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IMPROVING FINANCIAL POTENTIAL MANAGING MECHANISM OF OIL AND GAS ENTERPRISES

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CONTENT

INTRODUCTION

Relevance of the research topic. Managing financial potential is crucial for the efficient operation of any economic entity's financial system. This includes the prudent utilisation of resources, optimising capital structure, and examining and predicting activities. The instability of both micro and macro environments within enterprises results in some prioritising the pursuit of increasing sales volume and market share over acknowledging the role of financial management in market management and resource allocation. The primary goal of financial management is to enhance the company's worth since it mirrors investors' fundamental necessities and the internal development laws of the firm, permitting fitting into contemporary enterprise management systems' requirements.

Today, financial potential is a key factor in determining enterprise success as it influences competitiveness and investment appeal. Although the literature includes numerous works exploring this concept, there is no established interpretation and understanding of the essence of financial potential. Kalacheva A. G.[1] defines financial potential as a collection of available and potential opportunities for enterprises to increase financial volumes, transform them into other factors of production, and achieve strategic goals. It is essential to mobilise financial volumes to achieve strategic objectives. Improving the management mechanism of a company's financial potential is the best method to achieve financial management goals. This improvement carries substantial practical significance and has a promising impact on enterprise growth.

The research development of the problem. Theoretical and practical foundations of the study concerning financial potential definition, form classification, and model presentation have been extensively examined by foreign and domestic economists. Scholars including A. M. Volkov, N. S. Voronova, V. V. Ivanov, A. G. Kankiya, N. D. Stakhno, I. V. Ryzhov, and B. I. have provided valuable insights on this issue. Chernyakhovsky, A. A. Khomyakov[2], P. A. Fomin, M. G. Lapusta, A. M. Kovalev, P. V. Egorov, N. S. Krasnokutskaya, M. K. Mbappe, O. S. Fedonina, I. M. Repin, V. V. Grebenik, E. A. Razumovskaya, A. E. Voronkova, A. I. Ageeva, A. G. Kucher, B. I. Sokolov, P. N. Zakharov, S. G. Kudeshova, B. V. Kuroedov, O. V. Nemkova, A. V. Trofimchuk and others.

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[1] Kalacheva, A. G. Evaluation of financial potential and financial risks of the enterprise when analysing its investment attractiveness / A. G. Kalacheva // Young Scientist. -. 2015. - № 20(100). - C. 237-241.

[2] Kaigorodov, A. G. Financial potential as a criterion of expediency of financial rehabilitation of the enterprise / A. G. Kaigorodov, A. A. Khomyakova // Audit and financial analysis. - 2007. - № 4. - C. 226-233.

There are two distinct schools of thought amongst contemporary economists regarding the interpretation of enterprises' financial potential. Specifically, the view supported by A. G. Kaigorodov, A. A. Khomyakova, T. N. Tolstykh[3], A. M. Gubernatorov, I. B. Teslenko, A. P. Sokolov, V. K. Spilnichenko, E. M. Ulanova, N. A. Sorokina[4], and N. D. Stakhno[5] posits that the essence of financial potential lies in an organisation's resource endowments. P. A. Fomin, M. K. Starovoitov[6], V. V. Shlychkova[7], I. B. Teslenko, R. A. Timofeeva and A. O. Sheremetev[8] state that financial potential is the ability of an organisation to effectively manage resources. The analysis and study of the financial potential of enterprises and the internal and external factors affecting it can be found in the works of V.O. Kuntsevich, N.A. Lvova, A.G. Kaigorodova, M.N. Dudin, S.V. Shkodinsky, M.O. Ivanov, A.I. Ageeva, M. L. Pyatov, L. A. Aguzarova, I. D. Anikina, P. V. Akinin, N. H. Tokayev, N. D. Stakhno, T. N. Tolstykh, A. V. Trofimchuk, A. A. Lachin, A. M. Gubernatorov, P. A. Fomin, A. O. Sheremetiev, T. G. Sheshukova, N. V. Kolchin, L. T. Gilyarovskaya and others. The relationship between financial potential and other potentials in the economic sphere is presented in the works of M. V. Charaeva, I. B. Teslenko, A. V. Paleeva, A. L. Kolomiets, P. N. Zakharov, D. A. Komarov, N. E. Ivanova, E. A. Vasyuchkova, R. Ch. Guliev, Z. M. Dokhoyan.

T.N. Tolstykh and E. M. Ulanova introduced a method for determining the financial potential index; however, the evaluation process is subject to expert bias. L. F. Sukhova enhanced financial potential appraisal by computing the comprehensive financial potential which augments financial strength reserves and the external volume of capital accumulation. R. Ch. Guliyev and Z. M. Dokhoyan assessed enterprises' financial potential through coefficient analysis and integral method using a developed evaluation scale. Their research showed that coefficient analysis alone does not

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[3] Tolstykh, T. N. Problems of evaluation of economic potential of an enterprise: financial potential / T. N. Tolstykh, E. M. Ulanova // Evaluation Issues. - 2004. - № 4. - C. 18-22.

[4] Sorokina, N. A. Financial potential of the organisation as an element of strategic management // Baikal Research Journal. 2011. №5. - C. 1-10.

[5] Stakhno, N. D. Financial potential as a mechanism of transformation of resources of activity of organisations of recreational complex // Scientific Bulletin: Finance, Banks, Investments. 2010. №3 (8). - C. 1-4.

[6] Starovoitov, M. K. Peculiarities of estimating the potential of industrial enterprises / M. K. Starovoitov, P. A. Fomin // Anticrisis and external management. -2006. - № 2. - C. 27-41.

[7] Shlychkov, V. V.. Content and structure of the resource potential of the company / V. V. Shlychkov, Timofeev R. A. // Economic Sciences. - 2009. - № 11 (60). - C. 118 - 122.

[8] Sheremetev, A. O. Category "economic potential" in economic analysis //Economic sciences. -2008. - №8 (45). - C. 132-136.

provide a definite indication of the financial potential level, as some indicators may demonstrate high potential and others low potential. The application of the integral method removes this drawback and enables the consideration of industry-specific details and tracking of developments. However, the use of expert judgement in indicator selection, weighting, and creating the evaluation scale introduces subjectivity. American scientist C. Titman found that the financial structure of enterprises can regulate incentive conflicts within employee-enterprise relationships by serving as a mechanism for pre-positioning or binding. As a result, internal processes are influenced. While there have been efforts to manage financial potential, empirical methods for forecasting the financial potential of enterprises are not being fully utilized.

Purpose and objectives of the research. The aim of this dissertation is to enhance the management of an enterprise's financial potential through the development of new approaches using empirical methods such as principal component analysis, nonparametric test, stepwise discriminant analysis, cluster analysis, entropy, and integrated time series model ARIMA.

The specific objectives of the study, which reflect the structure of the dissertation, have been pre-determined. Therefore, it is necessary to:

1. The objective of this study is to identify the critical factors in evaluating the financial potential of enterprises. The objective of this study is to identify the critical factors in evaluating the financial potential of enterprises. An exhaustive and unbiased analysis of the firm's financial status is essential to enhance financial management mechanisms. Thus, it is essential to carry out comparative vertical and horizontal analyses of pertinent financial information to draw meaningful insights across different enterprises.

2. Identify the aims of managing financial resources to guarantee the financial steadiness of the business and attain the highest possible value throughout all phases of its existence. The impact process comprises four stages: (1) diagnosing the principal financial indicators to ascertain the size of the company's financial potential; (2) identifying the outcomes acquired throughout the diagnosis process; (3) adapting the parameters of the company's financial potential; (4) supervising the company's financial potential.

3. To clarify the position of financial potential in relation to other potentials within the economy and define it as the primary component of economic potential in the system. Labour potential and innovation potential guarantee development, resource potential improves economic efficiency, financial potential sustains the economy, and production potential ensures quality in the structure of economic potential.

4. To define and evaluate the stages of financial potential management as a mechanism to maximise the value of the company.

5. To investigate the reasons for the dynamics and trends of world oil prices and summarise the historical process of Russian-Chinese energy cooperation. Additionally, to identify trends in energy supply and demand and analyse the financial status and development of the oil and gas industry of the Russian Federation and the People's Republic of China.

6. Develop a universal theory of financial early warning mechanisms and construct early warning models to identify and manage financial potential. This will be achieved through the analysis of vital financial indicators and adjusting parameters accordingly.

Area of research. The research is carried out within the framework of the passport of speciality 5.2.4. - Finance (economic sciences) in the areas of research: 15. Corporate finance. Financial strategy of corporations. Financial management; 17. The system of financial control in corporations: content, forms, methods and tools of realisation; 22. Financial instruments and operations with them.

The object of the research is the financial potential of industrial enterprises of LUKOIL and China National Petroleum Corporation (CNPC).

The subject of the research is a set of indicators formed in the process of improving the mechanism of enterprise financial potential management.

The methodological basis of the research is a combination of quantitative and qualitative approaches, theoretical and empirical research, methods of literature research, comparative analysis, mathematical and statistical analysis and modelling, and implementation of machine learning. Considering the desirability, completeness and accuracy of the data, financial data of CNPC were obtained from China Securities Market and Accounting Research Database (CSMAR) and financial data of LUKOIL from the financial website www.economy.ru. The data were calculated and processed using Excel and SPSS 20.0 statistical programmes. The algorithm was built based on the ARIMA model using the arima_model package in the Pycharm 2021 programme with Python IDE coding support.

The theoretical basis of the research is on the works of both Russian and foreign economists that focus on fundamental theories of financial management, investment analysis, financial planning, financial potential management, methods for calculating cash flow, early financial warning mechanisms, capital structure, and enterprise value.

The information basis of the research is represented by normative-legal acts; international, foreign and national statistical databases; materials of periodicals and the Internet; analytical and informational materials published by Russian and foreign organisations.

The following provisions are proposed for defence:

1. Financial potential is a crucial factor in determining the success of an enterprise in market conditions. The competitiveness and investment attractiveness of the enterprise depend on its financial potential. The proposal is to include in scientific literature a definition of the financial potential of an enterprise as the combination of currently acquired and potentially available financial resources for conducting economic activities, subject to existing limitations. This approach differs from existing ones by incorporating the ability to ensure sustainable development of the enterprise through improved cash flow management and optimized capital structure. This is achieved by conducting a comprehensive analysis of the current financial situation and fully utilizing financial resources, as well as minimizing activity risks through forecasting financial position indicators.

2. Introduction of the financial risk forecasting system into the mechanism for managing the financial potential of oil and gas enterprises helps to avoid the disadvantages of relying solely on financial results to assess their financial potential. Additionally, this system enables the creation of practical tools for the sustainable development of these enterprises. At the same time, this system enables the creation of practical tools for the sustainable development of oil and gas enterprises.

3. The reserves of hydrocarbon resources in China and Russia differ significantly, leading to distinct directions in the development of their oil and gas industries. Consequently, the factors that determine the financial potential of oil and gas companies in these two countries also differ.

4. Russian oil and gas companies have a higher financial potential compared to their Chinese counterparts. The oil and gas industry is a crucial backbone of the Russian economy, with abundant resources, advanced production technology, and highly skilled personnel. It plays a significant role in increasing the country's GDP and has a higher financial potential. China's primary objective in developing its oil and gas industry is to ensure national energy security. Oil and gas companies primarily engage in oil and gas refining, a process that is highly susceptible to fluctuations in raw material prices, leading to increased production costs and reduced profitability.

5. By using principal component analysis, discriminant analysis, cluster analysis, and the ARIMA algorithm, a system can be built to assess and forecast the financial potential of oil and gas enterprises in Russia and the PRC. This allows for an assessment of the real financial condition of enterprises and reduces financial risks, enabling sustainable development towards green transformation.

The scientific novelty of the dissertation research lies in the substantiation of a set of provisions aimed at improving the model of management of financial potential of the enterprise

taking into account qualitative financial indicators characterising the level of financial condition and financial security of the economic entity.

The main scientific results reflected in the author's publications, containing scientific novelty, which is important for the development of the theory and practice of financial management at enterprises in Russia and China, are as follows:

1. Taking into account the generalisation of the points of view expressed in the scientific literature, the author's definition of the financial potential of the enterprise as a set of actually attracted and possible (available taking into account the current constraints) financial resources for economic activity is formulated [9, 10];

2. The financial condition assessment index (FCI) of enterprises is developed using indicators that characterise turnover, profitability, growth ability, solvency, and financial flexibility through Principal Component Analysis. The groups of factors that have the most significant impact on the FCI were identified [11, 12];

3. The financial security assessment index (FSI) of enterprises is developed using non-parametric Mann-Whitney U test and stepwise Bayes discriminant analysis. The research demonstrates that inventory turnover and gross profit are the two key indicators that influence the FSI [13];

4. On the basis of a cluster analysis, a comprehensive scoring system (CPSS) is developed. Using the entropy method, a comprehensive index of financial potential (CIFP) was created for oil and gas enterprises. This was achieved by calculating a comprehensive score of financial potential terms such as financial stability, financial security, financing attractiveness and investment

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[9] Ding, X. Can voluntary environmental regulation based on information disclosure improve the financial performance of enterprises? - Micro evidence from China / B. I. Sokolov, X. Ding // Financial Economics. 2023. № 11., pp. 145-147.

[10] Ding, X. Empirical study of the relationship between capital structure and the competitiveness of goods on the market / X. Ding // Financial Economics. 2021. №. 10, pp. 28-32.

[11] Ding, X. An empirical study to assess the quality of financial performance of listed companies in the oil and gas industry / X. Ding, M. V. Petrovskaya // International Standards of Accounting and Auditing: practice of application in the digital economy: collection of articles of the International Scientific and Practical Conference, Moscow, 25 February 2021 / Russian University of Friendship Peoples' Friendship University of Russia. - Moscow: Peoples' Friendship University of Russia (RUDN), 2021. pp. 183-185.

[12] Ding, X., et al. (2022). The impact mechanism of environmental information disclosure on corporate sustainability performance—micro-evidence from China. Sustainability, 14(19), 12366, pp. 1–15.

[13] Ding, X. Empirical studies on the influence of financial leverage on the financing methods of listed companies in the Russian Federation / M. V. Petrovskaya, L. N. Sorokina, X. Ding // Economics and Entrepreneurship. 2020. № 12(125), pp. 1243-1245.

potential. Technical term abbreviations were explained when first used, and objective, neutral language was employed throughout the text. Grammatical correctness and common sentence structure were also ensured. To ensure precise evaluation and comparison of the financial potential of oil and gas companies, the entropy method was employed [14];

5. This method was combined with a model based on ARIMA (using ADF test), resulting in a notable enhancement in the quality of forecasting trends in the financial potential of oil and gas companies from the Russian Federation and the People's Republic of China. The algorithm is based on the ARIMA model, implemented using the arima_model package in the Pycharm 2021 program with support from the Python IDE [15, 16];

6. To achieve sustainable development of Russian Federation and PRC's oil and gas enterprises in terms of financial potential management, we recommend diagnostic assessments of the main financial indicators, optimal allocation of financial resources, and forecasting of financial risks in accordance with the objective of value maximisation throughout the enterprise's life cycle [17, 18, 19].

The theoretical significance of the dissertation is determined by the author's conclusions, which provide a methodological basis for the creation and development of mechanisms for managing the financial potential of oil companies, including: redefining the financial potential of companies; developing models for assessing the quality of financial performance and financial security of oil companies; analysing micro-factors influencing the financial potential.

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[14] Ding, X. Empirical study of assessing the financial potential of oil and gas companies / X. Ding, B. Fan // Economics. Business. Banks. 2021. №. 8(58). pp. 37-48.

[15] Ding, X. W. (2022). A Time Series-Based Statistical Approach for Trade Turnover Forecasting and Assessing: Evidence from China and Russia. The Journal of Asian Finance, Economics and Business, 9(4), pp. 83–92.

[16] Ding, X., et al., (2023). Financial Profitability Evaluation and Forecasting Using the Deep Learning: A Case of the Chinese Petroleum Industry. Montenegrin Journal of Economics, 19 (4), pp. 55–59.

[17] Ding, X., et al. (2023). Does air pollution affect corporate shareholder responsibility performance?: Analysis of regression discontinuity design based on the “Qinling-Huaihe” line. Environment, Development and Sustainability, № 04063, pp. 1–20.

[18] Ding, X. et al. (2023). Exploring the impact mechanism of executives’ environmental attention on corporate green transformation: evidence from the textual analysis of Chinese companies’ management discussion and analysis. Environmental Science and Pollution Research, 30(31), pp.76640–76650.

[19] Ding, X. et al. (2022). The impact mechanism of green credit policy on the sustainability performance of heavily polluting enterprises—based on the perspectives of Technological Innovation Level and Credit Resource Allocation. International Journal of Environmental Research and Public Health, 19, 14518, pp. 1–17.

The practical significance of the scientific research lies in the fact that oil and gas companies can use the proposed measures and recommendations in the process of financial and economic activity, seeking to optimise the allocation of resources in order to achieve maximum corporate value. At the same time, the results of financial potential forecasting serve to improve the efficiency of investment and financing and to gain a competitive advantage in the market by reducing the cost of financing sources.

Degree of validity, approval and implementation of research results. The information and statistical base of the research were the legislative and regulatory acts of the Russian Federation and the People's Republic of China on enterprises, accounting standards, data of the Ministry of Economic Development of the Russian Federation, the Ministry of Energy of the Russian Federation, the Federal State Statistics Service, the World Bank, the National Bureau of Statistics of China, financial data of the largest oil and gas companies of LUKOIL and CNPC.

Some provisions have been reported at scientific conferences: I International Scientific and Practical Forum on Social and Behavioural Sciences (Barnaul, Altai State University, 22 October 2020); International Youth Scientific and Practical Conference "Economics and Management of Innovation Space of Emerging Markets" within the I International Forum "Economics of Emerging Markets" (Moscow, Russian People's Friendship University, 18 November 2021); IX International Scientific and Practical Conference "Current Problems of Social and Behavioural Sciences" (Moscow, Russian People's Friendship University, 18 November 2021); IX International Scientific and Practical Conference "Current Problems of Social and Behavioural Sciences" (Moscow, Russian People's Friendship University, 18 November 2021).

On the subject of research 11 scientific works with the total volume of 7,77 p.l. were published, including 4 publications (1,85 p.l.) from the list of peer-reviewed scientific journals and issues of VAK of the Ministry of Education and Science of Russia, 6 works (5,81 p.l.) in the issues indexed by scientific databases Web of Science and Scopus.

The scope and structure of dissertation are predetermined by its aim and objectives. It comprises an introduction, three chapters, a conclusion, a literature list (using 227 sources in Russian and English), and 5 appendices. The thesis spans 157 pages and includes 34 tables, 23 figures, and 27 formulas.

The introduction highlights the significance of the research topic and the current state of the problem, outlines the research goals, objectives, and scope, discusses scientific novelty based on the research methodology and summarizes the theoretical and practical importance of the thesis work. Moreover, it examines the reliability, approbation, and implementation of the research outcomes.

In the first chapter titled "Theoretical and methodological approach to financial potential management of enterprises," we define the economic essence and structure of an enterprise's financial potential. Our primary focus is on guaranteeing sustainable strategic development, and thus we provide a comprehensive overview of external factors affecting the formation of financial potential and the key conditions of financial stability. The author puts forth a definition of financial potential that encompasses the appraisal and prediction of its worth. The formation and functioning process of the financial potential management mechanism in enterprises has been enhanced through six stages, which incorporate the principles of formation, financial indicators diagnostics, results determination, parameter adjustment, financial indicators monitoring, and financial trends forecasting.

The second chapter, titled "Practical bases of improvement of financial potential management mechanism of enterprises", analyses the reasons and trends behind changes in global oil prices, presents a general overview of the historical process of energy cooperation between Russia and China, and outlines the trends in energy resource supply and demand. Additionally, the financial situation and dynamics of the oil and gas industry of both the Russian Federation and the PRC are summarized.

In the third chapter titled "Analytical methods improvement of financial potential management mechanism of enterprises," the author analyses the current financial situation of oil and gas companies. To enhance the management of financial potential, the author builds an evaluation subsystem and a financial potential forecasting subsystem. Additionally, the author constructs a system of financial indicators for oil and gas companies, comprising 12 indicators across 5 categories. Three principal components were extracted for FCI development by using principal component analysis. A non-parametric test and stepwise discriminant analysis were used to develop the FSI methodology for oil and gas companies. The CPSS was developed using cluster analysis. CIFP was calculated based on financial stability, financial security, financing attractiveness and investment potential by using the entropy calculation method. An ARIMA-based model has been developed to forecast the management efficiency and financial potential of oil and gas companies.

The conclusion provides a summary of the main proposals and conclusions based on the research's findings.

The appendices present analytical materials to illustrate the research process.

CHAPTER 1. THEORETICAL AND METHODOLOGICAL APPROACH TO FINANCIAL POTENTIAL MANAGEMENT OF ENTERPRISES

1.1. Economical essence and structure of financial potential of enterprises

Despite the globalisation of the economy and the continual improvement of information technology, political, social, and environmental challenges have intensified in recent years, and competition between companies has become increasingly intense. Business managers are recognising that the management of modern companies should prioritise both external and internal development. Effective management of a company's financial resources necessitates a system that optimises the efficient utilisation of all the firm's capabilities, manages cash flows judiciously, responds promptly to external environmental changes, and achieves high economic efficiency both in the short and long run. A unique management system - financial potential management - can facilitate the growth and development of enterprises in such a manner.

A flexible and fundamental financial policy is imperative for the growth of an enterprise. A reasonable policy must dictate the appropriate allocation of financial resources. In turn, an analysis of these resources unveils the necessary financial potential for enhancing operational efficiency. Thus, the financial potential is the primary determinant of the financial policy of the organisation. This policy is centrally concerned with managing financial resources[20]. The economic development of an enterprise relies on studying the fundamental components of management, namely the purpose, sources, driving forces, and controllable factors. Utilising the enterprise's potential as a foundation is vital for its growth.

The term "potential" derives from French and Latin, where "potentialis" means "capable of being". The term "potential" is defined by The Large Russian Encyclopaedia as "a source, opportunity, means, or reserve that may be utilized to solve problems or achieve goals; or the capacities of an individual, society, or state in a specific area"[21].

Capacity can be viewed from various perspectives. Typically, the term potential refers to a range of abilities, resources and factors utilised to attain a specific objective. In the context of an organisation, potential designates a variety of opportunities enabling it to achieve economic prosperity. Thus, M. A. Parkhomchuk underscores that the achievement of any entrepreneurial

[20] Pidyashova, O. P. Financial policy of the organisation as a mechanism of financial resources management / O. P. Pidyashova, Y. F. Polyakov // Sphere of services: innovation and quality. - 2017. - №30. -p.10

[21] Nemchinov, A. A. To the issue of researching the essence of the financial potential of an enterprise / A.A. Nemchinov // Financial Studies. - 2016. - №3(52). - p.157-165.

endeavour hinges on the prudent selection of a viable enterprise potential management strategy, which is an indispensable component of business management[22].

A. V. Sokolov posits that the potential of an enterprise denotes the capabilities of an economic entity in a particular region. This potential is characterised by distinct features, of which the following are noteworthy[23].

- Enterprise potential is temporally dynamic, varying from one period to the next;
- It represents a collective set of resources that are utilized in specific situations;
- The financial results reflecting the realization of an enterprise's potential can be seen when set objectives are achieved;
- An enterprise's financial potential must be realized and expanded to ensure its continued development.

Although the term "potential" is interpreted differently among academic economists depending on their specific research area, they generally agree on its definition. According to Sokolov A. V., it can be concluded that the potential is a combination of temporal and spatial characteristics when viewed through a temporal approach. Three temporal forms of potential are outlined in this textbook as follows: basic potential (accumulated), current potential (at present), and future potential (strategic)[24].

It is worth noting that the present economic potential demonstrates an inclination for rise or fall, whereas the strategic potential indicates only limited growth. After analysing the definition of "potential," it can be concluded that the concepts of "potential" and "resource" should not be dichotomised. After analysing the definition of "potential," it can be concluded that the concepts of "potential" and "resource" should not be dichotomised. Any capacity is a comprehensive and communal feature of resources relevant to a given context and time. When evaluating capacity as a resource collection, it is necessary to characterise the qualitative and quantitative values of the individual resource types, without considering or measuring their mutual influence. In the case of a

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[22] Parkhomchuk, M. A. Management of Enterprise Potential / M. A. Parkhomchuk // Vestnik of Kursk State Agricultural Academy. - 2008. - №1.

[23] Sokolov A. V. Sokolov. V. Methodical approaches to assessing the use of enterprise potential / A. V. Sokolov, E. V. Kucherova, I. P. Povarich // Scientific Proceedings of the VIII International Scientific and Practical Conference "Fundamental and Applied Problems of Instrumentation, Informatics and Economics. Economics and Management" - Part 2. - Moscow - 2013. - p. 35.

[24] Romanov, A. P. Managing the economic potential of an organisation: a textbook / A. P. Romanov, G. G. Serebrennikov, V. M. Bezuglaya, O. V. Kirillina, M. K. Charykova // Tambov: Izd-vo FGBOU VPO "TSTU". - 2012. - p. 88.

resource system, the characteristics of each individual component should be complemented by indicators describing the system's entirety. In line with the resource approach, the performance approach and the target approach, evaluating potential of an enterprise can be simplified to assessing whether it can sustain its operations and attain its objectives by using available resource systems[25]. The study of potential in modern economics begins with economic potential. Economic potential is interdependent with other potentials, culminating in a system of potentials.

In Russia, the inception of the term "economic potential" occurred in 1954 through the work of academician S. G. Strumilin[26]. He defined the economic potential as the aggregate productive force of the labour of all members of society possessing labour capability. Since that time, various domestic economists have examined the definition of economic potential from varied perspectives, putting forward differing opinions. The term economic potential refers to the capability to maintain effective operation of the enterprise in the long run and attain strategic purposes through the utilization of available resources. According to his viewpoint, economic potential should alter based on the modification of the enterprise's goals while maintaining long-term characteristics.

R. A. Belousov[27] examined economic potential in the context of regional studies, defining it as a range of opportunities for organizing financial and economic activity of companies. He also identified territorial, branch, legislative, organizational, technical, and financial limitations based on actual or prospective conditions. First used technical terms are fully explained. According to L. N. Chaynikova[28], the economic potential of an enterprise encompasses its personnel, primary and circulating capital, and its level is contingent upon the enterprise's capacity to effectively utilize its resources.

Through an extensive review of academic literature on the definition of economic potential, economists A. Todoysechuk, B. Plyshevsky, Y. Lychkin and E. P. Gorbunov have expressed differing perspectives on macro and micro levels. We can identify four different approaches to defining and comprehending the fundamental basis of the concept of "economic potential"[29].

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[25] Petrovskaya, M. V. Empirical studies on the influence of financial leverage on the financing methods of listed companies in the Russian Federation / M. V. Petrovskaya, L. N. Sorokina, S. Din // Economics and Entrepreneurship. - 2020. - № 12(125). - p. 1243-1249.

[26] Strumilin, S. G. To the question of measuring the national welfare / S. G. Strumilin // Voprosy statistiki. - 1954. - №5. -p.12-28.

[27] Belousov, R. A. Growth of Economic Potential / R. A. Belousov. - M.: Ekonomika, - 1971.

[28] Chaynikova L. N. Competitiveness of the enterprise: textbook / L. N. Chaynikova, V. N. Chaynikov. - Tambov: Izdvo Tambov. State Technological University, 2007.

[29] Karapeychik, I. N. The concept of potential in economics: problems and directions of research / I. N. Karapeychik // Problems of modern economics (Novosibirsk). - 2011. - №.5. - p.9-20.

- The various components of economic potential include investment potential, production potential, human potential, and natural resource potential.
- Economic potential is defined as the entire capacity of all sectors within the nation's economy, whilst the term "economic power" refers to the ability to exercise influence within both local and global economic contexts. This latter term should be differentiated from "national economic potential".
- In order to ensure precision when discussing these concepts, it is crucial to make a clear distinction between the terms "economic potential", "economic power", and "national economic potential".
- The effective realization of economic, financial, and production relations between counterparties has the potential to drive economic growth.

M. A. Parkhomchuk argues that an enterprise's economic potential comprises of a range of resources, such as labour, materials, non-material assets, finance, energy and other resources that are available to it. Additionally, the potential rests on the ability of the employees to utilize these resources effectively while creating goods and services with the aim of obtaining maximum income. The economic potential of the enterprise is determined by four primary characteristics[30]:

- The economic potential of an enterprise is determined by its actual capabilities in a particular economic sphere.
- The capabilities of any enterprise primarily depend on its available economic and social resources and reserves that do not participate in the production process.
- Possessing resources is essential but inadequate for success in a business. The management of available resources is also crucial, standing as the principal task in any enterprise.

Thus, the economic potential of a business encompasses a range of resources, investment opportunities and innovative measures, which ultimately lead to the generation of financial assets.

Although the categories of economic potential have been extensively studied, financial potential remains an area of insufficient research.

In the mid-1970s, the scientific community began using the term "financial potential" to refer to this area. The first known mention of this term was in A. M. Volkov's publication "Prospective Planning of Financial Resources". He viewed financial potential in a limited manner by narrowing the financial aspect down to the management of corporate taxation and using "financial potential"

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[30] Parkhomchuk, M.A. Managing the potential of the enterprise/A.M. Parkhomchuk//Vestnik of Kursk State Agricultural Academy. -2008. - №1.

as an equivalent for "tax potential". This approach is typical of countries with well-established fiscal federalism such as Canada, USA, and Switzerland.

Currently, financial potential acts as the most crucial gauge for determining the rate of economic growth of a nation, industry, or enterprise, at this stage of economic thought. The expansion of monetary resources suggests that the pursued strategy is appropriate, bolstering the competitiveness of individual firms and the nation as a whole. This is due to the fact that improved efficiency in a company's operations and greater cash inflow lead to heightened competitiveness. Thus, greater cash flow results in increased tax revenue for both federal and regional budgets[31].

The research of P. A. Fomin, M. G. Lapusta, A. M. Kovaleva, P. V. Egorov, N. S. Krasnokutskaya, M. K. Starovoitov, O. S. Fedonin, I. M. Repin, A. E. Voronkov, A. I. Ageev, S. G. Kudeshov, B. V. Kuroedov, O. V. Nemkov, A. V. Trofimchuk, et al. is focused on investigating the financial potential of enterprises. According to several authors including A. I. Ageev, S. G. Kudeshov, B. V. Kuroedov, O. V. Nemkova, and A. V. Trofimchuk, the financial potential of an enterprise is dependent on its ability to competently emit money capital[32]. Effective management of capital is crucial for financial potential. These economists analyse financial stability and its reliance on external resource mobilisation, the presence of robust accounting standards, efficient management of investment resources, and other relevant factors.

E. B. Verkhovtseva and V. V. Grebenik believe that proper management of financial potential in the system of enterprise value management will allow to form the necessary ratio of equity and debt capital, which ultimately contributes to maximising the value of the enterprise[33].

According to A. M. Kovaleva and M. G. Lapusta[34]. According to the definition of "financial potential", the financial potential should provide a stable payment system, which will allow the enterprise to be fully provided with its own working capital and to use it effectively in the process of economic activity, as well as a clear organisation of settlement operations and a stable financial

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[31] Lebedenko, E. A. Research of the essence of the financial potential of the enterprise and its elements / E. A. Lebedenko, E. A. Kolesnikova // Enterprise strategy in the context of improving its competitiveness. - 2018. - № 7. - p. 164-168.

[32] Ageev, A. I. Strategic matrix of the company: managing risks / A. I. Ageev, S. G. Kudeshova, B. V. Kuroedov, O. V. Nemkova, A. V. Trofimchuk // Economic Strategies. - 2008. - № 8(66). - p.62-75

[33] Verkhovtseva, E. A. Management of capital structure as a way to manage the value of the enterprise / E. V. Verkhovtseva, V. V. Grebenik // Internet journal "Naukovedenie". - 2016. - T. 8. - № 1.

[34] Finance of the firm: Textbook / A. M. Kovaleva, M. G. Lapusta, L. G. Skamai; State University of Management. - 4-e edition, revised and supplemented - Moscow: INFRA-M. - 2005. - 522 p

base in terms of providing the necessary sources of financing. The "financial potential" is defined as follows (Tab. 1).

Table 1 – The concept of "financial potential" proposed by various scholars

Author	Concept
Kankia, A.G.[35]	Financial potential refers to the capacity of an economic entity's available resources to generate income over a specific timeframe.
Stakhno, N. D.[36]	It encompasses all the financial resources utilized in production and economic activities, as well as those that could be obtained in the future to fund the enterprise's current and strategic undertakings.
Kuntsevich, V.O.[37]	The financial potential of enterprise development refers to the financial resources within an enterprise's disposal, including the possibility of acquiring additional resources through various sources and effectively managing them to fulfil both tactical and strategic objectives.
Kaigorodov, A. G.; Khomyakova, A. A.[38]	The maximum possible value of resources that can be acquired by the enterprise within a particular organizational structure defines the financial potential.
Korytko, T. U., Emelyanenko I. S., Shevchuk E.V.[39]	Financial potential is a crucial strategic tool for fostering sustainable enterprise development. The current legislative framework, which forms the basis of financial resource structures, does not, in fact, impact their production efficacy over the medium and long term. As such, it fails to enable an assessment of the opportunities for leveraging financial potential.
Joseph, O., Wilberforce, O. A., Kwame, O. D. and Emmanuel, K. A. [40]	Financial capacity is the interplay between an enterprise's resources and its sustainable development indicators. The availability of an organisation's resources for financial capability hinges on the amount of attention its decision-makers pay to accessing those resources.

[35] Kankia, A. G. Financial potential of business activity / A.G. Kankia // Economics and Management of Innovative Technologies - 2013 - №3.

[36] Stakhno, N. D. Financial potential as a mechanism of transformation of resources of activity of organisations of recreational complex / N. D. Stakhno // Scientific bulletin: finance, banks, investments. - 2010. - №3 (8).

[37] Kuntsevich, V. O. The concept of financial potential of the development of the enterprise's development and its evaluation / V. O. Kuntsevich // Actual problems of economics. - 2004. - №7 (37). - p. 123-130

[38] Kaigorodov, A. G. Financial potential as a criterion of expediency of financial rehabilitation of the enterprise / A. G. Kaigorodov, A. A. Khomyakova // Audit and financial analysis. - 2007. - № 4. - p. 226-233

[39] Korytko, T.U., Emelyanenko, I.S., Shevchuk E.V. Mechanism of management of financial potential of the enterprise // Scientific result. Economic research. - 2022. - T 9. - № 2. - p. 116-124.

[40] Joseph, O., Wilberforce, O. A., Kwame, O. D., & Emmanuel, K. A. (2021). Impact of financial resource building effort on financial resource availability among small and medium enterprises, Cogent Business & Management, 8:1, 1920676.

Continued table 1

Author	Concept
Ralf, W. and Agnieszka, K.[41]	Financial capability comprises a range of factors that contribute to the creation of long-term value within enterprises. It aids in the determination of suitable strategies to achieve enterprise development goals and promote sustainable growth.

Source: compiled by the author.

Analysing the findings from the aforementioned definitions, two perspectives can be identified in interpreting the financial capability of a firm:

- Some economists subscribe to the notion that an organization's financial potential is fundamentally linked to its resource endowment. This perspective is supported by experts like A. G. Kaigorodov and A. A. Khomyakova[42], Tolstykh, T. N. and Ulanova E. M.[43], Sorokina, N. A.[44], and Stakhno, N. D.[45].
- Some scholars argue that an organisation's financial potential lies in its capacity to effectively manage resources to attain optimal outcomes. This view is supported by Starovoitov M. K. and Fomin P. A.[46], as well as Shlychkov, V. V. and Timofeev, R. A.[47], and Sheremetyev, A. O.[48].

In line with the aforementioned approaches, Nemchinov, A. A.[49] partitions financial potential into two components: objective financial potential and subjective financial potential. Appropriate

[41] Ralf, W., & Agnieszka, K. (2023). Between Involvement and Profit: Value Captured by a Born-Social Start-Up. Journal of Social Entrepreneurship, 1-26.

[42] Kaigorodov, A. G. Financial potential as a criterion of expediency of financial rehabilitation of the enterprise / A. G. Kaigorodov, A. A. Khomyakova // Audit and financial analysis. - 2007. - № 4. - p. 226-233

[43] Tolstykh, T. N. Problems of estimating the economic potential of an enterprise: financial potential / T. N. Tolstykh, E. M. Ulanova // Valuation Issues. - 2004. - № 4. - p. 18-22.

[44] Sorokina, N. A. Financial potential of the organisation as an element of strategic management / N. A. Sorokina // Baikal Research Journal. - 2011. - №5.

[45] Stakhno, N. D. Financial potential as a mechanism of transformation of resources of activity of organisations of recreational complex // Scientific Bulletin: Finance, Banks, Investments. - 2010. - №3 (8). - p. 43-46.

[46] Starovoitov, M. K. Features of assessing the potential of industrial enterprises / M. K. Starovoitov, P. A. Fomin // Anticrisis and external management. -2006. - № 2. - p. 27-41.

[47] Shlychkov, V. V. The content and structure of the resource potential of the company / V. V. Shlychkov, R. A. Timofeev // Economic Sciences. - 2009. - № 11 (60). - p. 118 - 122.

[48] Sheremetyev, A. O. The category "economic potential" in the economic analysis / A. O. Sheremetyev // Economic Sciences. - 2008. - №8 (45). - p. 132-136.

[49] Nemchinov, A. A. A. To the issue of researching the essence of the financial potential of an enterprise / A. A. Nemchinov // Financial Studies. - 2016. - № 3(52). - p. 157-165.

financial instruments facilitate the efficient use of financial resources, while the subjective evaluation of Objective financial potential is defined as the effective utilisation of financial resources by company managers to attain optimal efficiency.

Although a regulatory and legal framework exists for the reliable analysis of the financial potential of enterprises, and numerous works in modern economic literature investigate this topic, the concept of financial potential lacks a clear explanation, and a standard approach to defining its essence is still absent. E. A. Lebedenko defines and evaluates the essence of financial potential through the constituent elements presented in Figure 1.

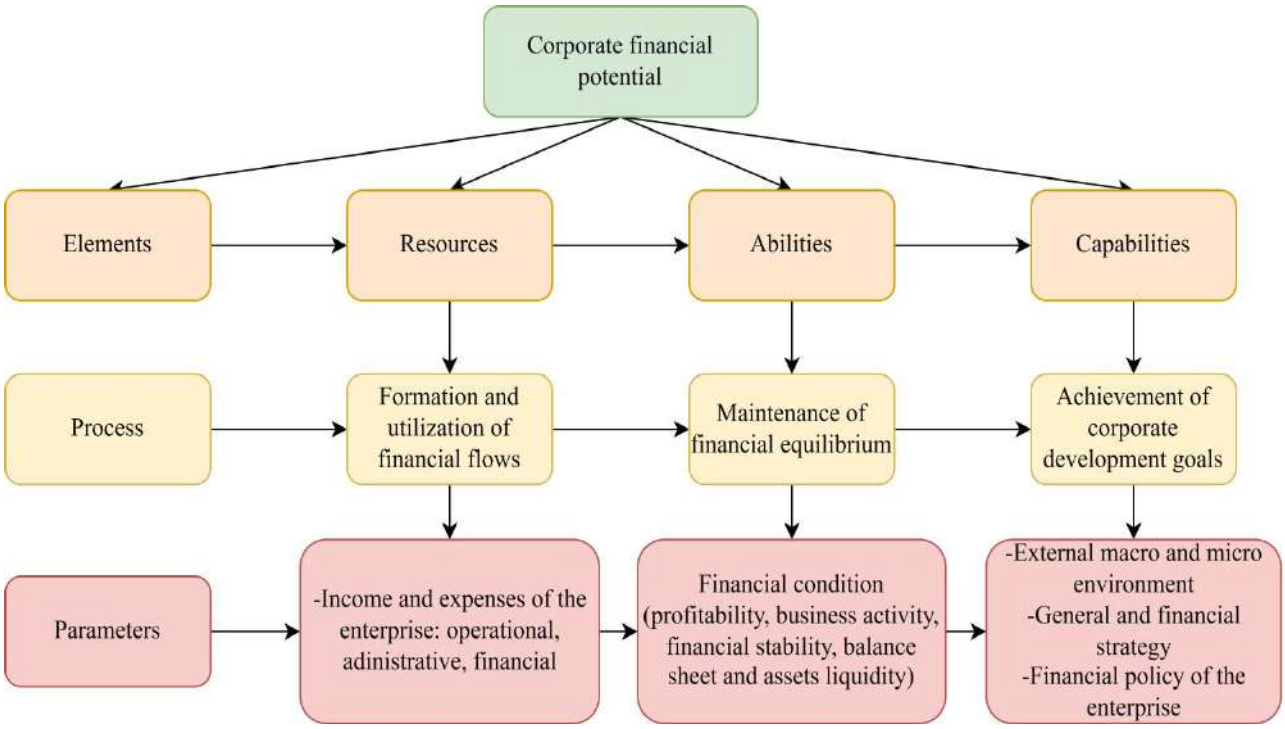

Figure 1 – Components of the financial potential of an enterprise

Source: compiled by the author based on data from Lebedenko E.A.

As an analysis of Figure 1 shows, the proposed system of elements of financial potential lays the foundation for a business management system aimed at optimizing financial flows, maintaining financial balance at the stages of its life cycle and achieving the goal of enterprise development - maximizing the interests of the owners of the enterprise in the current and future periods.

Despite the fact that the fundamental definition of financial potential has not yet been precisely fixed, what is common in the views of economists on the definition of financial potential is that they relate to the various types of resources available to the enterprise, to the conditions of the internal and external environment, which allow the enterprise to realize its potential and the ability of resources to satisfy certain needs.

Russian economists, specializing in the financial aspects of business organisations, Belolipetsky V.G.[50], Likhacheva O.N.[51], Lapusta M.G., and Skamai L.G.[52] posit that financial resources commonly refer to the money, including revenues and external incomes, available to an enterprise to fulfil obligations, cover costs, and facilitate the growth of production.

Romanov A.P. et al. in their works note that the investment attractiveness and creditworthiness of a business can be identified as the main components of its financial potential. Therefore, the essence of financial resources is analyzed from the point of view of their sources and the structure of financial resources. The results are shown in Figure 2.

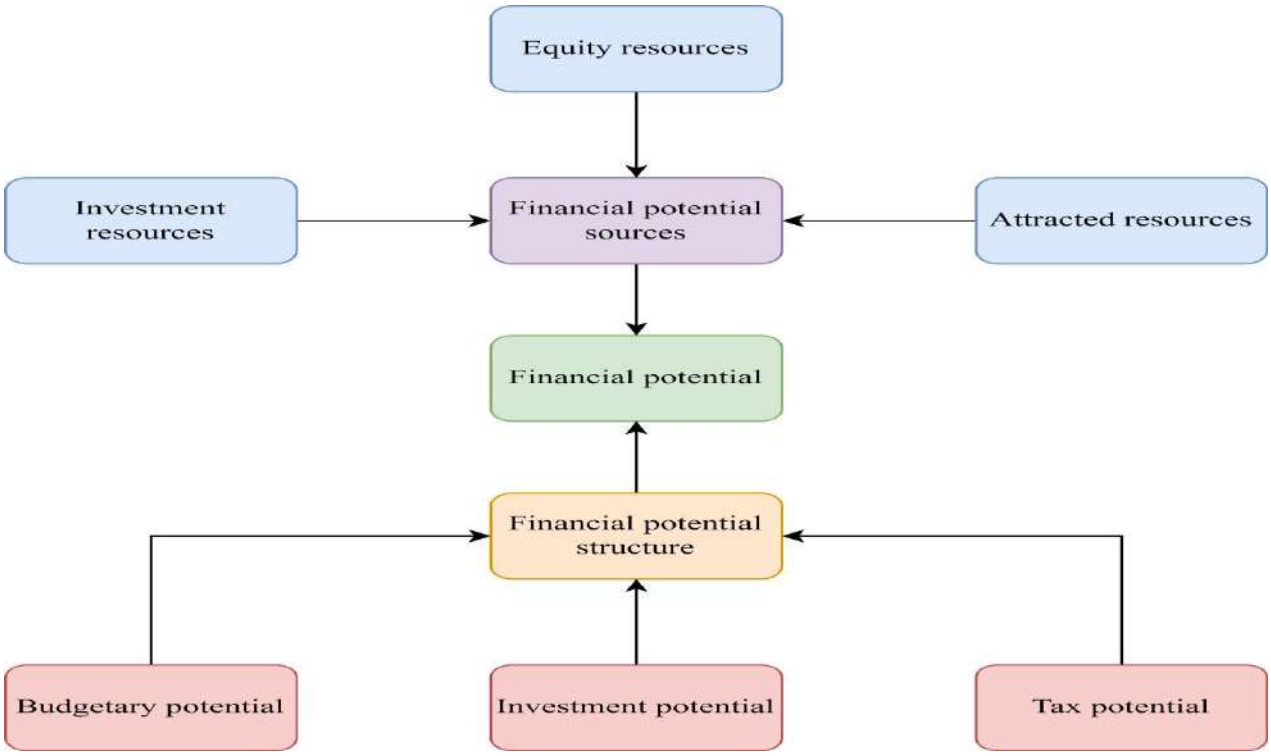

Figure 2 – Sources and structure of financial potential.

Source: compiled by the author.

As follows from Figure 2, sources of financial potential are divided into three main parts: (1) own resources; (2) resources invested; and (3) resources attracted. As a result, financial potential appears as the company's ability to receive real or potential cash income: investments, investment income, borrowed funds, and so on[53].

[50] Belolipetsky V.G. Finance of the firm: Course of lectures / Edited by I.P. Merzlyakov. M.: INFRA-M, 1999. p. 364.

[51] Likhacheva O.N. Financial planning at the enterprise: Study guide. Moscow: TK Velby, 2003. p. 44.

[52] Lapusta M.G., Skamai L.G. Finance of the firm: Study guide. MOSCOW: INFRA-M, 2002. p. 15.

[53] Zakharov, P. N. Digital transformation of managing the process of state financial control / P. N. Zakharov, D. A. Komarov // New challenges of digitalization in the strategic development of regions: materials of the III All-Russian

According to Rodionova V. M.[54], financial potential consists of a set of financial resources that an enterprise is able to fully manage. In terms of objective financial capacity, these resources include financial obligations and necessary financial fees and expenses:

- Financial obligations that companies have to the state, government and government agencies. For example, obligations to pay personal income tax to tax authorities, repay principal and interest on loans, pay wages and social benefits to employees of the enterprise[55];
- A number of necessary costs that ensure the production and operational activities of the enterprise. For example, production costs, management costs, agency costs, labor costs and so on.

From the point of view of subjective financial potential, the financial potential of an enterprise is a set of financial relations that arise in the process of maximizing the value of the enterprise under the following conditions[56]:

- Availability of own funds to pay off debt and ensure the financial stability of the enterprise;
- Effective investment attractiveness and high profitability from the investment project;
- Availability of an effective financial management system to monitor the financial condition of the enterprise and implement financial proposals.

According to Ivanov V. V. and Tsytovich N. N.[57], financial resources can be categorized based on their sources of formation. These include income from entrepreneurial activities and revenue not directly associated with business operations. Financial resources can also be distinguished based on their legal status as either own or borrowed. The company has full discretion over its own funds, whilst borrowed funds are repayable and subject to the limits set by external providers. Internal funding sources consist of accumulated profits, reserve funds, depreciation and amortisation charges, funds generated by changes to the company structure, and purpose-specific funds. External financing sources comprise bank loans, external investments (equity, revenue from the sale of shares, and other external investments), and debts owed to suppliers. It is worth noting that in the course of financial and economic activity, irrespective of the source of financial resources, a part of

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scientific and practical conference with international participation, Vladimir, November 30, 2022. – Vladimir: Vladimir State University named after Alexander Grigorievich and Nikolai Grigorievich Stoletov, 2023. – p. 117-121.

[54] Rodionova, V.M. Finance / V.M. Rodionova. – M.: Finance and Statistics, 1995. – 115 p.

[55] Ding, X. Comparative analysis of the tax policy of small and medium-sized enterprises in the Russian Federation and the People's Republic of China / X. Ding // Russian Economic Bulletin. – 2020. – T. 3. – №. 1. – p. 14-18.

[56] Kucher, A. G. Institutional environment of the management system of social sector organizations in the region / A. G. Kucher, P N. Zakharov // Bulletin of the Vladimir State University named after Alexander Grigorievich and Nikolai Grigorievich Stoletov. Series: Economic Sciences. – 2022. – №. 3(33). – p. 46-54.

[57] Ivanov V. V., Tsytovich N. N. Corporate financial planning / V. V. Ivanov, N. N. Tsytovich. V. V. Ivanov, N. N. Tsytovich. - SPb. BAN; Nestor-Istoria, 2009. - 332 p.

financial resources is transformed into investments, a part in the form of highly liquid assets, and a part for consumption. Investments result in the formation of property of the enterprise.

The essence of financial potential is that it is related to the overall potential and development strategy of the company. Therefore, according to the characteristics of capacity, the relationship between financial capacity and other capacities can be studied from the perspective of a process and performance approach.

For business development, resources are divided into internal and external, so economic potential can also be divided into internal economic potential and external economic potential. Financial potential, being an element of internal economic potential, can be analyzed from the point of view of the structure of economic potential as follows (Fig. 3).

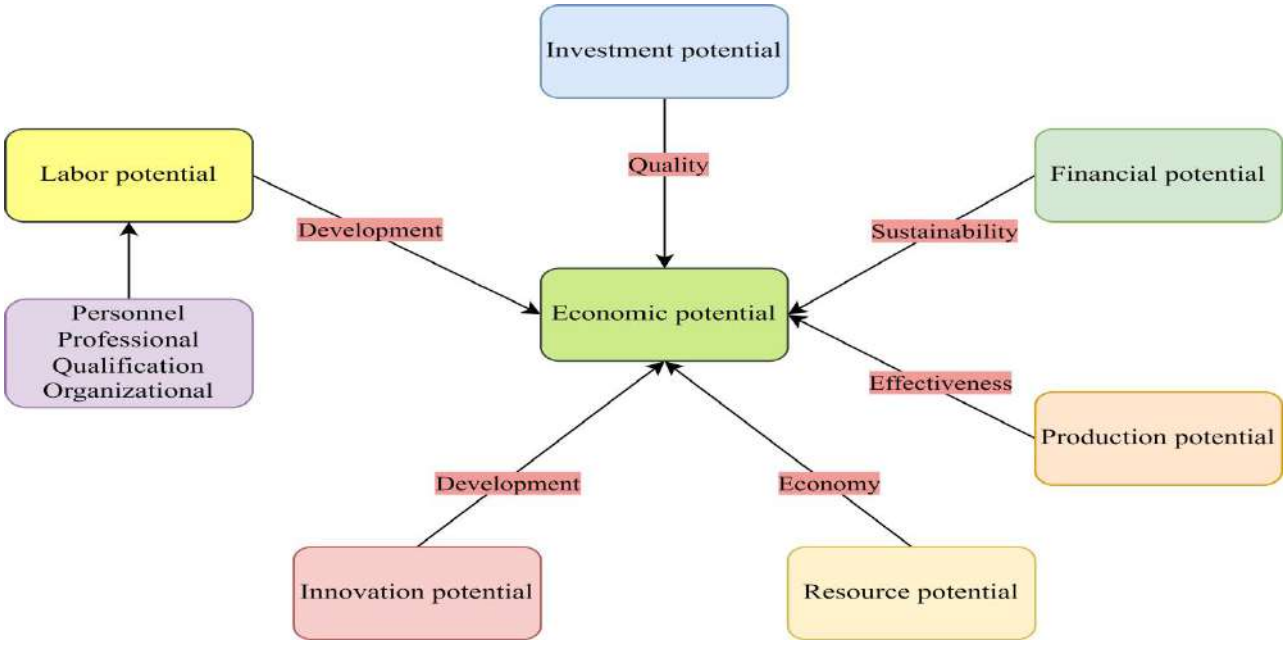

Figure 3 – Components of the economic potential of an enterprise.

Source: compiled by the author.

In Figure 3 only “internal” types of potentials are considered that relate to a certain enterprise and are considered within the framework of this enterprise, i.e. at the micro level[58]. The structure does not include “external” types of potentials that exist at the macro level, i.e. at the level of industry, region, country. Of course, if we consider the “external” types of potentials on the part of the enterprise, then this is also a set of production factors that allow the company to effectively enter foreign markets. Thus, financial potential is a structural component of economic potential along with other types of potentials. Therefore, the opinion is expressed that economic potential is

[58] Filipishina, L. M. Features of assessing the production potential of industrial enterprises / L. M. Filipishina, I. A. Zhuvagina // Bulletin of economic science. – 2016. – №. 1(30). – p. 146-149

divided into two types according to areas of application: in the production sector and in the service sector[59]. From the company's point of view, financial potential refers to internal types of potential in the service sector. In addition, the structure of economic potential shows what exactly each element is responsible for: labor potential and innovation potential ensure development, resource potential contributes to economic efficiency, financial potential is responsible for sustainability, production potential is responsible for quality, etc[60].

It is very important to study the role of financial potential in economic potential from the point of view of process and result approaches. To operate effectively, companies need to identify and manage multiple interconnected and interacting processes.

According to the international standard, the process approach is used to improve the performance of the organization. According to V.F. Protasov and A.V. Protasova, the economic potential of an enterprise is characterized by the following components of the internal and external environment: human resources, means of production, financial resources, information. The author sees innovation in the combination of process and results approaches to building the structure of the economic potential of an enterprise. The scheme of the process and result approach is presented as follows (Fig. 4).

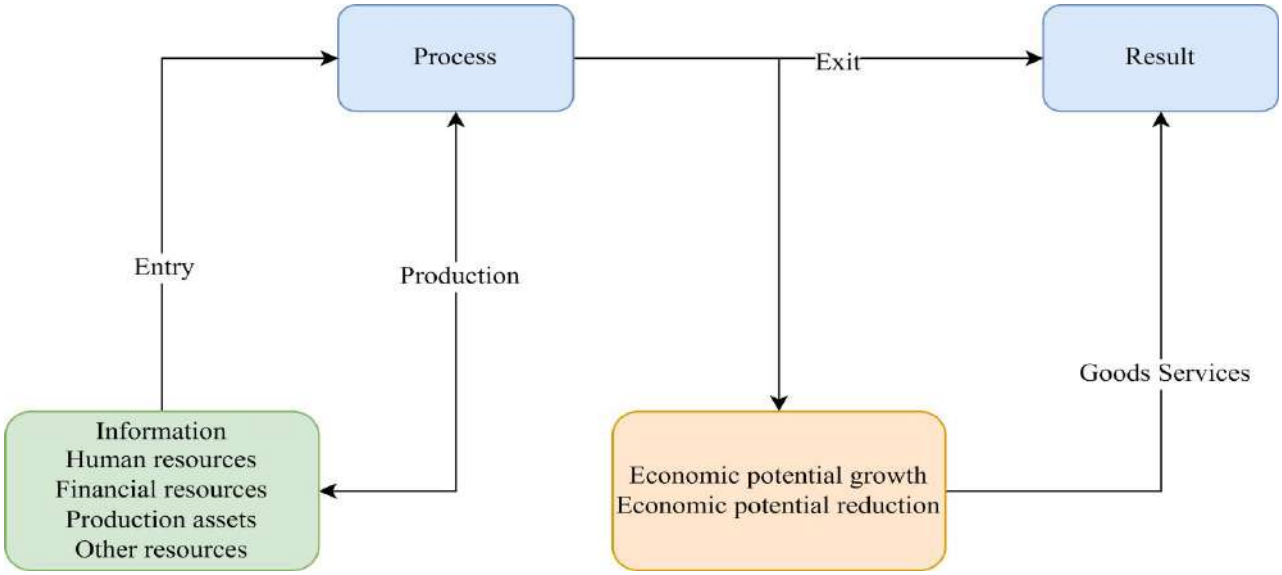

Figure 4 – Process and results-based approach to assessing economic potential

Source: compiled by the author.

[59] Protasov, V. F. Analysis of the activities of an enterprise (firm), production, economics, finance, investment, marketing, personnel assessment: textbook . allowance / V. F. Protasov, A. V. Protasova. – 2nd ed., revised. and additional – M.: Finance and Statistics, 2005. – 522 p.

[60] Ding, X. Empirical study of assessing the financial potential of oil and gas companies / X. Ding, B. Fan // Economics. Business. Banks. – 2021. – №. 8(58). – p. 37-56.

As shown in Figure 4, the role of financial capacity in economic capacity is analyzed from the perspective of the entire process of input, production and output. If a company does not have sufficient financial reserves at the input and production levels, it needs to create them. This relates to the fundamental issue of sustainability of enterprise development. The potentials are interconnected and together form a single system of economic potentials. To evaluate each potential individually, it is necessary to take into account some of the synergistic effects that result from the influence of other potentials. When analyzing the entire process of entry, production and exit, it is necessary to take into account not only financial resources, but also financial accumulated reserves. Based on the study of the above studies, we can conclude that financial potential refers to the internal types of potential in the service sector and is the main component of economic potential.

1.2. Characteristics of factors and conditions of financial potential formation

Financial potential is of great importance for ensuring sustainable strategic development of enterprises. Business development requires financing through various channels, so the company is inextricably linked with other stakeholders. Investors are increasingly directing their funds to listed companies, so the financial strength of companies is becoming a key factor for investors. With the development of a market economy, available political, economic and social resources, information technology, tax system, internal capital structure of an enterprise, debt level, cost of capital, government financial support, financial profitability, financial risk and other factors all influence the development of the financial potential of an enterprise.

When analyzing the role of financial potential in economic potential, it is noted that it is responsible for the sustainability of the enterprise. Therefore, the goal of managing financial potential is to ensure the financial stability of the enterprise to achieve maximization of its value at all stages of its life cycle. In achieving its goals, it inevitably encounters different environments. Factors influencing the formation of a company's financial potential are divided into internal and external. Specific factors influencing the financial potential are as follows[61]:

- External factors (economic, political, social and cultural): quality of information support; availability of accessible and cheap resources; level of education of employees; natural conditions; inflation; tax policy; investment climate of the region;

[61] Tolstykh, T. N. Problems of assessing the economic potential of an enterprise: financial potential / T. N. Tolstykh, E. M. Ulanova // Questions of assessment. – 2004. – №. 4. – p. 18-22.

- Internal factors: state of the enterprise's capital structure; quality of management of existing assets; taxation system and tax benefits; the level of receivables and payables of the enterprise; level of financial stability of the enterprise; government financial support; the level of financial reserves of the enterprise; level of early warning of financial risks; quality of management decisions; ability to develop and implement new directions for innovative development of the enterprise.

Financial potential has a dual characteristic - a financial resource and financial relations. From the point of view of financial market participants, external factors influencing financial potential include financial relationships between financial participants and the external available resources of the enterprise. Therefore, external factors influencing the financial potential of an enterprise can be defined as financial infrastructure at the macro level[62].

The quality of information support is a technical factor that affects the realization of the financial potential of an enterprise. As a result, the key financial technologies are: data analysis and Big Data, artificial intelligence, mobile technologies, cloud technologies, robotization, distribution registries, biometrics, etc.

In the context of the rapid pace of technological change, financial regulators have greater flexibility, and the development of the digital economy provides the technology for the formation of digital financial systems for companies[63]. Financial market participants include: banks, non-credit financial organizations (NFIs), fintech companies, legal entities, individuals. Modern digital financial infrastructure consists of the following elements[64]: platform for remote identification; fast payments platform; marketplace platform for financial services and products; platform for registering financial transactions; promising payment system of the Bank of Russia; national payment card system; financial information transmission system; end-to-end client ID; platform for cloud services; platform based on distributed ledger technology.

The state's tax policy directly affects the tax potential of an enterprise, and tax potential is the main component of financial potential. Increasing tax rates will inevitably lead to a decrease in economic income and an increase in the financial burden of enterprises, thereby limiting the realization of their financial potential. Investors' investment confidence depends on the investment

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[62] Khisamova, A. I. Modern conditions for the development of the financial potential of enterprises / A. I. Khisamova // Economics and business: theory and practice. – 2020. – №. 12-3(70). – p. 173-175

[63] Main directions for the development of the financial market of the Russian Federation for the period 2019-2021. URL: https://cbr.ru/content/document/file/71220/main_directions.pdf

[64] Main directions of development of financial technologies for the period 2018-2020. - [Electronic resource]. – Access mode: https://www.garant.ru/products/ipo/prime/doc/71773130/

environment. Government institutions must continue to optimize the investment environment in order to improve the investment attractiveness of enterprises.

Internal factors influencing the financial potential of an enterprise can be defined as financial relations and financial resources at the micro level. Among them, the most important internal factors affecting the financial potential of a company are the capital structure and the cost of capital of the enterprise.

Operating a business project requires a large amount of capital. An important question facing managers is how to raise the necessary capital at the lowest cost. The economic justification for the effectiveness of an investment project includes determining the method of financing the project and the cost of using sources of financing[65]. Sources of financing for real investments represent funds used as investment resources. In general, they are divided into internal (equity capital) and external (attracted and borrowed capital)[66].

There are several types of debt capital, including bank loans, various types of bonds issued by the government or companies. In practice, the after-tax cost of debt capital is usually calculated. In Russian practice, bank loans are typically considered more urgent liabilities than accounts payable, in contrast to international practice[67]. The bank rate of the Central Bank of the Russian Federation was adopted as a monetary policy instrument in September 2013. It is established in order to influence the level of interest rates operating in the country's economy. In October 2023, the Central Bank of the Russian Federation decided to increase the key rate by 200 bp, to 15.00% per annum[68].

A preferred share is a share with a specified dividend payout ratio. Once debt financing is eliminated, companies can raise funds through equity and by issuing new shares. There are two main models for estimating the value of equity capital: the dividend discount model and the return on capital asset model. There have been many different comments and criticisms regarding the practical relevance of the dividend discount model and its accuracy for estimating the value of equity capital. Because the dividend discount model assumes that a company pays dividends to

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[65] Tronin, S. A. Methods of financing investment projects / S. A. Tronin, E. S. Petrova // Search (Volgograd). – 2018. – №. 1(8). – p. 156-159

[66] Yuzvovich L.I. Investments: textbook for universities / ed. L. I. Yuzvovich, S. A. Degtyareva, E. G. Knyazevoy. – Ekaterinburg: Ural Publishing House. Univ., 2016. – 543 p.

[67] Ivanov V. V., Tsytovich N. N. Corporate financial planning / V. V. Ivanov, N. N. Tsytovich. V. V. Ivanov, N. N. Tsytovich. - SPb. BAN; Nestor-Istoria, 2009. - 332 p.

[68] The Bank of Russia decided to increase the key rate by 200 bp, to 15.00% per annum [Electronic resource]. – Access mode: URL: https://www.cbr.ru/press/keypr/

shareholders every period and that dividends grow at a constant rate from period to period, the assumed models do not correspond to the real situation.

Despite some existing problems, the return on capital asset model (CAPM model) is by far the most theoretically justified and widely used in practice. The capital asset return model is a capital asset pricing model based on the relationship between asset return and risk. The model was developed in the 1950s. American economist H. Markowitz and improved by W. F. Sharpe in 1964, for which they received the Nobel Prize in Economics. This model is often called the Sharpe model[69]. Sources of capital for enterprise investment projects include liabilities and equity, so the cost of capital for enterprise investment projects is defined as the weighted average cost of capital (WACC)[70].

The sustainable solvency of an enterprise depends on the liquidity of assets and profitability and is closely related to the capital structure[71]. In the practice of financial management, the capital structure policy includes the level of debt and solvency of the enterprise. In terms of the degree of debt, capital structure includes the ratio between total liabilities and equity, the ratio between long-term and current liabilities and equity, and the ratio between current and long-term liabilities. In terms of solvency, it is the ratio between income and consumer debt, net cash from operating activities and debt owed, interest owed and consumer debt, and total cash and consumer debt. There is a lot of debate among economists regarding the theory of capital structure, from which two key points can be distinguished:

- Relationship between debt ratios and enterprise value;
- Determination of the optimal debt ratio of the enterprise.

Currently, capital structure models are divided into static and dynamic. Through research and analysis, methods are identified that clarify the validity of the optimal capital structure. Static models prove the existence of an optimal capital structure and are the most popular in world practice, including traditional theories, MM theory, Miller model, equilibrium theory, etc. The famous American financier D. Durand summarized three different theories of capital structure[72].

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[69] Rustamzade, M. N. Modeling the cost of equity capital (CAPM model) / M. N. Rustamzade // NAUKA-RASTUDENT.RU. – 2017. – №. 2. – p. 3-12

[70] Graham, J. R. A review of empirical capital structure research and directions for the future. / J. R. Graham, M. T. Leary // Annu. Rev. Finance Econ. – 2011. – Vol. 3(1). – p.309-345.

[71] Ding, X. Empirical study of the relationship between capital structure and the competitiveness of goods on the market / X. Ding // Financial Economics. – 2021. – №. 10. – p. 28-32

[72] David Durand. Costs of Debt and Equity Funds for Business: Trends and Problems of Measurement. A chapter in Conference on Research in Business Finance. National Bureau of Economic Research, Inc., 1952. 215-262.

Miller and Modigliani used economic modeling analysis techniques to theoretically demonstrate the relationship between corporate debt and firm value by proposing tax-exclusive and tax-exclusive MM models. After that, in connection with the problems of the MM capital structure theory, many scientists proposed amendments, forming a “compromise model” that is more consistent with reality and has practical significance. In 1977, Miller studied the impact of the following rates on this issue: income tax rates on profits, income tax rates for owners of debt capital, income tax rates for shareholders on the value of companies and proposed the Miller Model.

In practice, it is impossible for a company to increase its debt ratio to 100% or close to 100%. The MM theory certainly has some shortcomings, and its criticism focuses on the following:

- MM theory assumes that the cost of debt capital does not depend on the amount of debt and that it does not increase as the amount of debt of the enterprise increases. In fact, once a business exceeds its debt level, the cost of debt capital will increase as the amount of debt increases.
- The MM theory only considers corporate income tax and does not consider the impact of other taxes on the debt ratio and business value.
- MM theory assumes that there are no transaction costs and therefore businesses are free to arbitrage. In fact, there are various transaction costs in capital markets that prevent such free arbitrage.
- MM theory assumes that the firm is in a state of zero growth and that its earnings before interest and taxes (EBIT) are constant, independent of the amount of debt. In fact, EBIT is related to the amount of debt used by a business.
- MM theory is based on the fact that individual investors and enterprises can borrow at risk-free interest rates. Although debt risk was subsequently introduced into the analysis, it was still assumed that investors and companies could borrow at the same rate.

MM theory is a revolutionary contribution to both enterprise financial management and capital market research. However, practice shows that a company cannot take out loans unlimitedly. The trade-off theory presents the factors that prevent companies from pursuing a high-debt policy:

- Costs of financial difficulties. When a business's debt exceeds a specified limit, a financial crisis or even bankruptcy may occur. Therefore, businesses must keep their debt ratio within acceptable limits. According to the Federal Law of the Russian Federation “On Insolvency (Bankruptcy)”, bankruptcy proceedings can be initiated in court against a company in a difficult financial situation (failure to fulfill its obligations for more than three months). Russian legislation provides for rehabilitation procedures aimed at restoring the financial position of the company (supervision, external management), and liquidation procedures aimed at the complete liquidation

of the company and satisfaction of creditors' claims through the sale of its assets (insolvency procedure)[73];

- Agency costs. There are agency relationships between the shareholders and creditors of the enterprise. When management decides to increase debt to expand a business, as the debt ratio increases, shareholders profit if the business does well and creditors suffer if the business fails. In this case, creditors will evaluate the feasibility of increasing debt to expand the enterprise's activities and the safety of debt so that the enterprise does not increase the debt ratio indefinitely;
- Changes in the cost of debt and equity capital. Once the debt ratio exceeds the limit, creditors and shareholders will perceive that their risk has increased and will therefore demand a correspondingly higher fee, causing the cost of debt capital and the cost of equity capital to rise as the debt ratio increases;
- Change in EBIT. MM theory assumes that EBIT is constant. In reality, EBIT is variable. As EBIT falls, the company's value falls along with it. The observation of such a relationship between EBIT and company value is also in the work of A. Stoiljković, S. Tomic, B. Lekovic and M. Matic[74].

Driven by these four factors, companies keep their debt ratio within a reasonable range to avoid becoming over-indebted. Thus, a company's debt ratio is the result of a trade-off between maximizing the company's value and four main factors.

1.3. Mechanism of financial potential management of enterprises

Investment attractiveness and solvency are the main indicators of financial potential, therefore the financial potential of an enterprise is one of the main factors of its success. Undoubtedly, the realization of financial potential will ensure financial stability, improve capital turnover and the creditworthiness of the enterprise. Therefore, an important task for enterprises is the question of forming an effective mechanism for managing financial potential[75].

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[73] Federal Law of October 26, 2002 N 127- Federal Law (as amended on December 28, 2022) “On insolvency (bankruptcy)” [Electronic resource]. – Access mode: URL: http://www.consultant.ru/document/cons_doc_LAW_81902/

[74] Stoiljković, A. Determinants of Capital Structure: Empirical Evidence of Manufacturing Companies in the Republic of Serbia. / A. Stoiljković, S. Tomić, B. Leković, M. Matić. // Sustainability. – 2022. – №15(1). – p. 778.

[75] Parakhin, R. S. Mechanism for managing the financial potential of an enterprise / R. S. Parakhin, R. I. Naydenova // Alley of Science. – 2018. – №. 5(21). – p. 680-684

According to the author, the purpose of forming a mechanism for managing financial potential is to maintain financial stability in order to obtain economic profit and achieve maximum company value. Complexity and optimality are the most important principles for the formation of a mechanism for managing financial potential[76].

The database should cover all aspects of the financial activities of an industrial enterprise. Sources for forming a database of a mechanism for managing the financial potential of an enterprise: accounting reports; statistical financial and economic information; information from banking system institutions; other information[77].

The financial statements of an enterprise are the main source of initial financial data for an enterprise. Although the composition and structure of the information differ, the basic content remains the same. Statistical financial and economic information is information published by the statistics department and is the basis for making strategic decisions about the financial potential of companies. Information from banking institutions includes information about lending rules and security conditions. Other information includes regulations relating to various aspects of managing the financial potential of an enterprise[78].

The rapid development of information technology has led to the improvement of financial information systems, including financial analysis tools and statistical programs, providing a better information processing platform for financial analysis and realizing the management and decision-making functions of the financial analysis system.

The process of operation of the mechanism for managing the financial potential of an enterprise in general can be represented in the following four stages[79]:

- Diagnostics of the main financial indicators to determine the parameters of the financial potential of the enterprise;
- Identification of the results obtained during the diagnostic process;
- Adjustment of parameters of the enterprise's financial potential;
- Monitoring the financial performance of the enterprise.

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[76] Borodin, A. I. Concept of a mechanism for managing the financial potential of an enterprise / A. I. Borodin // Bulletin of Tomsk State University. – 2015. – №. 391. – p. 171-175.

[77] Egorov, P. V. Concept of a mechanism for managing the financial potential of an industrial enterprise / P. V. Egorov, Yu. V. Serdyuk-Kopchekchi // Industrial Economics. – 2007. – №. 1(36). – p. 15-22

[78] Tyapkina, M. F. Approach to managing the financial potential of an enterprise / M. F. Tyapkina, E. A. Ilyina // Vestnik NSUEM. – 2015. – №. 1. – p. 71-77.

[79] Nikolaevskaya O. A. Assessing the financial potential of an industrial enterprise: textbook. allowance / O. A. Nikolaevskaya. − 2015.− 98 p.

Magomedova D. M. believes that the development of a concept for a mechanism for managing the financial potential of an enterprise, which would include principles, goals and objectives, functions of a mechanism for managing the financial potential of an enterprise, is presented as follows (Fig. 5).

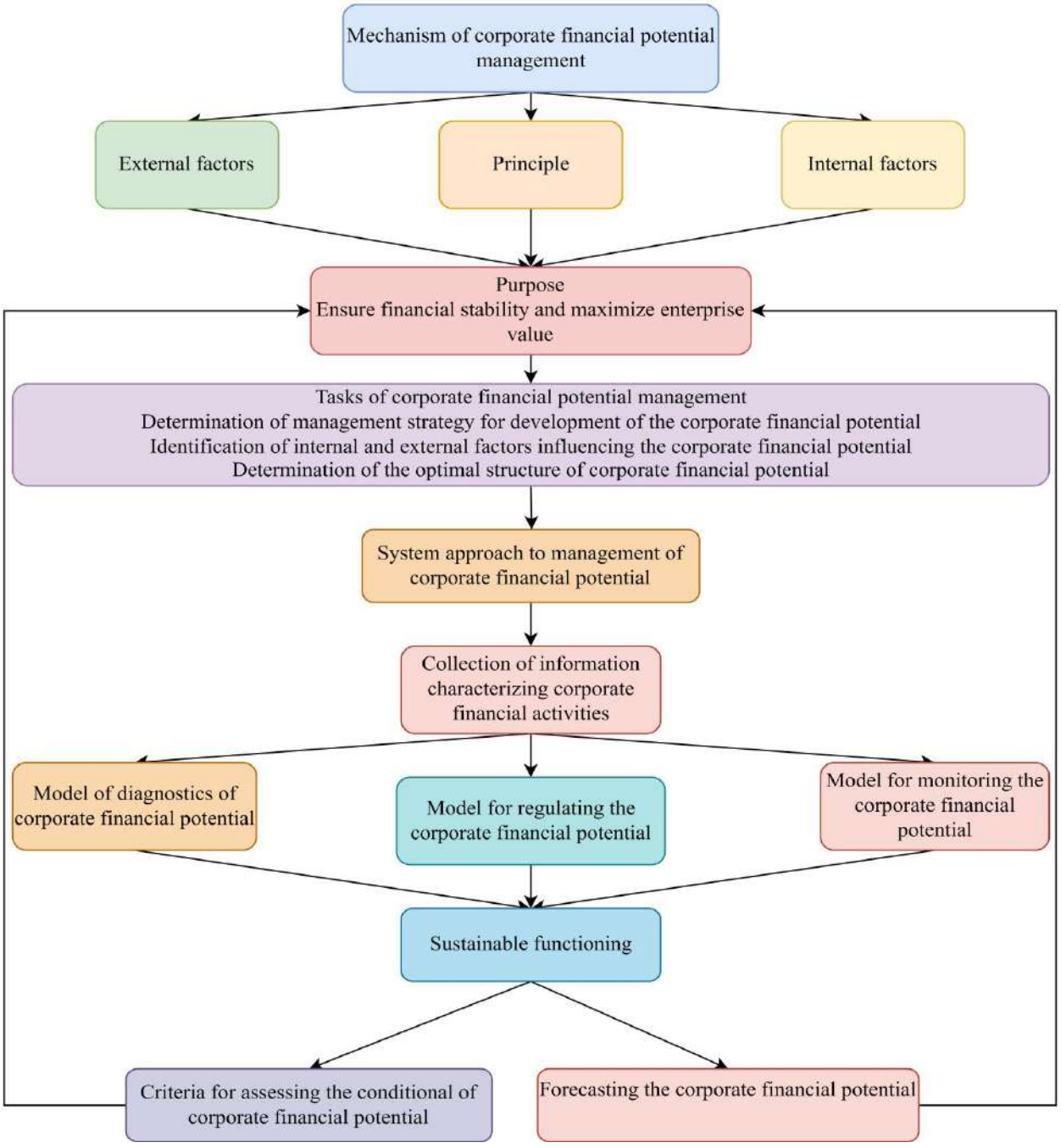

Figure 5 – Mechanism for managing the financial potential of an enterprise

Source: author's development based on the publication of Magomedova, D. M.[80]

[80] Magomedova, D. M. Mechanism of management of financial potential of the enterprise / D. M. Magomedova, A. G. Ramazanova, A. G. Ramazanov // Sustainable Development Economics. - 2018. - № 4(36). - p. 368-372.

With the growing development of capital markets, assessing the financial potential of companies becomes especially important. In a market economy, the problem of assessing the financial potential of an enterprise breaks down into a number of separate issues, of which financial analysis is the key one. Reasonable business management contributes to the successful operation of the enterprise; Accurate and effective financial analysis can identify problems in the business management process in order to subsequently propose appropriate measures to improve its performance. Using financial analysis, you can evaluate the past and current financial position of a business and identify possible problems and risks in the management process. Financial analysis can also be used to validate a company's strategic goals early on so that appropriate adjustments can be made to meet market needs. Additionally, the use of financial analysis predicts the future direction of a company and provides a basis for decision-making by investors and company managers.

Bryzgalova E.V. believes that diagnostics as a component of the mechanism for managing the financial potential of an enterprise is a comprehensive financial analysis of the enterprise's activities, determining results (positive or negative) and studying the sources and causes of identified deviations[81]. Thus, according to the author, the financial potential of an enterprise can only be realized on the basis of a comprehensive and objective analysis of its current financial situation. Financial analysis is the most important tool for assessing financial potential.

All economic experts emphasize the need to systematically analyze the financial position of companies in a market economy, since it is the most important tool of financial management. Widely known works on the financial sustainability of an enterprise were written by O. V. Efimova, M. V. Melnik, V. G. Kogdenko, G. B. Polyak, V. P. Litovchenko. The analysis of the financial condition of the enterprise was based on the indicators proposed by V. R. Bank, S. V. Bank, V. G. Kogdenko, A. V. Taraskina, G. V. Savitskaya and others.

For example, S.V. Shchurina and M.V. Mikhailova divide the concept of financial stability into an external component (the ability to pay off debts) and an internal component (the provision of assets with sources of financing). They also classify this category as long-term to maintain stability, solvency, creditworthiness and availability of financial sources[82]. I. V. Ryzhov

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[81] Bryzgalova, E.V. Features of assessing financial potential construction companies / E. V. Bryzgalova // Economy and society. – 2018. – №. 3(46). – p. 155-169.

[82] Shchurina, S. V. Financial stability of the company: problems and solutions / S. V. Shchurina, M. V. Mikhailova // Finance and credit. – 2016. – №. 42 (714). – p. 43-58.

emphasizes that the analysis of financial performance indicators at enterprises influences the optimization of the investment process[83].

Taking into account the opinions of various authors, E. A. Gutkovskaya and N. F. Kolesnik formed their definition of financial stability, which means “the stability of the financial position of an enterprise, its financial independence from external creditors and investors, ensured by a sufficient share of equity capital in the sources of financing, as well as such a state of financial resources, their distribution and use, which ensures the development of the enterprise and an increase in its market value in accordance with the goals of financial management[84]. Consequently, this concept is more capacious and complex, which characterizes not only financial independence, but also the solvency of the organization.

Foreign authors who contributed to determining the financial stability of an enterprise: Wang Zhen, Feng Lianyong, Zorn, A., Esteves, M., Baur, I., Lips, M[85].

Summarizing domestic and foreign experience, it can be argued that financial analysis, based on financial statements and other relevant information, is an important tool of financial management, providing the basis for decision-making by enterprise managers by assessing their past performance, objective analysis of the current financial situation and accurate forecasting future direction of the enterprise[86]. As an analytical tool, it can help managers understand the internal business situation, improve the business management model, detect problems in the company, suggest countermeasures and make recommendations to eliminate them. Therefore, it plays a vital role in the financial management of a business.

According to the author, diagnostics of the financial potential of an enterprise allows us to distinguish the following types of analysis:

- Capital Cycle Analysis: Forecasting and monitoring the company's cash flow and the use of various funds in accordance with the company's financial strategy and financial policies,

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[83] Ryzhov, I. V. Optimization of the investment process according to efficiency indicators at textile industry enterprises / I. V. Ryzhov , A.P. Sokolov, I.I. Savelyev // Textile industry technology. – 2021. – №.. 4 (394). – p. 27-37

[84] Gutkovskaya, E. A. Assessment of the financial stability of a commercial organization and measures to improve it / E. A. Gutkovskaya , N.F. Kolesnik // Bulletin of Samsu. – 2015. – №. 2 (124). – p. 35-46

[85] Zorn, A., Esteves, M., Baur, I ., & Lips, M. (2018). Financial ratios as indicators of economic sustainability: A quantitative analysis for Swiss Dairy Farms / A. Zorn, M. Esteves, I. Baur, M. Lips // Sustainability. – 2018. – №.10(8). – 2942.

[86] Pyatov, M. L. Boundaries of coefficient analysis of companies' financial statements / M. L. Pyatov // Development of territories. - 2021. - № 1(23). - p. 10-20.

providing information and supporting management's decision making on the use of the company's cash in planning;

- Financial policy analysis: analysis and forecasting of the company's financial returns and risks based on various financial statements, as well as providing recommendations for developing the company's business, creating and adjusting financial management policies and systems;
- Business management analysis: participation in analysis and financial forecasting, execution of budgeting and sales and production efficiency, provision of professional recommendations to provide expert financial support for business decisions;
- Analysis of investment and financing management: participation in financial calculations, cost analysis and other activities for investment and financial projects, prevention of financial risks and implementation of maximizing the value of the company;
- Financial reporting analysis: compiling financial investment research reports, feasibility study reports to support the company's financial decisions in accordance with financial management policies and business development needs.

The basis of an enterprise's activities is management, and the key to effective management is informed decision-making. Achieving the goals of an enterprise depends on the correctness of business decisions. The correctness of decision-making largely depends on the reliability, reliability and usefulness of financial information provided by the enterprise's financial analysts[87]. Without a scientific system of financial analysis methodology, managers will not be able to obtain useful financial information and will not be able to realize the potential of financial analysis. Therefore, it is necessary to form a scientific system of financial analysis methods, based on financial reporting and using quantitative and qualitative methods of analysis as a tool.

Financial analysis of enterprises is not only an analysis and study of the initial data of corporate financial statements, it must be carried out within a strict theoretical framework. Foreign and domestic researchers and scientists have different views on the theory of constructing financial analysis:

- J. Hanlon and K. Peasnell[88] note the scientific nature of economic value added (EVA) in financial analysis and in assessing the value created by business. This is because EVA takes into account not only the cost of debt capital, but also the cost of equity capital;

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[87] Sokolov, B. I. Can voluntary environmental regulation based on information disclosure improve the financial performance of enterprises? - Micro evidence from China / B. I. Sokolov, X. Ding // Financial Economics. - 2023. - № 11. - p. 145-150.

[88] Hanlon, J. Wall street's contribution to management accounting: The stern Stewart Eva financial management system / J. Hanlon, K. Peasnell // Management Accounting Res. – 1998. –№. 9(4). – p.421–444.

- EVA is a tool for assessing managers' use of capital and their ability to increase company value for shareholders. J. Stern and B. Stewart[89] identify four areas of application of their management concept ("the four M's of EVA"): reporting, planning and budgeting, managerial compensation and culture change;
- Robert and Norton[90] in 1992 introduced the concept of the balanced scorecard, which can be used to analyze and evaluate the level of management of a company through four main areas: finance, customers, learning and growth, and internal operations. This is a new way of assessing the performance of a company. Currently, the concept of a balanced scorecard is being developed and supplemented with new indicators that are relevant today, i.e. the concept of a balanced scorecard is still relevant today[91].

It is obvious that customer satisfaction, market share, new product development and product quality have a direct impact on the financial performance of the enterprise. The balanced scorecard takes into account not only the importance of financial factors, but also includes non-financial factors. Transformation of the strategic goals of the enterprise into quantitatively measurable indicators makes the economic activity of the enterprise aimed at achieving the corporate strategy. You can take a holistic view of the long-term health of the business rather than focusing only on short-term interests. The author believes that the introduction of a balanced scorecard, especially the introduction of non-financial indicators, is necessary to improve the financial analysis system. The objective of financial analysis is to ascertain the economic profitability of an organisation. However, it is noteworthy that determining the precise level of economic profit can be challenging. At present, indicators such as Economic Value Added (EVA), Currency Value Added (CVA), Shareholder Value Added (SVA), etc. are utilised to measure economic profit[92].

In general, non-financial information is usually not included in financial analysis because it is difficult to quantify and has a subjective element. But as the economy develops, the number of highly qualified specialists, market share, innovative capabilities, etc. become development factors

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[89] Stern, J. M. Eva®: An Integrated Financial Management System / J. M. Stern, G. B. Stewart, D. H. Chew // European Financial Management. – 1996. – №. 2(2). – p. 223–245.

[90] Robert, S. K. Using the Balanced Scorecard as a Strategic Management System /S. K. Robert, D. P. Norton // Harvard Business Review. – 1996. – №. 1. – p. 75–85.

[91] Chavan, M. The balanced scorecard: a new challenge. Journal of Management Development. – 2009. – №. 28(5). – p. 393 - 406.

[92] Ivanov V. V., Tsytovich N. N. Corporate financial planning / V. V. Ivanov, N. N. Tsytovich. V. V. Ivanov, N. N. Tsytovich. - SPb. BAN; Nestor-Istoria, 2009. - 332 p.

that companies are forced to take into account, and these factors, in turn, have an increasing impact on business operations.

Palepu et al.[93] proposed the "Harvard Analytical Framework," which integrates strategic analysis and financial reporting analysis, incorporating ideas from strategic analysis into financial analysis. The Harvard Analytical System is an effective financial assessment system that focuses on both the analysis of financial data and non-financial information. It uses strategic analysis to explain and understand changes in financial data, and financial analysis to confirm the company's development strategy. Thus, qualitative strategic analysis and quantitative financial analysis can be combined with each other, including analysis of the industry environment, political environment, macroeconomic environment, etc. in the analysis of financial indicators.

Strategic analysis is the start of the analysis, reflecting the competitive environment that the company faces, its future development plans and purpose. This helps managers better understand the reasons that led the business to its current financial position. The sequence of strategic analysis is shown as follows:

- Accounting analysis. Analysis of the accounting information disclosed by the company by understanding the accounting policies. It helps managers evaluate the completeness and accuracy of financial data;
- Financial analysis. Application of a number of scientific methods for analysis, assessment and conclusions based on financial data[94];
- Perspective analysis. Based on the analysis of the three components, a scientific and informed forecast of the company's future development is compiled, providing reference recommendations to company managers.

This is the biggest difference between the Harvard analytical framework and other analytical methods. Therefore, to a certain extent, it effectively overcomes the shortcomings of traditional financial analysis and is able to assess the business situation of the enterprise as a whole, predict the prospects for its development, give professional advice on the development of the enterprise and provide decision-making support for managers.

From all that has been said above, we can conclude that financial and economic analysis is the basis for making management decisions on issues of the life of an enterprise.

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[93] Palepu, K. G., Paul, M. H., Victor, L. B. Business Analysis and Valuation Using Financial Statements: Text and Cases. 3rd ed. Mason, OH: Thomson South-Western, 2003.

[94] Petrovskaya, M. Comparative analysis of the financial situation in the oil and gas industry in Russia and China in the context of the COVID-19 pandemic / M. Petrovskaya, X. Ding, Advances in Social Science, Education and Humanities Research. – 2021. – Vol. 527. – p. 194-199.

From the point of view of the theory of key capabilities, the essence of the enterprise is a complex system of numerous types of opportunities, one of which is financial opportunity. Having strong financial capabilities helps ensure that a company's current competitive advantage is maintained over a long period of time, facilitating expansion of its operations and ensuring the successful implementation of the company's diversification strategy. Kovalev V.V. also defines financial potential as a certain financial condition of the company and the totality of its financial capabilities[95].

In a narrow sense, financial capability is a comprehensive assessment of an enterprise's ability to finance, invest and profitability. Among them, the key financial capability of an enterprise is its ability to achieve sustainable and highly profitable development.

Kang L.[96] believes that any enterprise has certain economic and financial resources, but how to dominate and use these resources, how to transform these resources into a competitive advantage of the enterprise - these are issues that should really be considered by every enterprise. Optimizing the allocation of financial resources is an effective way to improve the core competitiveness of enterprise financing.

According to the author, in the practice of financial management, the main direction of managing the financial potential of an enterprise is to increase its financial capacity through the optimal distribution of financial resources, thereby maximizing its own value.

E. F. Sysoeva, L. I. Pavlova, V. E. Leontiev, V. M. Rodionova, V. G. Belolipetsky and other Russian economists studied in detail the concept of financial resources. For example, V. M. Rodionova defines the financial resources of an enterprise as cash income and receipts at the disposal of a business entity and intended to fulfill financial obligations, expenses for expanded reproduction and economic stimulation of workers[97]. V. G. Belolipetsky defines the financial resources of a company as part of the funds in the form of income and external receipts intended to fulfill financial obligations and incur costs to ensure expanded reproduction[98]. Afontsev S. A., Petrenko I. N., Matveev N. V., Sudoplatov A. P., Davydova L. V., Rodionova V. M. and others note that rational distribution of financial resources can increase the financial stability of enterprises .

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[95] Kovalyov V.V. Financial analysis: methods and procedures. – M.: Finance and Statistics. – 2010. – 560 p.

[96] Kang, L. P. Research on financial strategic management of enterprises based on core competitiveness / L. P. Kang // Finance and Accounting Learning. – 2020. – №. 281(36). – p. 51-52.

[97] Rodionova V. M. Finance: Textbook. manual / V. M. Rodionova // M.: Finance and Statistics. − 2000. − 485 p.

[98] Belolipetsky V. G. Firm finances: A course of lectures/Ed. I. P. Merzlyakova // M.: INFRA-M. − 1999. − 298 p.

In the Chinese school of economics, many economists have also explored the concept of financial resources. Thus, Wang Zhen emphasized the importance of introducing energy indicators and indicators affecting the environment into the concept[99]. Li Xinhe, Luo Fukai and others, in their works using the example of Chinese enterprises, showed that adequate use of financial resources leads to the right strategy for sustainable development.

In the process of developing an enterprise, it faces the question: when to expand and when to reduce the scale of production. Before making a decision, management first of all pays attention to the availability of sufficient cash flow. Companies are required to optimize cash flow management, rationally distribute funds in operating, investment and financial activities, and continue to improve the cash distribution system. Businesses try to earn high profits with a small amount of capital investment so that the company can use its limited financial resources to achieve sustainable and rapid development. Therefore, summarizing the research experience of domestic and foreign scientists, the author believes that cash is the most important financial resource of an enterprise. In the turbulent markets and post-financial crisis of the 21st century, businesses face both opportunities and pressures from internal and external financing. Restructuring of enterprises, diversification and decentralization of production determined fundamental changes in the strategy for managing the financial potential of enterprises. Working capital is present in the entire production and operational chain of the enterprise.

Kichigina E. G.[100] notes that effective working capital management is an important step to ensure that sufficient liquid resources are maintained for the company's daily business operations. Working capital is a measure of the cash and liquid assets available to finance the necessary operations of a company on a day-to-day basis. In a broad sense, working capital is the funds needed by an enterprise in its production and operating activities, which can be divided depending on their use, the composition and use of working capital is as follows (Fig. 6).

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[99] Li, S. Dilemma and exit from financial management / S. Li // Accounting Research. − Yuan.− 2006. – 7.

[100] Kichigina, E. G. Methodological foundations of effective management of an organization’s working capital / E. G. Kichigina // International Journal of Applied and Fundamental Research. – 2015. – №. 8. – p. 541-544.

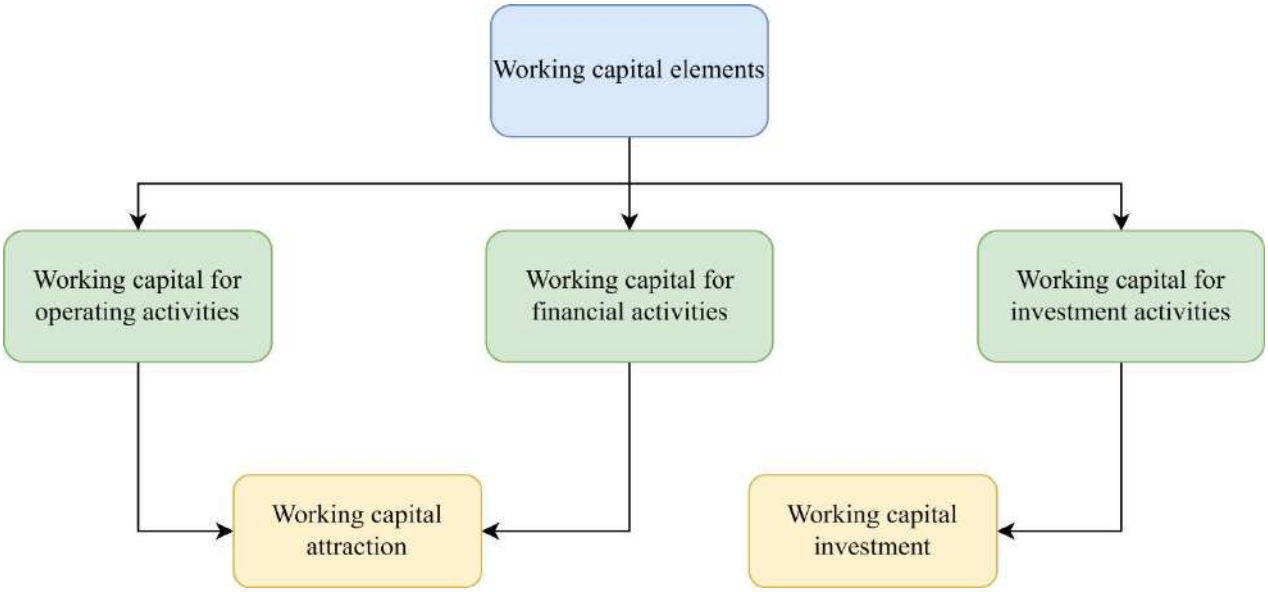

Figure 6 – Scheme of the composition and use of working capital

Sources: Compiled by the author.

Turnover and working capital efficiency are the most important factors that ensure that a company has sufficient funds to maintain stable operations. According to the author, the goals of managing working capital of an enterprise can be divided into a number of areas:

- Solvency at a reasonable level. Capital is the foundation of an enterprise's activities. Regardless of what type of activity a company is engaged in, it must have sufficient capital to support it. The main capital-intensive activities of an enterprise are collecting revenue from customers and paying suppliers for purchases. Moreover, if the company wants to continue its activities, the sales income must be greater than the purchase price. Otherwise, if revenues do not cover expenses, the enterprise will have to consume its own funds or attract external financing. If this situation continues for a long period of time, it can lead to difficulties with the liquidity of the enterprise, debts will not be repaid, and then the enterprise will go bankrupt. Therefore, companies need to ensure their solvency at a reasonable level;
- Ensuring order with working capital. Working capital management is based on the following: first of all, through scientific management, the turnover of this capital is continuously increased. This is expressed in improving turnover in all production and operational processes, reducing the time between the payment of funds in the procurement process and the receipt of funds in the sales process, ensuring a constant cash flow;
- Strengthening the management of external chains of product creation from the purchase of raw materials to the sale of prepared products. It is necessary not only to analyze the company's internal product creation chain, but also to take into account the external value chain and take into

account the interests of enterprises located upstream and downstream in the supply chain, as well as pay attention to factors such as purchasing method, sales mode, supplier relationships and clients.

The essence of working capital management is the activity of managing the current assets and current liabilities of the company and controlling the cash flow in the daily business activities of the company. In order to ensure the availability of sufficient working capital and accelerate the turnover of working capital, many companies use the strategy of using funds from other enterprises to manage working capital. Thus, implementing a strategy of leveraging funds from other businesses to effectively manage working capital has become the best way for companies to overcome the problem of insufficient cash flow. According to the author, the strategy of using funds from other enterprises is not only an important approach and a new tool for working capital management, but also an innovation in the profitability model. The essence of the strategy is to finance the business by transferring the cost of capital to suppliers to accelerate the turnover of current assets and the use of capital up and down the supply chain.

Today's competitive enterprise landscape no longer just exists between organizations. To achieve value maximization, companies must first ensure the liquidity and security of their own working capital, taking into account the interests of enterprises located upstream and downstream of the supply chain, thereby increasing the competitive advantage of the entire value chain.

Thus, the introduction of a working capital management approach based on the strategy of using funds from other enterprises in the value chain helps improve working capital turnover, ensuring sufficient cash flow for the business activities of the enterprise, and the use of large amounts of non-interest-bearing obligations reduces the cost of capital of the enterprise, thereby increasing the profitability of the enterprise and ensuring financial security for the sustainable development of the enterprise. Therefore, working capital management based on the strategy of using funds from other enterprises in the value chain must be considered as an integrated approach to the implementation of a strategy for managing the financial potential of a company, the goal of which is to achieve economic efficiency and sustainable viability of the company. Changes in a company's working capital needs reflect its competitive position along the entire chain:

- If the quantity of inventory is constant, when a company's accounts receivable are greater than its accounts payable, the working capital requirement is positive. This means that other companies are using the company's funds and that the company is in a "weak position" in the supply chain;
- If the quantity of inventory is constant, when a company's accounts payable is greater than its accounts receivable, the working capital requirement is negative. This means that the company uses the funds of other companies and that the company is in a “strong position” in the supply chain;

- When a company's working capital needs are on an upward trend, meaning that its inventory and accounts receivable are increasing or its accounts payable are decreasing, the company is moving from a strong position to a weak position;
- When a company's working capital needs are on a downward trend, it means that its inventories and accounts receivable are decreasing or its accounts payable are increasing and the company is moving from a weak to a strong position.

Net working capital (NWC) and total working capital (TWC) are used together to determine whether a company has implemented a strategy to utilize funds from other businesses.

When a company uses more other people's money in its operations than its own money is used by others, the NWC is negative, and it can be initially determined that the company has adopted a strategy of using the funds of other businesses for working capital management. Negative NWC can be divided into two cases. The first case: the enterprise is in a favorable business condition and has a competitive advantage in the supply chain, therefore it actively uses funds from suppliers and distributors, thereby saving the enterprise's own funds. The TWC is currently positive, which indicates that the company's current assets exceed its current liabilities and that it has enough funds to cover its debts. The second case: a decrease in the company's performance and an excess of current liabilities over current assets, as a result of which the company does not have enough current assets to cover its debts, and it is forced to delay payments to creditors; the TWC is currently negative. In this work, the author defines the first case as a positive implementation of a strategy for using the funds of other enterprises, and the second as a negative implementation of a strategy for using the funds of other enterprises.

Managing the working capital of an enterprise is the implementation of the process of their circulation at various stages: monetary, production and commodity[101]. From the point of view of the value chain, when implementing working capital management according to the strategy of using funds from other enterprises, it is important to strengthen the management of accounts receivable, inventory and accounts payable from the purchasing, production and sales links in order to form an effective capital circulation system[102]. The main methods are as follows:

- In the procurement process, enterprises need to pay attention to accounts payable management, because it essentially represents the enterprise's use of suppliers' funds. The longer

[101] Teslenko, I. B. New models of interaction of subjects in the conditions of digitalization / I. B. Teslenko // Scientific works of the Free Economic Society of Russia. – 2019. – T. 218, – №.. 4. – p. 459-466.

[102] Dudin, M. N. Current problems of ensuring the financial sovereignty of Russia in the conditions of international sanctions / M. N. Dudin, S. V. Shkodinsky, M. O. Ivanov // Finance: theory and practice. – 2023. – T. 27, –№. 1. – p. 185-194

the accounts payable turnover, the longer the company has to deal with supplier funds. A company can delay payment to suppliers only if it has a priority position in the procurement chain;

- This deferment of payment to the supplier will undoubtedly increase the company's cash flow when using the strategy of using funds from other businesses, providing the company with interest-free commercial financing. However, no interest on this type of financing does not necessarily mean no cost. This cost comes in the form of loss of business discounts and the impact on suppliers' trust in the company, which can lead to a negative reputation within the business. Therefore, when applying strategies for using other enterprises' funds in the procurement process, companies must consider various factors and use them wisely;
- In the production process, enterprises should strengthen the management of other accounts payable and inventory, make maximum use of other accounts payable, and speed up the inventory turnover. Effective turnover of inventory can reduce the amount of capital used, thereby increasing the liquidity of assets[103]. Therefore, companies can implement strategies for using funds from other enterprises in production, optimizing the management of other accounts payable and improving the mechanisms for organizing production activities to accelerate inventory turnover;
- During the sales process, companies can implement a strategy of using funds from other businesses to manage working capital by reducing accounts receivable and increasing advance receipts. Accounts receivable means that the capital of companies down the supply chain is used. Increasing advance earnings will help expand access to funds from other companies and implement a strategy for leveraging funds from other businesses. Control of accounts receivable should not be too strict, otherwise the company may lose some customers, which negatively affects the income of the activity[104]. Companies need to build trust with other companies up and down the supply chain and build their positive reputation.

Managing accounts receivable, inventory, and accounts payable ultimately impacts the company's cash management. The cash flow diagram looks like this (Fig. 7).

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[103] Lachina, A. A. Institutional support for growth points of innovative activity of economic systems / A. A. Lachina, A. M. Governors // Applied economic research. – 2020. – №. 3(37). – p. 46-50.

[104] Teslenko, I. B. Financial development of the market to increase the investment attractiveness of Russia / I. B. Teslenko // Science of Krasnoyarsk. – 2023. – T. 12, – №. 1-2. – p. 140-147.

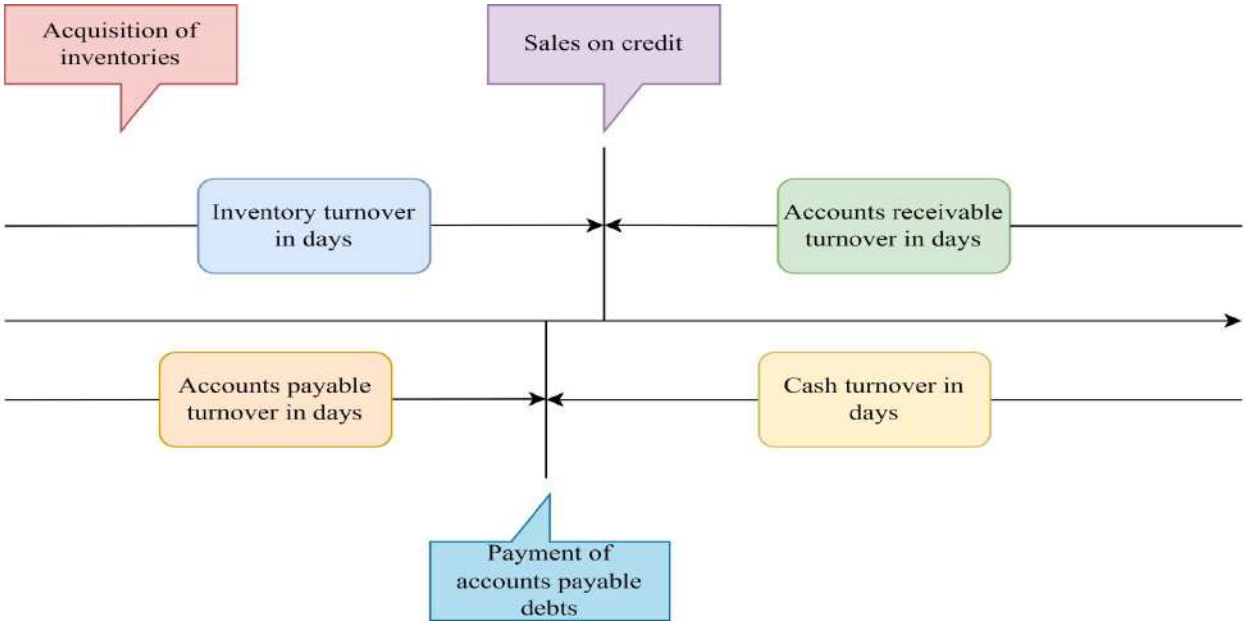

Figure 7 – Cash flow diagram

Source: compiled by the author.

From a cash flow cycle perspective, the day-to-day operations of a business include items such as inventory management, accounts receivable management, and accounts payable management. The shorter the cash conversion cycle, the faster the cash turnover. In this case, the company can use less capital for larger-scale production activities[105]. Therefore, the concept of working capital management should be applied in all activities, from the supply chain to the production chain. Only by paying more attention to the entire process of an enterprise's activities can one achieve the goal of working capital management, increase the efficiency of using working capital and, as a result, ensure sustainable and rapid development of the enterprise.

Since the tax shield has been proven to be effective, companies can use debt to lower their cost of capital. Companies can use financial leverage to increase the size of their assets and expand their production scale. An increase in the amount of debt leads to an increase in the equity multiplier and, therefore, the return on shareholders increases as the debt ratio increases[106]. However, it may increase the financial risk of the enterprise, which will lead to an increase in the cost of debt capital and the cost of equity capital, thereby interrupting the benefits of tax savings arising from debt.

[105] Koren, A. V. Regional tax policy as a tool for the dynamic development of the territory of the Far East / A. V. Koren, A. S. Nefedyeva // Economics and modern management: theory and practice. – 2014. – №. 37. – p. 172-177.

[106] Lipchiu, N. V. Models of working capital management of organizations in modern conditions / N. V. Lipchiu, A. A. Yurchenko // Polythematic network electronic scientific journal of the Kuban State Agrarian University. – 2012. – №. 76. – p. 1038-1050.

Excessive debt leads to a lack of financial flexibility and loss of development potential. When the situation at an enterprise in the process of economic activity worsens or efficiency decreases, excessive debt can lead to a financial crisis or even bankruptcy[107]. Businesses must constantly monitor their financial performance to prevent a crisis caused by excessive debt.

Effective financial planning can reduce the level of financial risk. Forecasting plays a key role in planning by determining the business environment for a specific period. N. D. Kondratiev[108], a noted theorist in planning, categorises visionary planning into three types:

- Forecasts of events, which can be irregular at a certain level of knowledge, and do not follow a specific order.
- Forecasts of cyclic or regularly repeating events are often studied in practice, especially when predicting the development of socio-economic processes and their outcomes. Forecasts of cyclic or regularly repeating events are often studied in practice, especially when predicting the development of socio-economic processes and their outcomes. Forecasts of cyclic or regularly repeating events are often studied in practice, especially when predicting the development of socio-economic processes and their outcomes. This type of foresight is primarily concerned with predictions.
- Forecasting the development of general economic trends, including growth or recession in specific countries or sectors of the economy, price changes, income fluctuations, shifts in economic structure, revolutionary movements, and international complications, is crucial.

Financial planning is typically recognised as the practice of crafting financial plans, encompassing balance sheet projections, income statement prognoses, cash flow estimates, and forecasts of crucial financial indicators[109].

Monitoring financial indicators is one of the main components of a systematic approach to managing the financial potential of an enterprise, which allows you to determine the likelihood of achieving your strategic goals. Monitoring is a key decision in implementing the forecasting function. Indicators that reflect trends in changes in the financial condition of the company are of

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[107] Ryzhov, I.V. Improving information support for the formation of business plans at an industrial enterprise, taking into account systemic and integrated approaches / I.V. Ryzhov, A. A. Khachaturyan, B. I. Chernyakhovsky // Information and economic aspects of standardization and technical regulation. – 2018. – №. 3(43). – p. 11.

[108] Kondratiev, N. D. Big cycles of conjuncture. Selected works / N. D. Kondratiev. - Moscow : Yurait Publishing House, 2021. - 490 p.

[109] Ivanov V. V., Tsytovich N. N. Corporate financial planning / V. V. Ivanov, N. N. Tsytovich. V. V. Ivanov, N. N. Tsytovich. - SPb. BAN; Nestor-Istoria, 2009. - 332 p.

great importance for preventing a financial crisis[110]. In the practice of financial management, optimizing cash flow management, reducing the cost of capital for investment projects, optimizing the capital structure, reducing financial risk and increasing sustainable solvency in order to improve financial capacity are the main directions of managing the financial potential of enterprises.

Conclusions for Chapter 1

1. The financial potential of an enterprise must be analyzed comprehensively, since the potential is formed in a combination of several factors (resources, reserves, results, entrepreneurial abilities), which are the object of analysis. The presence and growth of the financial potential of an enterprise determines its financial stability, and a comprehensive analysis of the financial potential of an enterprise ensures the effective implementation of management decisions.

2. Financial potential is a combination of effective use of financial resources and active coordination of financial relations that ensure the stable development of the enterprise. Financial potential is closely interconnected with other potentials, and together they constitute a single system of economic potential. To evaluate each potential individually, it is necessary to take into account some synergistic effects that arise from the influence of other potentials. Financial potential acts as the main element of economic potential.

3. When ensuring the financial stability of an enterprise to maximize its value, the formation of financial potential is influenced by internal and external factors. Managers should pay more attention to the use of information technology and optimization of capital structure to reduce the cost of capital and improve creditworthiness.

4. The financial mechanism forms key areas of development and effective tools for the long-term management of all financial activities of the enterprise. Effective management of the financial potential of an enterprise allows you to quickly make decisions with the least risk of financial losses and allows you to timely monitor the slightest deviations of indicators from the norm. It ensures the competitiveness of the enterprise and determines its place in the market. The mechanism for managing the financial potential of an enterprise is not limited to the implementation of any one component, but is a coordinating and regulatory system for ensuring the relationship between diagnostics, identification, adjustment and monitoring of indicators that form the types of financial stability of the enterprise and make it possible to increase the efficiency of managing the potential of the enterprise in general.

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[110] Governors A. M. Main trends in the development of digitalization in the financial sector / A. M. Governors, I. B. Teslenko, A. P. Sokolov, V K. Spilnichenko // Industrial Economics. – 2021. – №. 5(6). – p. 555-561.

5. Financial analysis is the most important tool for assessing financial potential. Implementing working capital management according to the strategy of using funds from other enterprises in the value chain is the best approach to managing financial potential. In addition, enterprises need to strengthen cost management and risk control, increase financial flexibility and create an early warning system for financial risks.

6. This dissertation proposes a definition of the concept of financial potential, which, unlike existing ones, includes not only the ability to improve the sustainable development of an enterprise by improving the cash flow management system and optimizing the capital structure based on a comprehensive analysis of the current financial situation and full use of financial resources, but and the ability to reduce risk by predicting future financial position.

CHAPTER 2. PRACTICAL BASES OF IMPROVEMENT OF FINANCIAL POTENTIAL MANAGEMENT MECHANISM OF ENTERPRISES

2.1. Situation and prospects of the global oil and gas industry development

The availability of various forms of energy has increased in the past five years, with the UN establishing criteria based on minimum levels of residential consumption. As of 2019, the number of people without electricity had decreased to 750 million, down from almost 1 billion in 2015. Furthermore, it has been predicted that by 2020, 63.7% of the global population will reside in countries with per capita energy consumption below 100 GJ/person (gigajoule), which is considerably lower than the 81% in 2019.

All regions worldwide experienced a decline, with the smallest decrease in the Asia-Pacific region (1.6%) due to a 2.1% increase in energy consumption in China. Decreases ranging from 7.8% to 3.1% were recorded in other regions. The per capita energy consumption worldwide saw a decline of 5.5% to 71.4 GJ/person in 2020. The regions that had the greatest decreases in per capita consumption, North America and Europe, were also identified as the regions with the highest per capita consumption. In contrast, Africa remained the region with the lowest average consumption at 14 GJ/person. The distribution of energy consumption across regions in 2020 showed no significant change as oil remained the primary fuel in Africa, Europe, and the Americas, followed by natural gas in the CIS and the Middle East, and coal in Asia and the Pacific. In 2020, oil represented 31.2% of total primary energy consumption in the energy mix, with coal increasing from 27.1% to 27.2% and natural gas accounting for 24.7%[111].

The significant decline in oil demand in 2020 can be attributed to the COVID-19 pandemic and a substantial reduction in transport demand following worldwide blockades. Global primary energy consumption decreased by 4.5 %, marking the most substantial drop since World War II. The primary factor behind the reduction in energy consumption was oil, with a decline of 9.1 million barrels per day, or 9.3%, whilst natural gas consumption decreased by 81 billion cubic metres, or 2.3%. The significant reduction in global energy demand resulted in excess capacity, which caused members of the Organisation of Petroleum Exporting Countries (OPEC) and leading non-OPEC countries to reach a consensus to decrease oil production by 6.6 million barrels per day. Simultaneously, a significant decrease in production and energy demand caused a substantial

[111] Steblyanskaya, A. N., Zhen, W., Razmanova, S. V., Iskritskaya, N. I. (2018). Sino-Russian transregional gas cooperation: Key issues. Vestnik of St. Petersburg University. Economics, 34(3), 369-395.

decline in international oil and gas prices. The average cost of oil (Brent spot price) in 2020 was $30.89 per barrel, the lowest rate since 2004. The average Henry Hub gas price in the US was $1.51 per million British thermal units, the lowest since 1995. The Japanese/Korean benchmark for the Asian LNG price was at a record low of $3.24 per million BTU (MMBTU).

Crude oil price is a key indicator of the industrial goods market in terms of national economic stability. Its impact on the growth rate of the national economy is significant due to the industrial chain. In addition, crude oil has historically been a strategic reserve for all countries, with past wars having been instigated by conflicts over control of this resource, making it a crucial matter for national security. The existence of an international crude oil market and the volatility of crude oil prices result from the interplay of supply and demand, commodity production chains, political perspectives and strengths, trade and reserves, and other economic policy factors. After the collapse of the Bretton Woods system in 1971, an oil price mechanism based on futures trading was implemented, and the petrodollar system came into existence. The petrodollar system provided the US with an advantage, resulting in the US dollar currently accounting for approximately 80% of global oil trade, with most crude oil prices measured in US dollars. International indices for crude oil futures prices comprise WTI, Brent, Dubai, and Nigerian Forcados. Crude oil futures are traded on over a dozen international exchanges, each using different currencies for measurement, yet prices remain constant after being adjusted for exchange rates. Figure 8 illustrates the trend of oil and gas price volatility throughout 1990-2020.

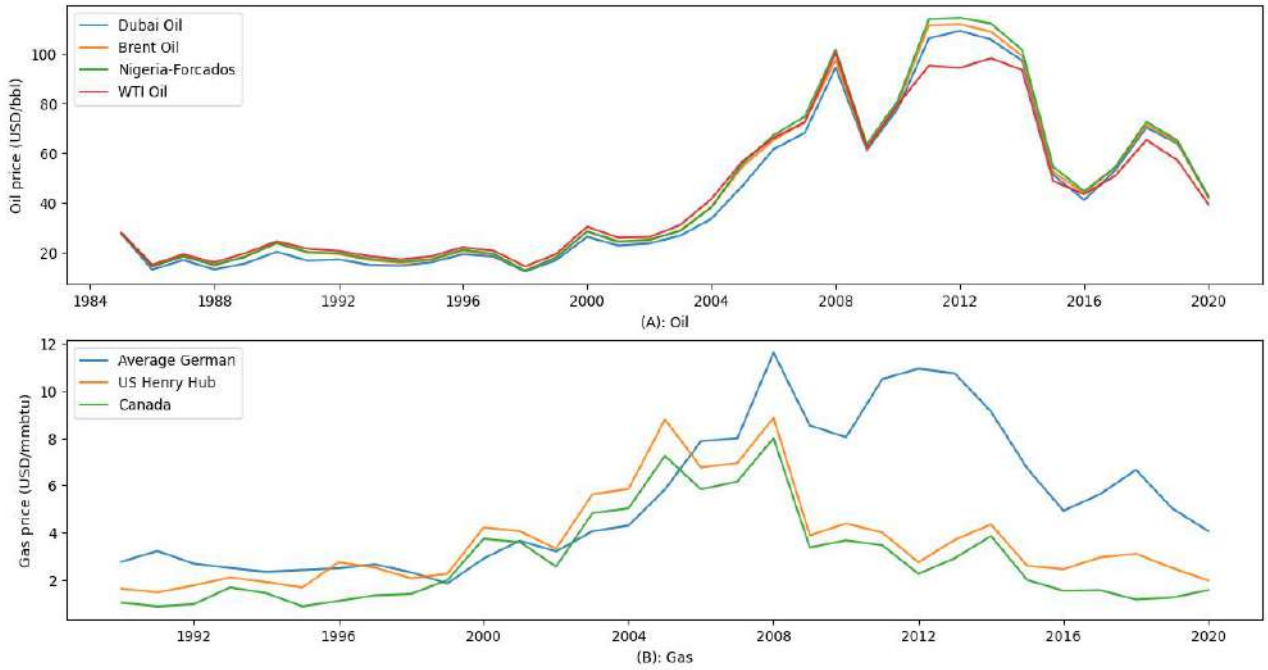

Figure 8 – Trends in world oil and gas prices

Source: compiled by the author.

Over the last two decades, there have been three significant fluctuations in oil prices accompanied by notable historical events.

The first of these was the financial crisis of 2008, as can be seen in Figure 8 A combination of several factors led to oil prices almost tripling in eighteen months: (1) the collapse of the second largest subprime mortgage firm in 2007, (2) the US's decision to cut interest rates multiple times to encourage economic growth, which resulted in a significant depreciation of the US dollar, causing investment in commodity markets such as oil to increase, and (3) political unrest in the Middle East. The events worsened market concerns over oil supply disruptions and created profitable opportunities for financial speculation. The US financial crisis of 2008 evolved into a global crisis as geopolitical tensions eased and worldwide growth decelerated, leading to below estimated oil demand. This prompted the outflow of speculative capital, causing oil prices to plunge over 76% in six months.

Furthermore, shale gas exports' prohibition was lifted in the US in 2015 to realise energy independence. The United States has historically imported large quantities of crude oil; however, since 2006, technological advancements in shale gas have enabled the nation to achieve self-sufficiency in crude oil production. In 2014, the emergence of the shale oil revolution in the US led to OPEC exerting pressure on shale companies through price wars, in an effort to maintain their dominant position in the global energy market. Nevertheless, as shale businesses continue to modernise, shale oil is becoming increasingly profitable and sustainable. US crude oil production decreased from 9.66 million barrels per day in April 2015 to 8.53 million barrels per day in September 2016, with a slight decline before a subsequent increase in oil prices. Since then, the supply of oil has formed a "three-legged" structure consisting of OPEC, the US, and Russia.

Since then, the supply of oil has formed a "three-legged" structure consisting of OPEC, the US, and Russia. The 2020 pandemic outbreak and advancements in new energy technologies have further impacted oil prices with price wars arising among exporting nations due to a decrease in demand. OPEC+ subsequently publicized a plan to decrease oil production by 9.7 million barrels per day. Following the gradual lifting of the embargo by countries, there was a recuperation in oil demand and a speedy rise in oil prices to approximately $32.92. Nevertheless, the resurgence of the epidemic caused OPEC+ to become less inclined to augment production, and the immediate progress of new energy sources made capital less willing to invest in conventional energy sources. The post-epidemic inflation in crude oil prices was caused by the easing of monetary policy by countries to stimulate their economies during the epidemic, a mismatch between supply and demand, capital's caution about new production capacity, and inflation expectations.

The world's energy landscape is undergoing dramatic changes with the development and use of new energy sources. Traditional energy sources such as oil and gas are facing significant challenges. The next decade will be crucial for expediting the transition to clean energy worldwide. The worldwide trend toward green and low-carbon development and energy transition has created a global consensus. The global energy mix is shifting towards low-carbon diversified energy sources, notably natural gas, in order to move away from high-carbon coal and oil. Natural gas, with its clean, low-carbon, stable, flexible and cost-effective attributes, plays a crucial role in the third energy transition to ensure energy demand is met safely, sustainably and reliably[112].

Despite this, the energy security of European nations is under serious threat, causing their energy policies to shift from "climate security" to "energy security". In the context of energy security and economic alternatives, coal represents a significant foundation for Europe in the resolution of its ongoing energy supply crisis. Certain countries have opted to restart coal power, lengthen the lifespan of existing coal plants, or increase coal production and importation in light of these considerations. Europe was the pioneer in proposing energy transition and became the global leader in this area by selecting energy transition as its development strategy and driving policy implementation. Europe was the pioneer in proposing energy transition and became the global leader in this area by selecting energy transition as its development strategy and driving policy implementation. However, sanctions against Russia seriously affected Europe. Additionally, anti-Russian policies have contributed to the current energy pricing situation in Europe. In the short term, the considerable rise in global oil, LNG and coal prices will negatively impact energy transition prospects and global carbon emissions reduction, resulting in continuous carbon emissions growth in 2023. Nevertheless, in the medium to long term, EU wind, solar, hydrogen, and energy storage investment and deployment will increase, and the current shift towards coal will be temporary to allow for the transition of energy[113]. Once the energy transition in Europe achieves a significant breakthrough, it will not only accelerate the global promotion of new energy development technology, but it will also facilitate the implementation of a new system to support the secure and stable operation of new technology enterprises.

High global prices for fossil fuels mean no country can afford to disregard the importance of clean, renewable energy. In the short term, there will be a shortage of fossil fuel capacity at all levels due to record levels of trade in oil and gas products, ranging from crude oil to refined

[112] A. Steblyanskaya, K. Bi, A. Denisov, Z. Wang, Z. Wang, Z. Bragina. (2021). Changes in sustainable growth dynamics: The case of China and Russia gas industries. Energy Strategy Reviews, 33, 100586.

[113] Ding, X., et al., (2023). Financial Profitability Evaluation and Forecasting Using the Deep Learning: A Case of the Chinese Petroleum Industry. Montenegrin Journal of Economics, 19(4), 55-64.

products and natural gas, while idle capacity in the oil and gas sector continues to dwindle. The combination of declining inventories and a gradual return to demand levels seen prior to the outbreak of Newcastle Pneumonia has resulted in a rise in energy prices. Furthermore, the oil and gas supply chain has been impacted by anti-Russian sanctions imposed by the US. Additionally, the lack of investment in the supply chain has resulted in increased energy prices. To ensure adequate oil and gas reserves after the conflict's conclusion, enhanced worldwide investment within the industry is imperative. In the long term, the conflict will inevitably alter the market position of significant oil and gas exporting nations including the US, Saudi Arabia, and Iran. As a result, the global oil and gas supply and demand balance will become further imbalanced[114].

Based on data from OPEC, IEA, and EIA, global oil demand is expected to reach its peak in 2025, over a decade earlier than the baseline scenario. It is then predicted to gradually decrease to 1.62 billion tonnes by 2050, which is 2.72 billion tonnes less than the 2015 level. Oil transport is expected to reach its peak around 2025 before experiencing a rapid decline, reaching 390 million tonnes in 2060. As a result, its share of overall oil demand is anticipated to decrease from 58.3% to 23.8%. Conversely, chemical oils are projected to experience some growth, with a peak around 2030 and a relatively stable trend thereafter, ultimately accounting for 63.6% of oil demand, up from 18.5%. Regionally, all areas contribute to the sustainable development of the oil industry and fulfilling worldwide demand by utilizing low-cost resources from existing fields and discoveries. As a result, oil production's share in the Middle East (advantage in resources) and the Americas (advantage in resources and technological advancement) has risen, while other regions' share has decreased. By 2050, the oil production in the Middle East is anticipated to reach 610 million metric tonnes, representing 37.8% of the worldwide volume, which is a 5.4 %age point rise from 2015. In comparison, the Americas are projected to account for 30% of the global volume, indicating a 1.4 %age point increase. The global natural gas reserves are extensive, environmentally friendly, and emit low carbon. The China Institute of Petroleum Economics and Technology (CIPET) predicts an estimated growth to 4.8 trillion cubic meters by 2040, an increase of 36.6% from 2015. Almost 2.5 trillion cubic meters of gas will be consumed for power generation, 91.5% higher than 2015 and accounting for 52% of the growth. After 2040, gas demand is expected to decline to 2.4 trillion cubic metres in 2050 due to the ongoing advancements in energy storage, hydrogen power, smart grid and other technologies, alongside emission reduction targets. This projection represents a 60% reduction from the baseline scenario and a 29.3% decrease from 2015 levels. Gas demand

[114] Thorbjörnsson A, Wachtmeister H, Wang J., et al., (2015). Carbon capture and coal consumption: Implications of energy penalties and large scale deployment. Energy Strategy Reviews, 7, 18-28.

declines to varying extents in all regions after 2040. The largest declines are seen in Asia-Pacific (48.6%), followed by the Middle East (19%), Eurasia (25.6%), and North America (23.2%). By 2060, North America, Central and South America, Asia Pacific, Europe, CIS, Middle East and Africa account for 23.6%, 7.5%, 17.5%, 3.6%, 18.2%, 19.2%, 19.2%, 19.2%, 19.2%, 19.2% and 2060 respectively, of global production. This represents increases of 18.2%, 19.2% and 10.4%, with declines of -3.6%, 1.9%, 2.1%, -3.2%, -2.3%, 1.1% and 4% from 2015, respectively.

2.2. Assessment of possibilities for realising the financial potential of the oil and gas industries of the Russia and the PRC

According to the Yearbook of World Energy Statistics, China's energy market experienced a 2.1% increase in primary energy demand in 2020, compared to an average annual growth rate of 3.8% over the previous decade. Additionally, there was a growth of 1.7% for oil consumption and 6.9% for gas consumption. Fossil fuel production, including coal, oil, and gas, continued to grow slowly, with a growth rate of 1.7% for oil and 9.0% for gas in 2020. The dependency on oil imports has stabilised, standing at 73%, while the share of gas imports has dropped to 41%.

Russia is the largest net exporter of oil and gas in the world. Despite the epidemic's impact, oil production endured an 8.7% decline, down to 10.7 million bpd, and gas production reduced by 6.2%, down to 63.8 bcm. Nevertheless, Russia remains the third largest producer and exporter of oil (second in 2019) and the second largest producer of natural gas, whereby oil and gas represent 17% and 12% of global production, correspondingly. Oil exports decreased by 11% to 7.3 million barrels per day (bpd), whereby Europe and China present Russia's primary oil export markets. Natural gas exports also decreased by 8.7% (to 238 bcm). Figure 9 illustrates the trends in oil and gas production and consumption in Russia and China during the past 35 years.

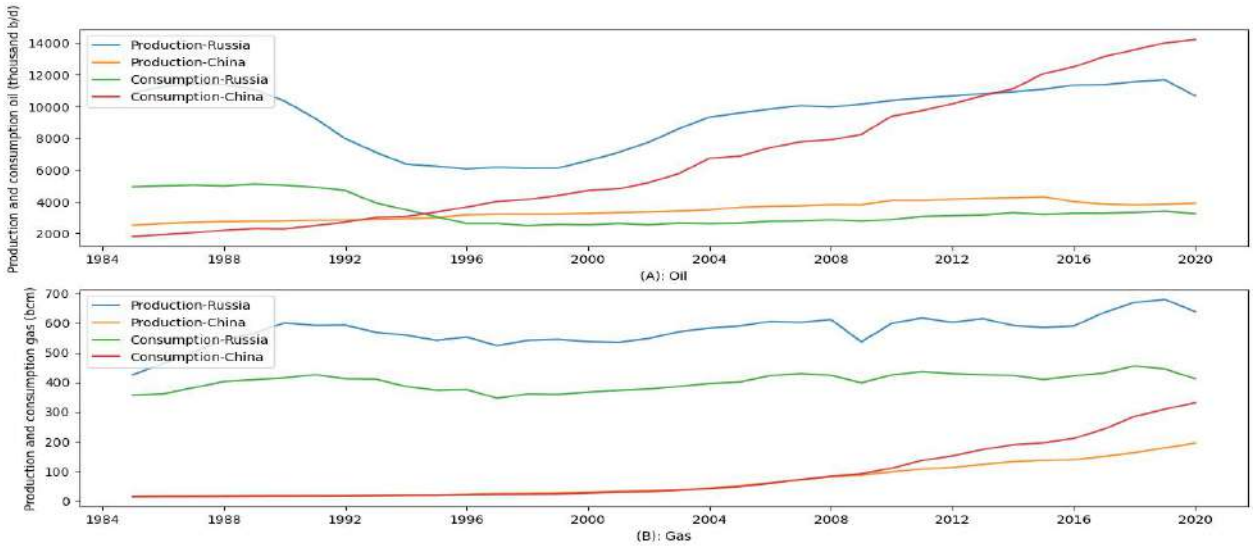

Figure 9 – Trends in oil production and consumption in Russia and China

Calculated by the author on the basis of data: Appendix 1.

World proven oil reserves fell by 2 billion barrels from 2019 to 1.732 trillion barrels by the end of 2020. According to the reserves-to-production ratio, the current level of oil production would sustain for over 50 years. Russia has 107.8 billion barrels of proven oil reserves, accounting for 6.2% of the world's total reserves, with a reserves-to-production ratio of 27.6. Conversely, China has only 20% of Russia's proven oil reserves, amounting to 1.5% of the world's total reserves, with a reserves-to-production ratio of 70% of Russia's. Nonetheless, China's proven oil reserves increased at an average annual rate of 1.8% from 2009 to 2019, while Russia's oil reserves grew gradually at 0.2%. World proven gas reserves in 2020 decreased by 2.2 trillion cubic metres to 188.1 trillion cubic metres. According to the ratio of world reserves to production in the same year, natural gas can be produced at the current production level for another 48.8 years. Russia holds the world's largest proven natural gas reserves of 1,320.5 billion cubic metres, comprising 19.9% of the world's share and a reserve-to-production ratio of 58.6. In comparison, China's proven natural gas reserves make up only 20% of Russia's and 4.5% of the global total, with a reserve-to-production ratio 15.3 lower than Russia's. Currently, Russia's proven natural gas reserves are expanding at an average annual growth rate of 1%, as opposed to China's proven natural gas reserves which are rising at an average annual growth rate of 11.3%.

Following the dissolution of the Soviet Union, Russia implemented a decade-long programme of "shock therapy" aimed at establishing a free market and capitalist system, resulting in a cumulative decline of almost 40% in GDP, 46% in industry and 40% in agriculture. According to Figure 9, oil and gas production in Russia was decreasing and industrial production was stagnant,

leading to a substantial decrease in oil and gas consumption. The production volume in the manufacturing industry of Russia decreased by 54%, with an average yearly drop of 8%[115]. Conversely, China's open policy and positive integration of foreign investments expedited industrial development, leading to a swift rise in oil and gas consumption. High-end industrial equipment and skilled technicians are essential requirements for oil and gas production. China's economy is expanding rapidly. However, without adequate personnel and maintenance equipment, there has been no growth in the production of oil and gas.

Russia has an economy that is heavily reliant on hydrocarbons, with the energy sector dominating the national economy. The structure of industry, trade, and investment in Russia reflects the significant role that natural resources, particularly oil and gas, have always played in the economy. The oil and gas sector represents a critical element for Russia's position as a prominent global force, as well as a significant contributor to the country's foreign exchange earnings and budget revenues. According to the "Strategy for Energy Development in the Russian Federation until 2035," launched in 2020, the energy sector has accounted for approximately one third of Russian investments, one half of exports, around 40% of budget revenues, and 4% of employment[116]. The price of oil is an indicator of the state of the Russian economy and serves as the best predictor of the cycle of economic development. The economic development cycle of Russia closely aligns with the global cycle of commodity prices.

Resource dependence renders the Russian economy exceedingly susceptible to shifts in universal energy rates. Specialists ascertain a correlation coefficient of 0.68 between the escalation of crude oil prices on global markets and the growth of the Russian GDP, unveiling a constructive correlation between crude oil costs and Russian economic expansion. The Russian economy boasts elevated growth figures when crude oil prices are high, yet shrinkage into a recession when prices nosedive. After 2000, there was a surge in foreign investment due to macroeconomic stability and an improvement in Russia's international credit rating. Institutional factors, such as policy adjustments and reforms, also contributed to Russia's economic recovery. In addition, the rapid increase in international oil prices played a crucial role in supporting this recovery.

International petroleum prices increased almost eight times from 1998 to 2008, with Russian crude oil export prices rising from $23 to $ 90 per barrel, refined oil export prices from $174 to

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[115] Russian Manufacturing Industry in the 1990s. [Electronic resource]. - Access mode: URL: https://newsruss.rn/doc/index.php/обрабатывающая_промышленность_России_в_1990-х_годах.

[116] Energy Strategy of the Russian Federation until 2035. [Electronic resource]. - Access mode: URL: https://minenergo.gov.ru/node/1026

$676 per tonne, and natural gas export prices from $85 to $353 per 1,000 cubic metres[117]. Russia's oil and gas production grew rapidly, by an average of 5.1% annually. The significant rise in exports enabled Russia to amass substantial foreign exchange reserves, settle foreign debt, and initiate capital investment. Russia's GDP surpassed the average growth rate of the world economy for ten uninterrupted years from 1999 to 2008. It maintained an impressive annual growth rate of 7%, with total GDP increasing by 94% and GDP per capita rising. In 2007, Russia's total GDP reached $1 trillion, ranking it among the top 10 largest economies globally[118]. The significant increase of funds into Russia has particularly affected the economic stability and prosperity of the country. This has enabled maintenance of a rapid annual growth rate of 7%, enhanced the structure of the pre-existing economy, and further reinforced the resource-dependent character of the Russian economy.

In 2001, China became a member of the World Trade Organization (WTO)[119], which expedited the process of market reform, while the global allocation of resources facilitated restructuring and optimization of the domestic economy, and upgrading of industries. Simultaneously, the 11th Five-Year Plan proposes to implement China's scientific concept of development and achieve comprehensive, coordinated, and sustainable development as its objective. Energy restructuring accelerated, resulting in a decline in coal consumption and a significant increase in demand for oil, with a yearly growth rate of 6.8%. On the other hand, due to limited oil reserves, oil production remained practically unchanged, with only a growth rate of 1.72%.

The Russian economy has been in a state of depression and stagnation since 2009. The financial crisis of 2008, the currency crisis in 2014, and the global health crisis in 2020 caused a decrease in world oil prices, resulting in a grave impact on the Russian economy. The decline in global oil prices has led to a sluggish growth in the production and exportation of oil and gas in Russia. Between 2009 and 2019, Russian oil production increased by an average of 1.4% annually, and consumption rose by 2%. Gas production grew by 2.4% per year, while consumption increased by 1%. Oil exports grew by 1.4% per year, and gas exports rose by 2.8%. Notable factors affecting Russian oil production include the mass protests in Moscow in 2011, conflicts in Georgia, Ukraine, and Syria, as well as seven years of Western sanctions.

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[117] Statistics: Hydrocarbon Exports from Russia. [Electronic resource]. - Access mode: URL: https://ruxpert.ru/Статистика: Hydrocarbons_export_from_Russia.

[118] Russia's GDP by year:1991-2020. [Electronic resource]. - Access mode: URL: http://global-finances.ru/vvp-rossii-po-godam/.

[119] WTO Ministerial Conference approves China's accession. [Electronic resource]. - Access mode: URL: https://www.wto.org/english/news_e/pres01_e/pr252_e.htm

The sudden fall of worldwide crude oil prices in 2014 was induced by a multitude of factors. Economic growth in certain countries fell short of predicted estimates, while EU economies have not been completely relieved of debt. Additionally, slowing economic growth in emerging economies like China and India further exacerbated the issue. Moreover, Japan's economic stimulus policy yielded suboptimal results, ultimately reducing the demand for crude oil in several countries worldwide. The advancement in shale gas development technology in the US has led to swift expansion in shale gas production and decreased the demand for US crude oil imports, along with other influencing factors like global oil overcapacity and Iran and Russia's geopolitical situation. In 2014, Russia's revenue from oil and gas reached approximately $150bn, accounting for 48% of the country's total revenue (roughly 8.9% of GDP). According to calculations by Sberbank, maintaining Russia's budget balance necessitates crude oil prices to remain above $104 per barrel. However, the global oil prices have plummeted to $60 per barrel as the ban on crude oil exports from the US was lifted, and OPEC members competed for the Asian market. The crisis in Ukraine caused 40% of Russian gas exports through the Ukrainian pipeline to halt, significantly impacting Russian gas exports. These exports declined by 10% year-on-year to 203.2 bcm, while oil exports fell by 2% year-on-year.

The USA and Europe have implemented enduring energy sanctions on the four most prominent energy corporations, namely Gazprom and Rosneft, which account for 95% of all profits in the oil and gas sector. These sanctions target political, energy, industrial, financial, and scientific sectors and have restricted Russia's ability to enhance and advance its main sectors, including the energy and military sectors. This ultimately suppresses the Russian economy's overall potential for growth. The sanctions have resulted in a significant devaluation of the ruble and capital outflows, and have had an impact on oil and gas exports. The 2019 Russia Economic Report from the IMF states that unfavorable factors such as Western sanctions and the decline in worldwide oil prices since 2014 have caused annual economic growth rates to be lower than expected. As a result of the sanctions, Russia's economic growth declined by an average of 0.2 % per year. Bloomberg's report on Russia's economy at the end of 2019 indicates a decline of 6% in the growth rate due to Western sanctions imposed in 2014. Moreover, the economy has lost another 4% of growth due to decreasing crude oil prices and inflation[120]. According to official Rosstat data, Russia's Gross Domestic Product (GDP) rose by 8.8 % cumulatively between 2008 and 2019, with an average yearly growth rate of just 0.88 % (refer to Appendix 2), which lags considerably behind the global

[120] Economists have estimated Russia's losses from sanctions at ₽ 800 billion. [Electronic resource]. - Access mode: URL: https://www.rbc.ru/economics/14/08/2019/5d51780c9a7947cd5eb6eb56

economy's average growth rate of 3.5 %. The size of Russia's GDP will diminish from its highest point of $2.289 trillion in 2013 to $1.47 trillion in 2020, returning to the 2009 level. In 2020, commodity prices underwent a decrease and increase due to the epidemic and the OPEC+ agreement that limited production. This resulted in a decline in Russia's exports of crude oil and gas, falling by $72.4bn and $25.2bn, respectively. As a consequence, there was a drop in the share of tax revenues from the oil and gas sector in budget revenues, reducing to 30% from an average of 41% over the previous five years (43% in 2019)[121].

Unlike the depressed and stagnant state of the Russian economy, China's economy excelled by surpassing 40 trillion yuan in 2010 and overtaking Japan, therefore becoming the second largest economy, accounting for 9.2% of the global gross product. Despite the global economic downturn, China managed to maintain more than 6 percent economic growth rates for 10 consecutive years, as shown in Appendix 2. The Chinese government was the initial entity to contain the epidemic, recommence work and production, reverse economic contraction into positive expansion, and augment share of the global economy from 16.3% in 2019 to roughly 17% in 2020. Such rapid industrial advancement substantially amplified the requirement for energy yield. From 2009 to 2019, China experienced an average annual growth rate of 0.1% in oil production and 5.4% in oil consumption, as well as an average annual growth rate of 7.5% in natural gas production and 13.1% in natural gas consumption. Concurrently, China's imports of oil and natural gas grew at average annual rates of 8.8% and 32.4%, respectively. To achieve carbon neutrality, China's energy strategy prioritises energy conservation and efficiency. Consequently, the country has seen a steady increase in oil and gas imports, while the proportion of coal has declined.

Russia possesses vast natural resources, specifically abundant in oil and gas. Whereas, China experiences a shortage of its oil and gas resources. Hence, to meet its demands, China and Russia have sustained mutually advantageous collaboration in oil trade, which dates back to the Soviet era and is still ongoing. Since 1992, when Russia initiated its privatisation policy, the two nations resumed their oil trade cooperation, providing a solid basis for subsequent collaboration in the oil trade. By 2005, as relations between the two sides stabilised, a stage of rapid development was entered, with the momentum of the oil trade cooperation growing. By 2005, as relations between the two sides stabilised, a stage of rapid development was entered, with the momentum of the oil trade cooperation growing. By 2005, as relations between the two sides stabilised, a stage of rapid development was entered, with the momentum of the oil trade cooperation growing. Since 2015,

[121] How Russia was able to reduce its dependence on oil and gas. [Electronic resource]. - Access mode: URL: https://vz.ru/economy/2020/12/18/1076267.html

China and Russia have deepened their trade ties and made significant strides under the "One Belt, One Road" strategy.

Three stages can be distinguished in the energy cooperation between China and Russia.

The first stage is the nascent recovery period from 1995 to 2000. During the 1990s, Russia's domestic economy suffered a severe downturn, and its leader Boris Yeltsin suggested "shock therapy" to rescue the Russian economy from a recession. The Yeltsin era was also distinguished by the growth of the Russian oil industry. However, in reality, the privatisation of the oil industry failed to boost the level and efficiency of oil production, nor did it improve the deplorable state of the Russian oil industry. Instead, it resulted in a significant decline in Russia's overall oil production and labour productivity. During the period spanning from 1991 to 2000, China imported 30 different types of crude oil from overseas and embarked on a quest to obtain foreign investments and businesses. In 1993, the China National Petroleum Corporation (CNPC) undertook a feasibility study to explore and exploit oil fields in Russia's East Siberian region. Concurrently, the Russian government began to encourage its gas, oil and electricity enterprises to export gas and electricity, including those from the Irkutsk region, to China. Overall, the partnership between China and Russia in oil trading from the 1990s to the early 21st century, despite its instability, provided the groundwork for collaboration and trade experience in the further progress of oil and other energy trading between the two nations.

The period of rapid development (2000-2015) marked the second stage in Russia's growth. Unfortunately, these efforts went unanswered. During the early 21st century, Vladimir Putin's presidency brought about domestic political stability, as well as rapid economic development. The government also tightened its grip on energy industries, including oil and gas. In the beginning, Putin made efforts to engage with the West, specifically Europe and the United States. Thus, the focus shifted to the East and a bilateral strategic partnership was forged with China. A number of proposals and frameworks were then put forth for collaboration between China and Russia in areas such as oil, gas, and other energy sources, which were subsequently added to the agenda of the Sino-Russian energy cooperation. The involvement of the Russian and Chinese governments, and the impact of political relations between the two countries, has resulted in sluggish negotiation progress between the companies. Additionally, the presence of checks and balances within local Russian governments and energy corporations, coupled with Russia's energy leadership's strategy, has posed significant challenges to Sino-Russian oil and gas cooperation. During this period, global oil prices rose to $150 per barrel, granting Russia a clear advantage. Amid the 2008 global financial crisis, China and Russia established extensive collaboration in energy trade, particularly in oil and gas. Though Sino-Russian energy cooperation at this time demonstrated vast potential, it also

encountered significant obstacles. In August 2010, the oil transport pipeline between Russia and China commenced oil delivery.

Third stage: stable and sustainable period (2015-present). Significant advancements in China's oil trade with Russia occurred after 2010. Owing to China and Russia's close economic and trade ties, the pace of their trading in upstream and downstream sectors has exhibited marked and rapid growth (Tab. 2). During this stage, China's oil and energy trade with Russia has progressed on the foundation of the completed initial oil pipeline. In January 2011, the oil pipeline from Skovorodino in Russia to Daqing in China launched a branch with a maximum capacity of 15 million tonnes of oil per year. In June 2013, CNPC China and Rosneft, a Russian oil enterprise, conducted an international economic forum in St. Petersburg, Russia, during which they reached and signed a long-term oil supply agreement. The provision obliges Russia to offer China 365 million tonnes of oil in the next 25 years, amounting to roughly $270 billion. The agreement stipulates that Russia will incrementally enhance its oil exports to China, based on the present volume of oil exports to China. The contract's terms extend for 25 years and expire in 2018, once the export level of 30 million tonnes of oil yearly is attained, and may be extended for a further five years beyond the termination date. Since January 2014, China and Russia have been incrementally implementing the five-year oil supply contract, primarily utilizing the Russia-China method of oil delivery by pipeline. The contract can be extended for up to five years after its expiry date. Additionally, Russia has clearly communicated to China its intention to supply over 9 million tonnes of crude oil each year to the Chinese side through a joint China-Russia refinery. Since then, with joint government assistance, China and Russia have engaged in multilateral discussions on crucial matters, reaching consensus on numerous issues. The two nations have made noteworthy advancements and strides in the evolution of the oil trade.

Table 2 – Sino-Russian co-operation projects in the whole oil and gas industry chain

Year	PRC	RF	Areas of cooperation
2009	CNPC	Transneft	Construction of the Sino-Russian oil pipeline, which became fully operational in 2011
2010	CNPC	TNG Group	MCI5570Micro-resistive scanning instrument for sales and maintenance purposes
2013	SINOPEC	SIBUR	Establishment of the Krasnoyarsk synthetic rubber plant, in which the Chinese party acquired a 25 % stake and participates in its management.
2014	CNPC	Gazprom	Construction of the China-Russia Eastern Gas Pipeline, the Russian section of which will start in 2014 and the Chinese section in 2015.
2014	SINOPEC	Novatek	Yamal LNG project, 20 % owned by SINOPEC, 50.1 % by Novatek and 20 % by Total

Continued table 2

Year	PRC	RF	Areas of cooperation
2014	CNPC	Novatek	Participation in the construction of 264 main process modules for the Yamal LNG project.
2014	SINOPEC	SIBUR	Joint venture to establish a nitrile rubber plant in Shanghai, in which SINOPEC holds a 74.9 % stake and SIBUR a 25.1 % stake.
2015	SINOPEC	SIBUR	Conclusion of a deal for the acquisition of SINOPEC's 10% stake in SIBUR
2015	Silk Road Fund	Novatek	Yamal LNG project, 9.9 % owned by Silk Road Fund
2015	SINOPEC	Rosneft	Signing of framework agreement "cooperation in Joint Development of Russkoye and Yurubcheno-Tokhomskoye Fields".
2016	Beijing Gas Company	Rosneft	Sale of 20% stake in Joint Stock Company Verkhnechonskneftegaz

Source: Official website of oil companies[122, 123, 124, 125, 126, 127]

In 2018, China and Russia collaborated in developing the Arctic region, with Russia's East Siberia and Far East oil and gas resources serving as the foremost supply area concerning the global energy geopolitical landscape, and China acting as a substantial present and future oil and gas consumer. In terms of oil and gas supply and consumption, technology, and energy cooperation, China and Russia possess natural complementarities in the most important geographical advantageous areas.

[122] SINOPEC Company [Electronic resource]. - Access mode: URL: http://www.sinopecgroup.com/group/ (date of address: 20.05.2022)

[123] Company MADE IN TATARSTAN [Electronic resource]. - Mode of access: URL: https://madeintatarstan.ru/node/ (date of address: 20.05.2022)

[124] Company NOVATEK [Electronic resource]. - Access mode: URL: https://www.novatek.ru/ (access date: 20.05.2022)

[125] CNOOC Company [Electronic resource]. - Access mode: URL: https://www.cnooc.com.cn/en/ (date of address: 25.05.2022)

[126] SIBUR Company [Electronic resource]. - Access mode: URL: https://www.sibur.ru/ru/ (access date: 25.05.2022)

[127] CNPC Company [Electronic resource]. - Access mode: URL: http://www.cnpc.com.cn/cnpc/index.shtml (date of access: 25.05.2022)

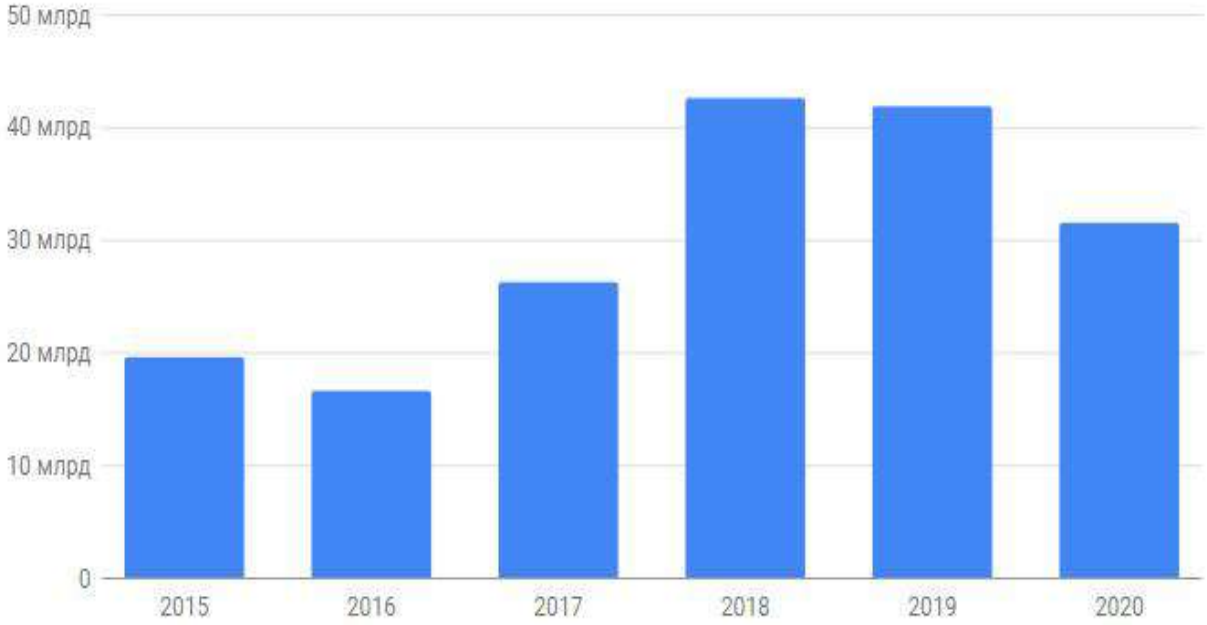

Figure 10 – Dynamics of mineral products exports from the RF to the PRC in 2015-2020

Source: ru-stat.com[128]

As illustrated in Figure 10, mineral exports from Russia to China steadily increased from 2015 to 2019, with a total worth of $17.92 billion and a weight of 604,477 thousand tonnes. Crude oil and petroleum products comprised 95% of the total export volume. China is currently the biggest trading partner of Russia, and both nations share close collaboration in the energy industry. The global economy has stagnated due to the COVID-19 pandemic in 2020. The halt in production within the origin of the outbreak in China has resulted in a decline in oil imports, leading to a corresponding decrease in Russian oil production. This has caused a decline in exports of at least $10 billion.

Russia is the world's leading resource-rich nation, ranking first in natural gas production and reserves, first in iron ore reserves, second in crude oil production and seventh in oil reserves. Russia is the only country worldwide that can independently develop its economy, without having to import resources from overseas. Its economic foundation pivots on the resource and energy sector.

Table 3 – Structure of exports of goods from Russia to China for the period 2015-2020

Product group	2015	2020	Change	∑ (2015-2020)	Share
01 : Animal products	$995 million	$1.89billion	90%	$8.42 billion	3.3%

[128] Federal State Statistics Service [Electronic resource]. - Access mode: URL: https://ru-stat.com/date-M202101-202201/RU/trade/CN (date of reference: 30.05.2022)

Continued table 3

Product group	2015	2020	Change	∑ (2015-2020)	Share
02 : Products of vegetable origin	$163 million	$668million	310%	$2.12 billion	0.8%
03 : Fats and Oils	$91.1 million	$1.08billion	1091%	$2.56 billion	1%
04 : Food, beverages, tobacco	$133 million	$313million	136%	$1.33 billion	0.5%
05 : Mineral Products	$19.7 billion	$31.7 billion	60%	$179.2 billion	70%
06 : Chemical products	$1.32 billion	$892 million	32%	$6.5 billion	2.5%
07 : Plastics, rubber and rubber products	$382 million	$954 million	149%	$3.11billion	1.2%
08 : Leather and fur products	$18 million	$6.4 million	64%	$52.2million	0%
09 : Wood and wood products	$2.22 billion	$3.08 billion	39%	$18.1 billion	7.1%
10 : Books, dissertation, dissertation board	$826 million	$1.21 billion	47%	$5.91 billion	2.3%
11 : Textiles	$15.6 million	$36.9 million	136%	$95 million	0%
12 : Footwear, hats, umbrellas, etc.	$42.1 thousand	$3.3million	7682%	$4.4 million	0%
13 : dissertations of stone, ceramics and glass	$3.4 million	$11.2 million	227%	$53.6 million	0%
14 : Jewellery	$42.3 million	$65.9 million	56%	$445 million	0.2%
15 : Metals and metal products	$380 million	$2.98 billion	683%	$7.21 billion	2.8%
16 : Machinery, equipment and apparatus	$1.56 billion	$2.02 billion	29%	$11.1 billion	4.3%
17 : Transport	$81.2million	$46.5 million	43%	$848 million	0.3%
18 : Tools and apparatus, watches	$150 million	$197 million	31%	$1.23 billion	0.5%
19 : Arms and ammunition	—	—	—	—	0%
20 : Miscellaneous manufactured goods	$4.5 million	$4.4 million	2%	$40.6 million	0%
21 : Works of art and antiques	$734 thousand	$901 thousand	23%	$16.6 million	0%
22 : Hidden section	$485 million	$1,95 млрд	301%	$7,54 billion	2.9%
23 : Other goods	—	—	—	—	0%
Total :	$28,6 billion	$49,1 billion		$255,9 billion	100%

Source: Federal State Statistics Service [Electronic resource]. - Access mode: URL: https://ru-stat.com/date-M201501-202107/RU/trade/CN (date of reference: 30.05.2022)

Table 3 displays that between 2015-2020, mineral products, wood and wood products, and chemicals were the dominant categories of the total volume of Russia's exports to China. These three categories accounted for 80% of the total exports. Among these, mineral products increased

by 60% to $179.2bn, making up 70% of the total exports. Furthermore, petroleum and petroleum products accounted for approximately 95% of mineral products. Whilst total exports from Russia to China are increasing, the export structure is gradually modernising, and Russia has become overly dependent on resource exports, resulting in falling into the "comparative advantage trap".

Energy co-operation has remained the most intense, fruitful and wide-ranging area of practical interaction between the two countries, and serves as the "cornerstone" of economic and trade relations. Russia is China's primary energy supplier, accounting for the majority of their imports for crude oil and electricity.

Energy cooperation is a significant area of practical collaboration between the two countries, and despite the challenges posed by the COVID-19 pandemic, growth in energy trade has continued with the successful promotion of major cooperative projects and expansion into new areas. Both parties are striving to establish a closer energy alliance, collaboratively maintain energy security, and address global climate change.

Over the past five years, several significant collaborations have been underway between China and Russia. These include the construction of the China-Russia Oil Pipeline, China-Russia Eastern Gas Pipeline, Yamal LNG, and Tianwan Nuclear Power Plant Units 1 to 4. Alongside the aforementioned projects, newly initiated developments such as the southern section of the China-Russia Eastern Gas Pipeline, Tianwan Nuclear Power Plant Units 7 and 8, and Xudabao Nuclear Power Plant Units 3 and 4, have been successfully implemented. Furthermore, both nations have cooperated extensively in the areas of green and low-carbon energy transformations, as well as the development of new energy. The collaboration between Russia and China holds significant potential for the advancement of low-carbon energy development, with Russian enterprises already emphasising the supply of low-carbon green energy to consumers. This agenda aligns with the long-term vision for energy development in both nations.

2.3. Research of the current financial situation and dynamics of the oil and gas industries of the Russia and the PRC

Oil and gas production is a capital-intensive industry that demands vast resources. Large-scale exploration and production cannot be feasible without adequate funding. The oil and gas sector requires substantial investments, and hence, partially state-owned enterprises exist in China and Russia. The domestic economic and political landscape in China and Russia is currently experiencing drastic transformations. These changes, whether they involve the deceleration of economic growth or the implementation of reforms for state-owned businesses, inevitably impact

the oil and gas industry. These changes, whether they involve the deceleration of economic growth or the implementation of reforms for state-owned businesses, inevitably impact the oil and gas industry. Since this sector is the backbone of the national economy, it is subject to varying degrees of influence. These changes, whether they involve the deceleration of economic growth or the implementation of reforms for state-owned businesses, inevitably impact the oil and gas industry. Hence, a transition towards modernisation and transformation of this industry is necessary. In the transformation and modernisation of the industry, finance holds considerable importance. To accomplish the strategic objectives of enterprise growth, optimising and modernising financial management is vital. Efficient enterprise management and improved enterprise activity efficiency can be achieved through the optimisation of financial management in oil and gas companies[129].

The oil and gas sector is a crucial subset of the national energy industry. Technological limitations continue to contribute to the uncertainty of future returns for those who choose to take the risk.

- Besides its overall contribution to industrial development, unearthing subterranean oil deposits necessitates significant capital investment due to the high degree of associated risk and industrial monopoly. Compared to other industries, the petroleum industry initially exhibited concentrated features with a high degree of monopoly and large company size.
- Additionally, the oil industry is a component of the resource extraction industry, and its survival and growth is constrained by the finite and non-renewable nature of oil resources. Furthermore, reservoir blocks demonstrate a gradual decline in production as they are depleted. Sustainable development must be founded on replenishing new reserves, which is of considerable significance to oil companies and all nations.
- Declining production and rising costs are inevitable once an oil or gas field is in operation. Additionally, as development continues, so do the associated costs. These inherent characteristics of the oil and gas industry pose significant uncertainties and risks for enterprises. Therefore, an important task for oil and gas and petrochemical enterprises is to establish a sound financial control system, actively implement comprehensive risk management, and effectively resolve and transfer risks.
- Production scales and output plans are subject to regulation. The production and output plans of oil and gas companies are subjected to obligatory limitations by state plans and objectives, distinguishing them from general industrial enterprises. This highlights the state's restrictions on the

[129] A. Steblyanskaya, K. Bi, A. Denisov, Z. Wang, Z. Wang, Z. Bragina. (2021). Changes in sustainable growth dynamics: The case of China and Russia gas industries. Energy Strategy Reviews, 33, 100586.

oil industry's investment scale and their control over petroleum product pricing. The principles of market economy are pertinent to the oil industry. However, they are specific to the industry and go beyond the economic man hypothesis130. Unlike companies in general industries, oil and gas companies cannot solely focus on profit objectives. As a result, they cannot entirely adopt the decision-making, analysis, and evaluation methods and principles of general industry companies.

- The intricacies of the production structure and operational circumstances persist. Although a novel integrated upstream oil company model has been put into practice alongside the development of limited liability oil and gas companies, there has been no significant alteration to the state economy's monopoly status; only a reorganisation of pre-existing oil and gas firms, including the Petroleum Exploration and Production Administration and petrochemical plants. This is a mere restructuring and consolidation of ownership in the oil and gas industry, covering enterprises engaged in oil exploration and petrochemical facilities.

The production organisation of oil and gas enterprises under the current economic model operates as follows: the group head office is accountable for subordinate oil exploration offices based on oil field distribution and size, offices are responsible for subordinate production units based on labour division, and production units are responsible for subordinate production units based on operating procedures. Although the production's organisational structure is comprehensive and efficient, numerous conflicts and contradictions exist within it. For instance, at the board level, the division of labour leads to an unavoidable overlap of production organisation structures among boards. This not only results in conflicts and contradictions between production capacity and business volume but also poses a challenge to production activities due to differing production conditions. As a result, hierarchical pricing and reimbursement of inventory and resources become necessary. These differences significantly impact production efficiency, economic efficiency, and management concepts.

- The non-standardized nature of production and management activities in the oil and gas sector necessitates the disclosure of information regarding production and operating activities. The non-standardized nature of production and management activities in the oil and gas sector necessitates the disclosure of information regarding production and operating activities. This disclosure is crucial for the effective information flow within the enterprise. The disclosure of a company's production and operational activities comprises primarily logistics, capital flow, and property rights flow. Furthermore, it entails the communication and implementation of feedback

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[130] Ding, X. (2022). The impact mechanism of environmental information disclosure on corporate sustainability performance—micro-evidence from China. Sustainability, 14(19), 12366.

relating to decision-making instructions. Although a general and special industry enterprise may appear similar in terms of logistics disclosure initially, there is, in fact, a significant difference between them. For oil and gas companies, logistics is distinct due to the vast majority of physical inputs entering but not leaving the company. Meanwhile, general industry differs significantly, as the logistics process is continuous - the flow enters, leaves, enters again, and so forth. The fundamental difference lies in the product's basic composition. Oil and gas companies deal with crude oil and natural gas, rather than various materials coming into their facilities. This leads to a discontinuous nature in the logistics process of oil and gas companies.

From the standpoint of disclosing capital flow, while both general industrial companies and oil and gas producing companies disclose the process of increasing cash resources, there are notable dissimilarities between their capital flows, which necessitates a different approach to disclosure. For instance, in oil and gas companies, the flow of funds usually involves acquiring mineral rights, paying lease fees, covering drilling and production costs before finally generating revenue through the sale of oil and gas. Nonetheless, the capital flow process is more intricate than in other industries, involving specific steps such as acquiring mineral rights and signing leases.

From an equity flow disclosure perspective, changes in the individual elements such as total contractual and capital investments, capital investment ratio, and capital operating income will impact equity flows. The disclosure of information relating to equity capital flows depends on the diversity and complexity of the components as well as changes in content and measurement methods. The primary distinction between oil and gas producing firms and general industry companies lies in the intricate ownership arrangements concerning mineral interests, including pooling, subdivision, and transfers.

- Assets and asset valuation. Assets are a fundamental aspect of accounting and represent economic resources owned or controlled by a corporation which can be measured in monetary terms. These resources include different types of property, claims, and other rights. Drozhzhina O. S.[131] believes that oil and gas reserves are crucial for the production activities of oil and gas corporations. However, standardised recommendations for disclosing their economic activity and value movement are nonexistent, resulting in description via geological concepts such as prospective reserves, proved reserves, control reserves, and recoverable reserves. The intricacy of these geological concepts, not designed for economic purposes, has frequently caused confusion regarding their economic significance and impeded the proper assessment of reserve assets.

[131] Drozhzhzhina, O.S. Features of the oil and gas industry and their impact on accounting and preparation of consolidated financial statements / O.S. Drozhzhzhina // Vestnik nauki. 2020. №. 11 (32).

The oil and gas industry brand holds a crucial position in the global economy and is indispensable to national oil companies. In 2020, the worldwide oil and gas brands lost an average of 16% of their brand worth, while Russian industry frontrunners amplified their brand worth by an average of 6%.

According to Brand Finance's "Annual Report on Russia's Most Valuable and Strongest Brands in 2021", Russia possesses two of the top five brands in the global oil and gas sector, three of the 50 most valuable brands in Russia and three in China[132]. The oil and gas sector holds the highest brand value in Russia, with almost $1.7 trillion. Oil and gas brands constitute over a third of the total value of the top 50 brands in Russia in 2021, and three out of the top five brands belong to oil and gas companies[133]. The oil and gas industry is not the most valuable sector in China; however, according to the Fortune 500 companies in 2021, two out of the top five and five out of the top 100 Chinese oil and gas firms exist[134]. The substantial number of publicly traded firms in China and Russia has significantly boosted the domestic oil and gas sector's economic growth, thereby enhancing the region and the country's economic robustness[135].

From the viewpoint of the free cash flow hypothesis and the debt control hypothesis, we analysed various objective conditions to realise the financial potential of the oil and gas industries in Russia and China. We accomplished this through regulating free cash flow and optimising capital structure to enhance financial potential.

High economic growth is unattainable without the impetus of the capital market. Capital injection enables the emergence of numerous high-quality listed companies in the oil and gas industry. The presence of listed companies constitutes a crucial impetus for the advancement of the market economy. Moreover, the degree of activity within listed companies indirectly mirrors the development of the market economy. Financial capability, in its entirety, reflects the financial capacity of an enterprise. From a financial perspective, the most accurate indicator of a company's

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[132] OIL & GAS 50 2021-The annual report on the most valuable and strongest Oil & Gas brands. Brand Finance Brandirectory, 2021. [Electronic resource]. - Access mode: URL: https://brandirectory.com/download-report/brand-finance-oil-and-gas-50-2022-preview.pdf (access date: 30.11.2022)

[133] RUSSIA 50 2021-The annual report on the most valuable and strongest Russian brands. Brand Finance Brandirectory, 2021. [Electronic resource]. - Access mode: URL: https://brandirectory.com/download-report/brand-finance-russia-50-2021-preview.pdf (access date: 30.12.2022)

[134] Global 500, Fortune, 2021. [Electronic resource]. - Access mode: URL: https://fortune.com/global500/2021/ (access date: 30.01.2023)

[135] Ding, X. (2022). The impact mechanism of green credit policy on the sustainability performance of heavily polluting enterprises-based on the perspectives of Technological Innovation Level and Credit Resource Allocation. International Journal of Environmental Research and Public Health, 19, 14518.

overall performance is free cash flow. This measurement provides a truthful and objective evaluation of a company's capacity to generate value and reflect its actual surplus. Therefore, free cash flow is a vital expression of a company's financial potential.

Indeed, a company cannot expand without the support of cash flow, and for publicly traded entities, it is their essential resource. A cash flow shortfall can result in a firm's insolvency. Cash flow influences a firm's capacity to establish its market value. Adequate cash flow is crucial for acquiring various resources from the market and is a prerequisite for creating company worth. As a result, the cash flow measurement system has progressively replaced earnings as a crucial benchmark for assessing firms' market values. In essence, firms with superior cash flow typically have a higher value. In recent times, countries across the globe have extensively adopted free cash flow measures for asset management and valuation.

Nonetheless, free cash flow represents a "double-edged sword" for publicly traded firms. While a high level of free cash flow may mirror the company's satisfactory operational performance, it may also reduce financial constraints and encourage investment, eventually compelling a company to seek profitable investment opportunities. However, an excess of free cash flow in listed companies, where operating and ownership rights are separated, may result in an increase in cash under management's control. This can lead to a range of issues, including cost and investment overruns, resulting in agency costs and a significant decrease in the company's value. Listed companies typically utilise debt financing to increase their financial leverage by acting as a supervisor and controlling the debt. This is done to reduce agency costs and to enhance the company's value.

A descriptive statistical analysis of financial data in the oil and gas industry, focusing on the correlation between free cash flow, capital structure, and net assets, is crucial. Accordingly, this section examines the aforementioned indicators in the oil and gas industries in Russia and China with a view to understanding the relationship between them.

If listed companies have substantial free cash flow, they can pay off their debts as they mature, boost their R&D expenditures, buy back issued ordinary shares or increase dividend payments. However, excessive free cash flows often bring about issues such as agency costs.Free cash flow trends in the oil and gas industry in Russia and China are shown as follows (Fig. 11).

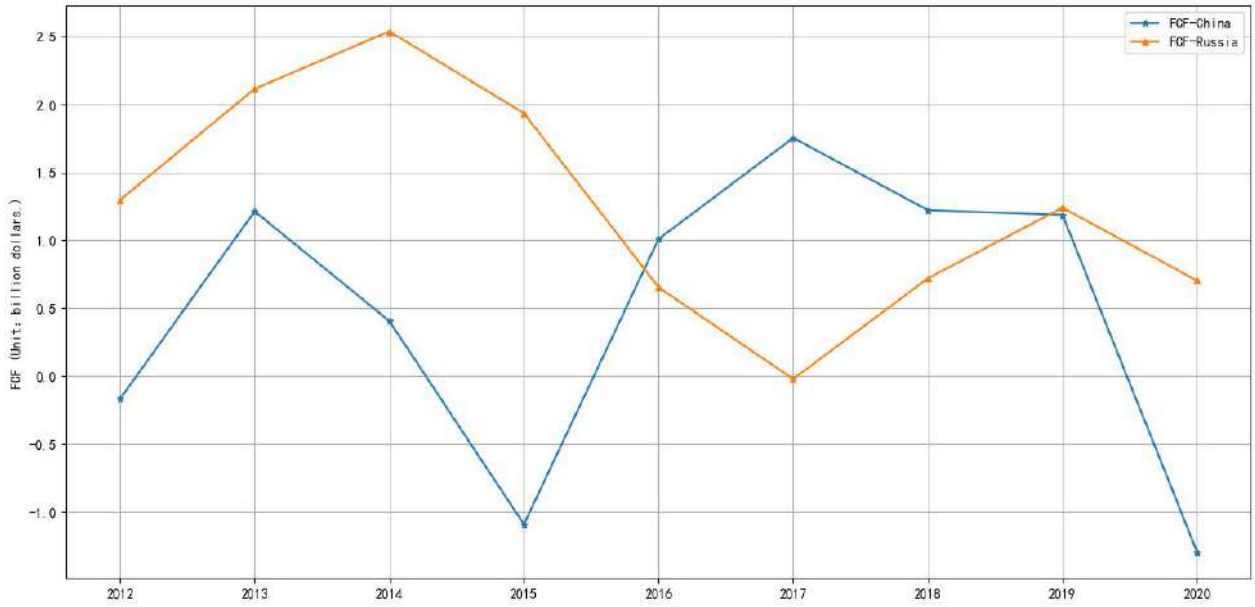

Figure 11 – Free cash flow trends in the oil and gas industry in Russia and China

Source: compiled by the author based on the corporate financial statements.

According to Figure 11, the Russian oil and gas industry has enjoyed consistently positive average free cash flow over the past nine years. In 2014, the industry recorded its highest free cash flow in almost a decade, reaching $2,344bn, thereby helping to ensure sufficient free cash flow to weather economic sanctions imposed by Europe and the United States. Russian oil and gas exports were curtailed following the emergence of the Crimean crisis. Over the course of three years, there was a decline in average free cash flow until it hit a historic low of $0.022bn in 2017. Even though the growth rate of average free cash flow was negative from 2015 to 2017, the fluctuations were insignificant and the growth trend remained stable. The growth rate of average free cash flow is 3368.18%. In 2018, the Russian oil and gas industry began to emerge from the impact of economic sanctions and experience gradual growth. However, the outbreak of the 2020 epidemic, along with supply chain disruptions and a decline in oil and gas prices, resulted in a decrease in net cash flow from operating activities and negative growth in free cash flow.

The average free cash flow within China's oil and gas sector has exhibited alternating periods of positive and negative movement over the past nine years. The average value remained positive from 2017 to 2019. However, it experienced a negative trend between 2013 and 2015, reaching its lowest point in 2015 with a negative growth rate of 370.12%. The free cash flow growth rate reflected a negative trend in 2020 due to the pandemic, with the mean plummeting to $1.298bn. The oil and gas industries in China and Russia had many comparable typical alterations in free cash flows.

From a lender's perspective, the asset to debt ratio indicates a company's assets' capability to back their obligations. Since long-term liabilities span over a prolonged duration, several factors can impact a company's ability to repay debts in a timely manner. To guarantee prompt obligation fulfillment, lenders sometimes necessitate that the company secures assets or equity. From a shareholder and investor perspective, a high gearing ratio reduces the need for share issues and facilitates the maintenance of company control by the original shareholders. It indicates the company's financing approach and operating dynamics. Figure 12 illustrates the capital structures of the oil and gas industries in Russia and China.

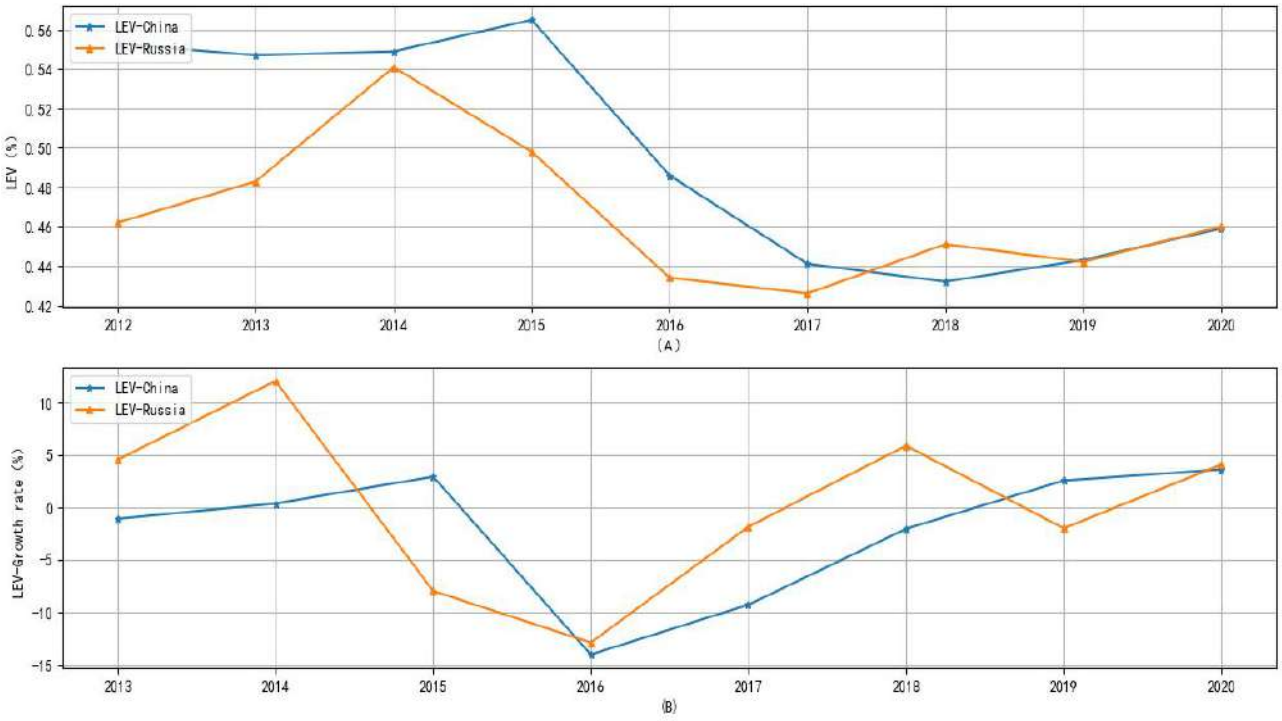

Figure 12 – Capital structures of the oil and gas industry in Russia and China

Source: compiled by the author based on the corporate financial statements.

As illustrated in Figure 12, the average leverage ratio in the Russian oil and gas sector exhibited a recurring upward and downward trend over the past decade, generally staying below 50%. This has facilitated maintaining a relatively stable capital structure. The highest gearing ratio (over 50%) was observed in 2014, while the average gearing ratio was 54.1%. The shareholders' equity currently cannot cover the creditors' liabilities, posing a greater financial risk for them. Furthermore, the average gearing ratio's growth rate reached 12.18%, followed by four years of negative growth, with oil and gas firms actively optimising their capital structure. In 2017, the leverage ratio in the Russian oil and gas industry reached 42.6%, indicating low levels of financial and operational risk, alongside better control over financial leverage.

Chinese oil and gas companies displayed similar trends of a recurring rise and fall in their leverage ratio over the past decade, comparable to Russia's. However, China's oil and gas industry's overall debt level is higher than Russia's. The company's leverage ratio surpassed 50% for four successive years, starting from 2012 and peaking at 56.5% in 2015. While the operational profits are generated by the shareholders utilising a minor share of the equity capital, it raises the risk for the creditors. Furthermore, in 2016, the average debt ratio dropped below 50%, making it the first time and ensuring a relatively secure capital structure. Since then, the overall average leverage ratio has remained at approximately 45%, with slight recovery in 2019 and 2020. Oil and gas companies with high debt ratios may incline towards divesting their oil and gas assets amidst declining oil prices catalysed by the Ukraine crisis in 2015 and the epidemic in 2020.

Low oil prices expose companies with high debt ratios to heightened financial risks. To maintain their financial stability, companies may choose to liquidate their oil and gas assets. This leads us to infer that the Chinese oil and gas industry is more actively engaged in mergers and acquisitions than its Russian counterpart.

The net asset method, one of the property approach methods, was employed. According to this technique, the market value of an enterprise is equal to the book value of its equity. The net asset values of oil and gas firms in Russia and China are displayed in Figure 13.

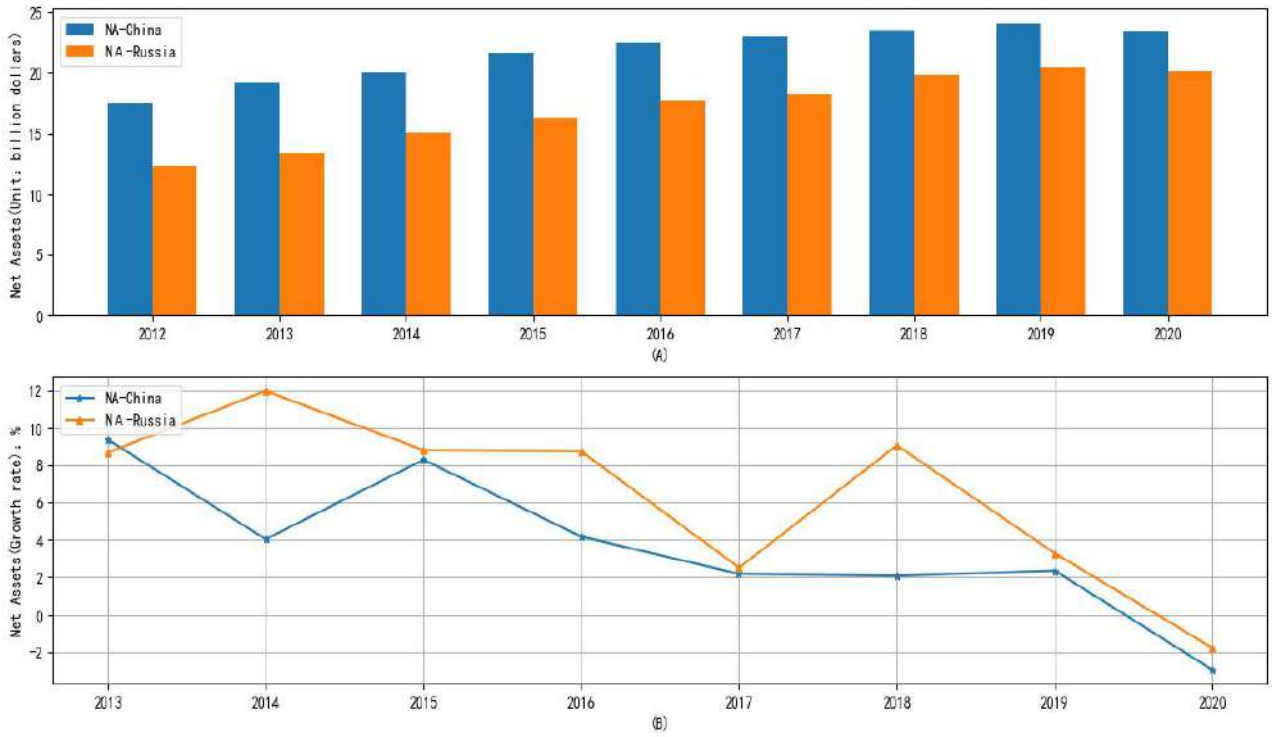

Figure 13 – Net asset value of oil and gas companies in Russia and China

Source: compiled by the author on the basis of the corporate financial statements.

The Russian oil and gas industry saw a consistent growth in average net assets over the past ten years. The value of companies was a mere $12.34bn in 2012 but peaked at $20.52bn in 2019, denoting a growth of nearly 66.3% from 2012. However, the net assets decreased in 2020 due to the COVID-19 pandemic. The growth rate of average net assets illustrates this trend more clearly: corporate net assets experience positive growth from 2012 to 2019, maintaining an approximately 8% growth rate in all years except 2017 and 2019. In 2020, growth becomes negative, with a rate of -1.77%, yet the overall value does not fall below $20bn.

Average net worth in China's oil and gas industry has manifested a year-over-year upward trend over the previous decade. In 2012, the average value of companies was merely $17.583bn, but it peaked in 2019 at $24.099bn, representing an increase of approximately 37.1% compared to 2012. However, the peak is still lower than Russia's impressive 66.3%. This implies that the Russian oil and gas industry demonstrates greater potential for net asset growth. The company's net asset growth rate is a clearer reflection of this trend, with positive growth between 2012 and 2019, but except for 2013 and 2015, the growth rate remained at only about 3% in the remaining years. In 2020, the COVID-19 pandemic caused a negative growth in net assets for the first time, decreasing by -2.86%. Despite a smaller decline, the epidemic had a negligible impact and net assets remained around $23 billion.

The size of a company may moderately influence its value. At present, state entities exercise some form of control over oil and gas firms in both China and Russia, who possess monopolistic power, enjoy advantages of scale, effortlessly gain external financing and frequently surpass their smaller competitors in operational performances. Bearing in mind the correlation between company size and worth, the total worth of assets in books serves as an indicator of size. Companies face pressure to make debt service payments regardless of whether it is short-term or long-term debt. Such payments can influence a company's financial decision-making and its capacity to sustain operations. When debt levels are high, a company's exposure to financial risk rises, and the most commonly applied metric of a firm's capital structure is the gearing ratio.

Jensen Michael[136] formulated the "debt control" hypothesis, which contends that debt can exert a controlling influence and that, as free cash flows rise, companies increase their debt ratio, thus curbing agency costs. The examination of free cash flow and debt ratio supports the conclusion that when free cash flow increases in China's oil and gas sector, the debt ratio also rises concurrently, confirming the "debt control" hypothesis. It can be concluded that there is a positive

[136] Jensen, M. C. (1996). Agency costs of free cash flow, corporate finance, and takeovers. Corporate Bankruptcy, 11, 11-16.

correlation between free cash flow and leverage in the oil and gas sector of China[137]. Conversely, data on the Russian oil and gas industry demonstrates that free cash flow and debt ratio exhibit an approximately opposite trend, indicating a negative correlation between them. Companies with high levels of free cash flow but relatively low growth rates tend to be susceptible to agency costs. Therefore, a decrease in the growth rate indicates that the company lacks superior investment prospects, while it could have retained greater free cash flows by refraining from increasing current dividends and sharing profits with shareholders. As a result, company management has the opportunity for excessive spending and corruption, which undermines investors' confidence in the company's potential and reduces its valuation. It is not feasible to establish a correlation between free cash flow and net asset trends in the oil and gas sector of Russia and China.

When a company opts for debt financing, it markedly heightens its debt ratio and endures greater debt service pressure. Additionally, the rising leverage effect results in heightened financial risk, amplifying the chances of experiencing a financial crisis and ultimately, bankruptcy. In this scenario, the lender and shareholders will enhance the required interest rate, which will lead to a substantial increase in the company's financing costs. Additionally, when an organisation secures a loan, it typically agrees to various binding terms with the creditor that could affect its regular operations and diminish its value to some degree. As a result, the company's value will decrease. Considering the developments in the trends of free cash flow and net asset flow in Russia and China's oil and gas industry, we can infer that they share a negative correlation.

Table 4 – Descriptive analysis of financial indicators of the oil and gas industry in Russia

Indicator	Net assets	Free cash flow	Debt ratio	Company size	Net profit growth rate	Return on net assets	Fixed assets turnover rate
Mean	17.071	1.141	0.466	31.670	0.538	0.111	237.141
Standard deviation	33.751	3.146	0.260	51.957	0.827	0.258	476.146
Min	0.155	-2.881	0.058	0.214	-0.546	-0.702	0.472
25%	0.503	0.003	0.277	3.036	0.085	0.101	1.052
50%	4.478	0.245	0.383	8.645	0.374	0.172	4.152
75%	13.116	0.809	0.733	22.797	0.867	0.254	40.774
Max	122.261	10.459	0.852	169.068	2.798	0.299	1452.775

Calculated by the author according to the data: Appendix 3.

Table 4 illustrates that the 13 Russian oil and gas companies selected for the period 2012-2020 had an average net worth of $17.071 bn. There was a considerable spread between the maximum

[137] Ding, X. (2023). Exploring the impact mechanism of executives' environmental attention on corporate green transformation: evidence from the textual analysis of Chinese corporate management discussion and analysis. Environmental Science and Pollution Research, 30(31), 76640-76659.

value of $122.261 bn and the minimum value of $0.155 bn, indicating a high degree of polarisation between Russian oil and gas companies. However, the third quartile is $4bn less than the average, which suggests that most companies have a lower net worth. The mean free cash flow is $1.411 bn, implying a high likelihood of agency cost problems due to the considerable variance between the maximum ($10.459 bn) and minimum ($-2.881 bn) flows among Russian oil and gas firms. The debt ratio mean is 46.6%, enabling a more realistic level of control. With a standard deviation of 0.260 and a noteworthy difference between the highest (85.2%) and lowest (5.8%) values, the debt ratio of oil and gas companies in Russia presents a polar trend. While the standard deviation is minor and fluctuations are relatively stable, the size of a company and the level of leverage employment result in a distribution of leverage ratio displaying pronounced polarity.

The average total assets amount to $3.167 bn, with a maximum of $169.068 bn and a minimum of only $0.214 bn. Additionally, the median asset value stands at $8.645bn. This demonstrates that there is a growing diversity in the size of companies within the Russian oil and gas industry which may not align with the pace of development. The average net profit growth rate was 53.8%, suggesting a generally positive trend. The significant variance between the maximum value (279.8%) and the minimum value (-54.6%) together with the median value of 37.4% suggests that the mean value is not a precise reflection of the growth characteristics of the sampled firms. Furthermore, the disparities in growth potential between oil and gas companies are relatively substantial. The oil and gas industry's profitability is typically scant, averaging only 11.1%. Furthermore, the considerable disparity between the highest value (29.9%) and the lowest value (-70.2%) manifests the industry's volatility and instability. The greatest and lowest fixed asset turnover ratios imply a notable discrepancy in the operative ability of Russian oil and gas corporations.

Table 5 – Descriptive analysis of the financial performance of China's oil and gas industry

Indicator	Net assets	Free cash flow	Debt ratio	Company size	Net profit growth rate	Return on net assets	Fixed assets turnover rate
Mean	21.680	0.470	0.497	40.846	-2.516	0.027	59.846
Standard deviation	60.493	1.652	0.150	111.420	8.329	0.067	222.382
Min	0.050	-0.167	0.129	0.138	-34.364	-0.161	0.626
25%	0.522	-0.005	0.444	1.413	-1.557	0.010	1.808
50%	0.881	0.020	0.498	2.139	-0.047	0.041	3.065
75%	1.834	0.174	0.615	5.144	0.235	0.074	6.854
Max	223.885	6.849	0.665	403.080	0.985	0.104	922.099

Calculated by the author according to the data: Appendix 3.

Table 5 displays that the mean net value of the 17 oil and gas enterprises sampled in China for the duration of 2012-2020 is $21.68 billion, with a substantial discrepancy between the highest value ($223.85 billion) and the lowest value ($0.050 bn). The third quartile falls below the mean, suggesting a polarization trend among the sample businesses and signifying that over 75% of the companies possess a relatively small value. The average free cash flow is 0.470 bn and the median value is 0.020 bn, suggesting that at least half of the companies under examination do not incur agency costs. The significant gap between the highest (6.849 bn) and the lowest (-0.167 bn) value indicates a marked diversity in free cash flows across the studied Chinese oil and gas industry businesses.

The average leverage ratio is 49.7% which is consistent with the median value, suggesting that this average is indicative of the realized capital structure. Moreover, the difference in leverage among sample companies is not noteworthy. The average total asset value amounted to $40.846bn, ranging from a minimum of only $0.138bn to a maximum of $403.080bn. Despite a standard deviation of 111.420, indicating substantial variability, most of the companies are not large. The average net profit growth rate was -251.6%, signalling a predominantly negative growth trend. The significant range between the highest and lowest values, together with the relatively high degree of variance in the sample standard deviation, suggests noteworthy differences in growth potential across the sample companies. The overall profitability is meagre, with an average of only 2.7% and a considerable gap between the highest value (7.4%) and the lowest value (-16.1%), revealing substantial variability and instability in profitability. The fixed asset turnover ratio's average value was 59.846, signifying an overall high level and indicating that the examined companies had a robust operational capacity.

Conclusions for Chapter 2

1. Demand and price changes are the fundamental factors affecting corporate profitability. The oil and gas markets in 2020 experienced an unprecedented collapse in demand due to the devastating impact of COVID-19 and a sharp fall in transport demand, resulting from global embargo policies. Simultaneously, the global energy production and demand chain faltered, leading to a significant decline in global oil and gas prices.

2. An analysis was conducted to identify the primary factors responsible for significant global oil price fluctuations in the last two decades. 3. These factors comprise the US subprime financial crisis in 2008, the lifting of the ban on shale gas exports in 2015 to attain energy self-sufficiency, and the 2020 pandemic outbreak.

3. The Russian economy is primarily reliant on hydrocarbon sources, with the energy sector exerting considerable influence on the national economy. The oil and gas sector holds the highest brand value in Russia, valued at nearly $1.7 trillion. While not the most valuable industry in China, it serves as a fundamental pillar of the national industry. The significant presence of listed companies in China and Russia greatly contributes to the development of the oil and gas industry, significantly bolstering each country's economic vitality.

4. Since 2015, China and Russia have strengthened their trade cooperation and achieved notable advancements through the "One Belt, One Road" initiative. The energy cooperation between China and Russia follows three distinct stages. There exist inherent synergies between China and Russia in the key geographical regions for oil and gas supply and consumption, technology and energy cooperation.

5. The financial environments of Russian and Chinese oil and gas industries share several similarities. Among them is the negative correlation of leverage ratio with company value. A high leverage ratio elevates the financial risk of a company and raises the possibility of encountering insolvency when creditors demand augmented profits and financing costs increase, thereby diminishing the worth of the company. Additionally, the value of the company is positively associated with its free cash flow. Free cash flow is vital to a company's current operations, and having enough of it not only establishes the groundwork for investment expansion, but also boosts the portion of earnings that are held onto.

CHAPTER 3. ANALYTICAL METHODS OF IMPROVEMENT OF FINANCIAL POTENTIAL MANAGEMENT MECHANISM OF ENTERPRISES

3.1. Analysis and assessment of financial potential management of oil and gas enterprises of the Russia and the PRC

Innovative shale oil technologies, the development and employment of novel energy sources, and regional military conflicts are prompting profound changes in the international energy landscape and heightened uncertainty in the external business milieu for oil corporations. Governments have reached a consensus on measures like controlling methane emissions, facilitating clean energy shift, and decarbonisation[138]. Oil price volatility impacts not only the operating income of oil companies but also the operating performance of non-financial companies. Additionally, high oil price volatility exposes companies to an increased risk of bankruptcy[139]. The fully completed COVID-19 epidemic has significantly impacted the global economy and energy markets. However, a stable macroeconomic environment in the post-epidemic period could stimulate growth in oil demand. Rapid economic growth has infused substantial capital into the oil industry, ultimately leading to a significant boost in the rapid growth of oil companies. Consequently, this has considerably enhanced the economic vitality of countries and regions[140]. However, the operational longevity and economic benefits for enterprises mainly depend on their financial potential.

LUKOIL ranks among the largest vertically integrated oil and gas firms and the second largest private oil company globally. The company engages in exploring, developing, producing, and selling oil and gas, as well as petrochemical products. Primary operations, including exploration and production, occur in Russia, with Western Siberia representing the primary hydrocarbon base. The majority of the company's products are sold internationally, including in Russia, Eastern Europe, CIS countries, and the United States of America. The company holds about 1.3% of global oil reserves and contributes about 5.1% to global oil production. It plays a vital role in the Russian

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[138] The UN Climate Change Conference in Glasgow, COP26, 2021. [Electronic resource]. - Access mode: URL: https://unfccc.int/sites/default/files/resource/cma3_auv_2_cover%2520decision.pdf (date of reference: 30.02.2023)

[139] Gupta, K., & Krishnamurti, C. (2018). Do macroeconomic conditions and oil prices influence corporate risk-taking? Journal of Corporate Finance, 53, 65-86.

[140] Feng, L.Y., & Wang,Y. (2009). The Impact of the Financial Crisis on the Russian Oil Industry. Russian Central Asian and East European Studies, 2, 10-11.

energy sector, representing 36% of Russia's complete crude oil production and 48% of Russia's total crude oil refining and refining throughput.

China National Petroleum Corporation (CNPC) is a significant participant in the global oil and gas industry, producing and marketing oil and gas on a large scale in China. The CNPC is involved in diverse petroleum, natural gas, and alternative energy projects, comprising exploration, development, production, and sales of crude oil and natural gas, refining of crude oil and petroleum products, production and vendition of basic and derivative chemicals and other chemical products, vendition of refined products, transportation of natural gas, crude oil, and refined products and sales of natural gas.

In 2020, CNPC achieved significant success in oil and gas exploration with the discovery of new fields, expansion of investments, and increased reserves of high-quality exploratory oil and gas. In 2020, CNPC achieved significant success in oil and gas exploration with the discovery of new fields, expansion of investments, and increased reserves of high-quality exploratory oil and gas. Furthermore, the company has demonstrated their potential to utilize new assets. Exploration at greater depths and in shallow fields continued successfully, and unconventional resources have increased in percentage of newly discovered oil and gas reserves.

Table 6 – Domestic oil and gas reserves and exploration activities

Indicators	2018	2019	2020
Increase in explored geological reserves of natural gas (bn m3)	541,9	569,8	584,6
Two-dimensional seismic survey (km)	24885	26813	18182
Three-dimensional seismic survey (square km)	8764	7843	12570
Number of exploration wells	1656	1774	1803
Number of prospecting wells	865	986	997
Number of appraisal wells	791	788	806

Source: compiled by the author based on the data of the Sustainable Development Report[141]

In 2020, newly explored areas increased China's geological reserves by 633.16 million tonnes of crude oil and 584.6 billion cubic metres of natural gas. In the previous year, the company prioritised the expansion of new oil fields and stabilising production in existing areas to organise crude oil production. The year yielded a production of 101.02 million tonnes of crude oil, still

[141] CNPC Company [electronic resource]. Mode of access: http://csr.cnpc.com.cn/cnpccsr/csrreport/shzrbg.shtml (date of access: 30.02.2023)

higher than 100 million tonnes. The implementation of significant production facility projects was enabled by increasing low-cost development, closely managing newly constructed production facilities and applying technological control. Detailed exploration of shallow reservoirs in older oil fields is necessary. Furthermore, it is essential to execute sizeable projects that focus on product testing, water injection and long-life well management. Additionally, the exploitation of horizontal wells, pad wells and rig applications should be broadened. Promotion of Internet of Things (IoT) in oil and gas production should accelerate the establishment of digital fields. After six years of construction, fields such as Changqing, Southwest, and Dagang have accomplished full digitalisation.

Table 7 – Data on refining and petrochemicals in China

Indicators	2018	2019	2020
Volume of oil refining (million tonnes)	14709.2	15244.6	16236
Refinery utilisation (%)	80.9	80.8	83.1
Production of petroleum products (million tonnes)	9932.4	10350.9	11290.9
Petrol	3797.4	4098.1	4590.4
Paraffin	931.8	1017.7	1254.4
Diesel fuel	5203.2	5235.2	5446
Lubricating oil production (million tonnes)	116.4	163.6	160
Ethylene production (million tonnes)	558.9	576.4	556.9
Synthetic resin production (million tonnes)	919.9	940.4	916.5
Synthetic fibre production (million tonnes)	6.1	5.8	5.2
Synthetic rubber production (million tonnes)	76	80.9	86.9
Urea production (million tonnes)	190	143.9	82.8
Synthetic ammonia production (million tonnes)	152.9	136.3	105.1

Source: compiled by the author based on the data of the Sustainable Development Report[142].

In 2020, the corporation's refining and chemicals business pursued ongoing efforts to streamline operations and measure performance. Additionally, the refining and chemical equipment operated consistently, with an accelerating pace of transformation and modernisation. Key projects were making steady progress, while the product mix was continually adjusted to achieve optimal results. Refining and chemical processes maintained high levels of efficiency. The company has a strategic plan to enhance the technological efficiency of its refineries, including integrating refining and chemical processes, delineating market boundaries, and optimising resource allocation based on demand and unit characteristics. In 2020, the company produced 5,57 million tonnes of ethylene, 11,291 million tonnes of refined petroleum, and 16236 million tonnes of crude oil.

[142] CNPC Company [electronic resource]. Access mode: http://csr.cnpc.com.cn/cnpccsr/csrreport/shzrbg.shtml (date of access: 30.02.2023)

In 2020, the company pursued enhanced refinery business management, intensified production control, bolstered operational optimisation and aimed to perpetually enhance long-term profitability and equipment performance. The equipment operations remained stable at a rate of 99.66%. The domestic market for petroleum product sales signified an abundance of resources, preference for clean energy implementation and diverse participation in the industry, leading to intensifying competition. The company advanced its integration of wholesale and retail operations, enhanced its active and quality marketing strategies, implemented regional marketing campaigns, and diversified its promotional techniques.

Table 8 – Data on oilfield technical services provided by CNPC

Indicators	2018	2019	2020
Geophysical survey			
Volume of two dimensional seismic survey work (km.)	162684	154904	105739
Volume of three dimensional seismic survey work (sq. km.)	58120	57182	76702
Well drilling			
Number of wells drilled	9328	11687	11264
Volume of drilling penetration (million metres)	19,50	25,79	25,71
Logging			
Volume of logging operations (wells/unit)	79231	101531	106963
Underground operations in a well			
Volume of underground operations in the well (wells/unit)	112643	110844	87007
Volume of formation sampling testing operations (reservoir)	8515	9237	11969

Source: compiled by the author based on the data of the Sustainable Development Report[143]

In 2020, the engineering technology services company underwent reform and reorganisation, which resulted in significant progress through top-level design optimisation, process improvements, new service models, and other initiatives. To address the increased pressure in the domestic market, we are augmenting the use of resources such as deep drilling rigs, fracturing machines, coiled tubing, and more, to perform comprehensive drilling and fracturing operations under winter conditions. We are applying cutting-edge technologies to improve the quality, speed, and efficacy of the project. Our impressive expansion overseas has garnered successful outcomes as the value of contracts in established markets like Algeria, Niger, and Pakistan has doubled. Moreover, we have secured multiple geophysical exploration and drilling projects of immense significance in the UAE, Saudi Arabia, and Kuwait. The organisation intends to recruit 8,176 engineering teams by 2024 to serve the oil and gas industry in 53 countries. Its services include geotechnical surveys, drilling, logging, well logging, offshore engineering, and other technical offerings.

[143] CNPC Company [electronic resource]. Mode of access: http://csr.cnpc.com.cn/cnpccsr/csrreport/shzrbg.shtml (date of access: 30.02.2023)

Additionally, the corporation executes offshore technical engineering projects in a variety of offshore regions, including the South China Sea, Bohai Sea, and Persian Gulf. These projects involve drilling, completing wells, cementing, offshore testing, production and designing offshore structures. The corporation deployed twelve offshore drilling and production platforms and executed a total of 72,000 metres of offshore drilling by the end of the year. In 2020, the company completed 97 significant construction projects, both domestically and abroad, across the oil and gas, refining, chemical industries, oil and gas storage, transport and environmental engineering sectors.

Effective risk management and control is imperative for ensuring business continuity. Financially driven inefficiencies and insolvency can often result from insufficient and unscientific financial risk assessments. While it is important to improve the company's risk tolerance, it is equally crucial to establish robust financial risk control systems in order to facilitate information flow, align branches with the head office's strategic intent, and achieve overall strategic goals. Therefore, it is necessary to set up an adequate corporate system to monitor and assess the company's financial hazards.

Global political, military and health events, including the Arab Spring in Arab countries during 2010, the Ukrainian crisis in Russia and Ukraine during 2014, the COVID-19 outbreak in 2020 and the Russian special operation in Ukraine during 2022, have resulted in significant fluctuations in oil prices. This will have a considerable impact on the operations of oil and gas companies in Russia and China. At the same time, the proliferation of new alternative energy sources, coupled with environmental policy restrictions and various other factors, has hindered efforts to rectify the oversupply predicament. Currently, global prices for oil and gas are relatively stable. Nevertheless, some consumers in certain markets favour lower-priced products, leading to a persistence of enterprises' hidden concessions. Local refineries employ various marketing methods to capture market share through low prices and open sales returns. The market for petroleum products will remain composed of diversified competition models. LUKOIL operating activities are shown as follows (Fig. 14).

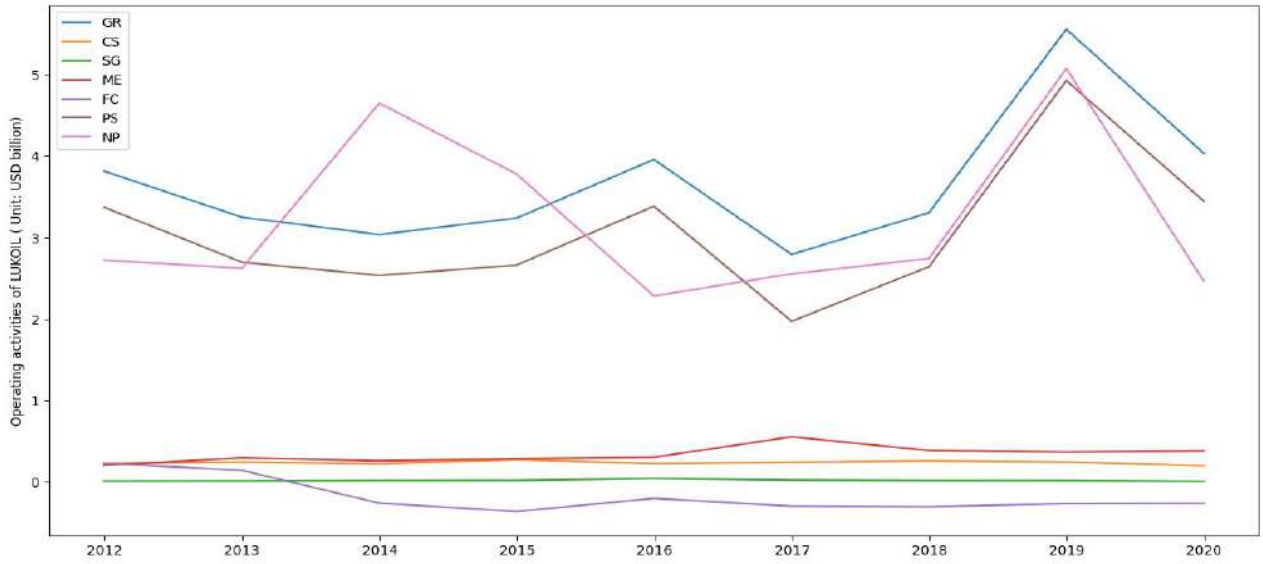

Figure 14 – Operating activities of LUKOIL in 2012-2020

Source: compiled by the author based on the corporate financial statements.

Figure 14 illustrates an alternating upward and downward trend in revenue (GR) from 2012 to 2020, with profit on sales (PS) following an identical pattern. The year 2013 experienced a 20% year-on-year decrease in operating profit, and a 3.6% year-on-year decrease in net profit due to a simultaneous increase in cost of sales (CS), selling expenses (SG), and management expenses (ME). Lower crude oil prices and an 83.8% increase in management costs resulted in sales revenue of $2.793 billion in 2017, down 27.4% year-on-year. Operating profit fell below $200 million to $1.972 billion, down 41.7% year-on-year.

In 2019, operating revenue increased 68.1% year-on-year to $5.556 billion, driven by higher oil and gas prices and higher sales volumes. Consequently, as a result of reduced costs (whereby the cost of sales saw a reduction of 5%, selling expenses decreased by 1.1% and management expenses decreased by 5% year-on-year), the highest earnings from sales reached $4.927 billion, which was an increase of 86.5% compared to the previous year, and the maximum net profit was $5.073 billion, which was an 84.9% rise from the year before. The Russian technology in the upstream and downstream sectors has reached maturity, and the technicians possess extensive experience in their respective fields. Therefore, the overall change in cost of sales is insignificant and stable, remaining consistently around $ 0.22-0.25 billion. Finance costs (FC) from 2014 show that interest income surpasses expenses, resulting in a negative interest expense. This suggests that companies can fully cover the interest expense of short-term borrowing through lending and other investment methods of income generation. Consequently, this greatly reduces financial risk and improves the credit rating of enterprises, making financing easier.

The global spread of COVID-19 in 2020 impeded the supply chain and decelerated industrial progress, leading to surplus production of oil and natural gas and a significant decline in their respective market prices. As a consequence, the operating profit experienced a considerable reduction to $403.5 billion, a decrease of 27.4% compared to the previous year. Increased spending on sanitation and protective equipment resulted in a 3.7% rise in management costs in comparison to the previous year. There was a 30% decrease in operating profit to $3.448 billion and a considerable net profit (NP) reduction last year to $2.469 billion, dropping 51.3%. From this, it can be deduced that the operating performance of LUKOIL is mainly influenced by oil and gas prices along with management expenditures.

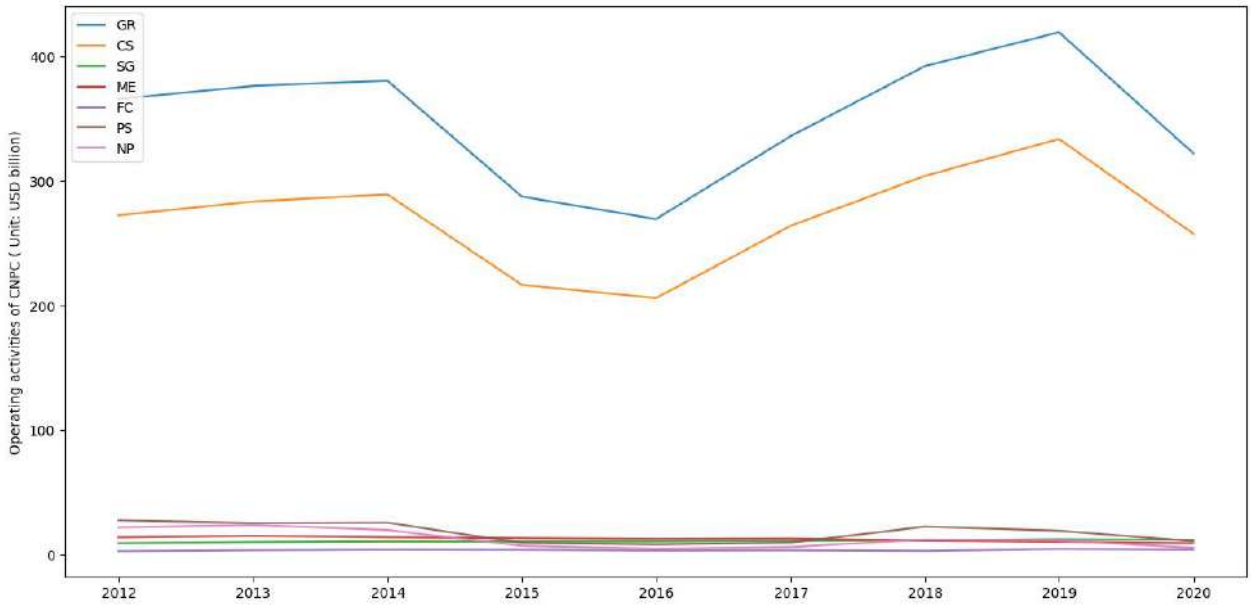

Figure 15 – Operating activities of CNPC in 2012-2020

Source: compiled by the author based on the corporate financial statements.

Based on the data presented in Figure 15, it can be observed that CNPC operations are significantly larger than those of LUKOIL. Furthermore, CNPC operating revenue shows a fluctuating pattern from 2012 to 2020, with alternating upward and downward trends. Notably, the cost of sales (CS) follows exactly the same trend. However, there is a consistent downward trend in net profit over the years. The proportion of revenue expended on cost of sales is notably high, owing to China's limited oil and gas reserves, intricate geology, and challenging production conditions. This factor sets it apart from LUKOIL. In 2015, the operating income plummeted to $287.571bn, representing a year-on-year decline of 24.4%. This can be attributed to the significant decline in oil and gas prices, which was a result of the Crimea crisis. Costs and expenses: The cost of sales decreased by 25.1%, while selling expenses and administrative expenses decreased by

0.4% and 5.8% respectively. Finance costs also saw a decline of 4.2% year-on-year. However, the operating income fell significantly by 63.3% year-on-year and the net income witnessed a decline of 64.4% year-on-year, marking the biggest decline in history.

After a three-year decline between 2015 and 2017, the operating performance notably improved in 2018. During that year, operating revenue reached $392.265 bn, marking a 16.8% increase year-on-year. Costs and expenses decreased while operating income grew significantly, reaching $22.469bn, a 133.4% growth. Additionally, net income experienced its largest increase, rising to $12.068bn, which marked a 96.8% increase. Despite interest expenses exceeding revenue, finance costs, although representing the smallest share of total costs and expenses, remained at $4-5 billion. Companies incurred significant interest expenses on short-term borrowings, which substantially increased financial risk and did not support financing. Despite the Chinese government's robust efforts to combat the epidemic in 2020 and industries swiftly resuming production, oil and gas prices did not experience a surge in the short term, and the firm's operating profit decreased to $322.306 million, representing a 23.2% year-on-year decline. The operating income decreased to $10.797 bn, which is a 43.9% year-on-year decline, due to recurring expenses falling concurrently. Likewise, net income reduced to $558bn, indicating a 50% decrease compared to last year. Therefore, it can be inferred that the primary factors influencing CNPC operating performance were commercial expenses, and oil and gas prices.

Profitability measures the relative profit generation by an enterprise during a specific period[144]. It is primarily influenced by metrics such as the net profit ratio, gross profit ratio, cost-effectiveness, return on equity, return on assets, and return on investment.

Table 9 – Analysis of profitability of CNPC and LUKOIL companies

Year	Return on investment		Return on assets		Return on equity		Return on costs		Ratio gross profit	
	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL
2012	0.085	0.209	0.060	0.183	0.111	0.295	0.816	0.048	0.255	0.940
2013	0.085	0.150	0.061	0.162	0.112	0.243	0.830	0.089	0.246	0.925
2014	0.076	0.102	0.049	0.212	0.090	0.328	0.836	0.065	0.240	0.927
2015	0.034	0.094	0.018	0.149	0.032	0.232	0.850	0.087	0.246	0.916
2016	0.027	0.131	0.012	0.094	0.021	0.138	0.864	0.094	0.236	0.943
2017	0.031	0.061	0.015	0.097	0.027	0.151	0.868	0.165	0.214	0.913

[144] Ding, X., Vukovic, D. B., Shams, R., & Vukovic, N. (2023). Does air pollution affect corporate shareholder responsibility performance?: Analysis of regression discontinuity design based on the "Qinling-Huaihe" line. Environment, Development and Sustainability.

Continued table 9

Year	Return on investment		Return on assets		Return on equity		Return on costs		Ratio gross profit	
	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL
2018	0.055	0.088	0.030	0.101	0.051	0.220	0.841	0.122	0.225	0.922
2019	0.048	0.184	0.025	0.184	0.046	0.424	0.861	0.139	0.204	0.956
2020	0.032	0.170	0.013	0.114	0.024	0.256	0.878	0.202	0.200	0.951

Source: compiled by the author on the basis of the corporate financial statements.

The overall situation is satisfactory. CNPC return on assets exhibited a declining trend from 2013 to 2016. While there was a slight increase in 2017-2018, it was not sustained, resulting in a drop to 1.3% in 2019-2020. Although LUKOIL profitability also showed a declining trend year on year, the ROA remains at 10-20%. Even in 2020, amidst the epidemic, the ROA is expected to be sustained at 11.4%. When the author compared the ROA of CNPC and LUKOIL to the market interest rate, they discovered that the ROA of both companies exceeds that of the market interest rate. This implies that the companies are utilizing their financial leverage to the fullest and working with debt to generate revenue. Nevertheless, with regards to the overall performance of the companies, LUKOIL has a higher level of investment and better outcomes, along with more efficient management of its assets. CNPC should focus on improving its overall asset turnover and EBIT margin, while paying close attention to the state of corporate asset utilization and promoting higher returns per unit of assets.

A company's assets comprise two parts: equity (the sum of equity, corporate reserves and retained earnings) and funds borrowed and temporarily borrowed by the company. Proper use of financial leverage can enhance funds utilisation efficiency. In contrast, inadequate borrowing can decrease the efficiency of funds utilisation. Excessive borrowing can lead to a financial crisis in the enterprise, but it can also enhance profitability. The return on equity is a crucial financial indicator of the shareholders' funds utilisation efficiency. The return on equity is a crucial financial indicator of the shareholders' funds utilisation efficiency. The return on equity is a crucial financial indicator of the shareholders' funds utilisation efficiency. It reflects the return on shareholders' investment comprehensively.

Between 2012 and 2020, CNPC demonstrated a general decline in its capacity to produce return on equity. There was solely a rise in return on equity in 2018, accompanied by a decline in operating efficiency. In comparison, LUKOIL return on equity, while declining, remained consistently high, ranging between 20% and 30%. This indicates the company's exceptional ability to generate return on equity and maintain good operational efficiency. Based on the DuPont formula, it is apparent that an upsurge in debt will result in an increase in return on equity. Despite

CNPC having a higher debt level than LUKOIL, CNPC ROE is much lower than that of LUKOIL, indicating that debt does not significantly affect CNPC ROE. Thus, CNPC should implement effective measures to manage expenses, augment the net profit ratio, and hasten asset turnover for enhancing the return on equity.

Cost profitability enables us to evaluate the capability to regulate and manage a company's expenses. According to the data, it can be inferred that CNPC expenses account for a considerable proportion of their operating income, exceeding 80%. Due to the high costs of oil and gas production, raw materials, product processing, and fixed asset leasing, CNPC incurs a significant cost of sales as a percentage of its revenue, which diminishes its profitability. This conclusion is corroborated by CNPC stable gross profit margin ratio at approximately 25%, emphasizing that cost of sales constitutes the most significant factor influencing the firm's profitability. LUKOIL maintains a cost profitability range of 10-20%, with a gross profit exceeding 90%. The company experiences increased income due to interest income surmounting interest expenses. Cost control measures have been effectively implemented, resulting in significant cost savings and ensuring financial stability for the company.

When analyzing the gross profit ratio and cost profitability of CNPC and LUKOIL, a case can be made that CNPC must enhance its cost control system, strengthen staff training, and improve research to fortify internal management, reduce costs, and boost operational quality.

During times of economic instability and high inflation, the primary responsibility of financial managers is to secure the survival, liquidity, and solvency of the business; that is, to preserve the business’s capacity to settle its outstanding debts on time. Solvency is determined by accounting for the firm's cash and cash equivalents that are adequate in settling debts for each accounting period. Thus, the primary indicators of a company's solvency are the absence of outstanding accounts payable and the adequacy of its current accounts. An evaluation of a company's liquidity is based mainly on historical data found in its balance sheet. Liquidity is determined by both the availability of funds for current payments and the availability of potential payment resources.[145] Solvency refers to a company's capacity to repay its debts, which is determined by indicators like the quick ratio, current ratio, cash ratio, interest coverage ratio, debt ratio, and others.

[145] Ivanov V. V., Tsytovich N. N. Corporate financial planning / V. V. Ivanov, N. N. Tsytovich. V. V. Ivanov, N. N. Tsytovich. - SPb. BAN; Nestor-Istoria, 2009. - 332 p.

Table 10 – Analysing the solvency of CNPC and LUKOIL companies

Year	Current liquidity ratio		Quick liquidity ratio		Cash ratio		Interest coverage ratio		Debt ratio	
	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL
2012	0.727	1.151	0.355	1.151	0.076	0.035	10.915	-9.462	0.456	0.378
2013	0.668	0.902	0.316	0.902	0.080	0.035	9.130	-9.253	0.458	0.333
2014	0.675	1.507	0.389	1.507	0.127	0.184	7.302	-15.448	0.452	0.354
2015	0.741	2.095	0.472	2.095	0.154	0.309	3.441	-12.759	0.438	0.357
2016	0.764	1.719	0.470	1.719	0.196	0.286	3.188	-10.362	0.427	0.319
2017	0.737	0.792	0.486	0.792	0.213	0.196	3.452	-6.396	0.426	0.354
2018	0.739	0.607	0.441	0.606	0.146	0.176	7.234	-10.015	0.420	0.541
2019	0.706	0.658	0.431	0.658	0.131	0.235	4.711	36.515	0.471	0.567
2020	0.804	0.551	0.592	0.551	0.196	0.026	3.307	11.691	0.451	0.553

Source: compiled by the author on the basis of the corporate financial statements.

Financing is a fundamental component of a business's production and operation. Through equity or debt financing, a company can acquire enough cash flow to ensure continued operation and enhance profitability. While financing can alleviate cash flow crises, excessive costs of capital can have a detrimental effect on asset security. The safety of a company's assets comprises two aspects: having a relatively stable cash flow and current asset ratio, as well as having relatively high short-term asset liquidity that does not affect the stability of earnings. Generally speaking, the greater the liquidity of the assets, the higher the level of safety. The current ratio, quick ratio, cash ratio, interest coverage ratio, and debt ratio represent the financial position of a company and gauge its capacity to repay short-term debts.

Table 10 exhibits CNPC short-term solvency through its current ratio, quick ratio, and cash ratio, which demonstrate an alternating upward and downward trend from 2012 to 2020. The current ratio rose from 0.727 to 0.804, the quick ratio from 0.355 to 0.592 and the cash ratio from 0.073 to 0.196 with fluctuations that indicate stability. Accordingly, all three ratios display an increasing trend, signifying a strengthened short-term solvency. However, the interest coverage ratio has declined from 10.915 in 2012 to 3.307 in 2020, and the leverage ratio lingers at approximately 45%, hinting at an unpropitious shift in business profitability. Notably, while LUKOIL current ratio, quick ratio, and cash ratio demonstrate an alternating upward pattern, recent data suggests a downward trend. LUKOIL three ratios surpass those of CNPC, and the interest coverage multiplier shows that LUKOIL interest income exceeds interest expense between 2012 and 2018. Additionally, CNPC has no short-term debt service obligations, further boosting its profit.

In conclusion, the current ratio is primarily influenced by accounts receivable turnover and inventory turnover. The proportion of LUKOIL inventories in its current assets is minimal, resulting in an insignificant difference between the current liquidity ratio and the quick liquidity

ratio. This implies that LUKOIL is extremely competitive in the market for its goods and maintains a high level of operational efficiency. On the other hand, CNPC current assets are primarily made up of inventories, with securities, receivables and promissory notes accounting for a lesser proportion. Therefore, LUKOIL current assets exhibit greater liquidity than CNPC, and their short-term solvency is also superior.

The relationship between the gearing ratio and financial risk is positive. It is noteworthy that CNPC gearing ratio declined from 45.8% to 42.6% between 2013 and 2017, whereas LUKOIL ratio remained stable at approximately 35%. Both corporate debt ratios exhibited limited volatility even amidst a sharp decline in international oil prices, suggestive of strong solvency. Between 2018 and 2020, CNPC debt ratio remained constantly at around 45%, while LUKOIL rose from 35% to 55%. This indicates a weakening of LUKOIL capacity to service its long-term debt. Concerning short-term solvency, CNPC holds majority inventories among the current assets, whereas LUKOIL boasts a fast inventory turnover, thereby indicating stronger short-term solvency than CNPC. CNPC maintains a stable leverage ratio of 45% for long-term solvency, contrasted by LUKOIL increase from 35% to 55% with chaotic fluctuations.

Efficiency of business management and profit-generating abilities are responsible for turnover. Accounts receivable turnover, inventory turnover, asset turnover, working capital turnover, fixed asset turnover and cash flow ratio are key indicators for evaluating turnover.

Table 11 – Analysis of turnover of CNPC and LUKOIL companies

Year	Turnover receivable		Turnover rate inventory		Turnover fixed assets		Turnover assets		Turnover working capital	
	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL
2012	34.062	2.026	7.635	534.715	4.025	40.503	1.012	0.257	5.251	0.594
2013	35.268	1.547	7.497	600.057	4.037	19.790	0.964	0.201	5.240	0.805
2014	42.990	1.335	10.455	572.789	3.675	18.193	0.949	0.138	5.834	0.410
2015	33.015	1.842	10.249	1140.955	2.532	17.536	0.721	0.128	4.939	0.300
2016	34.173	1.674	8.414	518.071	2.410	20.519	0.675	0.163	4.236	0.398
2017	37.933	0.758	10.951	629.761	2.903	15.077	0.838	0.107	4.741	0.454
2018	40.227	0.766	10.450	579.181	3.432	18.108	0.968	0.122	5.434	0.486
2019	39.212	1.116	11.007	499.177	3.578	30.460	0.921	0.201	5.390	0.634
2020	36.958	1.478	12.032	258.719	4.649	20.906	0.777	0.187	3.973	0.943

Source: compiled by the author on the basis of the corporate financial statements.

Accounts receivable form an essential part of a company's current assets. Efficient collecting of accounts receivable has a substantial impact on the company's efficient use of funds. The accounts receivable turnover ratio reflects the number of times on average receivables are converted to cash over a certain period of time.

Table 11 indicates an upward trend in CNPC receivables turnover rate from 2012 to 2020. The number of times that receivables were converted into cash on average remained steady at approximately 40 times per year. Between 2012 and 2014, the receivables turnover ratio increased from 34.062 to 42.99, reaching its highest point. Although there was a sharp decline in 2015, the receivables turnover rose to a higher level of 40,227 times per year by 2018. This suggests that the company's products have become more competitive, and debtors are in a market where sellers have an advantage with shorter payment deferrals. Despite the epidemic in 2020, which slowed down the collection rate and weakened receivables turnover, it remains at 37 times per year and has not significantly decreased. From 2012 to 2020, LUKOIL has maintained an average receivables turnover rate of approximately 1.5 times per year. This suggests that the company faces extended delinquency and low creditworthiness of debtors, which, in turn, increases the chance of bad debt losses. Moreover, it indicates that the company's collection processes are inefficient and, as a consequence, exposes them to the risk of bad or even doubtful debts. This leads to a slow working capital flow that adversely impacts the company's healthy operational performance. LUKOIL falls significantly behind CNPC in terms of its ability to efficiently convert receivables into cash. In general, CNPC boasts a superior collection rate, lower rates of bad debt losses, greater asset liquidity and stronger solvency.

The inventory turnover ratio is a reflection of a company's inventory management level, which has an impact on its short-term solvency and represents a crucial factor in corporate governance. Notably, LUKOIL enjoys a gross margin of over 90% and maintains a very low cost of sales. In 2015, the company's average inventory turnover reached 500 times per year, with a maximum turnover of 1,140.955 times per year. Even in 2020, when the epidemic caused overcapacity issues, LUKOIL was able to maintain a turnover rate of 258.719 times per year. LUKOIL demonstrates high efficiency in all aspects of production and operation, including inventory procurement and sales, which contributes to the enhancement of the company's inventory realisation rate and short-term solvency. Conversely, CNPC inventory turnover days are approximately 90-100 days, which is significantly less efficient than LUKOIL performance. The large amount of capital tied up in inventory is inconducive to production expansion. Therefore, this highlights the inadequacy of CNPC sales and inventory management and emphasises the importance of cost management to reduce sales costs. The fixed asset turnover ratio, total asset turnover ratio, and current asset turnover ratio for CNPC and LUKOIL witnessed a decline from 2014-2016, with the capital turnover ratio also slowing down due to a global fall in oil prices. However, there was an upward trend in all indicators from 2017-2019, with a gradual increase in the turnover ratio.

Thus, although CNPC current asset turnover ratio is greater than that of LUKOIL, the variance is not significant. However, CNPC accounts receivable turnover ratio is significantly higher than LUKOIL. On the other hand, LUKOIL inventory turnover rate is significantly higher than CNPC, though inventories are among the least fluid current assets and realised slowest. Thus, it can be deduced that CNPC has a higher rate of turnover of immediately realisable assets compared to LUKOIL.

Growth capability is the ability of a company to sustainably extrapolate and develop its business in the future. Its assessment includes such indicators as revenue growth rate, net profit growth rate, net assets growth rate and total assets growth rate.

Table 12 – Analysing the growth potential of CNPC and LUKOIL

Year	Growth rate revenue		Growth rate net profit		Growth rate net assets		Growth rate of net cash flow		Growth rate profitability net assets	
	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL
2013	-0.011	-0.148	0.111	-0.036	0.075	0.169	-0.200	-0.134	0.122	-0.176
2014	-0.120	-0.066	-0.593	0.772	0.038	0.312	-0.161	-0.054	-0.603	0.350
2015	-0.017	0.067	-0.113	-0.187	0.020	0.147	-0.299	0.303	-0.035	-0.292
2016	0.134	0.221	1.221	-0.396	0.021	0.018	-0.061	-0.114	4.133	-0.407
2017	0.159	-0.294	-0.227	0.119	0.006	0.023	0.230	0.008	0.158	0.095
2018	0.071	0.183	-0.650	0.074	0.021	-0.265	-0.146	0.327	-0.787	0.462
2019	0.136	0.681	-0.065	0.849	0.025	-0.039	0.145	0.144	-0.056	0.923
2020	0.021	-0.274	-0.709	-0.513	-0.054	-0.193	0.844	-0.326	-0.778	-0.397

Source: compiled by the author on the basis of the corporate financial statements.

The operating revenue growth rate is a crucial key performance indicator for evaluating an enterprise's business status and market share, as well as predicting growth trends. Operating revenue growth provides the foundation for an enterprise's sustenance and development. However, CNPC operating revenue growth rate from 2013 to 2015 demonstrates an unfortunate downward trend, indicating unfavourable market prospects for its products. Conversely, the data illustrates an upward trend from 2016 to 2020, highlighting an increase in the company's operating revenue and market competitiveness. LUKOIL experienced a decline in operating revenue growth rates during 2013-2014; however, operating profit grew from 2015-2019. Unfortunately, due to the 2020 epidemic, overcapacity and a significant drop in oil prices caused a reduction in operating income resulting in negative growth.

The net income growth rate, net cash flow growth rate from operations, and return growth rate on net assets of CNPC from 2012 to 2019 are declining, while LUKOIL rates are increasing. The growth rate of net assets indicates the retention and increase of the company's assets. Both CNPC

and LUKOIL were affected, leading to a negative growth. The net asset growth rate of both companies exhibited a consistent upward trend between 2012 and 2019.

Li's research[146] demonstrates that a correlation exists between the employment of other corporate funds and financial flexibility. The practice of utilising external funds is characterised by low cost and high risk, which presents greater strain on firms' sustainable operations. Companies that adopt the tactic of obtaining funding from affiliated enterprises can benefit from access to capital from upstream and downstream companies at minimal or zero cost. This funding can then be channelled towards financing daily operations or financial management activities, leading to improvements in capital efficiency and operating cash flow, ultimately impacting the financial resilience of the company.

Listed companies can benefit from their vast scale and exert more influence during negotiations with suppliers and distributors. As a result, they can receive more capital upstream and downstream without additional costs, leading to increased profitability. While leveraging other businesses can enhance financial strength and boost profits, there are significant operational and financial risks that can impede company growth. The utilization of capital from external companies by CNPC and LUKOIL is illustrated in Figure 16, displaying their implementation of the funding strategy.

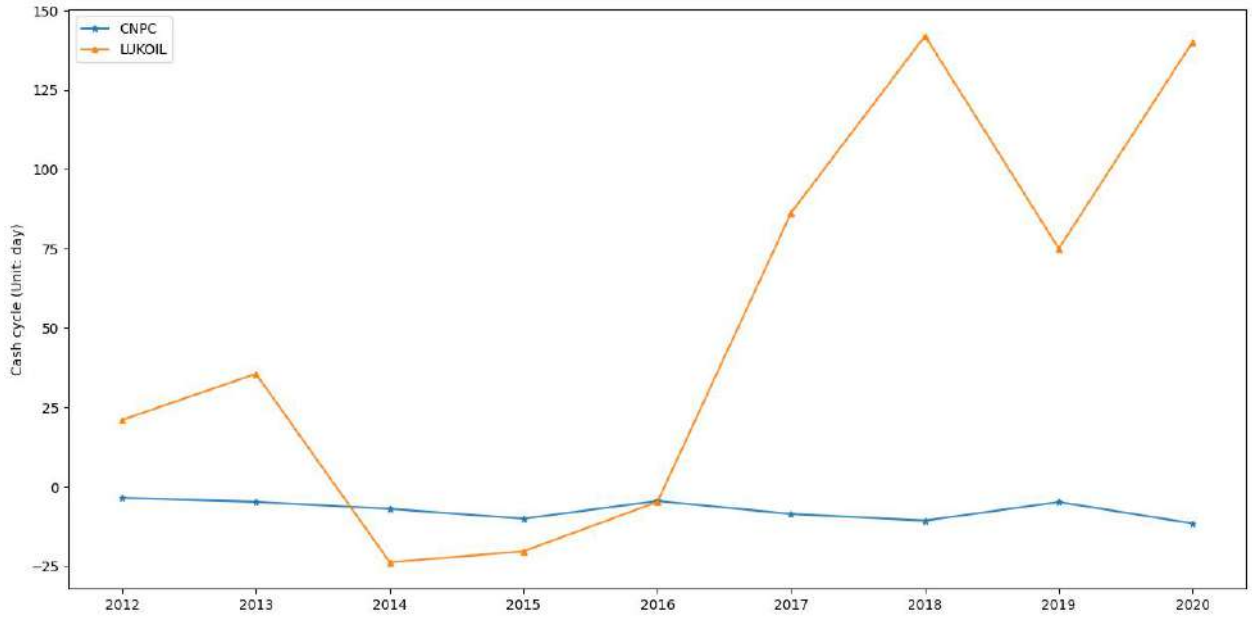

Figure 16 – Working capital cycle time of LUKOIL and CNPC companies

Source: compiled by the author based on the corporate financial statements.

[146] Li B. Z. (2012). Financial Elasticity Analysis in OPM Strategy - Case Study of EWM Wuhan Zhongshang and Wuhan Zhongbai. Herald of Finance and Accounting, 3, 117-118.

The cash conversion cycle serves as an indicator of the efficiency of the organization's method of utilizing funds from other enterprises and the state of its working capital. As demonstrated in Figure 16, LUKOIL cash conversion days have a tendency to increase, decrease, and then increase once more. The positive cash conversion days between 2012 and 2013 suggest that LUKOIL is disadvantaged in the market due to tied-up capital in its upstream and downstream suppliers and distributors, resulting in reduced competitiveness. Despite the drop in oil and gas prices between 2014 and 2016, the persistent supply and demand balance, combined with the cost-effectiveness of oil production and high product quality gave LUKOIL an edge in the price war. Thus, a successful strategy was implemented during this period, which involved utilizing funds from other enterprises. This allowed for the capital of both upstream and downstream companies to be utilized for the stimulation of the company's operational development. With little change in the company's inventory turnover days between 2017 and 2020, the accounts receivable turnover ratio decreased while accounts payable turnover days increased. This led to a lower working capital turnover, meaning that capital is now tied up with suppliers and distributors. Although the business has implemented conservative measures leading to reduced financial risk, lowered finance costs and increased interest income, as shown in Table 9 expense ratio, this has resulted in decreased profitability. From 2010 to 2017, CNPC cash conversion days declined gradually, with negative values. The increased adoption of other businesses' utilisation strategies is reflected in CNPC dominant position in the supply chain. The amount of time in which CNPC received funds from suppliers and distributors without cost saw a rise from 3,953 days in 2012 to 11,622 days in 2020. Based on the financial statements of CNPC, it is apparent that the value of accounts payable is significantly greater than that of inventory and accounts receivable, demonstrating that CNPC effectively executed its plan to utilise funds from other firms by securing a substantial amount of capital from upstream suppliers.

The notion of financial flexibility stems from the order of priority theory, which highlights a company's capacity to manage risk while retaining adequate cash reserves. Following the financial crisis, numerous business leaders have emphasised the importance of financial flexibility, acknowledging that investment and financing determinations hinge upon a company's present financial standing. Although scholars have offered varying interpretations of financial flexibility, the concept generally denotes a company's capacity to employ its cash and residual borrowing potential to defend against financial crises caused by uncertain environmental factors or to access capital for higher-yield investments.

Based on the theory of financial constraints, priority is given to internal financing, followed by external financing through debt or equity financing[147]. Thus, the main sources of financial flexibility are the firm's cash, borrowing ability, credit limits, and dividend payments. Additionally, external factors affecting the level of financial flexibility can be classified as endogenous or exogenous.

Sources of Financial Flexibility. One of the sources of financial flexibility is cash. Companies prefer to keep a certain amount of cash because internal financing costs are lower than external financing costs. Cash also has the potential to mitigate capital allocation costs resulting from financing constraints. Moreover, given the underdeveloped nature of external capital markets, cash can present a crucial strategic means for enhancing market competitiveness alongside other companies in the same industry. Another valuable tool that can bolster financial flexibility among companies is residual debt capacity. Appropriate financial decision-making can enable companies to alleviate the effects of fluctuations in the external environment on their cash flows, thereby sustaining optimal financial policies for acquiring debt. Baskin[148] discovered that corporate investment levels in the future are higher when they possess a greater level of residual debt capacity and financial flexibility. Furthermore, their financial flexibility is influenced by dividend payout policy and credit limits. Sufi[149] analysed that on average, the unused credit limit in outstanding payables is twice as high as the utilised limit, indicating that a low debt structure has become favourable. Reducing cash reserves, dividend payouts decrease financial flexibility, leading firms to decrease the dividend payout rate. Notwithstanding, in line with the signalling theory, Denis[150] contends that due to low dividends being perceived as negative news by stakeholders, businesses usually forfeit investment efficiency in order to elevate the dividend distribution percentage.

Factors influencing financial flexibility. Exogenous factors are important determinants of firms' financial flexibility. Thus, based on the sources of financial flexibility, scholars argue that

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[147] Ding, X. An empirical study to assess the quality of financial performance of listed companies in the oil and gas industry / X. Ding, M. V. Petrovskaya // International Standards of Accounting and Auditing: practice of application in the digital economy: collection of articles of the International Scientific and Practical Conference, Moscow, 25 February 2021 / Russian University of Friendship Peoples' Friendship University of Russia. - Moscow: Peoples' Friendship University of Russia (RUDN), 2021. - C. 183-187.

[148] Baskin, J. B. (1987). Corporate Liquidity in Games of Monopoly Power. The Review of Economics and Statistics, 69, 312-319.

[149] Sufi, A. (2009). Bank Lines of Credit in Corporate Finance: An Empirical Analysis. Review of Financial Studies, 22, 1057-1088.

[150] Denis, D. J., & McKeon, S. B. (2012). Debt financing and financial flexibility evidence from proactive leverage increases. Review of Financial Studies, 25(6), 1897–1929.

external factors such as financial crisis and the degree of regional marketisation can influence financial flexibility, as the latter refers to the area of financial structure[151]. It is a capability that can be proactively acquired by adjusting relevant indicators such as cash. Endogenous factors arise within the firm. The literature focuses mainly on corporate governance: the more confident managers are, the lower the level of financial flexibility of the firm[152]. In addition to corporate governance, there is a relationship between a firm's dividend policy, asset liquidity and equity issuance and the level of financial flexibility.

The economic effects of financial flexibility include the following areas:

- Firm value. Research on the relationship between financial flexibility and firm value has not reached a conclusive conclusion. Some scholars suggest that financial flexibility can increase firm value. A high level of financial flexibility contributes significantly to the expansion of firm size[153].
- External environmental factors. The greater the environmental uncertainty, the stronger the positive correlation between financial flexibility and firm value. However, some scholars take a different view. During a financial crisis, high financial flexibility may have a negative impact on firm value due to agency costs[154].
- Investment efficiency. Current financial policies support borrowing capacity and can mitigate the impact of external shocks on cash flows. Financial flexibility contributes significantly to the expansion of business investment. Maintaining an appropriate level of financial flexibility can increase the scale of a firm's future investment and improve investment efficiency[155].
- Risk taking. Financial flexibility has a positive effect on the level of risk taking by firms. The cost of issuing bonds should include the opportunity cost of not being able to issue bonds in the future. Companies should consider the benefits of the tax shield as well as the opportunity costs when making financing decisions. Low or zero debt is used to reduce the cost of financing and to increase negotiating power in debt covenants.

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[151] Huang, Y. H. (2014). Financial Crisis, Financial Flexibility and Corporate Recapitalisation: Evidence from Chinese Listed Companies. Journal of the Central University of Finance and Economics, 8, 53 - 59.

[152] Ma, C. N., & Yi, C. (2017). A study on the effect of managerial complacency on financial elasticity. Accounting Research, 7, 75-81.

[153] Marchica, M. T. and Mura, R. (2010). Financial flexibility, investment ability, and firm value: Evidence from firms with spare debt capacity. Financial Management, 39(4), 1339–1365.

[154] Zhang, F. (2013). The relationship between financial flexibility and company value. Systems Engineering, 31(11), 35-39.

[155] Cheng, H. B., & Lian,Y. J. (2013). Effect of financial elasticity on investment level and investment efficiency of enterprises. Economic Management, 35(10), 109-118.

When a company has some free cash flow, it is better able to adapt to economic changes. For this reason, many scholars prefer to measure a company's financial flexibility using a set of financial ratios related to operating cash flows. The author uses cash flow adequacy ratio, cash flow to equity ratio and cash flow to current liabilities ratio to assess financial flexibility. The financial flexibility of LUKOIL and CNPC is shown below (Tab. 13).

Table 13 – Financial flexibility of LUKOIL and CNPC

Year	Cash flow to capital ratio cash flow to capital		Cash flow adequacy ratio cash flow		Cash flow to current liabilities ratio	
	CNPC	LUKOIL	CNPC	LUKOIL	CNPC	LUKOIL
2014	1,141	1,131	0,324	0,945	0,615	0,836
2015	1,167	1,413	0,246	0,932	0,554	1,221
2016	1,400	1,513	0,275	0,924	0,531	0,906
2017	1,547	1,483	0,345	0,975	0,636	0,791
2018	1,275	2,229	0,322	1,162	0,600	1,101
2019	1,101	2,560	0,306	1,562	0,544	0,954
2020	1,241	1,567	0,239	0,723	0,526	0,877

Source: compiled by the author on the basis of the corporate financial statements.

Firms possessing significant financial flexibility can enhance their capacity to weather crises. Financial flexibility gauges how a company's cash flows affect its solvency. As traditional solvency measures are inadequate, evaluating a firm's financial flexibility allows for a more accurate assessment of the robustness of its working capital and the efficacy of its allocation of resources from other enterprises.

Table 13 presents data indicating that both CNPC and LUKOIL exhibit high levels of capital self-sufficiency, enabling them to sustain and grow their business activities. Additionally, their cash flow to capital ratios consistently exceed 1, demonstrating that external funding is not required and expansion can be internally funded. CNPC cash flow adequacy ratio remains at 0.2-0.3 with slight fluctuations but less than 1. Although the company is pursuing a strategy of utilising funds from other businesses and using capital from upstream to sustain its operations, it does not generate enough cash to repay debts, invest in property, plant and equipment or pay dividends during production and operations, relying on other sources, such as financing and asset sales, to do so. LUKOIL cash flow adequacy ratio hovers at approximately 0.9-1.5 with negligible fluctuations and a high level of profitability, highlighting its potential to carry out its day-to-day capital operations smoothly, sans the worry of any cash flow interruptions. The corporation is fully equipped to pay dividends and reinvest on its own, enabling it to maintain regular business operations. Further, it depicts LUKOIL heightened profitability, capability to continue as a going concern, and commendable financial flexibility. The company has cash available for reinvestment in different

assets and profitable projects, enabling flexible investment decisions. CNPC cash flow to current liabilities ratio is stable between 0.5 and 0.6. However, reliance on external financing is still necessary as the net flow from operating activities does not cover all current liabilities. This suggests that the adoption of the plan to use resources from other enterprises, to save costs and secure sufficient cash flow, has also undermined the firm's financial adaptability. LUKOIL ratio of cash flow to current liabilities has experienced slight changes while remaining within the range of 0.9 to 1, indicating that the net cash flow from operating activities is capable of repaying obligations as they become due and safeguarding the stake of the firm's creditors. The company is not fully utilising its current funds, which could negatively impact its profitability.

While CNPC has implemented a strategy of utilizing funds from other enterprises, the combination with financial flexibility has not always been successful, and the financial flexibility strategy requires further improvement. Conversely, LUKOIL has not employed a strategy of utilizing funds from other enterprises, but its level of financial flexibility is high, leading to less financial risk for the business.

3.2. System approach to improving the financial potential management mechanism of oil and gas enterprises of the Russia and the PRC

Russia is the foremost producer and exporter of fossil energy resources globally. Its economic growth and tax earnings are predominantly reliant on the energy industry[156]. Oil and natural gas income has consistently contributed over 40% of the Russian Federation's budget revenue. The year 2020 witnessed a swift progression towards the global climate change agenda. Consequently, in October 2021, Russian President Vladimir Putin declared that Russia aimed to achieve carbon neutrality by 2060. The Russian government has announced its long-term strategy for the development of the Russian Federation until 2050 with low greenhouse gas emissions, opening a new development path for the country to reduce emissions and achieve low-carbon emissions[157].

In 2021, the Chinese government made proposals to establish carbon-neutral and carbon-peak energy targets. This would position energy efficiency as one of the foremost priorities of China's energy strategy, creating more stringent environmental requirements for oil companies and

[156] Liu, J.M. (2015). International Oil Prices and Russia's Economic Growth. Eurasian Economy, 6, 27- 30.

[157] The Ministry of Economic Development of Russia has prepared a draft Strategy of long-term development of Russia with low greenhouse gas emissions until 2050. [Electronic resource]. - Access mode: URL: http://economy.gov.ru/material/news/minekonomrazvitiya_rossii_podgotovilo_proekt_strategii_dolgosrochnogo_razvitiya_rossii_s_nizkim_urovnem_vybrosov_parnikovyh_gazov_do_2050_goda_.html (date of reference: 10.03.2023)

necessitating the scrutiny of their financial standing. Russia-China energy collaboration under the Belt and Road Initiative has been consistently progressing, with Russian energy exports to China comprising 70% of the overall total. This collaboration is pivotal to the progression of the global economy. The energy sector accounts for over 80% of total carbon dioxide emissions on a global scale, therefore becoming a significant aspect to mitigate emissions. The pursuit of carbon neutrality by China and Russia necessitates a significant overhaul of their energy sectors and economic growth models in the years to come[158]. This undertaking is riddled with internal and external obstacles, and is fraught with uncertainties. As such, it requires abundant long-term consideration and research. Therefore, the author aims to develop an efficient model for the comprehensive and objective evaluation and financial forecasting of listed oil companies in Russia and China. The goal is to offer a foundation for the sustainable green development of oil companies and the stabilization of oil market supply. The financial potential is vital for the continuity of an enterprise. We assess an enterprise's financial potential across four areas: financial stability, financial security, attractiveness for financing, and investment potential[159].

In recent years, various algorithms have been proposed by scientists to calculate financial potential. Sukhova, L. F.[160], for example, defines the financial potential of an enterprise as its self-development, self-sufficiency, and self-preservation of its financial system for a specific timeframe. The financial strength reserve is a crucial element of a company's financial capability and a significant financial metric that financial managers consult when considering the expansion of the market share of goods, services, and works. A higher indicator value signals greater financial capacity of the enterprise, conferring it with the potential to hold onto or enhance its market share in the sale of goods, works, and services[161]. The financial reserves of a firm reflect its level of price competitiveness in the market for goods, projects, and services[162].

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158 Mi, J., & Liu, Y.J. (2016). The Impact of International Oil Price Fluctuations on Russia's Economic Growth. Russian Studies of Central Asia and Eastern Europe, 1, 112- 123.

159 Steblyanskaya Alina, Mingye Ai, Artem Denisov, Olga Efimova and Maksim Rybachuk, Carbon dioxide emissions reduction efficiency and growth potential: the case of China, PSU Research Review. - 2022. - №. 2, .

160 Sukhova, L. F. Financial potential of the enterprise: concept, essence, measurement methods / L. F. Sukhova // Financial analytics: problems and solutions. - 2016. - № 12(294). - p. 2-11.

161 Chernova, N. A. Practicum on the development of business plan and financial analysis of the enterprise: textbook for universities with griff / N. A. Chernova, L. F. Sukhova. - Moscow: Finance and Statistics, 1999-2008. - 160 p.

162 Glaz, V. N. Analysis of financial condition and business plan of the trade organisation of consumer cooperation: textbook for universities with griff / V. N. Glaz, N. A. Chernova, L. F. Sukhova. - Moscow: Finance and Statistics, 2006. - 288 p.

The financial strength margin (FSM) can be calculated using the following formula:

$$\text{FSM} = \text{Revenue} - \frac{\text{Revenue} * \text{Fixed costs}}{\text{Revenue} - \text{Variable costs}} \quad (1)$$

The FSM quantifies the financial potential created through the formation, distribution, and utilization of the company's operating income.

- It serves as an indicator of the volume of financial resources (revenue) that can be lost without the financial system transitioning from profitable to unprofitable territory, making it potentially acceptable and permissible.
- The amount of potential financial resources ensures a measure of stability for the financial system.

To objectively and comprehensively evaluate the financial potential of enterprises, Sukhova, L. F.[163] put forward a linear model for calculating financial potential. This algorithm incorporates managerial factors that guarantee effective scientific financial management and development of mutually beneficial financial relationships with competitors. The algorithm is expressed by the following formula:

$$\text{FPE}_{\text{linear}} = \text{FSM} + \frac{\text{ROA} - (1 - \text{ITR})\text{MVC}}{100}\text{LIA} + \frac{(1 - \text{ITR})\text{MVC} - \text{WACC}}{100}\text{LIA} \quad (2)$$

The linear model of business economics and finance has been simplified, whereas the non-linear model is considered more appropriate for real-world business scenarios. Consequently, we suggest the following algorithm for calculating the financial potential of enterprises.

$$\text{FPE}_{\text{nonlinear}} = \text{FSM} + \frac{[\text{ROA} - (1 - \text{ITR})\text{MVC}]^2}{100}\text{LIA} + \frac{[(1 - \text{ITR})\text{MVC} - \text{WACC}]^2}{100}\text{LIA} \quad (3)$$

Where, $\text{FSM}-$ financial strength margin; $\text{LIA}-$ liability (excluding depreciation and amortisation, VAT on purchases and reinvested earnings); $\text{ROA}-$return on assets; $\text{MVC}-$market value of cash; $\text{ITR}-$income tax rate measured in fractions; $(1 - \text{ITR})\text{MVC}-$average market price in the capital market including tax adjustment; $\text{WACC}-$weighted average cost of capital[164].

This dissertation uses linear and non-linear models proposed by Sukhova L. F. to calculate the value of financial potential of CNPC and LUKOIL for the period of 2015-2020 (Tab. 14).

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[163] Sukhova, L. F. Analysis and assessment of the financial potential of enterprises: an innovative approach / L. F. Sukhova, I. V. Kryuchkova, I. B. Botsyun // Bulletin of Belgorod University of Cooperation, Economics and Law. - 2016. - № 2(58). - p. 106-116.

[164] Gorelkina, I. A. Price of capital as an indicator of the formation of the market value of the company / I. A. Gorelkina, D. A. Dudko // Innovative aspects of science and technology development: Collection of selected articles of the IV International Scientific and Practical Conference, Saratov, 29 January 2021. - Saratov: Scientific public organisation "Digital Science", 2021. - p. 59-66.

Table 14 – Values of financial potential of LUKOIL and CNPC companies

Year	LUKOIL		CNPC	
	Linear model	Nonlinear model	Linear model	Nonlinear model
2015	3.786	3.779	7.047	7.062
2016	2.283	2.282	4.879	4.905
2017	2.557	2.555	6.109	6.134
2018	2.752	2.744	12.036	12.070
2019	5.090	5.076	11.099	11.176
2020	2.478	2.470	5.528	5.593

Source: compiled by the author on the basis of the corporate financial statements.

As indicated in Table 14, analysis of the financial potentials of LUKOIL and CNPC using both linear and non-linear models showed no significant difference in the results obtained. Nevertheless, said decline did not significantly differentiate the two models' results. When analysed using the non-linear model, the financial potential of LUKOIL showed a general upward trend, although in 2016 there was a decline of 39.688% year-on-year, from $3.786 billion to $2.283 billion. There was a consistent rise in the financial potentials from 2016 to 2018, with an average growth rate of 10%. The maximum value of financial potentials was recorded in 2019, reaching $5.09bn, marking an 84.971% increase compared to 2018. The value of financial potentials reduced notably in 2020, declining by 51.326% compared to the previous year as a result of the epidemic. A non-linear model was employed to analyse the financial potential of CNPC, revealing alternating decreasing and increasing trends in the period 2015-2020. The financial capacity substantially increased by 96.8% in 2018 compared to the preceding year; and slightly declined by approximately 7.4% in the subsequent year of 2019. However, due to the impact of the epidemic, the financial potential saw a significant drop of 50% in 2020 compared to 2019.

It is important to note that the linear and non-linear models of Sukhova L.F. have been developed on the basis of a sample of Russian companies. Given the significant economic and social differences between the Russian Federation and the PRC, the linear model may not be entirely applicable to Chinese companies. In this model, the financial strength reserve is the primary determinant of financial potential. Furthermore, measuring financial strength reserves proves difficult, leading to a margin of error when estimating financial capacity values, which is compensated by using net income and exchange rate differences instead. Accordingly, comparing the financial potential of LUKOIL and CNPC using this model is neither objective nor reliable. We, therefore, suggest an analytical approach to evaluate and forecast the financial potential management mechanism of oil and gas enterprises in Russia and China.

In line with the distinctive features of Russian and Chinese oil and gas enterprises, this study chooses 12 diverse financial indicators under five categories, i.e., operating efficacy, profitability, growth potential, solvency, and financial flexibility (Tab. 15), to establish an effective system for evaluating financial performance.

Table 15 – Financial indicators quality assessment system

Aspects	Indicators	Definitions	Sign
Operating capacity	Inventory turnover	Operating income/inventory	X1
	Fixed assets turnover	Operating income/fixed assets	X2
	Total assets turnover	Operating income/total assets	X3
Profitability	Profitability assets	Net income/total assets	X4
	Return on equity	Net income/equity	X5
	Gross profit margin	Gross operating profit/operating income	X6
Development potential	Revenue growth rate	(Revenue for the current period - revenue for the previous period)/revenue for the previous period	X7
	Net profit growth rate	(Net profit for the current period - net profit for the previous period)/net profit for the previous period	X8
Solvency	Current liquidity ratio	Current assets/current liabilities	X9
	Debt load	Liabilities/total assets	X10
Financial flexibility	Fixed Assets Acquisition Ratio	Net cash flow from operating activities/capital expenditures (acquisition of property, plant and equipment)	X11
	Cash flow adequacy ratio	Net cash flow from operating activities / (repayment of long-term liabilities + acquisition of fixed assets + dividend payments)	X12

Source: compiled by the author on the basis of the corporate financial statements.

Currently, both domestic and foreign scholars utilise traditional evaluation methods to analyse the financial performance of listed companies. These include the DuPont analysis, Wall evaluation, and EVA evaluation methods. The DuPont analysis method, with comparable and comprehensive indicators, serves as a comprehensive tool for evaluating the financial performance of enterprises[165]. However, the stability analysis of the enterprise is not taken into consideration, and the impact of cash flow on the enterprise is not addressed[166]. It is essential to emphasise that cash flow forms the foundation for sustainable business, and cash turnover is significantly and positively related to

[165] Ahamed, M. J. (2020). Comparison of the Financial Performance between Square Pharmaceuticals Limited and Beximco Pharmaceuticals Limited: DuPont Analysis. Global Disclosure of Economics and Business, 9(1), 39 - 48.

[166] Cheng, L., Li, D., & Li, Y. L. (2019). Limitations of traditional DuPont analysis. Contemporary Marketing, 8, 145-155.

financial performance[167]. In recent years, the primary methods for assessing corporate performance have been factor analysis, principal component analysis, entropy method, and data envelopment analysis, all of which have gained popularity with the advancement of statistical tools. Public factors can be extracted through dimensionality reduction techniques such as factor analysis and principal component analysis, which replaces most of the original variable information. The financial condition evaluation index can be calculated by using the sum of public factor scores as weights for their respective variance contributions, culminating in a comprehensive score for the enterprise's financial performance, objectively evaluating each public factor score. However, the majority of methods utilise cross-sectional data and merely examine the profitability level of a firm and its industry for a single year, precluding us from prognosticating the dynamic trend of the firm's own performance. In order to resolve this predicament, the technique of time series principal component analysis (GPCA)[168] was formulated. Therefore, this paper employs a time-series stereodata table to compute the quality index of financial performance of listed companies utilizing the time-series principal component analysis method.

This method combines time-series analysis and principal component analysis techniques to exhibit the trajectory of the overall system level over time utilizing a complex variable[169]. It allows the trajectory to be dynamically displayed and economic problems to be analysed through multiple indicators, providing a fast and scientific quantitative analysis tool for business performance research[170].

If N is the total number of samples and each sample is described by P variables, the crosstabulation table can be presented as:

$$X_t = (x_{ni}^t)_{N*P} \tag{4}$$

The cross-tabulation table for each year over T years will form a time series data table with stereo information, governed by the following equation:

$$X = (X_{2001}, X_{2002}, \ldots\ldots X_{2020})_{N*T*P} \tag{5}$$

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[167] Jing, W.T. (2021). Analyzing the performance of listed pharmaceutical companies in China based on DEA. Modern Management. 11(11), 1169-1174.

[168] Cheng, D. W., & Jin, D. J. (2013). A time series and global principal component analysis study of listed company management estimation. Journal of Anhui University of Technology (Social Sciences), 5, 21-24.

[169] Liu, C. (2016). Predicting multivariate time series based on principal component analysis method. Journal of MUC (Natural Sciences), 4, 27-33.

[170] Qiao, F., & Yao, D. (2003). Application of time series analysis and comprehensive PCA in describing economic dynamics. Journal of Applied Statistics and Management, 2, 1-5.

Where, x_{ni} represents the value of the i-th variable for the n-th sample, $t = 2000, 2001, \ldots 2020; n = 1,2, \ldots N; i = 1,2, \ldots P$. The data will be standardized using the following formula:

$$x_{ji}^{t'} = \frac{(x_{ni}^{t} - \overline{x_{ni}^{t}})}{(s_{ni}^{t})^2} \tag{6}$$

$$\overline{x_{ni}^{t}} = \frac{1}{N*T*P} \sum_{t=2000}^{2020} \sum_{j=1}^{N} x_{ni}^{t} \tag{7}$$

$$(s_{ni}^{t})^2 = \frac{1}{N * T * P} \sum_{t=2000}^{2020} \sum_{j=1}^{N} (x_{ni}^{t} - \overline{x_{ni}^{t}}) \tag{8}$$

The weights for constructing a model to evaluate the financial performance of oil companies are determined by the variance contributions of the selected K principal components. The following formulas are presented:

$$FC_{nj}^{Y} = \lambda_{1j} x_{n1}^{Y'} + \lambda_{2j} x_{n2}^{Y'} + \ldots + \lambda_{Pj} x_{nP}^{Y'} \tag{9}$$

$$F_{n}^{Y} = \alpha_1 F_{n1}^{Y} + \alpha_2 F_{n2}^{Y} \ldots + \alpha_K F_{nj}^{Y} \tag{10}$$

Where, F_{n}^{Y} is the index of quality of financial indicators for n oil company in Y year; FC_{nj}^{Y} is the value of j main component for n oil company in Y year, Y=1,2...T， j=1,2...K.

Due to the desirability, completeness, and accuracy of the data, CNPC financial data have been sourced from the China Securities Market and Accounting Research Database (CSMAR), and LUKOIL financial data from the financial website economy.ru (refer to Appendix 4). The data have been processed and analysed through Excel and SPSS 20.0 statistical programmes. The assessment of oil company financial indicators includes numerous relevant indicators from diverse companies across different periods. We employ time series principal component analysis to not only reduce the dimensionality of the original data, but also to dynamically and effectively evaluate the financial performance of oil corporations. During the analysis, the financial indicators of chosen oil companies are arranged chronologically, followed by obtaining a three-dimensional table consisting of time series data. Afterwards, principal components are selected based on their corresponding eigenvalues and variance contribution coefficients. The values of principal components, along with a comprehensive index of financial condition evaluation (FCI), are then calculated to provide an objective and comprehensive evaluation of the financial performance of oil companies.

Table 16 – Adequacy measure and Bartlett's criterion

Kaiser-Meyer-Olkin measure of sampling adequacy		**0.524**
Bartlett's sphericity criterion	Approximate chi-square	248.526
	df	13
	Sig.	0.000***

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

As demonstrated in Table 16, the correlation test illustrates KMO values > 0.5 and Sig. < 0.01 in Bartlett's spherical test. These values suggest that the correlation between the initial variables is significant and the data is appropriate for principal component analysis[171].

Table 17 – Total explained variance

Component	**Total**	**% of variance**	**Cumulative %**
1	7.476	57.849	57.849
2	2.671	20.667	78.515
3	1.196	9.254	87.770

Source: compiled by the author on the basis of oil and gas corporate reports.

After standardising the raw data, we utilised principal component analysis to extract common factors and acquire a table containing the variance of such factors. Table 17 exhibits the common factors extraction process, with the variance of common factors nearing 1, indicating a significant degree of the original variables were explained through the extracted factors. Three common factors, namely FPOS, FP, and FSR, were extracted based on the principle that their eigenvalues should be greater than 1 and their cumulative variance contribution should be more than 80%[172]. The coefficient of cumulative variance contribution of the first three factors was found to be 87.770%, indicating that these factors capture most of the original information. Such factors can serve as public criteria to evaluate and analyse the financial performance quality of oil and gas enterprises. The FPOS variance had the highest contribution coefficient at 57.849%, making it the most significant public factor. The second public factor was the FP variance, with a contribution coefficient of 20.667%, while the FSR variance had a contribution coefficient of 9.254%, making it the third influencing factor.

[171] Chen, Z. (2006). Factor Analysis and Cluster Analysis with SPSS Software. Market Research, 6, 45-48.

[172] Guo, T.T. (2014). A study of financial quality assessment of listed companies in China. North China Electric Power University, 1, 66-77.

Table 18 – Matrix of loading of the principal factors

Variables	FPOS	FP	FSR
X1	**0.321**	0.260	0.013
X2	**0.366**	0.058	0.124
X3	**0.350**	0.126	0.139
X4	**0.351**	0.085	0.035
X5	**0.353**	0.091	0.093
X6	**0.360**	0.100	0.207
X7	0.117	0.352	**0.618**
X8	0.154	0.152	**0.568**
X9	0.156	**0.493**	0.325
X10	0.025	**0.565**	0.319
X11	0.254	**0.414**	0.036
X12	**0.369**	0.089	0.004

Source: compiled by the author on the basis of oil and gas corporate reports.

Orthogonal rotation of the Kaiser factor normalization, utilizing the maximum variance technique, yielded the general factor loading matrix. Please refer to Table 18 for results. Five indicators, namely inventory turnover (X1), fixed asset turnover (X2), asset turnover (X3), return on assets (X4), return on equity (X5), gross profit margin (X6), and cash flow adequacy ratio (X12), have the highest factor loadings on the FVOS factor. These indicators are representative variables of the public FVOS factor, which reflects the profitability and operating ability of oil and gas enterprises. Thus, they are referred to as the profitability and operating ability factor. Current liquidity ratio (X9), debt load (X10), and fixed assets acquisition ratio (X11) have the highest factor loadings on the FP factor. These ratios mainly indicate the ability of oil and gas companies to repay their debts and are therefore referred to as the solvency factor. On the other hand, revenue growth rate (X7) and net profit growth rate (X8) have the highest factor loadings on the FSR factor. These ratios reflect the growth of oil and gas corporate profits and are therefore named as the growth ability factor. Thus, in this paper, three common factors are extracted from 12 indicators using principal component analysis (Fig. 17)

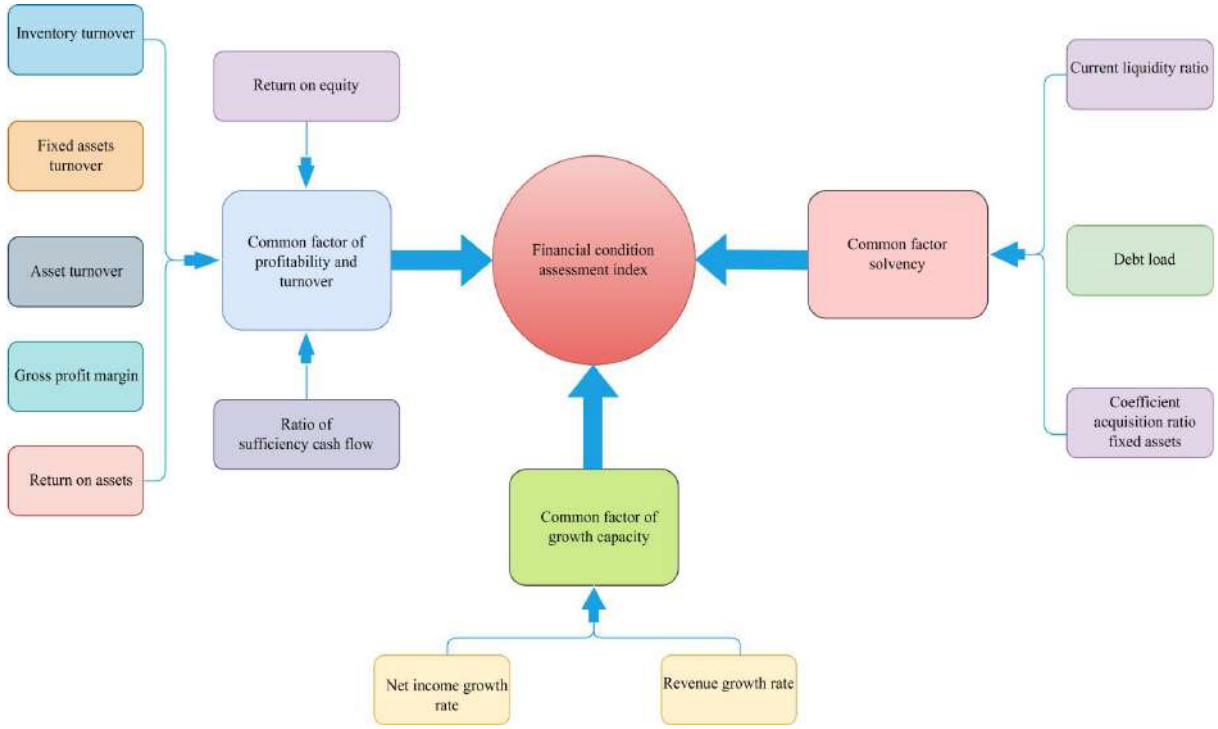

Figure 17 – Components of FCI

Source: compiled by the author.

Accordingly, the scores for each common factor according to equation (11) are as follows.

$$\begin{aligned} FPOS &= 0.321X1 + 0.366X2 + 0.350X3 + 0.351X4 + \ldots + 0.369X12 \\ FP &= 0.260X1 + 0.058X2 + 0.126X3 + 0.085X4 + \ldots + 0.089X12 \\ FSR &= 0.013X1 + 0.124X2 + 0.139X3 + 0.035X4 + \ldots + 0.004X12 \end{aligned} \quad (11)$$

According to formula (12), the financial condition evaluation index (FCI) is obtained by weighting the sum of the total factor value and the proportion of variance contribution to the total variance contribution as weights as follows.

$$FCI_{Y,C} = (57.849\%FPOS_{Y,C} + 20.667\%FP_{Y,C} + 9.254\%FSR_{Y,C})/87.770\% \quad (12)$$

Where, Y represents the year; C represents the enterprise; FSI represents the financial condition assessment index; FPOS represents the profitability and operating ability factor; FP represents the solvency factor; and FSR represents the growth ability factor.

Table 19 – Index for assessing the financial condition of oil companies

Company	Year	FPOS	FP	FSR	FCI
CNPC	2014	-2.568	-0.034	0.791	-1.419
	2015	-2.576	-0.007	-0.053	-1.496
	2016	-1.997	0.695	-1.862	-1.184

Continued table 19

Company	Year	FPOS	FP	FSR	FCI
CNPC	2017	-2.359	0.596	-0.562	-1.293
	2018	-2.656	0.071	0.080	-1.514
	2019	-2.592	0.565	-0.413	-1.421
	2020	-2.710	0.037	0.408	-1.522
LUKOIL	2014	2.806	-1.964	-0.545	1.167
	2015	2.876	-2.766	-0.523	1.044
	2016	1.772	-1.866	-0.667	0.578
	2017	1.337	-1.403	0.955	0.572
	2018	2.489	1.845	0.687	1.884
	2019	4.952	3.572	-1.011	3.509
	2020	1.227	0.659	2.715	1.097

Source: compiled by the author on the basis of oil and gas corporate reports.

According to Table 19, the variance of FPOS contributed 57.849% to the degree of influence of the common factor, indicating that profitability and operating ability significantly affect the quality level of financial performance of listed oil and gas companies. In 2019, FPOS of LUKOIL value was 4.925, considerably higher than in other years. When using a limit of 0, FPOA of CNPC index indicates very low financial performance quality for every year between 2014 and 2020. In contrast, LUKOIL FPOA index has been consistently greater than 0 during the same period, with a value higher than 1 in most years, indicating very high financial performance quality.

Both CNPC and LUKOIL are globally established firms dealing in oil and gas. CNPC is under government control and benefits from significant political and economic backing. This has facilitated growth in the company's assets and a rise in its market capitalisation. Nonetheless, CNPC financial performance is lacking, with profitability and operational ability below 0 from 2014-2020. This suggests the inevitability of inefficiency and uneven personnel quality within the company. Additionally, China possesses only 2% of the world's crude oil reserves, resulting in increased labour and transportation costs due to a dependency on external sources for 72% of crude oil and 45.8% of natural gas. Companies must therefore undertake extensive reforms to decrease costs and enhance product competitiveness. Although LUKOIL solvency factor was less than zero from 2014-2017, improved profitability has resulted in increased solvency. CNPC and LUKOIL possess limited growth ability factors and ought to actively promote corporate social responsibility, green innovation, and adhere to a sustainable development path with a focus on low-carbon emissions.

The aim of financial management is to maximize the worth of a company. The financial strength of a company is an essential factor that contributes to its competitiveness and investment

potential - therefore, evaluating financial capability is an indispensable part of any enterprise value assessment system[173]. The degree of financial risk is one of the primary indicators of financial potential. The aim of financial management is to maximize the worth of a company. Managing financial risk is a pertinent concern that companies must tackle while steering financial management. Financial risk objectively exists and can only be mitigated by enterprise managers, not completely eliminated. In empirical analysis of financial risk for listed companies, both domestic and foreign scientists currently use mathematical models such as the Logistic and Z-Score models. Non-parametric testing methods are also employed. Mann-Whitney U test, Moses test of extreme reactions, Kolmogorov-Smirnov Z test, and Wald-Wolfowitz runs path test are employed for nonparametric testing, whereas discriminant analysis techniques such as maximum likelihood, distance discriminant, Fisher discriminant, and Bayes discriminant are utilized[174]. The U Mann-Whitney test is utilized for building the Z-score correction model, while Bayes discriminant is employed for stepwise discriminant analysis. Based on their financial quality scores between 2014 and 2020, CNPC and LUKOIL are categorized into two groups: financial security and financial insecurity, with 0 being the limit.

Table 20 – Financial risk groupings

Group	Company	Year
Financial security	LUKOIL	2014
	LUKOIL	2015
	LUKOIL	2016
	LUKOIL	2017
	LUKOIL	2018
	LUKOIL	2019
	LUKOIL	2020
Financial insecurity	CNPC	2014
	CNPC	2015
	CNPC	2016
	CNPC	2017
	CNPC	2018
	CNPC	2019
	CNPC	2020

Source: compiled by the author on the basis of oil and gas corporate reports.

Table 20 indicates that CNPC was categorized under the financial insecurity group for all years in the 2014-2020 period, whereas LUKOIL was classified under the financial security group

[173] Wei, M. G, Wen, W., & Zheng, M. G. (2015). Study on financial assessment and risk control of listed steel companies in China based on factor analysis. Journal of Jiangxi University of Technology, 36(06), 46-53.

[174] Zhdanov V. Yu. Y. Financial analysis of the enterprise with the help of coefficients and models: Textbook / V. Y. Zhdanov, I. Y. Zhdanov. -M.: Izd-vo Prospect. - 2018. - 251p.

for each year in the same period. In order to assess whether there are significant distinctions in the variables between these two groups, a non-parametric test needs to be performed on these two independent samples to determine the suitability of grouping by the financial quality index[175].

Table 21 – Mann-Whitney test statistics

Aspects	Variables	Mann-Whitney test	Wilcoxon W	Z	Asymptotic significance (2-sided)
Operational capability	X1	0	28	-3.13	0.002***
	X2	0	28	-3.13	0.002***
	X3	0	28	-3.13	0.002***
Profitability	X4	0	28	-3.13	0.002***
	X5	0	28	-3.13	0.002***
	X6	0	28	-3.13	0.002***
Development potential	X7	24	52	-0.064	0.949
	X8	15	43	-1.214	0.225
Solvency	X9	22	50	-0.319	0.749
	X10	21	49	-0.448	0.654
Financial flexibility	X11	9	37	-1.981	0.048
	X12	0	28	-3.13	0.002***

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

Table 21 illustrates that the Mann-Whitney U-test demonstrates significant differences between the two autonomous samples regarding inventory turnover (X1), fixed asset turnover (X2), asset turnover (X3), return on assets (X4), return on equity (X5), gross profit margin (X6) and cash flow adequacy ratio (X12). Following this, we executed a stepwise discriminant analysis, utilizing these seven variables as independent variables and dependent variable being the financial security z-score, employing Wilk's Lambd[176]. Throughout the analysis, we gradually detached the indicators that did not fulfill the prerequisites.

[175] Zhu, Q. X. (2011). A Study of Financial Early Warning of Listed Companies in Hebei Manufacturing Industry. YanShan University, 4, 10-16.

[176] Wu, N. (2016). A study of financial early warning of listed companies in Shanxi based on Z-model. Shanxi University of Finance and Economics, 66(12), 56-77.

Table 22 – Variables entered/excluded

Step	Entered	Wilk's Lambd					
						Exact value of F	
		Statistics	df1	df2	df3	Statistics	Sig.
1	X6	0.002	1	1	12	5618.896	0.000***
2	X1	0.002	2	1	12	3557.322	0.000***

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

Table 22 demonstrates that inventory turnover (X1) and gross profit margin (X6) show a significance of less than 1%, indicating that both variables are highly significant among groups and are significant in distinguishing the model. Thus, the variables selected for inclusion in the model were inventory turnover and gross profit margin (X6).

Table 23 – Eigenvalues of the discriminant function

Function	Eigenvalue value	% of explained variance	Cumulative %	Canonical correlation
1	646,786	100	100	0,999

Source: compiled by the author on the basis of the corporate financial statements.

Table 23 indicates that the discriminant function has a strong association with the groups, as evidenced by a high canonical correlation coefficient of 0.999. Additionally, the eigenvalues are 646.786 and the percentage and cumulative percentage variances are both 100%.

Table 24 – Wilks Lambda significance test

Function verification	Wilks' Lambda	Chi-square	df	Sig.
1	0.002	71.209	2	0.000***

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

Table 24 displays the results of the significance test for the discriminant function, showing a Wilks Lambda value of 0.002, Chi-square value of 71.209, 2 degrees of freedom, and a significance level of 0.000. These findings indicate a significant correlation and suggest that the function can be employed to evaluate the financial stability of oil companies.

Table 25 – Z-Score correction model of the discriminant function coefficient

Variables	Function
	1
X1	0.594
X6	1.129

Source: compiled by the author on the basis of the corporate financial statements.

According to Table 25, the revised formulas for calculating the Z-score in the financial early warning model used for oil and gas companies from China and Russia are provided below.

$$FSI_{Y,C} = 0.594OZ_{Y,C} + 1.129MVP_{Y,C} \quad (13)$$

Where, Y represents the year; C represents the enterprise; FSI represents the financial security assessment index; OZ represents inventory turnover; and MVP represents gross profit margin

According to the Z-value function correction model, Z-values were calculated for CNPC and LUKOIL.

Table 26 – Financial Security Index of Oil Companies

Companies	Year	FSI
CNPC	2014	6.481
	2015	6.366
	2016	5.264
	2017	6.747
	2018	6.461
	2019	6.769
	2020	7.373
LUKOIL	2014	341.283
	2015	678.761
	2016	308.799
	2017	375.109
	2018	345.075
	2019	297.590
	2020	154.752

Source: compiled by the author on the basis of the corporate financial statements.

Table 26 displays the results of the Z-score correction model. It indicates that LUKOIL had the greatest financial performance quality in 2019, while the highest financial security index occurred in 2015. This suggests that a higher level of financial performance quality does not necessarily equate to a higher financial security index. The financial security of oil companies is most influenced by their operating ability and profitability.

By creating a time series stereo data table, we have overcome the barrier of being unable to examine cross-sectional data dynamically. Furthermore, by using time series principal component

analysis, we have heightened the precision and impartiality of evaluating the financial performance quality of oil companies[177]. The analysis indicates that operating capacity and profitability have the highest impact on the financial performance quality of CNPC and LUKOIL, contributing to 57.849% of the variance. Additionally, non-parametric tests and discriminant analysis reveal that the most significant indicators affecting financial security are inventory turnover (X1) and gross profit margin (X6). Due to its high inventory turnover ratio, LUKOIL financial security index surpasses that of CNPC.

Financial activities are a crucial aspect of the oil industry and size plays a key role in determining financial constraints. As a capital-intensive industry, oil companies require significant investment to thrive. Hadlock[178] uses the SA index to assess the level of financial constraints faced by a firm, with higher values indicating greater constraints.

$$SA = -0.737Size + 0.043Size^2 - 0.040Age \quad (14)$$

Where, Size is the natural logarithm of total assets; Age is defined by the period after stock exchange registration.

From a financial perspective, free cash flow is the most comprehensive measure of cash flow that reflects a company's ultimate operating performance and ability to create value objectively. If a company cannot cover the principal and interest on its debt, it indicates lower solvency and an increased risk of crisis[179]. In the long term, cash flows provide a more accurate reflection of a company's solvency by demonstrating its present cash balance. Cash flows are recorded on a cash basis, which helps to eliminate the drawbacks of the accrual method and prevent artificial fluctuations that may cause deviations. Therefore, cash flows offer a more realistic representation of a company's profitability, assessing its future cash-generation capacity and reflecting all cash receipts and losses from different transactions[180]. Financial adaptability represents a company's capacity to respond to modifications in financing conditions, taking into account feedback. In assessing a company's financial robustness, cash flow is a valuable metric.

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[177] Ding, X. (2022). The Relationship Between Environmental Taxes, Technological Innovation and Corporate Financial Performance: a Heterogeneous Analysis of Micro-Evidence from China. BRICS Journal of Economics, 4(3), 249-270.

[178] Hadlock, K., & Pearce, D. (2010). New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. The Review of Financial Studies, 23(5), 1909-1940.

[179] Purwanti, T. (2019). An analysis of cash and receivables turnover effect towards company profitability. International Journal of Seocology, 1, 37-44.

[180] Mishelle, D. (2016). Using DuPont analysis to assess the financial performance of the top three JSE listed companies in the food industry. Investment Management and Financial Innovations, 13(2), 29-41.

In general, financial capability is challenging to quantify because it incorporates many implicit elements. Therefore, this study utilizes a multivariate time series clustering approach to assess the financial potential of LUKOIL and CNPC from 2014 to 2020, based on four key measures: financial performance quality index, financial security index, enterprise size, and cash flow among the listed oil and gas enterprises in China and Russia. The popular clustering techniques employed encompass second-order clustering, K-means clustering, and hierarchical clustering. K-means clustering is applied in this paper and the results are categorized into three groups based on the financial potential of the years. The high potential years are given "3" points, medium potential are assigned "2" points, and the low potential years are rated "1" point. Table 27 displays the clustering outcomes.

Table 27 – ANOVA comparison results for clustered categories

Variables	**Results of ANOVA comparison for clustering categories (mean ± standard deviation)**			**F**	**P**
	cluster_1(n=7)	**cluster_2(n=3)**	**cluster_3(n=4)**		
Company size(CS)	1.39±0.04	2.61±0.01	2.62±0.03	2162.502	0.000**
Cash flow (CF)	8.46±4.42	-9.81±5.97	6.46±5.18	15.026	0.001**
FCI	1.41±1.03	-1.48±0.05	-1.35±0.14	23.901	0.000**
FSI	2.52±0.19	0.83±0.03	0.80±0.05	251.541	0.000**

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

The data in Table 27 indicates that F-values for financial performance quality index, financial security index, enterprise size and cash flow are significant at the 1% level (Sig. < 0.01), implying that there is an extremely significant level of variability among the categories and the division into three groups is well-founded. Please refer to Table 28 for the outcomes of the comprehensive evaluation of the financial abilities of listed companies involved in the oil and gas sector in Russia and China.

Table 28 – Findings from the thorough evaluation of financial capability using cluster analysis of time series data.

Company	**Year**	**Clustering categories**	**Frequency**	**Percentage**	**Level**	**Score/year**	**Total score**
CNPC	2014	cluster_2	3	21.43%	low	1	13
CNPC	2015	cluster_2			low	1	
CNPC	2016	cluster_3	4	28.57%	average	2	
CNPC	2017	cluster_3			average	2	

Continued table 28

Company	Year	Clustering categories	Frequency	Percentage	Level	Score/year	Total score
CNPC	2018	cluster_3	4	28.57%	average	2	13
CNPC	2019	cluster_3			average	2	
CNPC	2020	cluster_2	3	21.43%	low	1	
LUKOIL	2014	cluster_1	7	50.00%	high	3	21
LUKOIL	2015	cluster_1			high	3	
LUKOIL	2016	cluster_1			high	3	
LUKOIL	2017	cluster_1			high	3	
LUKOIL	2018	cluster_1			high	3	
LUKOIL	2019	cluster_1			high	3	
LUKOIL	2020	cluster_1			high	3	

Source: compiled by the author on the basis of the corporate financial statements.

The final clustering has produced three groups; whose proportions are 50.00%, 21.43% and 28.57%, respectively. The balance of distribution across the three categories is comparatively uniform, indicating excellent clustering efficiency. Regarding financial potential, LUKOIL is at a high level for 2014-202, achieving an overall score of 21 while CNPC financial potential rates medium for 2016-2019. In contrast, in 2014-2015 and 2020, the score is low, totaling 13 overall. Compared to LUKOIL, CNPC financial potential is comparatively low. In order to validate these findings, a study was carried out employing the entropy method to determine weighting coefficients for four different aspects, namely the quality of financial performance, financial security, enterprise size, and cash flow management. To validate the results of cluster analysis, the comprehensive indicator of financial capacity was calculated.

Analysis of the Operating Environment (hereafter-ASF) is a technique used in operations research to measure the performance of decision-making units. This method is widely used in evaluating the performance of facilities by comparing each facility with all others. It is a mathematical programming method applicable to any object or activity about which decisions are made about inputs and outputs. But despite the fact that the AFS method can measure the efficiency of units, it is important to note that the financial capacity management system is a complex system. It includes levels of financial stability, financial security, financial attractiveness and investment potential. Therefore, for a more detailed and qualitative analysis of subdivision efficiency, to conduct a comprehensive analysis and assessment of the financial potential of oil and gas enterprises, the Entropy method is used as a measurement tool in this study. The Entropy method is a weighting method that relies on objective data to determine the weighting coefficients of

estimated indicators[181]. The Entropy method offers an advantage due to its objectivity, as the calculation relies solely on objective data. This guarantees an objective and comprehensive evaluation and reduces the subjectivity that occurs with the hierarchical analysis method. The process for applying the entropy method is as follows.

We have chosen a sample of n companies, established m assessment criteria, and X_{ij} represents the value of i assessment criterion for j enterprise (i=1,2,3.....n; j=1,2,3.....m). Financial indicators' quality, security, business size and cash flow are deemed positive indicators, hence there is no equalisation requirement; however, a discrepancy exists in the unit measurement, thus the indicators require dimensionless shifting. Since there are negative values in the financial data of financial performance quality and cash flow, to ensure meaningful data processing, it's necessary to eliminate zero and negative values by implementing a "non-negative shift" process. This process is required to maintain the accuracy of the data, with a = 0,000001 as the unit of shift.

$$Y_{ij}=\left|X_{ij}\right|_{min}+a \tag{15}$$

After shifting the raw data in a negative direction, the calculations for the contributions of P_{ij} indicator j to i of the company are as follows:

$$p_{ij}=\frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}} \tag{16}$$

We calculate the entropy value $e_j$of the indicator j, as a result of the following process:

$$e_j=-\frac{1}{\ln n}\sum_{i=1}^{n} p_{ij}\ln(p_{ij}),\ 0\le e_j\ge 1 \tag{17}$$

The process of calculating the coefficient of variability is as follows:

$$g_j=1-e_j \tag{18}$$

The weighting of w_j is calculated as follows:

$$w_j=\frac{g_j}{\sum_{i=1}^{m} g_j} \tag{19}$$

The process of calculating the composite index of financial potential is as follows:

$$\mathrm{CIFP_n}=w_{\mathrm{CS}}p_{i\mathrm{CS}}+w_{\mathrm{CF}}p_{i\mathrm{CF}}+w_{\mathrm{FCI}}p_{i\mathrm{FCI}}+w_{\mathrm{FSI}}p_{i\mathrm{FSI}} \tag{20}$$

[181] Wang, X. H., & Wang, L. (2019). A Study on Industry Profitability Evaluation Based on Entropy Method, Commercial Accounting. (13), 37-40.

To more clearly compare the differences in the financial potential of two companies, we use the logarithm of financial security index to measure it and the logarithm of assets to measure the size of the company. Python software is used in the calculation process.

Table 29 – Financial potential entropy values and weights

Company	Year	CS		CF		FCI		FSI		CIFP
		g_{CS}	w_{CS}	g_{CF}	w_{CF}	g_{FCI}	w_{FCI}	g_{FSI}	w_{FSI}	
CNPC	2014	0.298	0.199	0.071	0.048	0.339	0.227	0.292	0.195	0.332
	2015									0.315
	2016									0.368
	2017									0.380
	2018									0.348
	2019									0.357
	2020									0.309
LUKOIL	2014	0.298	0.199	0.071	0.048	0.339	0.227	0.292	0.195	0.477
	2015									0.526
	2016									0.453
	2017									0.476
	2018									0.570
	2019									0.677
	2020									0.440

Calculated by the author. See Appendix 5.

As a result, the composite index of financial potential is computed as follows.

$$\mathrm{CIFP}_{Y,C} = 0.199\mathrm{CS}_{Y,C} + 0.048\mathrm{CF}_{Y,C} + 0.227\mathrm{FCI}_{Y,C} + 0.195\mathrm{FSI}_{Y,C} \quad (21)$$

Where, Y represents the year, C represents the enterprise, CIFP represents the comprehensive index of financial potential, CS represents the size of the enterprise, CF represents the cash flow, FCI represents the financial condition assessment index, and FSI represents the financial security assessment index.

As seen in Table 29, the comprehensive index of financial potential calculation results show that the quality of financial performance is of utmost importance. The comprehensive index of financial potential for LUKOIL is higher than CNPC even between 2014-2020, with the maximum value in 2019. This conclusion is in line with the findings of the financial performance quality index and affirms that financial performance quality is the primary determinant of financial potential. The results of the entropy method-based comprehensive index of financial potential are in concurrence with the outcomes of cluster analysis.

3.3. Forecast analysis of the financial potential of oil and gas enterprises of the Russia and the PRC

Listed oil and gas companies in both China and Russia confront significant challenges amidst the swift development of capital markets and market economy reforms. As per global benchmarks, these companies face issues with solvency, operating ability, profitability and growth capacity. The subpar financial capacity of these companies has considerably impacted their growth and sustainability. This poses a significant threat not only to oil and gas companies but also to other stakeholders. The investors' goal of preserving and enhancing their asset's value may not be achieved and they could even incur losses. Bank loans are confronted with the dilemma of not being paid on time, whilst authorities responsible for securities and energy markets may experience pressure to clean up. Anticipating the operating environment of oil and gas companies, proactively addressing the operational and financial potential, and mitigating the risk of failure are essential duties for all publicly-traded oil and gas firms. As oil and gas company management increasingly recognise their financial potential, assessing and forecasting this potential has become a crucial aspect of financial management, with extensive applications. Risk analysis and capacity forecasting of oil and gas companies has the following main implications:

- National economic decision-making necessitates the analysis and forecasting of oil and gas enterprises' financial potential. These enterprises operate under the energy market economic system, where any policy implemented by the government affects their business activities and efficacy. Macroeconomic regulation and national economic policy control continue to guide the development of oil and gas enterprises. Macroeconomic regulation is informed not only by macroeconomic data but also by the laws of capital flow and the actual availability of oil and gas enterprises in operation. Failure to do so would not only negatively impact the operation of oil and gas companies but also lead to significant economic fluctuations.
- Investors must analyse and predict the financial potential of oil and gas enterprises. Thus, investors must examine their financial position. Investors must analyse and predict the financial potential of oil and gas enterprises. Operating and developing these enterprises invariably involve financing, whether through equity or debt. When investing in an oil and gas business for the first time, an objective analysis of future development, the company's intrinsic value, and expected returns must be made. Similarly, when considering additional investment, growth and profitability analysis are essential. When investors are considering transferring equity interests, they must analyse and forecast the growth and profitability of the oil and gas businesses. It is vital to conduct objective evaluations and maintain clear language to ensure informed investment decisions.

Additionally, following conventional academic structures and maintaining a formal register is necessary to produce high-quality work.

- Managers should objectively analyse and forecast the financial potential of oil and gas companies. Additionally, it is crucial to adhere to conventional academic structures, maintain a clear and logical flow of information with causal connections, and use precise, formal language that is free from bias. To maximise the value of the oil and gas business and the capital of its shareholders, management is responsible for navigating many uncertainties surrounding the development of this industry. As such, they must prepare and analyse financial statements consistently, using the results to plan for both expansion and contraction. This task involves forecasting and analysing the performance of an oil and gas company primarily by studying its production and operations, inventory turnover, and capital turnover. Additionally, it includes projecting and evaluating the growth potential of an oil and gas company, mainly by scrutinising its ability to develop new products, penetrate new markets, and make management decisions. Forecasting and analysing the solvency and financial capacity of oil and gas companies is primarily done by examining solvency indicators, operating cash flow indicators and financial capacity.

Thus, precise prediction of the financial capabilities of oil and gas organisations is advantageous for investors and creditors and can also be a red flag for company management. Furthermore, it can assist the securities regulatory commission in comprehending the energy market's potential and aid in devising policies to stabilise it. Hence, the research on forecasting the financial potential of companies has immense theoretical and practical significance.

The most common procedures for predicting a company's economic performance during its operations include trend extrapolation, simple regression calculation, multiple regression calculation, direct calculation method, normative method, forecasting methods for operating profit based on cash flows, the method of cost, sales volume and profit interrelationships, and the factor modelling method. The dissertation employs the linear forecasting model to forecast the direction of fluctuations in the financial capacity of corporations[182]. Linear forecasting models comprise smooth time series models and non-smooth time series models. Among smooth time series models are autoregressive (AR) models, moving average (MA) models and autoregressive moving average (ARMA) models. The most classic and broadly employed non-smooth time series model is the

[182] Ivanov V. V., Tsytovich N. N. Corporate financial planning / V. V. Ivanov, N. N. Tsytovich. V. V. Ivanov, N. N. Tsytovich. - SPb. BAN; Nestor-Istoria, 2009. - 332 p.

autoregressive integrated moving average (ARIMA) model[183]. To construct the ARIMA model using the Python IDE coding in PyCharm 2021 software, we utilised the arima_model package.

The ARIMA model is a well-established approach to analysing time series data. It employs a precise mathematical model to characterise the autocorrelation among a series of time-dependent random variables, allowing one to identify patterns in the forecasting target and make short-term predictions based on available time series information. The formula for the ARIMA model is given below:

$$\mathrm{ARIMA} = (\mathrm{p}, \mathrm{d}, \mathrm{q}) \times (\mathrm{P}, \mathrm{D}, \mathrm{Q}) \tag{22}$$

The SARIMA model is a developing model derived from the ARIMA model, designed specifically for analysing seasonal or cyclical data[184]. The model formula is presented below:

$$\mathrm{SARIMA} = (\mathrm{p}, \mathrm{d}, \mathrm{q}) \times (\mathrm{P}, \mathrm{D}, \mathrm{Q})_{\mathrm{S}} \tag{23}$$

Where, p and P represent autoregressive and seasonal autoregressive orders respectively; d and D are differential and seasonal differential counts; q and Q are moving average orders and seasonal moving average orders; and S represents the number of cycles.

Seasonal and trend decomposition using Loess (STL) is a highly versatile and sturdy strategy for decomposing time series[185]. Loess is a method for estimating non-linear relationships that blends the simplicity of traditional linear regression with the flexibility of non-linear regression. Moreover, STL decomposes time series into three main components, i.e. trend, seasonal terms, and residuals. The decomposition in general can be expressed as follows.

$$\mathrm{Y_t} = \mathrm{T_t} + \mathrm{S_t} + \mathrm{R_t} \tag{24}$$

Where, T(t) represents the trend value at time t, S(t) stands for the seasonal value at time t, and R(t) represents the residual value at time t.

The minimum information criterion is a standard method for evaluating the complexity and measuring the "goodness of fit" of a statistical model[186]. The model parameters are determined using Akaike's information criterion (AIC), which effectively compensates for the subjectivity of

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[183] Ding, X. W. (2022). A Time Series-Based Statistical Approach for Trade Turnover Forecasting and Assessing: Evidence from China and Russia. The Journal of Asian Finance, Economics and Business, 9(4), 83–92.

[184] John, E.E., & Patrick, U.U. (2016). Short-Term Forecasting of Nigeria Inflation Rates Using Seasonal ARIMA Model. Science Journal of Applied Mathematics and Statistics, 4, 101-107.

[185] Farooqi, A.A. (2014). ARIMA Model Building and Forecasting on Imports and Exports of Pakistan. Pakistan Journal of Statistics and Operation Research, 10, 157-168.

[186] Akaike, H. (1974). A new look at the statistical model identification. IEEE Transactions on Automatic Control, 19, 716-723.

fixed order of autocorrelation and partial autocorrelation plots. This criterion can find the most suitable model faster in a limited order range. The AIC formula for the model's value is as follows.

$$AIC = 2k - 2\ln(\hat{L}) \quad (25)$$

The ARIMA model is employed in this dissertation to predict the comprehensive index of financial potential of LUKOIL and CNPC. The forecasting stage is illustrated in Figure 18.

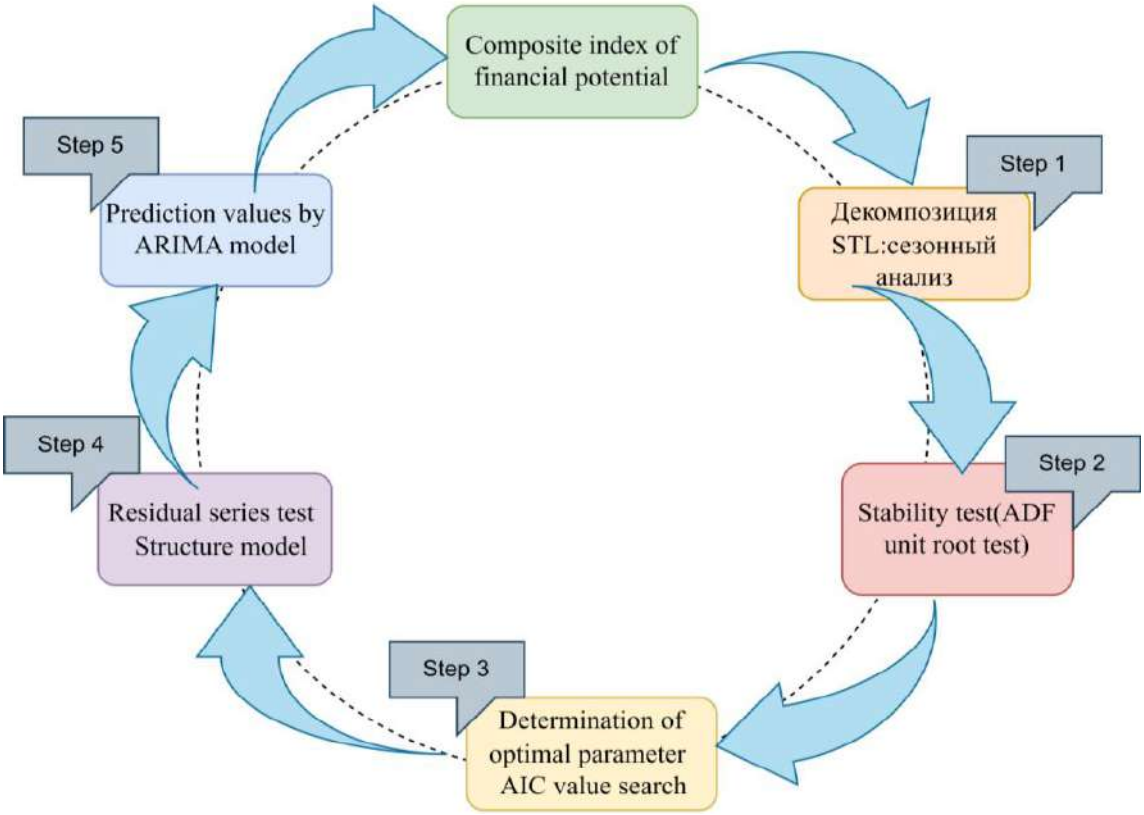

Figure 18 – ARIMA model scheme

Source: compiled by the author.

Initially, we multiplied LUKOIL financial potential value by 100 to enhance the accuracy and precision of its financial potential projection. Subsequently, we decomposed the LUKOIL financial potential time series using the STL method. Based on the decomposition of the effects of seasonality, trend and residual volatility in Figure 19, a clear trend can be observed in LUKOIL financial potential. The upward trend began after 2016 and reversed to a downward trend by 2019. Therefore, it may not be a smooth series and requires differentiation. Figure 19 ("Seasonality") indicates that LUKOIL financial potential does not have a stable cyclicality. There is no seasonal pattern in LUKOIL financial potential time series, therefore it is represented using the ARIMA(p, d, q) x (P,D,Q) model.

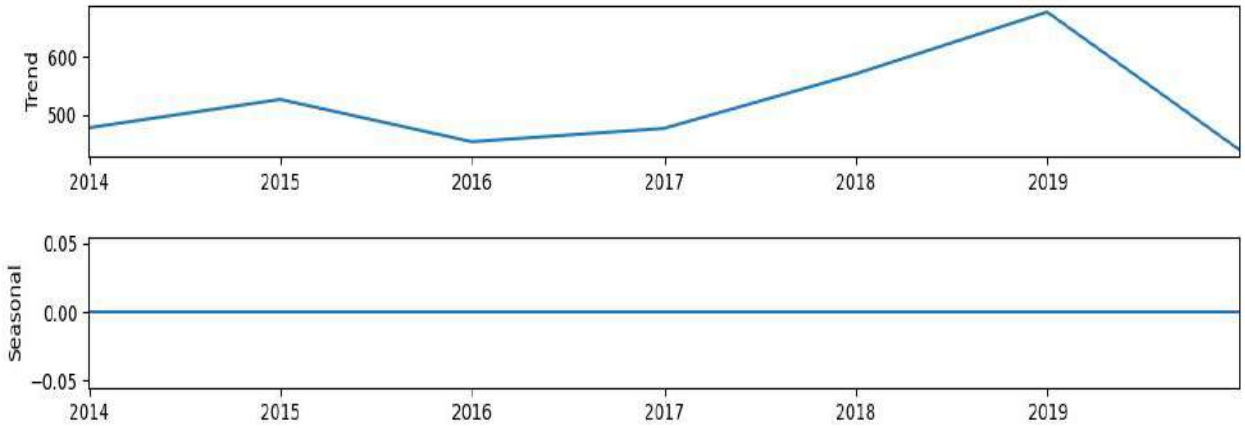

Figure 19 – Decomposition of seasonality and trend effects for LUKOIL financial potential

Source: compiled by the author on the basis of the corporate financial statements.

Prediction can only be made if the time series is smooth. The following methods are conducted to check smoothness: time series plot test, autocorrelation plot test and unit root test (ADF). The ADF test is used to confirm the smoothness of LUKOIL financial potential time series. Further processing is implemented on a stable series to make it steadfast. Various techniques such as differentiation methods, log-transformations, moving averages, and exponential averaging are utilized for this objective.

Table 30 – Time series ADF test result for LUKOIL financial potential

Differentiated orders	**t**	**p**	**Critical values**		
			1%	**5%**	**10%**
0	-2.438	0.131	-6.045	-3.929	-2.987
1	-2.572	0.038**	-7.355	-4.474	-3.127

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

As presented in Table 30, the ADF test was conducted on LUKOIL financial potential time series and the results indicate a t-statistic of -2.438, with critical values of -6.045, -3.929 and -2.987 for 1%, 5% and 10% significance levels, respectively. The corresponding p-value is 0.131, which is greater than the predetermined significance level of 0.1. Consequently, we cannot reject the null hypothesis and infer that the series is non-stationary. Prior to the ADF test, the time series underwent a first order differencing procedure. After first order differentiation, the outcomes of the

ADF examination indicated that the p-value is 0.038 (less than 0.5), exceeding 95% confidence level, which implies that the original hypothesis can be discarded, and the sequence is consistent.

Autocorrelation Function (ACF) refers to the correlation between values of a series that are k intervals apart. Private Autocorrelation Function (PACF) refers to this function at a particular lag k. At lag k, the correlation is calculated between values in a series that are separated by k intervals, with interval values included in interval[187].

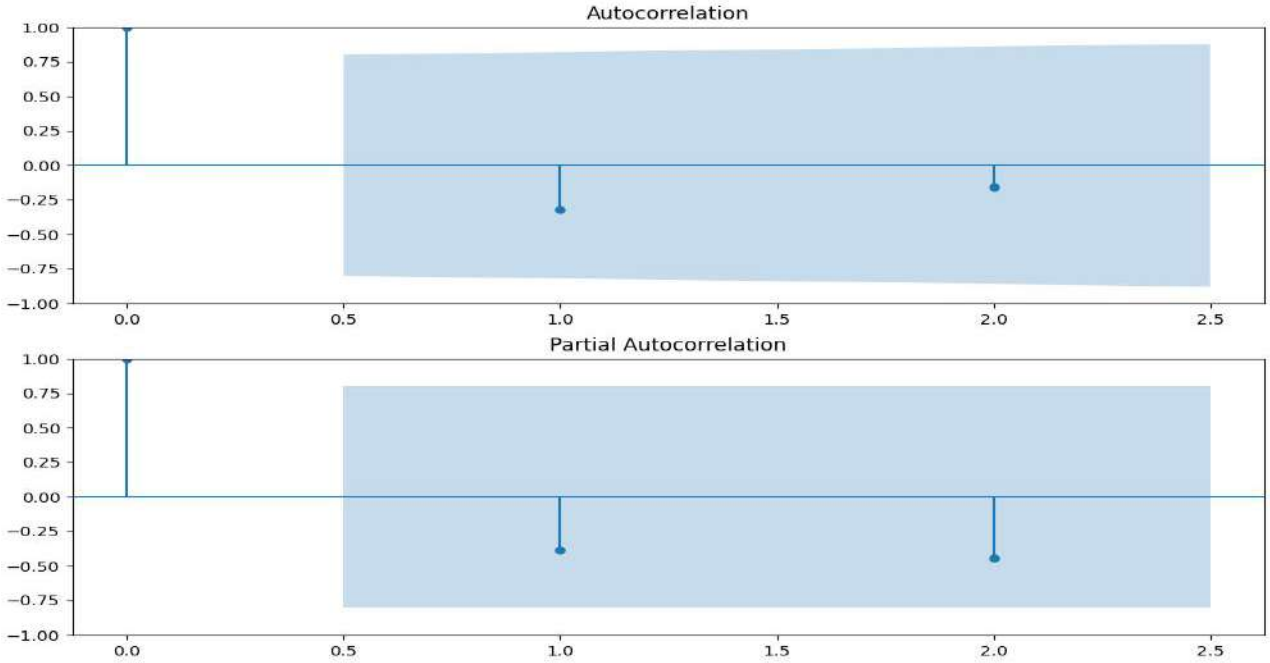

Figure 20 – Autocorrelation and partial autocorrelation plots of the time series of LUKOIL financial potential

Source: compiled by the author.

The autocorrelation function (ACF) and partial autocorrelation function (PACF) enable the identification of the parameters within the interval [0,3]. The search range of parameters should be established in the grid search of the ARIMA model.

Table 31 – Results of AIC calculation

	MA0	**MA1**	**MA2**	**MA3**
AR0	-	58.121	58.916	60.660
AR1	61.410	60.099	60.910	62.555
AR2	61.024	**58.103**	62.772	64.279
AR3	59.748	61.526	63.378	65.285

Source: compiled by the author.

[187] Access mode: https://www.ibm.com/docs/ru/spss-modeler/saas?topic=data-autocorrelation-partial-autocorrelation-functions.

As presented in Table 31, the AIC value reaches a minimum of 58.103 when the parameter $\hat{p} = 2$， $\hat{d} = 1$， $\hat{q} = 1$. Following the Durbin-Watson (DW) test, the value is 2.367, indicating no autocorrelation in the residuals. Results from the Ljung-Box Q(LBQ) white noise test on the residuals show that the p-value of the LB statistic when the 1st order delay is 0.104 is significantly greater than 0.05. Therefore, the ARIMA model's residuals series is one of white noise, and the fitted model is valid.

Table 32 – Significance test of ARIMA(2,1,1) model parameters

Parameter	Coefficients	Standard error	z	P>|z
Free term	8.799	33.676	0.261	0.794
ar.L1	0.145	0.083	0.741	0.081*
ar.L2	-0.993	0.014	-69	0.000***
ma.L1	-0.997	-0.468	2.130	0.033**

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author.

According to Table 32 of the ARIMA(2,1,1) model parameters, the coefficient ar.L2 is statistically significant at the 1% level. This indicates that the ARIMA(2,1,1) model can be implemented to predict LUKOIL financial potential over time. The equation for the model is as follows, as specified in Table 32.

$$\mathrm{CIFP}_{\mathrm{LUKOIL}}^{\mathrm{Y}} = 8.799 + 0.145 * \mathrm{CIFP}_{\mathrm{LUKOIL}}^{\mathrm{Y-1}} - 0.993\mathrm{CIFP}_{\mathrm{LUKOIL}}^{\mathrm{Y-2}} - 0.997\varepsilon_{\mathrm{LUKOIL}}^{\mathrm{Y-1}} \quad (26)$$

Where, Y represents the year; CIFP represents the composite index of financial potential; ε represents the moving average term.

Note: The model is based on data of 1st order difference.

We multiplied CNPC financial potential by a factor of 100, to mirror the approach taken with LUKOIL financial potential. The time series of CNPC financial potential was then decomposed using the STL method. Based on the decomposition of seasonality, trend, and residual volatility, it is apparent that the financial potential of CNPC exhibits a clear upward trend since 2015, followed by a downward trend in 2017. Thus, the series may not be smooth and require differentiation. There is no significant cyclicality in the financial potential of CNPC. There is no seasonal variation present in CNPC financial potential time series, hence it is represented using ARIMA(p, d, q) x (P,D,Q) model. The ADF test is performed primarily to assess the series' smoothness and the demand for differential operations.

Table 33 – Time series ADF test result for CNPC financial potential

Differentiated orders	t	p	Critical values		
			1%	5%	10%
0	-1.617	0.114	-10.858	-7.721	-5.611
1	-2.136	0.063*	-9.562	-5.853	-4.712
2	-3.410	0.011**	-7.355	-4.474	-3.127

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author on the basis of the corporate financial statements.

According to Table 33, following first-order differentiation, the ADF test's t-statistic for the financial potential time series of CNPC measures at -3.410. Critical values of -7.355, -4.474 and -3.127 at 1%, 5% and 10% respectively. The p-value is under 0.05, measuring at 0.011. Rejecting the original hypothesis, the series remains stable.

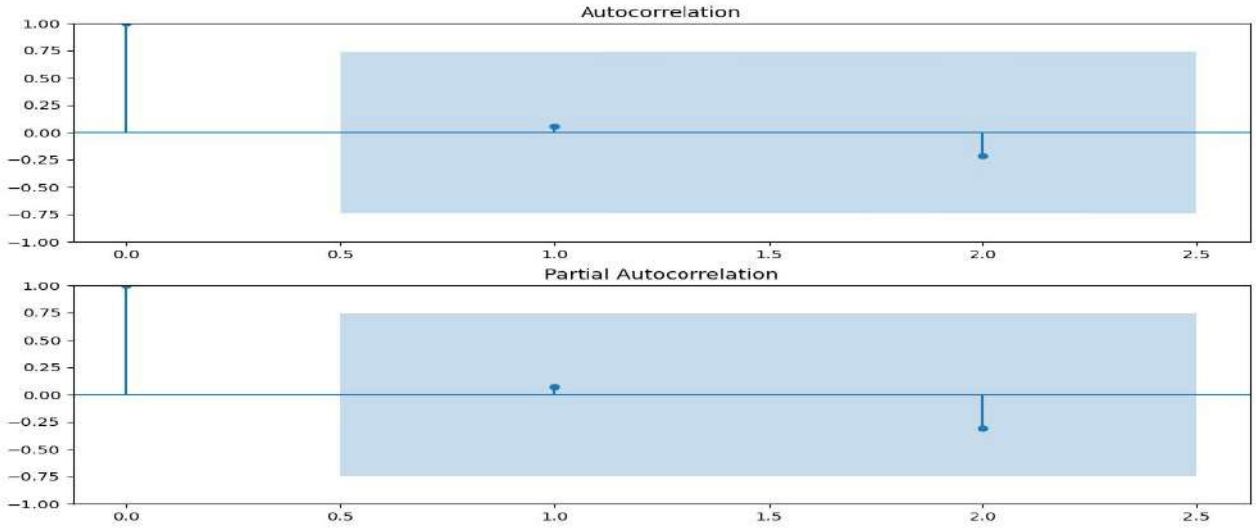

Figure 21 – Autocorrelation and partial autocorrelation plots of the time series of CNPC financial potential

Source: compiled by the author.

Figure 21 demonstrates that the autocorrelation and partial autocorrelation plots display lag, and the lag values are within two times the standard deviation at first order. Thus, the parameter $\hat{p} = 1$, $\hat{d} = 2$, $\hat{q} = 1$. Following the Durbin-Watson (DW) test, the value is 1.5, indicating that there is no autocorrelation in the residual series. The Ljung-Box Q(LBQ) test on the residuals reveals that the p-value of the LB statistic at the 1st order delay is 0.681, which is significantly higher than 0.05. Hence, the residual series of the ARIMA model represents white noise, indicating the validity of the fitted model.

Table 34 – Significance test of ARIMA(1,2,1) model parameters

Parameter	Coefficients	Standard error	z	P>|z
Free term	-19.116	15.308	-1.249	0.212
ar.L1	-0.689	-0.274	2.511	0.012**
ma.L1	-0.994	-0.345	2.881	0.004***

Note: * significance at 10% statistical level,

** significance at 5% statistical level,

*** significance at 1% statistical level.

Source: compiled by the author.

According to Table 34, the coefficient ma.L1 is statistically significant at the 1% level, indicating that the ARIMA(1,2,1) model can be utilised to forecast the time series of CNPC financial potential. The equation of the ARIMA(1,2,1) model is as follows:

$$\mathrm{CIFP}_{\mathrm{CNPC}}^{\mathrm{Y}} = -19.116 - 0.689 * \mathrm{CIFP}_{\mathrm{CNPC}}^{\mathrm{Y-1}} - 0.994\varepsilon_{\mathrm{CNPC}}^{\mathrm{Y-1}} \quad (27)$$

Where, Y represents the year; CIFP represents the composite index of financial potential; ε represents the moving average term.

Note: The model is based on data of 2nd order difference.

Determine the optimal hyperparameters of the ARIMA model through cross-validation with grid search to acquire ARIMA model forecast values. We present a chart displaying the financial potential trends of oil companies (Fig. 22).

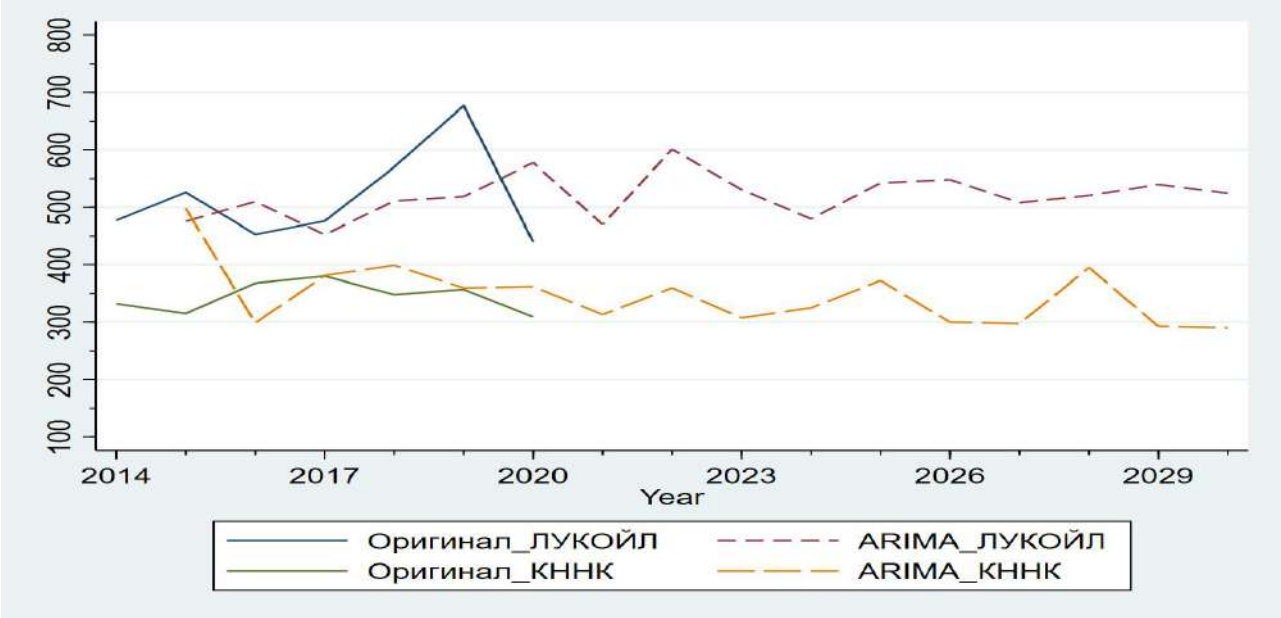

Figure 22 – Projects the future financial potential trends of LUKOIL and CNPC companies from 2015-2030

Source: compiled by the author.

Figure 22 indicates that the ARIMA (2,1,1) model for LUKOIL effectively depicts the upward trend in the time series between 2017 and 2019. Furthermore, the time series of financial potential values from 2020 to 2030 displays a mix of downward and upward trends, which the ARIMA (2,1,1) model more accurately predicts. The ARIMA (1,2,1) model for CNPC inaccurately represents the fluctuations in the financial potential time series between 2020 and 2020. However, the predicted values for 2017 and 2019 were nearly identical to the actual values. The financial potential displays a trend of both decrease and increase between 2020 and 2030. In specific years, the ARIMA (1,2,1) model can provide a more precise prediction of CNPC financial potential.

China's energy consumption is increasing at a rapid pace. According to the World Bank, if current policies persist, China may become the world's largest oil importer, requiring it to import 75% of its oil and 50% of its natural gas by 2030[188]. The Organisation for Development and Cooperation on Global Energy Interconnection has released a report titled “Study on China's Energy and Electricity Development Plan to 2030 and Development Prospects to 2060”[189]. The report predicts that China's oil consumption will reach 740 million tonnes and natural gas consumption will reach 500 billion cubic metres by 2030. Additionally, it states that clean energy will account for over 30% of total primary energy. In 2016, 178 countries signed the Paris Agreement in response to global climate change. China has pledged to reach a carbon peak by 2030. The National Development and Reform Commission and the Energy Bureau have developed the “Energy Production and Consumption Revolution Strategy (2016-2030)”[190]. The strategy emphasises the significance of promoting green industrial transformation and adopting cleaner production methods at oil and gas facilities. In the short term, reducing the financial potential of oil and gas companies can be achieved by upgrading old equipment and investing in new technologies. However, in the long term, green innovations can bring economic benefits and contribute to sustainable development. The trend of decreasing and then growing financial potential of oil and gas companies is consistent with the law of industry restructuring in the energy sector. This indirectly confirms the validity of the proposed forecast.

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China and Russia have taken a number of steps to develop their energy resources in light of the turbulent global situation and their own energy security concerns. These measures have helped to stabilise domestic energy prices and foster the sustainable growth of oil and gas firms. As a financial entity operating within the market, an enterprise must acquire initial capital from shareholders and subsequently return profits to them through business operations. The goal is to attain higher profits, generate more wealth, and contribute to the advancement of the market economy. The operating power and profitability of a company are crucial factors for analysing its overall performance. A proficiently-operating and profitable company is capable of maximising its assets, acquiring market intelligence and manufacturing products that align with market needs[191]. This suggests that the company has a sound financial practice, superior management and efficient capital utilisation, which can augment the company's sales proceeds, generate more prosperity and heighten the potential for future progress.

Conclusions for Chapter 3

1. The analysis of CNPC and LUKOIL shows that the main factors affecting LUKOIL operations are oil and gas prices and management costs, whereas the main factors affecting CNPC operations are oil and gas prices and commercial costs.

2. This chapter evaluates the company's financial potential by examining its business performance, profitability, liquidity, financial stability, asset position, and solvency. Despite implementing a strategy to utilize funds from other enterprises, CNPC has not effectively combined this approach with financial flexibility. Consequently, their financial flexibility strategy requires further improvement. On the other hand, LUKOIL has not adopted a similar strategy, but its high level of financial flexibility allows the business to bear less financial risk. The financial potentials of CNPC and LUKOIL have exhibited sustainable growth trends from 2015 to 2020.

3. This dissertation considers the distinguishing features of the oil and gas sectors in Russia and China and selects 12 distinct indicators across five key areas, namely operating ability, profitability, growth ability, solvency, and financial flexibility. These financial indicators establish a comprehensive evaluation system in this analysis. By creating a time series stereo data table, we have overcome the inability to dynamically analyze cross-sectional data. Utilizing time series

[191] E, L. Chapter 9. Regional innovation systems on the example of the Guangdong and Beijing region in China / L. E, X. Ding // Innovative development: the potential of science and modern education: Monograph / Under the general editorship of G.Y. Gulyaev. - Penza: Nauka i Prosveshchenie, 2022. - p. 93-104.

principal component analysis, we have improved the accuracy and objectivity of assessing the financial performance worthiness of oil companies. The profitability and operating capacity factor accounted for 57.849% of the variance in financial performance for CNPC and LUKOIL, demonstrating the significant impact of these factors.

4. The author then utilised U Mann-Whitney for non-parametric tests and Bayes discriminant for stepwise discriminant analysis, to develop a Z-score correction model. Non-parametric tests and discriminant analysis reveal that inventory turnover (X1) and gross profit margin (X6) significantly impact financial security. As LUKOIL exhibits an exceptionally high inventory turnover ratio, their financial security index is much higher than that of CNPC.

5. Consequently, a systematic strategy is suggested for enhancing the management mechanism of financial potential by employing the entropy technique to evaluate weight coefficients and compute the all-encompassing financial potential index in four categories: the quality of financial indicators, financial security, enterprise size, and cash flow.

6. Predicting the financial potential of companies carries significant theoretical and practical significance. Assessing the financial potential of oil companies is a complex and highly volatile task. The ARIMA model, a classical linear regression method for time series forecasting, is better than other models in this regard. Results indicate that LUKOIL and CNPC oil corporate financial potential can be forecasted more accurately using the ARIMA model.

7. Furthermore, it is worth noting that the external business environment for oil companies is currently undergoing notable changes, and sustainable development has been gaining global attention. China is the top global importer of oil and gas, whereas Russia is the foremost producer and exporter of fossil fuels. The oil industry is the cornerstone of China's economy, with energy security being a paramount concern for national security. The potential economic gains of oil and gas firms, as well as their likelihood of sustained operations, hinge mainly on their financial resources. Under the current global environment, both the Chinese and Russian governments have introduced numerous constructive measures to advance the oil and gas sector.

CONCLUSION

The research conducted allows us to draw the following conclusions and generalisations.

The author's definition of the financial potential of the enterprise as a set of actually attracted and possible (available, taking into account current constraints) financial resources for economic activity is formulated. This approach to definition, in contrast to the existing ones, includes not only the ability to ensure sustainable development of the enterprise by improving the cash flow management system and optimising the capital structure on the basis of a comprehensive analysis of the current financial position and full use of financial resources, but also the ability to minimise the risks of activity on the basis of forecasting the indicators of the financial position.

The dissertation research revealed that the value of Chinese and Russian oil and gas companies in the period 2014-2020 changes to different degrees. The purpose of financial potential management is to maintain the financial stability of the company in order to maximise its value at all stages of the life cycle. Financial potential, which has the dual nature of financial resources and financial relationships, is the most important indicator of the economic growth rate of the country, industry and company. An increase in financial capacity indicates the implementation of the right policies that increase the competitiveness of the company and the country as a whole. The more efficient a company is, the more tax revenue it brings to the federal and regional budgets.

Russia has a hydrocarbon-dependent economy, characterised by the dominance of the energy sector in the national economy. The structure of Russia's industry, trade and investment shows that natural resources such as oil and gas occupy a significant share and have always played an important role in the economy. The large number of listed companies in China and Russia makes a great contribution to the economic development of the domestic oil and gas industry, which greatly enhances the economic vitality of the country and the region. With the development and use of new energy sources, the global energy picture is changing dramatically and oil and gas companies are facing major challenges. Demand and price changes, which are the main assets of oil and gas companies, are considered to be the most fundamental factors affecting their profitability. Therefore, it is necessary to analyse the energy supply and demand trends and summarise the financial situation and dynamics of the Russian and Chinese oil and gas industries in order to improve the financial capacity management mechanisms for application in the oil and gas sector.

The study improves the financial capacity evaluation model because the existing financial capacity evaluation model is very subjective. As the management of oil and gas companies are gradually becoming more aware of their financial potential, the evaluation and prediction of the financial potential of oil and gas companies has become an important financial management tool

and is widely used in many fields. Accurately forecasting the financial potential of oil and gas companies not only benefits investors and creditors, but can also serve as a warning to management. In addition, it can also help the Securities and Exchange Commission to understand the potential of the energy market and can be a useful aid in formulating policies to stabilise the energy market. Therefore, the study of forecasting the financial potential of companies is of great theoretical and practical importance. In this study, an algorithm for predicting the effectiveness of financial potential management is developed.

All the tasks of the study have been solved. This allows us to propose a number of theoretical provisions for inclusion in training courses on financial management, broadening their scope, since financial potential also depends on the system of social relations, including interstate relations.

1.The research of the dissertation analyses and generalises the theoretical bases of the mechanisms of financial potential management, redefines the concept of financial potential and presents the advantages of the implementation of the financial strategies of other companies in the value chain.

Financial potential has a dual nature of financial resources and financial relationships. The sources of financial potential are divided into three main parts: financial resources, investment resources and credit resources. Of these, financial resources are the most important source. Thus, financial potential is the ability of an enterprise to receive disposable or potential monetary income: investments, investment income, borrowed funds and so on. Financial potential is an element of internal economic potential. The structure of economic potential shows what each element is responsible for: labour potential and innovation potential ensure development, resource potential contributes to economic efficiency, financial potential is responsible for sustainability, production potential is responsible for quality, and so on.

A company's sustainable solvency depends on the liquidity of its assets and its profitability, and is closely related to its capital structure. In the practice of financial management, the capital structure policy includes the level of indebtedness and solvency of the enterprise.

The actual process of functioning of the mechanism of management of financial potential of the enterprise can be represented in a general form by the following four stages: diagnostics of the main financial indicators to determine the parameters of the financial potential of the enterprise; identification of the results obtained in the process of diagnostics; adjustment of the parameters of the financial potential of the enterprise; monitoring of the financial indicators of the enterprise.

Financial analysis is not only the main tool for assessing the financial potential, but also the basis for making managerial decisions on the issues of the life of the enterprise. In the practice of financial management, the main direction of management of the financial potential of the enterprise

is to increase the financial capacity of the enterprise by optimal distribution of its financial resources, thus the enterprise realises the maximisation of its own value. Cash is the most important financial resource of a company. Effective working capital management has become the best way for companies to solve the problem of insufficient cash flow. Thus, the implementation of working capital management approach through the strategy of other people's money in the value chain helps to improve the working capital turnover rate, ensuring sufficient cash flow for the business operations of the enterprise, and the use of large amounts of interest-free liabilities reduces the cost of capital of the enterprise, thereby increasing the profitability of the enterprise and providing financial security for the sustainable development of the enterprise.

2.The study examines the causes and trends of world crude oil prices and summarises the historical process of Sino-Russian energy cooperation. From the perspective of national economic stability, the crude oil price is the barometer of the industrial goods market. From the perspective of national security, crude oil has always been a strategic reserve for all countries, and several wars in history have been caused by disputes over crude oil.

In the last 20 years, there have been three dramatic fluctuations in oil prices, which have also been accompanied by landmark historical events: the 2008 financial crisis; the lifting of the US ban on shale gas exports in 2015 to achieve energy independence; and the outbreak of 2020 and the development of new energy technologies. The next decade will be a crucial period for accelerating the world's transition to clean energy. Green and low-carbon development and energy transition is a major trend that has built a global consensus. The direction of the global energy mix is shifting from high-carbon coal and oil to low-carbon diversified energy sources, mainly natural gas.

3.The research identifies trends in energy supply and demand, summarises the financial situation and dynamics of oil and gas activities in Russia and the PRC.

In fact, the validation of the proposed theoretical provisions is carried out throughout the thesis by means of a comparative analysis of LUKOIL and CNPC. To this end, the thesis uses time series principal component analysis, non-parametric tests, stepwise discriminant analysis, cluster analysis and entropy to improve the financial potential assessment model.

Time series principal component analysis was used not only to reduce the dimensionality of the original data, but also to effectively dynamically evaluate the financial performance of oil companies. According to the characteristics of Russian and Chinese oil and gas companies, this paper selects 12 different indicators from five aspects: operational capability, profitability, growth capability, solvency and financial flexibility to form a financial performance quality evaluation system. The level of financial risk is one of the main indicators of financial capability. Financial risk is a real problem that companies have to face in the process of financial management. The

study uses Mann-Whitney U for non-parametric test and Bayes discriminant for stepwise discriminant analysis to build a Z-score correction model. For a clearer comparison of the differences in the financial capacity of the two companies, it uses the logarithm of the financial security index to measure it and the logarithm of assets to measure the size of the company.

This paper uses multivariate time series clustering method to evaluate the financial potential of LUKOIL and CNPC for the period 2014-2020 based on four aspects: financial quality index, financial security index, company size and cash flow of listed oil and gas companies in China and Russia. To better compare the differences in the financial strength of the two companies, we use the logarithm of the financial security index to measure financial security and the logarithm of assets to measure company size. This paper uses K-means clustering, and the clustering results are provisionally classified into three groups, where high financial potential years are scored as '3', medium as '2' and low as '1'. LUKOIL's financial potential for 2014-202 is high with a total score of 21, while CNPC's financial potential for 2016-2019 is medium and its financial potential for 2014-2015 and 2020 is low with a total score of 13.

The entropy method was used to determine the weights and calculate the composite index of financial capability in four aspects: quality of financial performance, financial security, company size and cash flow. According to the comprehensive index of financial potential, it is clear that the quality of financial performance is the most important index. As a result, we can see that the value of the comprehensive index of financial potential of LUKOIL is higher than that of CNPC even in 2014-2020, it reaches the maximum value in 2019. This conclusion is consistent with the results of the index of the quality of financial performance and confirms that the quality of financial performance is the main indicator of financial potential. The results of the comprehensive index of financial capacity, calculated using the entropy method, are consistent with the results of the cluster analysis. At the same time, comparing the comprehensive index of financial potential calculated by the entropy method with the index calculated by the linear model of Sukhov, L.F., the trend of the time series is basically the same.

LUKOIL is a private company, CNPC is a state-owned company. Their comparison shows that the form of ownership is not a factor in improving the efficiency of the company's functioning. A state-owned company can perform better than a private one.

4.In this paper, an ARIMA model is proposed to predict the financial potential of listed oil companies in Russia and China in order to provide a basis for the green and sustainable development of oil companies and to stabilise the oil market supply.

After passing the unit root test, the optimal hyperparameters are determined using grid search and cross-validation in machine learning.The forecasting models were defined as ARIMA (2,1,1)

for LUKOI and ARIMA (1,2,1) for CNPC. All residual sequences passed the Durbin-Watson (DW) test and the Ljung-Box Q (LBQ) test. These results prove the validity of the developed ARIMA model for CNPC and LUKOI. In response to the unstable international situation, Russia and China have implemented a number of measures to develop the energy sector and their own energy security, which had a positive impact on stabilising domestic energy prices and contributed to the sustainable development of oil and gas companies.

The paper uses the methods of time series principal component analysis, non-parametric tests, stepwise discriminant analysis, cluster analysis and entropy to improve the financial potential assessment model, and uses the ARIMA model to develop an algorithm for predicting the efficiency of financial potential management. As a result, the financial potential assessment and forecasting system of the company is shown in Figure 23.

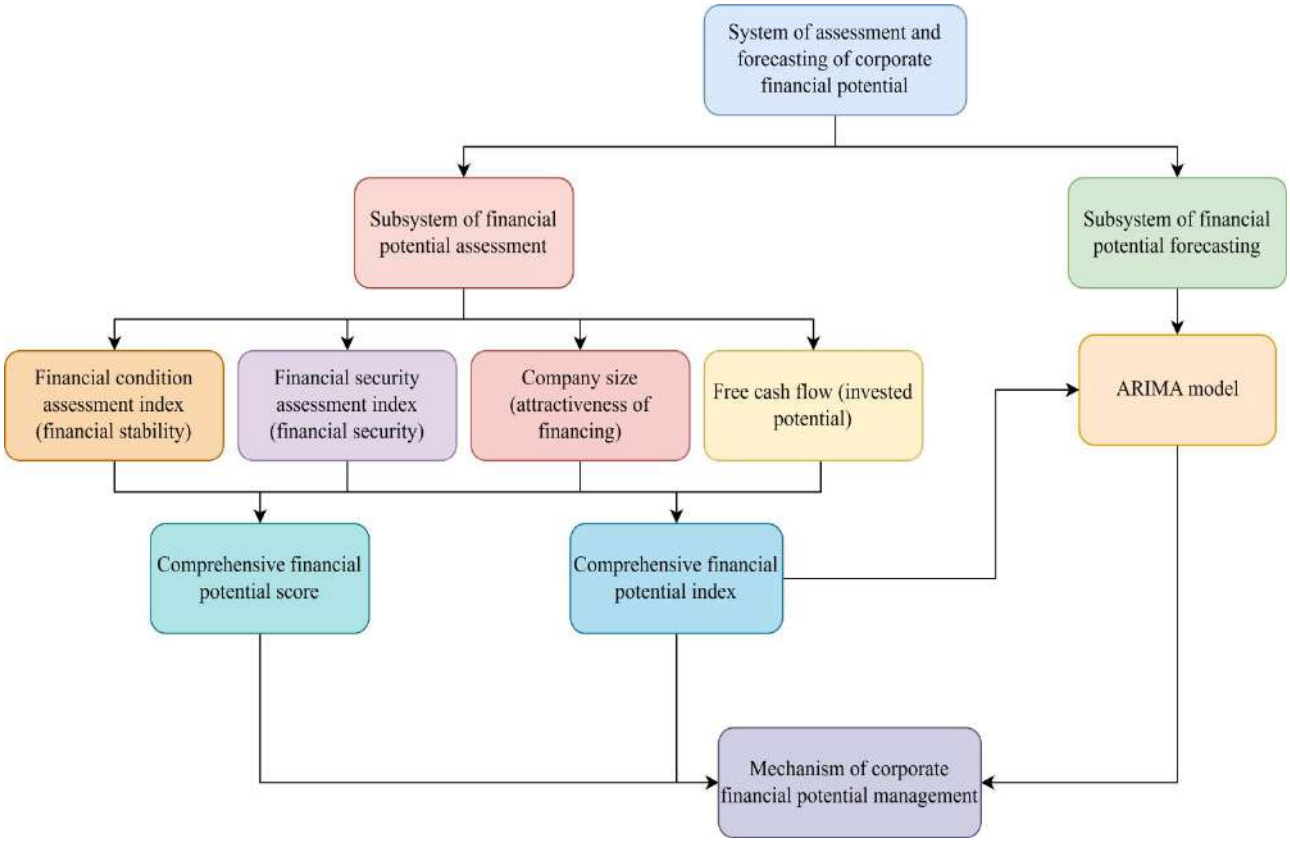

Figure 23 – Scheme for assessing and forecasting the financial potential of the enterprise

Source: compiled by the author.

This dissertation enhances the management of financial potential through the development of a financial potential assessment subsystem and a financial potential forecasting subsystem, resulting in improved mechanisms. The financial stability, financial security, financing attractiveness and investment potential are considered when applying FCI and FSI to assess the financial potential of

oil and gas companies. Additionally, the ARIMA model is used in financial potential forecasting to effectively predict the financial situation.

The theoretical and practical significance of these findings extends to both financial potential researchers and managers of oil and gas companies. Improving investment and financing through rational resource allocation will furnish enterprises with the financial resources needed to realise environmentally-friendly technological advancements and sustainable development.

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APPENDIX

Appendix 1. Time series of oil and gas production and consumption in Russia and China

Year	Oil production (thousand bpd)		Oil consumption (thousand bpd)		Gas production (billion cubic metres)		Gas consumption (billion cubic metres)	
	RF	PRC	RF	PRC	RF	PRC	RF	PRC
1985	10863	2508	4944	1807	424,9	13,0	356,1	13,0
1986	11247	2625	5006	1925	462,6	13,9	360,2	13,9
1987	11416	2694	5051	2048	500,5	14,0	381,0	14,0
1988	11373	2745	5001	2203	542,4	14,4	402,1	14,4
1989	11070	2764	5111	2315	566,3	15,2	408,0	15,2
1990	10342	2778	5042	2297	599,6	15,4	414,2	15,4
1991	9264	2831	4917	2491	591,3	15,6	425,0	15,6
1992	7978	2845	4699	2705	592,2	15,9	411,3	15,9
1993	7119	2892	3928	3013	568,6	16,9	410,1	16,9
1994	6371	2934	3486	3069	558,5	17,7	385,3	17,7
1995	6236	2993	3058	3342	541,2	18,1	372,4	17,9
1996	6062	3175	2624	3660	552,3	20,3	374,5	18,7
1997	6171	3216	2630	4007	523,5	22,9	345,4	19,8
1998	6110	3217	2490	4139	541,3	23,5	359,6	20,4
1999	6119	3218	2568	4387	544,4	25,4	358,5	21,7
2000	6583	3257	2540	4697	537,1	27,4	366,2	24,7
2001	7106	3310	2628	4810	534,8	30,6	372,2	27,6
2002	7755	3351	2544	5200	547,5	32,9	376,7	29,4
2003	8602	3406	2653	5781	570,6	35,3	385,6	34,2
2004	9335	3486	2619	6738	582,6	41,8	395,6	40,0
2005	9598	3642	2647	6878	589,5	49,7	400,4	47,0
2006	9834	3711	2762	7402	604,8	59,0	421,7	57,8
2007	10057	3742	2780	7778	601,6	69,8	428,8	71,1
2008	9965	3814	2861	7904	611,5	80,9	422,7	81,9
2009	10152	3805	2775	8240	536,2	85,9	397,8	90,2
2010	10379	4077	2878	9390	598,4	96,5	423,9	108,9
2011	10533	4074	3074	9739	616,8	106,2	435,6	135,2
2012	10656	4155	3119	10170	601,9	111,5	428,6	150,9
2013	10807	4216	3163	10668	614,5	121,8	424,9	171,9
2014	10927	4246	3300	11120	591,2	131,2	422,2	188,4
2015	11087	4309	3197	12066	584,4	135,7	408,7	194,7
2016	11342	3999	3265	12499	589,3	137,9	420,6	209,4
2017	11374	3846	3271	13137	635,6	149,2	431,1	241,3
2018	11562	3798	3320	13576	669,1	161,4	454,5	283,9
2019	11679	3836	3393	14005	679,0	177,6	444,3	308,4
2020	10667	3901	3238	14225	638,5	194,0	411,4	330,6

Source: Statistical Review of World Energy. bp, 2021. [Electronic resource]. - Access mode: URL: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Appendix 2. Macroeconomic indicators of the PRC and the RF

Economic indicators	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Growth rate of oil turnover between the PRC and the RF	0,098	-0,317	-0,158	0,586	0,632	-0,027	-0,275
Oil prices (Dollars per barrel)	93,28	48,71	43,34	50,79	65,20	57,03	39,25
RF GDP growth rate	0,007	-0,020	0,002	0,018	0,028	0,022	-0,027
RF industrial production growth rate	0,017	-0,034	0,011	0,037	0,035	0,033	-0,021
PRC GDP growth rate	0,074	0,070	0,068	0,069	0,067	0,060	0,022
PRC industrial production growth rate	0,067	0,057	0,057	0,062	0,061	0,048	0,024

Source: GDP of Russia by years: 1991-2020. [Electronic resource]. - Mode of access: URL: http://global-finances.ru/vvp-rossii-po-godam/ ; Energy Strategy of the Russian Federation for the period up to 2035. [Electronic resource]. - Mode of access: URL: https://minenergo.gov.ru/node/1026; Statistical Yearbook 2012-2020, National Bureau of Statistics of China (NBSC). [Electronic resource]. - Mode of access: URL: http://www.stats.gov.cn/tjsj/ndsj/; Trade turnover between Russia and China: oil and oil products. [Electronic resource]. - Mode of access: URL: https://ru-stat.com/date-Y2014-2020/RU/trade/CN/0527; Statistical Review of World Energy. bp, 2021. [Electronic resource]. - Access mode: URL: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Appendix 3. Average value of financial indicators of the oil and gas industry in RF and the PRC for 2012-2020

Financial indicators(billion)	**Oil and gas industry of the RF**	**Oil and gas industry of the PRC**
Total assets	31,670	40,846
Total liabilities	14,599	19,167
Net assets	17,071	21,680
Fixed assets	9,150	13,243
Revenue	13,634	47,355
Net income	1,677	1,390
Net cash flow from operating activities	1,704	4,846
Free cash flow	1,141	0,470
Ratio equity and debt	0,466	0,497
Return on equity	0,111	0,027
Growth rate of total assets	0,091	0,185
Net profit growth rate	0,476	-2,516
Fixed assets turnover ratio	237,141	59,846

Source: compiled by the author on the basis of corporate financial statements.

Appendix 4. Financial Performance of CNPC and LUKOIL

Company	Год	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
CNPC	2014	10,455	3,675	0,949	0,049	0,090	0,240	-0,120	-0,593	0,675	0,452	1,141	0,324
	2015	10,249	2,532	0,721	0,018	0,032	0,246	-0,017	-0,113	0,741	0,438	1,167	0,246
	2016	8,414	2,410	0,675	0,012	0,021	0,236	0,134	1,221	0,764	0,427	1,400	0,275
	2017	10,951	2,903	0,838	0,015	0,027	0,214	0,159	-0,227	0,737	0,426	1,547	0,345
	2018	10,450	3,432	0,968	0,030	0,051	0,225	0,071	-0,650	0,739	0,420	1,275	0,322
	2019	11,007	3,578	0,921	0,025	0,046	0,204	0,136	-0,065	0,706	0,471	1,101	0,306
	2020	12,032	4,649	0,777	0,013	0,024	0,200	0,021	-0,709	0,804	0,451	1,241	0,239
LUKOIL	2014	572,789	18,193	0,138	0,212	0,328	0,927	-0,066	0,772	1,507	0,354	1,131	0,945
	2015	1140,955	17,536	0,128	0,149	0,232	0,916	0,067	-0,187	2,095	0,357	1,413	0,932
	2016	518,071	20,519	0,163	0,094	0,138	0,943	0,221	-0,396	1,719	0,319	1,513	0,924
	2017	629,761	15,077	0,107	0,097	0,151	0,913	-0,294	0,119	0,792	0,354	1,483	0,975
	2018	579,181	18,108	0,122	0,101	0,220	0,922	0,183	0,074	0,607	0,541	2,229	1,162
	2019	499,177	30,460	0,201	0,184	0,424	0,956	0,681	0,849	0,658	0,567	2,560	1,562
	2020	258,719	20,906	0,187	0,114	0,256	0,951	-0,274	-0,513	0,551	0,553	1,567	0,723

Source: compiled by the author on the basis of corporate financial statements.

Appendix 5. Results of ratings by financial potential index of CNPC and LUKOIL

Company	Year	CS	CS_rating	CF	CF_rating	FCI	FCI_rating	FSI	FSI_rating	CIFP	CIFP_rating
CNPC	2014	2,603	4	-4,411	12	-1,419	10	0,812	12	0,332	12
	2015	2,601	7	-8,790	13	-1,496	12	0,804	13	0,315	13
	2016	2,602	6	9,770	4	-1,184	8	0,721	14	0,368	9
	2017	2,603	5	11,354	2	-1,293	9	0,829	10	0,380	8
	2018	2,608	3	4,830	8	-1,514	13	0,810	11	0,348	11
	2019	2,659	1	-0,096	11	-1,421	11	0,831	9	0,357	10
	2020	2,618	2	-16,225	14	-1,522	14	0,868	8	0,309	14
LUKOIL	2014	1,341	13	2,525	10	1,167	3	2,533	4	0,477	4
	2015	1,403	11	3,276	9	1,044	5	2,832	1	0,526	3
	2016	1,386	12	7,356	7	0,578	6	2,490	5	0,453	6
	2017	1,418	10	9,461	6	0,572	7	2,574	2	0,476	5
	2018	1,433	9	12,524	3	1,884	2	2,538	3	0,570	2
	2019	1,441	8	14,376	1	3,509	1	2,474	6	0,677	1
	2020	1,335	14	9,699	5	1,097	4	2,190	7	0,440	7

Source: compiled by the author on the basis of corporate financial statements.