of the financial stability of the enterprise and justification of directions for increasing the efficiency of management of its financial resources.

Assessment of the economic stability of an enterprise is impossible without analyzing its profitability and efficiency of resource use. If liquidity and solvency indicators characterize the ability of the enterprise to fulfill financial obligations, then profitability and business activity reflect the effectiveness of economic activity and the intensity of capital turnover. It is these parameters that form the basis of long-term competitiveness and financial stability.

Profitability is a relative indicator that determines the ratio of profit to the amount of expenses, income or assets. The most common indicators are return on sales, return on assets and return on equity. Return on sales shows the share of profit in the structure of net sales income and reflects the effectiveness of pricing policy and cost management. A decrease in this indicator may be a consequence of an increase in cost or a decrease in sales volumes.

Return on assets characterizes the efficiency of using the entire property complex of the enterprise. It is calculated as the ratio of net profit to the average annual value of assets and shows how much profit is generated by each hryvnia of invested resources. For capital-intensive industries, which include metallurgical production, this indicator is especially important, since a significant share of expenses is associated with the maintenance of fixed assets.

Return on equity reflects the profitability of owners' investments and is a key criterion for the investment attractiveness of an enterprise. Positive dynamics of this

indicator indicates an increase in the value of the business and effective management of financial resources. At the same time, an excessive increase in profitability may be due to an increase in financial leverage, which requires additional analysis of the capital structure.

Profitability analysis is closely related to the study of business activity, which characterizes the speed of resource turnover and the efficiency of working capital use. The main indicators of business activity are the asset turnover ratio, inventory turnover, receivables and payables. Acceleration of capital turnover contributes to income growth without additional resource involvement, while slowing down turnover indicates a decrease in operating efficiency.

The asset turnover ratio is defined as the ratio of net income to the average annual value of assets and demonstrates the intensity of use of property potential. For an industrial enterprise with a large share of fixed assets, this indicator is usually relatively low, but its dynamics are of key importance for assessing development trends.

Inventory turnover characterizes the speed of product sales and the rational management of warehouse resources. A decrease in this indicator may indicate the accumulation of excess inventory or a decrease in demand. Accounts receivable turnover reflects the effectiveness of settlement discipline with buyers, and a long period of debt collection negatively affects the liquidity of the enterprise.

To summarize the main indicators of profitability and business activity, it is advisable to present them in a systematic form (Table 2.6).

Table 2.6

#### Indicators of profitability and business activity of the enterprise

Indicator	Calculation formula	Economic content
Sales profitability	Profit / Net income	Profit share in revenue
Return on assets	Net profit / Assets	Property efficiency
Return on equity	Net profit / Equity	Owners' return on investment
Asset turnover	Net Income / Assets	Resource intensity
Inventory turnover	Cost / Inventories	Product sales speed
Accounts receivable turnover	Income / Accounts Receivable	Clients' settlement discipline

The results of calculating the above indicators are presented in Table 2.7.

Table 2.7

## Profitability and business activity indicators of INTERPIPE

Indicator	2022	2023	2024
Profitability indicators			
Gross profit margin, %	35.74	46.60	38.27
Operating profitability of sales, %	28.27	36.26	32.09
Net sales profitability, %	20.83	25.58	26.70
Return on assets (ROA), %	20.75	26.52	24.47
Return on equity (ROE), %	63.77	68.69	47.66
Business activity indicators			
Asset turnover ratio, rev./year	1.00	1.04	0.92
Return on investment, vol./year	2.63	3.27	2.95
Current assets turnover ratio, rev./year	1.71	1.77	1.63
Inventory turnover ratio, vol./year	3.25	2.95	3.64
Duration of one inventory turnover, days	112.27	123.76	100.30
Accounts receivable turnover ratio, turnover/year	6.07	8.13	9.61
Accounts receivable repayment period, days	60.18	44.88	37.98
Accounts payable turnover ratio, vol./year	6.05	5.58	6.97
Accounts payable repayment period, days	60.29	65.39	52.40

Analysis of INTERPIPE's profitability indicators in 2022-2024 indicates a generally fairly high level of efficiency of the enterprise's economic activities, although the dynamics of individual coefficients was uneven. In particular, gross margin of sales increased from 35.74% in 2022 to 46.60% in 2023, which reflects a significant improvement in the ratio between net income and cost of goods sold. In 2024, this indicator decreased to 38.27%, but remained higher than the level of 2022, which gives reason to speak about the preservation of the enterprise's relatively stable positions in the formation of gross financial results. A similar trend was demonstrated by operating margin of sales, which increased from 28.27% to 36.26% in 2023, and in 2024 decreased to 32.09%. This indicates that after achieving the highest level of operating efficiency in 2023, the company somewhat lost its growth rate in 2024, but maintained a higher level of performance compared to the base period.

A positive sign is also the dynamics of net sales profitability, which increased throughout the entire period under study: from 20.83% in 2022 to 25.58% in 2023 and 26.70% in 2024. This indicates an increase in the ability of the enterprise to transform sales revenue into net profit, which is an important characteristic of overall financial performance. Return on assets in 2023 increased to 26.52% compared to 20.75% in

2022, and in 2024 decreased to 24.47%, but remained higher than the initial level. This means that the enterprise's assets were used quite effectively, although the rate of return on their use slowed down somewhat in 2024. Return on equity in 2022-2023 remained very high, increasing from 63.77% to 68.69%, while in 2024 it decreased to 47.66%. Despite this reduction, the value of the indicator continues to indicate a fairly effective use of the company's equity.

Analysis of business activity indicators gives grounds to assert that in 2022-2024 INTERPIPE was characterized by a generally sufficient level of resource turnover, although individual components of turnover changed unevenly. The asset turnover ratio increased from 1.00 rev./year in 2022 to 1.04 rev./year in 2023, but in 2024 it decreased to 0.92 rev./year, which indicates a certain slowdown in the overall speed of asset turnover. Similar dynamics were demonstrated by the return on capital and the turnover ratio of current assets: in 2023 they reached their highest values, after which they decreased slightly in 2024. This may indicate that in 2023 the enterprise used the available resource potential as efficiently as possible, while in 2024 the expansion of assets was not accompanied by a proportional acceleration of their return.

At the same time, the analysis of individual elements of working capital indicates the presence of positive changes in the current assets and liabilities management system. Thus, inventory turnover in 2024 increased to 3.64 vol./year compared to 2.95 vol./year in 2023, and the duration of one inventory turnover decreased to 100.30 days. This indicates an acceleration of the sale or use of inventories and an increase in the efficiency of their management. The dynamics of receivables are also positive: its turnover ratio increased from 6.07 vol./year in 2022 to 9.61 vol./year in 2024, while the repayment period decreased from 60.18 to 37.98 days. Thus, the enterprise improved its policy of settlements with debtors and accelerated the return of funds to economic turnover. Accounts payable was also characterized by an acceleration of turnover in 2024, when its repayment period was reduced to 52.40 days. This trend indicates an increase in payment discipline and more active fulfillment of obligations to counterparties.

The results of the analysis indicate that in 2022–2024, INTERPIPE generally maintained an adequate level of profitability and business activity, which is an important prerequisite for maintaining its economic stability in the face of global challenges. Despite a certain slowdown in asset turnover and a decrease in individual profitability indicators in 2024 compared to 2023, the company demonstrated positive changes in such areas as an increase in net sales profitability, increased efficiency in receivables management, and accelerated inventory turnover. This gives reason to argue that the company retains the ability to adapt to an unstable external environment, maintain the effectiveness of resource use, and form the basis for strengthening economic stability in the long term. Therefore, the identified trends can be used as an analytical basis for further substantiating management decisions aimed at strengthening the stability of an industrial enterprise in the face of global instability.

### 2.3. Analysis of the impact of global challenges on economic sustainability

Comprehensive diagnostics of the economic stability of an enterprise involves not only the analysis of individual financial and production indicators, but also their generalization in the form of an integral assessment. This approach allows you to form a systemic vision of the state of the enterprise, determine development trends and identify critical risk areas. An integral assessment is appropriate in cases where it is necessary to compare the dynamics of indicators over several years or determine the overall level of stability in conditions of significant variability of parameters.

To calculate the integral indicator of economic sustainability, it is advisable to use a system of standardized indicators that reflect the key components of activity: financial performance, resource efficiency, business activity and social stability. The integration is based on an additive model, according to which the overall index is determined as a weighted sum of standardized indicators:

$$I_{\text{CT}} = \sum_{i=1}^n w_i \cdot x_i$$

Where:

$w_i$ — weight coefficient of the  $i$ -th indicator;

$x_i$ — normalized value of the indicator;

$n$ — number of indicators in the evaluation system

$\sum w_i = 1$  — condition for normalizing weights (the sum of all fractions is equal to one)

The integral assessment includes the following indicators: cost efficiency, return on assets, working capital turnover ratio, profitability of production assets, labor productivity, and cost ratio per UAH of sales (as a disincentive indicator).

The output data was normalized using the linear scaling method to bring diverse indicators into a comparable form:

For stimulating indicators (the growth of which indicates an improvement in the condition):

$$x_i = X_i / X_{\max}$$

For discouraging indicators (the increase of which indicates a deterioration in the condition):

$$x_i = X_{\min} / X_i$$

As a result of the calculations, the following integral values were obtained (Table 2.8, conditional results of generalization based on the data in Table 2.3):

Table 2.8

#### Integral indicator of economic sustainability of INTERPIPE

Year	Cost-effectiveness	Fund return	Current asset turnover ratio	Profitability of production assets	Labor productivity	Cost per \$1 of sales*	Integral indicator	Level of economic sustainability
2022	0.637	0.804	0.966	0.692	0.843	0.831	0.796	sufficient
2023	1,000	1,000	1,000	1,000	1,000	1,000	1,000	relatively high
2024	0.710	0.902	0.921	0.753	0.831	0.865	0.830	sufficient

The results of the integral assessment indicate that in 2022–2024, INTERPIPE's economic stability was generally characterized by a sufficient level, however, its

dynamics were uneven. In 2022, the integral indicator was 0.796, which reflects a sufficient level of economic stability of the enterprise. In 2023, the index value increased to 1.000, which indicates the achievement of the best ratio of the studied parameters within the analyzed period. This was due to the improvement of cost efficiency, return on assets, turnover of current assets, profitability of production funds, labor productivity, as well as a decrease in costs per unit of sales. In 2024, the integral indicator decreased to 0.830, which indicates a certain weakening of individual components of economic stability compared to the previous year, although the overall level remained higher than in 2022. Thus, the enterprise maintained a sufficient margin of economic stability, however, the identified deterioration of some indicators in 2024 confirms the feasibility of developing and implementing management measures aimed at its further strengthening in the face of global challenges.

Ensuring the economic sustainability of an industrial enterprise in the face of global challenges is impossible without a systematic risk analysis. A preliminary analysis of financial and economic indicators showed the presence of sharp fluctuations in income, profitability and business activity during 2022–2024, which indicates the increased sensitivity of the enterprise to external and internal factors. This unit identifies key risks, assesses their impact and determines critical areas of economic sustainability decline.

The first group is market risks associated with changes in demand and conditions in international markets. Since the company is export-oriented, a decrease in sales volumes in 2023 may be due to a decrease in external demand, logistical restrictions or trade barriers. The high share of exports creates dependence on global economic cycles and fluctuations in world prices for metal products.

The second significant group is production and resource risks. The increase in the cost of production and costs per UAH 1 of sales in 2024 indicates an increase in the resource intensity of activities. Such risks include rising energy prices, disruptions in the supply of raw materials, increased transportation costs, and technological failures. For a capital-intensive enterprise, these factors directly affect margins and profitability.

Financial risks are associated with cash flow volatility, declining profitability, and a possible increase in debt burden. The sharp drop in profits in 2023 has reduced the company's financial cushion, which increases its sensitivity to external shocks. Even with a partial recovery of profits in 2024, the level of profitability remains significantly lower than in the base period.

To summarize risks, it is advisable to use a matrix (Table 2.7) for their assessment according to the criteria of probability and impact.

Table 2.7

#### Matrix for assessing the main risks of the enterprise

Type of risk	Probability	Impact on sustainability	Risk level
Market (decrease in demand)	Medium	High	Essential
Resource (increasing costs)	High	High	Critical
Financial (decrease in profitability)	Medium	Average	Moderate
Monetary	Medium	High	Essential
Personnel	Medium	Average	Moderate

The results of the risk assessment indicate that the greatest threat to the economic stability of INTERPIPE is posed by resource and currency factors, while market risks are significant but not critical. Financial and personnel risks at the current stage are reasonably assessed as moderate, as the company maintains profitability, sufficient liquidity and the potential to adapt to global challenges.

Determining critical areas allows you to form priority areas of management influence. To reduce market risks, it is advisable to diversify the geography of sales and expand the range of products with higher added value. To minimize resource risks, it is necessary to implement energy efficiency measures, optimize costs and modernize production processes. Reducing financial risks is possible through the formation of reserves, optimization of the capital structure and strengthening control over cash flows.

Thus, the risk assessment shows that the economic sustainability of the enterprise is influenced by a complex of external and internal threats. The key critical areas are market instability and rising costs, which directly affect profitability and

business activity. Taking these factors into account in further strategic planning is a necessary condition for strengthening the economic sustainability of the enterprise.

The analysis of financial and economic indicators, integrated assessment and risks allows us to form a generalized characteristic of the current level of economic stability of the enterprise and outline key areas for its improvement. The complexity of the results obtained makes it possible to move from descriptive diagnostics to strategic conclusions and practical recommendations.

Firstly, the dynamics of INTERPIPE's performance indicators for 2022–2024 does not confirm the presence of a crisis recession in 2023, but, on the contrary, indicates an uneven, but generally positive nature of changes in the development of the enterprise. If 2022 can be considered a base period with a sufficient level of economic stability, then 2023 was characterized by an improvement in a number of key parameters, in particular, cost profitability, return on assets, turnover of current assets, profitability of production assets and labor productivity. In 2024, there was an increase in net sales income, but at the same time there was a certain weakening of individual performance indicators compared to the previous year, in particular, cost profitability, turnover of current assets and labor productivity. This gives grounds to distinguish not the stages of "stability, crisis and recovery", but the sequence of the basic state, the relative strengthening of economic stability and the subsequent partial weakening of its individual components while maintaining a generally sufficient level of enterprise stability.

Secondly, the integral assessment of economic sustainability confirmed that the highest relative level of the generalized indicator within the studied period was achieved in 2023. If in 2022 the integral index was 0.796, then in 2023 it increased to 1.000, which reflects the best ratio between the selected parameters of performance, business activity and resource efficiency. In 2024, the integral indicator decreased to 0.830, which indicates a certain deterioration of some of the components of economic sustainability compared to the previous year. At the same time, the value of 2024 remained higher than the level of 2022, which gives reason to speak not about the loss of sustainability, but about its weakening after the most productive year. Thus, the

results obtained indicate that the enterprise retains a sufficient reserve of economic sustainability, but the existing trends need to be consolidated by systemic management decisions.

Thirdly, the results of the risk analysis allowed us to clarify the key areas of potential decline in the economic stability of the enterprise. The most significant remains the resource risk associated with the growth of costs and the increased burden on the resource base of the enterprise, since it is this group of factors that most significantly hinders the strengthening of profitability and overall efficiency of activities. Market and currency risks caused by the instability of the external environment, possible fluctuations in demand and dependence on market changes in external markets also have a significant impact on economic stability. Financial and personnel risks at the current stage are appropriate to assess as moderate, since the enterprise maintains profitability, a sufficient level of liquidity and financial independence, although some performance indicators in 2024 compared to 2023 have deteriorated somewhat. The totality of the identified trends indicates the presence of internal reserves for further strengthening the economic stability of the enterprise, as well as the need for targeted management influence on the most vulnerable components of its functioning. That is why, based on the summarized results, it is possible to determine strategic directions for increasing the economic sustainability of the enterprise.

Based on the summarized results, it is possible to determine strategic directions for increasing the economic sustainability of the enterprise.

The first direction is related to cost optimization and increasing resource efficiency. The increase in costs per UAH of sales is a key factor in reducing profitability, therefore it is necessary to introduce energy-saving technologies, review logistics schemes, and improve the production process management system.

The second direction involves diversifying sales markets and increasing the share of products with high added value. Expanding the range and focusing on specialized segments will reduce dependence on price competition and increase margins.

The third direction concerns strengthening financial stability by forming reserves, optimizing the capital structure, and improving cash flow management. It is advisable for an enterprise to maintain a balance between profitability and financial security, avoiding excessive debt burden.

The fourth direction is related to the development of human resources and innovation potential. The growth of labor productivity in 2024 indicates positive results of optimization, but long-term sustainability requires investment in the development of personnel competencies, digitalization of production processes, and the implementation of modern management technologies.

Summarizing the results of the diagnostics, we can conclude that the enterprise is in the recovery phase after the crisis period, but its economic stability remains vulnerable to external factors. Further strengthening of positions requires a comprehensive combination of financial, production and strategic measures. It is on the basis of the identified problems and reserves that it is advisable to form a system of economic stability management that will ensure the stable development of the enterprise in the face of global challenges.

#### PEST analysis of the external environment of the enterprise's functioning

The external environment of an industrial enterprise is formed under the influence of political, economic, social and technological factors. For an export-oriented metallurgical enterprise, these factors are of a decisive nature, as they directly affect production, financial and investment stability.

##### 1. Political (P – Political) factors

The political component is one of the most significant in modern conditions. Military risks, changes in regulatory policy, customs restrictions and anti-dumping procedures form the instability of the external environment. The impact of international trade policy, in particular quotas, tariffs and technical regulations in importing countries, is critical for the enterprise. At the same time, the process of Ukraine's European integration creates potential opportunities for expanding access to EU markets, provided that standards are met.

Changes in tax legislation, currency regulation, and environmental regulations also contribute to uncertainty. Tightening requirements for decarbonization of metallurgical production may increase costs, but at the same time stimulate modernization.

## 2. Economic (E – Economic) factors

Economic conditions determine the level of effective demand, the availability of financial resources, and the dynamics of prices for raw materials and energy. The metallurgical industry is cyclical, so changes in world prices for steel, oil and gas resources, and energy have a direct impact on the company's revenues.

Inflation processes, currency fluctuations and the level of the discount rate affect the cost structure and the cost of capital raised. For an export-oriented enterprise, the devaluation of the national currency can have both a positive (increasing hryvnia income) and a negative effect (increasing the price of imported raw materials).

## 3. Social (S – Social) factors

Social factors include demographic trends, employment levels, migration processes and the skill structure of the workforce. The reduction in the number of personnel in recent years indicates the impact of demographic and migration processes on the labor market. The shortage of qualified personnel can limit production potential.

The growth of social standards and occupational safety requirements increases the company's costs, but at the same time contributes to the formation of a positive image and stability of the workforce.

## 4. Technological (T – Technological) factors

Technological modernization is a key factor for long-term sustainability. Global trends in digitalization, automation, and the introduction of energy-efficient technologies create both challenges and opportunities. The high capital intensity of metallurgical production requires constant renewal of fixed assets.

Increasing requirements for environmental friendliness of products and the introduction of decarbonization technologies may change the cost structure, but allow the company to remain competitive in international markets.

Table 2.8

## PEST analysis of the external environment

Factor	Main manifestations	Impact on sustainability
Political	Military risks, trade restrictions, regulatory changes	High
Economic	Price volatility, inflation, currency fluctuations	High
Social	Staff shortage, salary increase	Average
Technological	Modernization, automation, ESG requirements	High

In general, the external environment is characterized by increased turbulence, which requires a flexible strategy for managing economic sustainability.

SWOT analysis allows you to integrate the results of internal diagnostics and PEST analysis to determine the strategic positions of the enterprise.

#### Strengths

The company's strengths include vertical integration of production, the presence of a modern electric steelmaking complex, diversified export geography, and labor productivity growth in 2024. The company has experience working in international markets and compliance with international quality standards, which increases its competitiveness.

#### Weaknesses

Among the weaknesses are high energy intensity of production, significant dependence on export conditions, increased costs per unit of production and reduced profitability compared to the base period. Another negative factor is the reduction of human resources, which may limit innovative development.

#### Opportunities

Opportunities include expanding cooperation with EU countries within the framework of European integration processes, introducing energy-efficient technologies, diversifying the range of products with high added value, and attracting international investments to modernize production.

#### Threats

The main threats are military risks, instability in global steel markets, trade barriers, rising energy costs, and increasing environmental requirements. Additional threats include currency instability and competition from global producers.

Table 2.9

## SWOT analysis of the economic sustainability of the enterprise

Internal factors	External factors
S– modernized production base, export experience, increased productivity	About– integration into the EU market, technological modernization
W– high cost, dependence on the market situation	T– military risks, energy instability

Summarizing the results of the SWOT analysis, it can be noted that the enterprise has significant internal potential for strengthening economic sustainability, however, its effectiveness largely depends on the ability to minimize the impact of external threats and realize modernization and diversification opportunities.

## Conclusions to Chapter 2

In the second section of the master's thesis, a comprehensive analysis of the financial and economic condition and level of economic sustainability of the INTERPIPE company was carried out based on its performance indicators for 2022-2024. The conducted research made it possible to identify the main trends in the functioning of the enterprise, assess the efficiency of resource potential use, identify key risk areas, and summarize the factors affecting the level of economic sustainability of an industrial enterprise in the face of global challenges.

The analysis of the main technical and economic indicators showed that the development of the enterprise in the studied period did not show signs of a crisis recession in 2023, but was characterized by uneven, but generally positive dynamics. In 2022, the enterprise operated at a sufficient level of economic stability, while in 2023 there was an improvement in a number of key performance parameters. In particular, cost profitability, return on assets, turnover of current assets, profitability of production funds and labor productivity increased. In 2024, the enterprise ensured further growth in net income from sales of products, however, some of the efficiency indicators deteriorated somewhat compared to 2023. This primarily concerns cost profitability, turnover of current assets, profitability of production funds and labor productivity. At the same time, the results of 2024 remained higher or comparable to

the base year 2022 in most general characteristics, which indicates that the enterprise maintains a sufficient margin of economic stability.

The assessment of profitability and business activity indicators confirmed that INTERPIPE maintained a sufficiently high level of economic performance during 2022-2024. The best ratio between the parameters under study was recorded in 2023, when the company demonstrated the maximum values of a number of efficiency indicators within the analyzed period. In 2024, despite the growth in sales revenue, there was a certain slowdown in asset turnover and a weakening of individual profitability indicators compared to the previous year. At the same time, positive changes were the improvement of receivables management, acceleration of inventory turnover, and generally maintaining an adequate level of business activity. This gives grounds to consider the company's activities as sufficiently effective, although requiring further improvement of resource management mechanisms.

The analysis of labor indicators showed the presence of structural changes in the use of personnel. The reduction in the number of employees in 2023 was accompanied by an increase in labor productivity, which indicated an increase in the effectiveness of the use of labor potential. In 2024, the number of personnel increased, but labor productivity per employee decreased compared to 2023, which indicates incomplete coordination between the expansion of the personnel base and the growth rate of performance results. At the same time, the growth of the payroll and the preservation of a higher level of average monthly wages than in 2022 indicate an increased role of personnel costs in the overall system of economic indicators of the enterprise.

The assessment of liquidity and solvency showed a clear strengthening of INTERPIPE's financial stability during the period under study. The enterprise demonstrated a steady growth in the current, quick and absolute liquidity ratios, an increase in net working capital, as well as an improvement in the structure of financing sources. An increase in the autonomy ratio and a decrease in financial dependence indicate an increased role of equity in the formation of assets and a reduction in dependence on borrowed funds. Thus, the results of the calculations show that the

enterprise not only maintained profitability, but also strengthened its solvency and financial security.

The calculation of the integral indicator of economic sustainability confirmed the uneven, but generally sufficient level of sustainability of the enterprise in 2022-2024. The value of the integral index in 2022 was 0.796, in 2023 it increased to 1.000, and in 2024 it decreased to 0.830. Such dynamics indicate that the highest relative level of economic sustainability within the studied period was achieved in 2023, while in 2024 there was a certain weakening of individual components of sustainability. At the same time, the level in 2024 remained higher than the indicator in 2022, which does not give grounds to speak of a loss of sustainability, but indicates the need for its further strengthening.

The risk analysis conducted allowed us to establish that the most significant threat to the economic sustainability of the enterprise is resource risk, associated with increasing costs and a high burden on the resource base of production. Market and currency risks also have a significant impact, due to the instability of the external environment, dependence on the situation in external markets and possible changes in demand. Financial and personnel risks at the current stage are appropriate to assess as moderate, since the enterprise maintains profitability, a sufficient level of liquidity and financial independence, although individual performance results in 2024 compared to 2023 have deteriorated somewhat.

PEST analysis of the external environment allowed us to determine the high level of influence of political, economic and technological factors on the activities of the enterprise. War risks, instability of world steel markets, fluctuations in energy prices and increased environmental requirements form an increased turbulence of the external environment. SWOT analysis confirmed the presence of significant internal potential of the enterprise - a modernized production base, experience in working in international markets, increased labor productivity - at the same time revealed dependence on the export situation and high production costs.

Thus, according to the results of the analytical section, it was established that INTERPIPE in 2022-2024 maintained a sufficient level of economic stability and

demonstrated the ability to adapt to difficult operating conditions. At the same time, the identified trends indicate the presence of a number of problematic aspects, among which the most important are the growth of costs, the weakening of individual performance indicators in 2024, sensitivity to market and currency fluctuations, as well as the need to increase the consistency between the use of labor, production and financial resources. The results obtained justify the feasibility of developing and implementing systematic strategic measures aimed at further strengthening the economic stability of the enterprise in the face of global challenges.

## CHAPTER 3. IMPROVEMENT OF THE ECONOMIC SUSTAINABILITY MANAGEMENT SYSTEM OF INTERPIPE COMPANY

### 3.1. Formation of strategic directions for increasing economic sustainability

The results of the analysis of the financial and economic activities of the enterprise, presented in section 2, showed that the economic stability of INTERPIPE is formed under the influence of a complex of external and internal factors, among which the market situation, the cost component of production and the conditions of operation in foreign markets play a significant role. The calculations performed demonstrated an improvement in a number of efficiency indicators in 2023, which contributed to achieving the highest relative level of economic stability within the studied period. At the same time, in 2024, despite the further growth in sales volumes, a certain weakening of individual profitability and business activity indicators was observed, which indicates the sensitivity of the results of activities to changes in the external environment and resource load. One of the key problems remains the dependence of the enterprise on the situation in foreign markets, since the concentration of sales in certain export directions increases the risk of losses in the event of changes in regulatory conditions, trade restrictions, currency fluctuations or a decrease in demand in certain regions.

The first identified problem is the high share of exports in the total sales volume in the conditions of instability of the international environment. In the absence of sufficient diversification, even minor changes in the trade policy of individual countries can significantly affect the volume of income. The second problem is the currency sensitivity of income and expenses, which causes instability of financial results. The third problem is the insufficient depth of product positioning in individual markets, which limits the possibilities of forming a stable customer base.

To overcome these problems, it is advisable to implement a set of measures aimed at diversifying the geography of sales, expanding the range of products with high added value, and forming long-term contractual relationships with key customers.

The first strategic measure is to expand the presence in the markets of the Middle East and Southeast Asia. These regions are characterized by active development of infrastructure, energy sector and transport systems, which creates a stable demand for pipe and railway products. Entering new markets involves adapting technical standards of products, creating local representative offices or concluding partnership agreements with regional distributors. The expected result is a decrease in dependence on individual markets and stabilization of export volumes.

The second measure is to reduce the concentration of sales on one consumer segment by developing specialized products for mechanical engineering and energy. The transition to the production of products with increased technical characteristics will allow to increase margins and reduce the impact of price competition. This approach will contribute to the formation of a stable order portfolio even during periods of decline in world metal prices.

The third direction is to intensify work with the domestic market, in particular, participation in state infrastructure projects and industrial recovery programs. Although the domestic market cannot fully compensate for export volumes, its development will allow for partial diversification of income and reduce currency risks.

The fourth measure is the implementation of an export risk management system, which includes currency hedging, export contract insurance, and the use of factoring instruments. This will minimize the negative impact of exchange rate fluctuations and increase the stability of cash flows.

To summarize the proposed measures, it is advisable to present them in a systematic form (Table 3.1).

Table 3.1

#### Measures to diversify sales markets

Problem	Proposed event	Expected effect
Export concentration	Access to new regions	Reducing the risk of losing the market
Low margin	Expanding the product portfolio	Profitability growth
Currency instability	Using hedging instruments	Income stabilization
Limited domestic demand	Participation in national projects	Partial export compensation

The economic justification for the feasibility of diversification is based on the expected growth in sales volumes and an increase in the average margin. By expanding the geography of sales by 10-15% of the total sales volume, the company can provide additional income growth and reduce the amplitude of fluctuations during periods of recession. Even a slight increase in the average margin by 2-3% due to specialized products can significantly affect the overall level of profitability.

Diversification will also have a positive impact on the integrated indicator of economic sustainability by increasing asset turnover, stabilizing cash flows, and reducing the risk component. In the long term, this will help strengthen the competitive position of the enterprise and increase its investment attractiveness.

Thus, diversification of sales markets is a key strategic direction for increasing the economic sustainability of the enterprise. The implementation of the proposed measures will reduce dependence on individual regions, increase product margins and minimize export risks, which creates the prerequisites for the stable development of the enterprise in conditions of global turbulence.

The analysis of the financial and economic indicators of the enterprise's activities conducted in section 2 showed that one of the key factors that hinders the further strengthening of its economic sustainability is the resource component of production. In 2024, despite the increase in net sales revenue, there was an increase in unit costs and a weakening of individual profitability indicators compared to the previous year. This indicates that the company's performance remains significantly sensitive to changes in the cost structure. For metallurgical and pipe production, energy intensity remains one of the determining factors in the formation of cost, and therefore directly affects the level of economic sustainability. The increase in the cost of electricity, gas, logistics services and raw materials is transformed into an increase in the cost burden and limits the enterprise's ability to increase margins. That is why increasing energy efficiency, optimizing resource use and reducing dependence on cost-intensive elements of production should be considered as one of the strategic directions for strengthening the economic sustainability of INTERPIPE in the face of global challenges.

The first identified problem is the high energy intensity of production processes. Despite the presence of a modern electric steelmaking complex, the share of energy costs remains significant in the cost structure. In periods of instability in the energy market, this creates additional financial risks. The second problem is dependence on external suppliers of resources, in particular electricity and transport services. The third problem is the insufficient level of use of secondary resources and by-products of production.

To overcome these problems, it is advisable to implement a set of interrelated measures that include technological modernization, optimization of energy consumption, and development of elements of resource autonomy.

The first strategic measure involves the implementation of an energy management system in accordance with the international standard ISO 50001. Such a system will allow for constant monitoring of energy consumption, identification of inefficient production areas and development of an energy saving plan. The expected effect is to reduce energy consumption by 5-8% without significant capital investments, by optimizing equipment operating modes and reducing technological losses.

The second measure is the modernization of individual energy-intensive production units, in particular, the introduction of variable frequency drives, heat recovery systems and the renewal of compressor equipment. Investments in these areas will reduce the specific electricity costs per unit of production. Even a reduction in energy costs by 3-5% on the scale of a large enterprise creates a significant economic effect.

The third direction is to develop own generation or use alternative energy sources. This includes installing solar power plants to cover part of the auxiliary load or participating in green energy supply programs. Although complete energy autonomy is unattainable, a partial reduction in dependence on external suppliers will reduce the risks of price fluctuations.

The fourth measure concerns the implementation of circular economy principles. Reusing scrap metal, optimizing waste logistics, and recycling by-products

can reduce the cost of primary raw materials. In addition to the economic effect, this will contribute to increasing environmental sustainability and compliance with ESG requirements.

The fifth direction is related to the optimization of logistics costs. Reviewing transport routes, using multimodal transportation and concluding long-term contracts with carriers can reduce the costs of delivering raw materials and finished products. Reducing logistics costs by even 2–3% will have a positive impact on the overall cost.

To systematize the proposed measures, it is advisable to present them in the form of a generalizing table 3.2.

Table 3.2

#### Measures to increase energy efficiency and resource autonomy

Problem	Proposed event	Expected result
High energy consumption	Implementing ISO 50001	Reduction of energy consumption by 5-8%
Tariff increases	Equipment modernization	Reduction of unit costs
Dependence on suppliers	Partial self-generation	Reducing price risks
High material consumption	Reuse of resources	Reducing raw material costs
Logistics costs	Route optimization	Reduction of transportation costs

The economic feasibility of the proposed measures lies in reducing the cost intensity of production and increasing the efficiency of resource use, which directly affects the strengthening of the economic sustainability of the enterprise. The calculations carried out in the analytical section showed that in 2024 the costs per \$1 of sales amounted to \$0.6173, while in 2023 this figure was \$0.5340, which indicates an increase in the cost burden on the enterprise's activities. Under such conditions, even a partial reduction in costs per unit of sales, for example by \$0.02-0.04, will significantly improve the ratio between costs and financial results, and therefore, increase the profitability of costs. It is important that such an effect can be achieved without necessarily increasing production volumes, that is, through internal optimization of energy, raw materials and logistics processes. That is why the implementation of the proposed measures is economically justified, as it creates the prerequisites for increasing profitability, reducing resource vulnerability, and

strengthening the overall economic stability of INTERPIPE in the face of global challenges.

In addition to the direct economic effect, increasing energy efficiency reduces the risk of losses during periods of energy instability, which has a positive impact on the integrated indicator of economic sustainability. Reducing dependence on external resources forms a more predictable cost structure and increases the adaptability of the enterprise.

Therefore, increasing energy efficiency and resource autonomy is a strategic direction for strengthening the economic sustainability of INTERPIPE. The implementation of the proposed measures will reduce the cost component, stabilize financial results, and create the prerequisites for the long-term development of the enterprise in the context of global turbulence.

The analysis of the company's activities in section 2 showed that fluctuations in income, slowing down of capital turnover and growth of costs are largely related not only to external factors, but also to internal features of the organization of production and management. In conditions of high market turbulence, traditional approaches to managing an industrial enterprise are not flexible enough. That is why digitalization of production and management processes is a strategic direction for increasing the economic sustainability of INTERPIPE.

The first problem that needs to be solved is the insufficient efficiency of management decisions. In a complex production complex with a multi-level management structure, significant time lags between information collection and decision-making can lead to loss of economic opportunities or untimely response to risks. The second problem is limited transparency of production processes, which complicates control over costs and resource use. The third problem is the insufficient level of integration of information systems, which reduces the efficiency of financial, logistics and inventory management.

To overcome these problems, it is advisable to implement a set of digital transformation measures that cover both the production and management components of the enterprise's activities.

The first strategic measure is the implementation of an integrated ERP system, which will provide a single information environment for managing finances, inventories, procurement, production and sales. Such a system will allow you to receive up-to-date data in real time, automate budgeting and cost control processes. The expected effect is to reduce operating costs, reduce inventory turnover and increase the accuracy of financial planning.

The second direction is the implementation of the MES (Manufacturing Execution System), which will provide real-time monitoring of production processes. The use of sensors and analytical modules will allow tracking equipment performance, defect levels, downtime, and energy consumption. This will help increase return on investment and reduce unproductive losses.

The third measure is the use of predictive analytics technologies to predict the technical condition of equipment. Timely detection of potential malfunctions will reduce the risk of emergency production stops and reduce repair costs. Even a slight reduction in downtime by 1-2% can provide a significant increase in revenue in large-scale production.

The fourth direction is the digitalization of logistics processes and inventory management. The implementation of warehouse management systems (WMS) and electronic document management will reduce order processing time, reduce excess inventory, and accelerate the turnover of working capital. This will directly affect business activity and liquidity indicators.

The fifth measure is the development of digital channels of interaction with customers and partners. The use of a CRM system will allow to improve contract management, increase the accuracy of demand forecasting and strengthen long-term relationships with customers. This will help reduce the risk of losing the market and stabilize cash flows.

To summarize the proposed measures, we present them in a systematic form (Table 3.3).

Table 3.3

## Measures to digitize the company's activities

Problem	West	Expected result
Slowness of management decisions	ERP implementation	Increasing efficiency and transparency
Low equipment performance	MES implementation	Reducing downtime and shortages
Emergency stops	Predictive analytics	Reduction of repair costs
Excess inventory	WMS and electronic document management	Increasing turnover
Instability of the customer base	CRM system	Strengthening contract policy

The economic efficiency of digitalization is manifested in several directions. First, reducing operating costs through process automation. Second, increasing asset turnover and reducing the amount of frozen funds in inventories. Third, increasing labor productivity and reducing the share of defects. Even a 3–5% increase in production efficiency can provide a significant increase in profit under conditions of large sales volumes.

In addition to the direct financial effect, digitalization increases the adaptability of the enterprise to external changes. The availability of analytical data in real time allows you to quickly respond to changes in demand, prices or resource constraints. This reduces the level of management risk and increases the integral indicator of economic sustainability.

Thus, the digitalization of production and management processes is an important component of the strategy for increasing the economic sustainability of INTERPIPE. The implementation of the proposed measures will reduce costs, increase the efficiency of resource use and strengthen the competitive position of the enterprise in the face of global challenges.

### 3.2. Economic justification of the proposed measures

In section 3.1, three key strategic directions for increasing the economic sustainability of INTERPIPE were proposed: diversification of sales markets, increasing energy efficiency, and digitalization of production and management

processes. To substantiate the feasibility of their implementation, it is necessary to calculate the expected economic effect, which reflects the increase in profit or cost savings as a result of the implementation of relevant measures.

The starting point for calculations is the indicators of 2024, which reflect the state of the enterprise's activities after achieving the highest relative level of economic stability in 2023 and a certain weakening of individual efficiency parameters in 2024. Net income from sales in 2024 amounted to 1,050,391 thousand USD, cost of goods sold - 648,407 thousand USD, gross profit - 401,984 thousand USD, and costs per 1 dollar of sales - 0.6173 USD.

#### 1. Economic effect of market diversification

It is expected that the implementation of measures to enter new markets and expand the product portfolio will allow for a 10% increase in sales volume in the medium term without a proportional increase in fixed costs.

The projected revenue growth will be:

$$\Delta D = 1050391 \times 10\% = 105039 \text{ thousand US dollars.}$$

Assuming the average margin remains at 20% (after cost optimization), the additional profit will be

$$\Delta P_1 = 105039 \times 0.20 = 21008 \text{ thousand US dollars.}$$

Thus, diversification of sales markets and expansion of the product portfolio can provide an annual profit increase of over 21 million USD solely due to increased sales volumes.

#### 2. Economic effect of increasing energy efficiency

According to calculations, the implementation of an energy management system and the modernization of individual production units will reduce the cost of production by 5%.

The cost savings will be:

$$\Delta C = 648407 \times 5\% = 32420 \text{ thousand USD.}$$

Since the reduction in cost directly affects the financial result of the enterprise, the increase in profit will be:

$$\Delta P_2 = 32,420 \text{ thousand USD.}$$

Even a partial reduction in energy consumption and increased resource efficiency generate a tangible economic effect and create additional prerequisites for strengthening the economic sustainability of the enterprise.

### 3. Economic effect of digitalization

Digitalization of production and management processes ensures reduction of unproductive costs, reduction of equipment downtime and increase of working capital turnover. We conservatively estimate savings at 3% of total cost:

Here is an adjusted version of this fragment according to the indicators used in the analytical section.

Cost savings from digitalization will be:

$\Delta C_{\Pi} = 648407 \times 3 \% = 19,452$  thousand USD. Since in the calculations for 2024 the cost of INTERPIPE's sold products amounted to 648,407 thousand USD, this is the correct base for determining the forecast effect of digitalization.

In addition, increasing the turnover of current assets by 10% allows for the conditional release of part of the working capital. With an average volume of current assets at the level of 642,452 thousand USD, accelerating their turnover by 10% is equivalent to the conditional release of about 64,245 thousand USD of working resources, which will contribute to reducing the need for short-term financing.

The profit increase from digitalization will be:

$$\Delta P_3 = 19452 \text{ thousand USD.}$$

### 4. Overall economic effect

The total annual economic effect from the implementation of the three areas will be:

$$\Delta P_{zag} = \Delta P_1 + \Delta P_2 + \Delta P_3$$

$$\Delta P_{zag} = 21008 + 32420 + 19452$$

$$\Delta P_{total} = 72,880 \text{ thousand USD.}$$

Thus, the expected profit increase could be over \$72.8 million per year.

If the proposed measures are implemented, the company's net profit could increase from 280,479 thousand USD to approximately:

$$280479 + 72880 = 353359 \text{ thousand US dollars.}$$

This would correspond to a profitability increase of almost 26% compared to the base year 2024.

Table 3.4

#### Generalization of the economic effect of implementing measures

West	Profit growth, thousand USD
Sales diversification	21008
Improving energy efficiency	32420
Digitalization	19452
Together	72880

The results obtained show that the greatest economic effect is provided by increasing energy efficiency, as it directly affects the cost of production. Digitalization and market diversification create an additional effect through revenue growth and increased operational efficiency.

Thus, the proposed strategic measures are economically justified and capable of significantly strengthening the financial results of the enterprise.

To confirm the feasibility of implementing the proposed measures, it is necessary to carry out their investment assessment using classic investment efficiency indicators - net present value (NPV), internal rate of return (IRR), and payback period (PP).

The initial data for the calculations are based on the obtained result of the expected annual economic effect in the amount of 72,880 thousand USD.

The following investments are required to implement the measures:

- market diversification (marketing programs, certification, opening of representative offices) – 25,000 thousand USD;
- energy efficiency measures (modernization of equipment, energy management systems) – 60,000 thousand USD;
- digitalization (ERP, MES, analytical systems) – 45,000 thousand USD.

The total investment volume is:

$$I_0 = 130,000 \text{ thousand US dollars.}$$

The calculation horizon is 5 years.

The discount rate is set at 18% (0.18), taking into account the cost of capital and industry risks.

### 1. Calculation of Net Present Value (NPV)

The formula for net present value is:

$$NPV = \sum(CF_t / (1 + r)^t) - I_0$$

where:

$CF_t$  – net cash flow in period  $t$ ;

$r$  – discount rate;

$n$  – duration of the project implementation period;

$I_0$  is the amount of initial investment.

Assuming a stable annual additional cash flow of 72,880 thousand USD, obtained as a result of preliminary calculations of the effect of sales diversification, increased energy efficiency and digitalization, the resulting cash flows will be:

$$1 \text{ year: } 72880 / 1.18 = 61763 \text{ thousand USD}$$

$$\text{Year 2: } 72880 / 1.18^2 = 52341 \text{ thousand USD}$$

$$\text{Year 3: } 72880 / 1.18^3 = 44357 \text{ thousand USD}$$

$$\text{Year 4: } 72880 / 1.18^4 = 37591 \text{ thousand USD}$$

$$\text{Year 5: } 72880 / 1.18^5 = 31857 \text{ thousand USD}$$

The sum of the discounted flows will be:

$$61,763 + 52,341 + 44,357 + 37,591 + 31,857 = 227,909 \text{ thousand US dollars.}$$

Therefore:

$$NPV = 227909 - 130,000 = 97909 \text{ thousand USD.}$$

A positive NPV value indicates the economic feasibility of implementing the proposed strategy. The size of the annual additional flow is derived from the calculated profit growth in three areas, which is based on the financial indicators of 2024.

### 2. Calculation of the payback period

The payback period is defined as the period during which the accumulated cash flow covers the initial investment:

$$130000 / 72880 \approx 1.78 \text{ years.}$$

Therefore, the project pays off in less than 2 years, which is a high figure for an industrial enterprise.

Discounted payback period:

after 1 year: 61,763 thousand USD

after 2 years: 114,104 thousand USD

after 3 years: 158,461 thousand USD

Therefore, the discounted payback occurs between 2 and 3 years, approximately 2.36 years later.

### 3. IRR calculation

IRR is the discount rate at which  $NPV = 0$ .

According to calculations, the internal rate of return is approximately 48.2%, which significantly exceeds the adopted discount rate of 18%. This indicates a high investment attractiveness of the proposed measures.

A summary of the results is presented in Table 3.5.

Table 3.5

#### Investment performance indicators

Indicator	Value
Investment volume	130,000 thousand US dollars
Annual cash flow	72,880 thousand US dollars
NPV (5 years, 18%)	97909 thousand USD
IRR	≈ 48.2%
Payback period	1.78 years
Discounted payback period	≈ 2.36 years

The results obtained confirm that the proposed measures for diversification, energy efficiency and digitalization are financially justified. The internal rate of return exceeds the cost of capital, the payback period is relatively short, and a positive NPV value indicates an increase in the value of the enterprise.

At the same time, INTERPIPE operates in conditions of increased uncertainty, which necessitates taking into account possible fluctuations in the external environment. For this purpose, it is advisable to apply scenario analysis, which allows assessing the results of strategy implementation under different scenarios.

Three scenarios were used for modeling: optimistic, baseline, and pessimistic. The starting point is the 2024 figures and the expected annual effect calculated above in the amount of 72,880 thousand USD.

#### 1. Baseline scenario

The baseline scenario assumes full implementation of the measures in the absence of significant external shocks. Revenue growth is 10%, cost reduction is 5%, and savings from digitalization are 3%. Under these conditions, the annual additional cash flow will be 72,880 thousand USD, which provides an NPV of 97,909 thousand USD and a payback period of 1.78 years. The baseline scenario reflects a moderately stable external environment in which the enterprise not only maintains a sufficient level of economic stability, but also creates the prerequisites for its further strengthening.

#### 2. Optimistic scenario

The optimistic scenario assumes a more active growth in demand in external markets and higher effectiveness of the implementation of energy efficiency and digitalization measures. Under these conditions:

- the income increase is 15%;
- cost reduction – 7%;
- digitalization effect – 4% cost savings.

Calculation of additional cash flow:

income growth:

$$1050391 \times 15\% = 157559 \text{ thousand USD};$$

additional profit at a margin of 20%:

$$31,512 \text{ thousand USD};$$

savings from cost reduction:

$$648407 \times 7\% = 45388 \text{ thousand USD};$$

effect of digitalization:

$$648407 \times 4\% = 25936 \text{ thousand USD}.$$

The total annual effect will be:

$$31512 + 45388 + 25936 = 102836 \text{ thousand US dollars}.$$

In this scenario, the NPV for 5 years at a discount rate of 18% will be about 191,587 thousand USD, and the payback period will be reduced to 1.26 years. Under the condition of implementing this scenario, the enterprise can move to a relatively high level of economic sustainability, since the expected financial effect significantly exceeds the baseline option.

### 3. Pessimistic scenario

The pessimistic scenario takes into account a possible slowdown in global demand, continued high energy prices, and partial implementation of the proposed measures. Under the following conditions:

- income growth – only 5%;
- cost reduction – 3%;
- digitalization effect – 2%.

Calculation:

income growth:

$$1050391 \times 5\% = 52520 \text{ thousand USD};$$

additional profit at a margin of 20%:

$$10,504 \text{ thousand USD};$$

savings from cost reduction:

$$648407 \times 3\% = 19452 \text{ thousand USD};$$

effect of digitalization:

$$648407 \times 2\% = 12968 \text{ thousand USD}.$$

The total annual effect will be:

$$10504 + 19452 + 12968 = 42924 \text{ thousand US dollars}.$$

Under these conditions, the NPV will decrease to about 4232 thousand USD, and the payback period will increase to 3.03 years. However, even in the pessimistic scenario, the project remains economically feasible, since the net present value remains positive. In this case, we can expect to maintain only an average or close to sufficient level of economic sustainability.

Below is a comparative analysis of the scenarios.

Table 3.6

## Scenario analysis results

Indicator	Pessimistic	Base	Optimistic
Annual effect, thousand USD	42,924	72,880	102,836
NPV, thousand USD	4,232	97,909	191,587
Payback period, years	3.03	1.78	1.26
Level of stability	average	sufficient	relatively high

Scenario analysis demonstrates that the implementation of the proposed strategy is feasible even under adverse conditions. The indicators related to market diversification have the greatest variability, while energy efficiency measures provide a stable positive effect regardless of the economic situation.

### 3.3. Assessment of the long-term economic sustainability of the enterprise

Assessment of the long-term economic sustainability of the enterprise requires a transition from the analysis of individual financial and production indicators to the formation of a general indicator that allows for a comprehensive reflection of the results of the implementation of the proposed strategy. In subsections 2.3 and 3.2, the basic parameters of the enterprise's activities and the economic effect of the implementation of strategic measures were determined. On this basis, it is advisable to form an integral indicator of economic sustainability, which will allow comparing the state of the enterprise "before" and "after" the implementation of changes.

The methodological basis is a multifactor additive model that combines key indicators of financial performance, business activity, resource efficiency, and the innovation and organizational component. The choice of the additive model is justified by its transparency, the possibility of normalizing indicators of different dimensions, and adaptability to industry specifics.

It is advisable to include the following indicators in the integral indicator: cost profitability; return on capital; current assets turnover ratio; profitability of production funds; labor productivity; cost ratio per \$1 of sales as a disincentive indicator.

The indicators are normalized using the relative scaling method: for stimulating indicators – as the ratio of the actual value to the maximum, and for discouraging indicators – as the ratio of the minimum value to the actual. This allows all indicators to be brought to a single scale in the range from 0 to 1. The basis for calculations is INTERPIPE's indicators for 2022-2024, formed on the basis of the group's consolidated IFRS reporting.

The general formula for the integral indicator of economic sustainability is as follows:

$$I_{st} = \sum (w_i x_i),$$

where  $x_i$  is the normalized value of the  $i$ -th indicator;

$w_i$  – weight coefficient;

$\sum w_i = 1$  is the normalization condition.

The weighting factors are determined by experts taking into account the impact of each component on the economic sustainability of the enterprise. In this case, the weight of financial performance 0.30 is expedient to distribute between two indicators – cost profitability and cost ratio per 1 dollar of sales – 0.15 each. Thus, the weighting system takes on the following form: cost profitability – 0.15; return on assets – 0.25; current assets turnover ratio – 0.20; profitability of production assets – 0.15; labor productivity – 0.10; cost ratio per 1 dollar of sales – 0.15.

#### 1. Integral indicator in the base year 2024.

Based on the normalized values obtained in Section 2, the integrated economic sustainability indicator for 2024 is:

$$I_{(2024)} = 0.842.$$

This corresponds to a sufficient level of economic stability and indicates that the enterprise in 2024 maintained an acceptable level of performance, liquidity and resource efficiency, although in some parameters it was inferior to the best value achieved in 2023. For comparison: according to the same methodology, the value of the integral indicator in 2022 was 0.803, and in 2023 - 1.000, which reflects the best relative combination of the studied parameters within the analyzed period.

#### 2. Predicted value of the integral indicator after the implementation of measures

Taking into account the baseline scenario, which assumes a 10% increase in income, a 5% decrease in cost, an increase in current asset turnover, and an improvement in individual performance indicators, it is advisable to estimate the forecast value of the integral indicator of economic sustainability at the level of:

$$I_{(\text{after implementation})} \approx 0.95.$$

This value corresponds to a relatively high level of economic stability and indicates the expected strengthening of the company's positions as a result of the implementation of the proposed measures. At the same time, it is methodically more correct than overestimated or underestimated estimates, since it is consistent with the already made calculations of the annual economic effect, NPV, payback period and with the fact that the company was not in a crisis state even before the implementation of the strategy. With a conservative approach, even an increase in the integral assessment by approximately 15% from the 2024 level brings the indicator to the zone of about 0.95.

### 3. Comparative dynamics of the integral indicator

Table 3.7

Dynamics of the integral indicator of economic sustainability

Year / condition	Integral indicator	Level of stability
2022	0.803	sufficient
2023	1,000	relatively high
2024	0.842	sufficient
After implementing the strategy	0.950	relatively high

Therefore, the adjusted dynamics of the integral indicator does not indicate overcoming the crisis, but rather a transition from a sufficient level of economic stability in 2022 to the highest relative level in 2023, with a subsequent certain weakening of individual components in 2024. The forecast after implementing the proposed strategy confirms the possibility of strengthening the economic stability of the enterprise to a relatively high level, which is logically consistent with the results of the analytical section and justifies the feasibility of the proposed management measures.

The implementation of the proposed strategy allows restoring a high level of economic stability, bringing it closer to the pre-crisis state. At the same time, the structure of the integral indicator indicates an increasing role of resource and management efficiency, which corresponds to modern trends in the development of industrial enterprises.

Positive dynamics of the integral index means that the enterprise not only increases profitability, but also strengthens adaptability to external shocks. Reducing the share of risk factors in the structure of the indicator creates the prerequisites for long-term stability.

Thus, the formation of an integral indicator of economic sustainability confirms the systemic nature of the proposed strategy and its ability to ensure sustainable growth of the enterprise in the medium and long term. In the next subsection, it is advisable to forecast financial and economic results taking into account the obtained integral estimates.

Assessment of the long-term economic sustainability of the enterprise requires not only an integral generalization of indicators, but also the formation of a forecast of key financial and economic development parameters. In the previous sections, the expected economic effect from the implementation of a set of strategic measures was determined, and an integral indicator of economic sustainability was also calculated. On this basis, it is advisable to carry out a medium-term forecast of the main indicators of INTERPIPE's activities for a three-year horizon.

Methodologically, the forecast is based on a combination of a trend approach and taking into account the expected effect of the implementation of the proposed measures. The base year is 2024, which was characterized by an increase in net sales revenue with a simultaneous certain weakening of individual performance indicators compared to 2023. The forecast is carried out according to the baseline scenario, which assumes relative stability of macroeconomic conditions and full implementation of strategic initiatives.

#### 1. Forecast of net sales revenue

In 2024, net sales revenue amounted to 1,050,391 thousand USD. Due to the diversification of sales markets and expansion of the product portfolio, revenue growth of 10% is forecast in 2025, and in 2026–2027 - further growth of 8% annually.

Predicted values:

2025:  $1050391 \times 1.10 = 1155430$  thousand US dollars.

2026:  $1,155,430 \times 1.08 = 1,247,865$  thousand US dollars.

2027:  $1247865 \times 1.08 = 1347694$  thousand USD.

Thus, within three years, sales volume may increase to almost 1.35 billion USD, which indicates a stable positive dynamics of the company's sales activities.

## 2. Cost and profitability forecast

In 2024, the cost of sales amounted to 648,407 thousand USD, or 61.73% of net income. Taking into account measures to increase energy efficiency, digitalization and optimization of production processes, a gradual decrease in unit costs in the income structure is forecast. In 2025, the cost of sales may be about 58.90% of income, in 2026 - 58.00%, and in 2027 - 57.00%.

Projected cost values:

2025: 680,566 thousand US dollars.

2026: 723,761 thousand USD.

2027: 768,185 thousand USD.

Accordingly, the forecast gross profit will be:

2025: 474,864 thousand US dollars.

2026: 524,103 thousand USD.

2027: 579,509 thousand USD.

Under such conditions, cost profitability may increase from 62.00% in 2024 to 69.8% in 2025, 72.4% in 2026, and 75.4% in 2027, which will indicate a consistent strengthening of the company's performance.

## 3. Forecast of turnover and efficiency of asset use

Thanks to digitalization, logistics optimization and improved current asset management, the current asset turnover ratio is expected to gradually increase from 1.63 rev/year in 2024 to 1.69 rev/year in 2025, 1.74 rev/year in 2026 and 1.79 rev/year

in 2027. This will mean an acceleration of the resource cycle, a reduction in the duration of one turnover and a reduction in the need for short-term financing. At the same time, we can expect an improvement in the efficiency of the use of fixed assets, as increased equipment utilization and reduced downtime will create the prerequisites for an increase in return on capital.

#### 4. Labor productivity forecast

In 2024, the average annual labor productivity per employee was 108.29 thousand USD. Under the conditions of digitalization, improvement of the organization of production processes and rationalization of the use of human resources, an annual growth of this indicator of approximately 6% is forecast.

Predicted values:

2025: 114.79 thousand USD.

2026: 121.67 thousand USD.

2027: 128.97 thousand USD.

Increasing labor productivity will make it possible to increase the competitiveness of the enterprise without a proportional increase in the number of personnel and will contribute to strengthening economic sustainability in the long term.

#### 5. Summary of forecast indicators

Table 3.8

#### INTERPIPE financial and economic results forecast

Indicator	2024	2025	2026	2027
Net income, thousand USD	1050391	1155430	1247865	1347694
Cost price, thousand USD	648407	680566	723761	768185
Gross profit, thousand USD	401984	474864	524103	579509
Cost efficiency, %	62.0	69.8	72.4	75.4
Current assets turnover, rev./year	1.63	1.69	1.74	1.79
Labor productivity, thousand USD/person	108.29	114.79	121.67	128.97

The forecast indicates a stable positive dynamics of the main financial and economic indicators of the enterprise. The most significant growth is expected in gross profit, cost efficiency and labor productivity, which will directly affect the strengthening of INTERPIPE's economic stability in the medium term.

Therefore, the implementation of the proposed strategy allows you to form a trajectory of stable development of the enterprise with a gradual increase in income, increased profitability, and improved business activity indicators.

The long-term economic sustainability of an enterprise is closely related to its competitiveness and ability to adapt to changes in the external environment. If financial indicators reflect the effectiveness of activities in the short term, then competitive advantages and adaptability form the basis of stable development in a strategic perspective. In the previous sections, it was proven that the implementation of measures to diversify markets, increase energy efficiency and digitalization provides a significant increase in profitability and an integral indicator of economic sustainability. At the same time, it is important to assess how these changes are transformed into strengthening the company's position in the market.

#### 1. Impact on competitiveness

The competitiveness of an industrial enterprise is determined by a combination of price, quality, technological and organizational advantages. The implementation of the proposed strategy affects each of these components.

First, reducing the cost of production by increasing energy efficiency directly strengthens the price position of the enterprise. Reducing unit costs by 5-7% allows either to reduce selling prices to expand market share, or to maintain prices at the previous level, increasing margins. In industries with high competition, cost efficiency is a key factor in the formation of competitive advantages.

Secondly, the digitalization of production processes contributes to improving product quality and reducing defects. The implementation of monitoring and analytics systems allows ensuring the stability of technical parameters of products, which is important for an export-oriented enterprise. This increases trust from international partners and strengthens reputational capital.

Third, diversification of sales markets reduces dependence on individual regions and customers, which forms a more stable revenue structure. Expanding the geography of presence and developing new consumer segments increases the stability of competitive positions even in the face of changing global conditions.

Summarizing the impact on competitiveness, the following key results can be noted:

- strengthening price advantages;
- improving the quality and technological level of products;
- expansion of market presence;
- increasing the investment attractiveness of the enterprise.

## 2. Impact on adaptability

The adaptability of an enterprise is determined by its ability to respond quickly to changes in demand, resource conditions, and the regulatory environment. The proposed strategy increases adaptability in several ways.

First, digitalization of management provides access to operational information, which allows for rapid adjustments to production plans, output volumes, and logistics routes. The availability of real-time analytical data reduces management risks and shortens decision-making time.

Secondly, energy efficiency and partial resource autonomy reduce dependence on external suppliers and tariff fluctuations. This increases the stability of the cost base and allows the enterprise to maintain a competitive position even in conditions of energy instability.

Third, market diversification creates a more flexible sales model. In the event of a decline in demand in one region, the company can reorient supplies to other markets, which minimizes revenue losses.

To summarize the impact of the strategy on competitiveness and adaptability, it is advisable to present the results in the form of a systematized table 3.9.

Table 3.9

The impact of strategy on the competitive and adaptive characteristics of an enterprise

Direction of influence	Before implementation	After implementation
Price competitiveness	Sufficient	High
Technological level	Sufficient	Higher / upgraded
Sales diversification	Limited	More diversified
Management efficiency	Sufficient	High
Risk of external shocks	Essential	Moderate

### 3. Systemic effect of the strategy

The complexity of the proposed measures provides a synergistic effect. Increased profitability creates financial resources for further investments in modernization, which, in turn, strengthens competitive positions. Increased adaptability reduces the likelihood of sharp declines in the event of external shocks, which has a positive effect on the integral indicator of economic sustainability.

In the long term, the implementation of the strategy allows for the formation of a sustainable business model focused on innovation, efficiency and flexibility. The enterprise moves from a reactive model of responding to crises to proactive development management.

Therefore, the implementation of a set of strategic measures not only increases financial results, but also creates a new level of competitiveness and adaptability of the enterprise. This ensures the strengthening of its positions in the industry and creates the prerequisites for stable development in the face of global challenges.

### Conclusions to Chapter 3

In the third section of the master's thesis, a set of measures aimed at improving the management system of the economic sustainability of the INTERPIPE company in the face of global challenges is developed and economically justified. The logic of the section is built on a consistent transition from defining strategic directions to their quantitative justification, scenario testing and assessment of the long-term impact on the company's performance.

Subsection 3.1 identifies three key strategic directions for increasing economic sustainability: diversification of sales markets, increasing energy efficiency and resource efficiency, and digitalization of production and management processes. It is substantiated that these directions most fully correspond to the problems identified in section 2, related to the sensitivity of the enterprise to the external environment, increased cost burden, the need to increase resource turnover and improve management

efficiency. The proposed measures are interrelated and form a holistic model for strengthening the economic sustainability of an industrial enterprise.

In subsection 3.2, an economic justification of the proposed measures was carried out. Calculations showed that their implementation in the baseline scenario provides the expected annual profit growth of 72,880 thousand USD. The investment assessment confirmed the high efficiency of the project: the net present value is positive and amounts to 97,909 thousand USD. The internal rate of return exceeds the accepted discount rate, and the payback period is less than two years. Scenario analysis showed that even under a pessimistic scenario of the development of the external environment, the project remains economically feasible, which confirms a sufficient margin of its financial reliability.

In subsection 3.3, an assessment of the long-term economic sustainability of the enterprise was carried out. An integral indicator of economic sustainability was formed, which allowed to summarize the impact of strategic changes on the performance, resource efficiency and business activity of the enterprise. Calculations showed an increase in the integral index from a sufficient level in 2024 to a relatively high one after the implementation of the strategy, which indicates the expected strengthening of the enterprise's positions. The forecast of financial and economic results confirmed the stable positive dynamics of net income, gross profit, cost profitability, turnover of current assets and labor productivity. The assessment of competitive and adaptive characteristics showed that the implementation of the strategy increases price competitiveness, technological level, flexibility of sales policy and reduces sensitivity to external shocks.

Thus, in Section 3 it is proved that the proposed system of measures is economically justified, financially effective and strategically expedient. Its implementation ensures not only an increase in the effectiveness of activities, but also a strengthening of the economic stability, competitiveness and adaptability of the enterprise to global challenges. This forms the basis for the stable development of INTERPIPE in the medium and long term.

## CONCLUSIONS

The master's thesis has carried out a comprehensive theoretical, methodological and applied study of the problems of managing the economic sustainability of an industrial enterprise in the face of global challenges using the example of the INTERPIPE Company. The results obtained allow us to formulate generalized conclusions regarding the achievement of the set goal and the fulfillment of the specified research tasks.

In the theoretical aspect, the essence of the concept of economic sustainability of an enterprise is clarified as an integral characteristic of its ability to ensure stable functioning, maintain competitive positions and adapt to changes in the external environment under conditions of risk and uncertainty. It is substantiated that economic sustainability is multidimensional and covers financial, production, resource, innovation and management components. The relationship of economic sustainability with strategic management and competitiveness of the enterprise is proven.

The analytical part examines the financial and economic condition of INTERPIPE for 2022-2024. It was found that the company's activities in the period under study were characterized by uneven, but generally positive dynamics, due to the influence of external and internal factors, in particular, the instability of world markets, military risks, energy restrictions and changes in the cost structure of production. The calculations showed that in 2023 the best ratio of profitability, business activity and resource efficiency indicators was achieved, while in 2024, despite the increase in net sales income, there was a certain weakening of individual efficiency indicators compared to the previous year. Generalization of the analysis results made it possible to identify key risks and internal reserves for strengthening economic stability. The calculation of the integral indicator showed that the enterprise maintained a sufficient level of economic stability in 2022-2024, and its highest relative level was achieved in 2023, which confirms the need for further strategic strengthening of sustainable competitive positions.

In the applied part of the work, a set of measures to improve the enterprise's economic sustainability management system was developed, which includes diversification of sales markets, increasing energy efficiency and resource efficiency, as well as digitalization of production and management processes. The economic justification confirmed the feasibility of their implementation: the expected annual profit growth in the baseline scenario is 72,880 thousand USD, the net present value of the project is positive, the internal rate of return exceeds the accepted discount rate, and the payback period is relatively short. Scenario analysis showed that the economic feasibility of the proposed measures is maintained even under a pessimistic scenario of the external environment.

The formation of the forecast of financial and economic indicators and the integral index of economic stability showed that the implementation of the proposed strategy makes it possible to increase the level of economic stability to a relatively high level, to ensure stable growth in net income, gross profit, cost efficiency, labor productivity and resource efficiency. The proposed measures will contribute to increasing the adaptability of the enterprise to external shocks, reducing sensitivity to resource and market risks, as well as the formation of a more flexible and effective business model.

Thus, the goal set in the work to develop theoretical and methodological provisions and practical recommendations for improving the management of economic sustainability of an industrial enterprise in the face of global challenges has been achieved. The results obtained can be used in the practical activities of the enterprise to form an effective development strategy, increase the effectiveness of management decisions and strengthen the positions of the INTERPIPE company in the long term.

## LIST OF SOURCES USED

1. Altman E. Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*. 1968. Vol. 23(4). P. 589–609.
2. Barney J. Firm Resources and Sustained Competitive Advantage. *Journal of Management*. 1991. Vol. 17(1). P. 99–120.
3. Brynjolfsson E., McAfee A. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: WW Norton & Company, 2014.
4. Caldara D., Iacoviello M. Measuring Geopolitical Risk. *American Economic Review*. 2022. Vol. 112(4). P. 1194–1225.
5. Christopher M., Peck H. Building the Resilient Supply Chain. *International Journal of Logistics Management*. 2004. Vol. 15(2). P. 1–14.
6. COSO. *Enterprise Risk Management — Integrating with Strategy and Performance*. Committee of Sponsoring Organizations of the Treadway Commission, 2017.
7. Eccles R., Ioannou I., Serafeim G. The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science*. 2014. Vol. 60(11). P. 2835–2857.
8. International Energy Agency. *World Energy Outlook 2023*. Paris: IEA, 2023.
9. Ivanov D. Viable Supply Chain Model: Integrating Agility, Resilience and Sustainability. *International Journal of Production Research*. 2020. Vol. 58(10). P. 2904–2915.
10. Kaplan R., Norton D. *The Balanced Scorecard: Translating Strategy into Action*. Harvard Business School Press, 1996.
11. Knight F. *Risk, Uncertainty and Profit*. Boston: Houghton Mifflin, 1921.
12. Porter M. *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press, 1985.

13. Porter M., van der Linde C. Toward a New Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*. 1995. Vol. 9(4). P. 97–118.
14. Saaty T. *The Analytic Hierarchy Process*. New York: McGraw-Hill, 1980.
15. Schoemaker P. Scenario Planning: A Tool for Strategic Thinking. *Sloan Management Review*. 1995. Vol. 36(2). P. 25–40.
16. Teece D. Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*. 2007. Vol. 28(13). P. 1319–1350.
17. Teece D. Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*. 2007. Vol. 28(13). P. 1319–1350
18. Teece D., Pisano G., Shuen A. Dynamic Capabilities and Strategic Management. *Strategic Management Journal*. 1997. Vol. 18(7). P. 509–533.
19. World Bank. *The Economic and Social Consequences of Armed Conflict*. Washington, DC, 2017.