DOI: https://doi.org/10.32782/2519-884X-2025-54-3 UDC 338.45:[339.137.2+330.322]

Habrylevych O. V., Postgraduate Student National University of Water and Environmental Engineering o.v.habrylevych@nuwm.edu.ua ORCID: 0009-0002-5991-9903

ENHANCING COMPETITIVENESS IN THE OIL REFINERY SECTOR THROUGH STRATEGIC INVESTMENTS

Anomauia. The oil refinery sector faces significant challenges, including market volatility, regulatory pressures, and the global energy transition. This study examines investment provision strategies essential for refinery modernization, financial stability, and sustainability. Key investment trends include infrastructure upgrades, diversification into petrochemicals and alternative fuels, digital transformation, and sustainability-driven initiatives. Government policies, tax incentives, and risk management strategies play a crucial role in shaping investment flows. Strategic investment approaches, including financial restructuring and ESG-focused projects, are vital for ensuring long-term competitiveness in an evolving energy market. Adopting innovative technologies and aligning investment strategies with global sustainability goals will be critical for the industry's resilience and future growth.

Keywords: oil refinery sector, investment provision, refinery modernization, financial stability, sustainability.

JEL code classification: E22, E29

Statement of the problem. The oil refinery industry is one of the key sectors of the global economy, involving the extraction, transportation, processing, and distribution of oil and petroleum products. The sector's development is closely linked to investment provision, which ensures technological advancements, infrastructure upgrades, and overall economic sustainability.

In the current economic environment, the oil refinery sector faces multiple challenges, including volatile oil prices, environmental regulations, geopolitical risks, and technological shifts towards renewable energy. These factors influence investment flows and require a strategic approach to ensure the long-term competitiveness of oil refineries. This paper aims to analyze the investment provision mechanisms in the oil refinery sector, assess their economic implications, and propose strategic approaches to enhance financial sustainability and efficiency.

Analysis of recent research and publications. Numerous studies have focused on investment provision in various industries, highlighting the role of capital allocation in ensuring economic growth and technological progress. Key scholars, such as N.V. Bakhur [1], S.S. Hasanov [2] and N.P. Reznik [5], have explored investment provision in different sectors, including agriculture and manufacturing, emphasizing the importance of financing mechanisms. In the oil industry, it has been examined: investment risks and returns in the global energy market, the role of government policies and fiscal incentives in attracting capital, technological advancements and digitalization as investment drivers, environmental sustainability measures impacting investment decisions. Despite extensive research, specific challenges in the oil refinery sector remain insufficiently explored, particularly in the context of macroeconomic instability, geopolitical tensions, and the transition to alternative energy sources.

Formation of the objectives of the article. The objective of this research is to identify the main investment challenges in the oil refinery sector, analyse investment trends and financial strategies in refinery modernization, evaluate government policies and economic instruments that influence investment provision, and develop strategic recommendations to enhance investment attractiveness and financial sustainability. This study aims to provide a comprehensive understanding of the economic dynamics shaping investment decisions in the oil industry and propose solutions to ensure long-term financial stability and competitiveness.

Summary of the main material. Investment provision in the oil refinery sector plays a critical role in maintaining operational efficiency, ensuring compliance with environmental regulations, and adapting to global energy market shifts. Given the capital-intensive nature of refinery operations, investment trends in this sector are shaped by technological advancements, regulatory policies, market dynamics, and the evolving energy landscape.

Infrastructure Modernization and Capacity Expansion. One of the primary investment directions in the oil refinery industry is the modernization of existing infrastructure. Many refineries worldwide operate with outdated technology, leading to inefficiencies, increased production costs, and higher environmental impact. Investment in advanced refining technologies, such as hydrocracking, catalytic reforming, and desulfurization, allows companies to optimize crude oil processing, improve fuel quality, and reduce waste generation. Additionally, capacity expansion projects are essential to meet growing energy demands in emerging markets, especially in Asia and the Middle East, where energy consumption continues to rise [6].

Environmental Compliance and Sustainability Investments. The tightening of environmental regulations has become a significant driver of investment in the oil refinery sector. Governments worldwide are implementing stricter emission standards and carbon reduction policies, compelling refineries to invest in cleaner technologies and sustainable practices. This includes upgrading sulfur recovery units (SRUs), improving energy efficiency through heat integration systems, and integrating carbon capture and storage (CCS) technologies. Additionally, many refiners are exploring biofuel production and co-processing renewable feedstocks, such as vegetable oils and waste-based raw materials, to align with global sustainability goals [5].

Digitalization and Automation in Refinery Operations. The rise of Industry 4.0 has led to increased investment in digital transformation within oil refineries. Companies are leveraging artificial intelligence (AI), machine learning (ML), and big data analytics to optimize refinery operations, predict maintenance needs, and enhance overall productivity. The implementation of Internet of Things (IoT) sensors enables real-time monitoring of refining processes, reducing downtime and improving asset reliability. Advanced process control systems (APCS) and digital twin technology further contribute to operational efficiency by allowing refineries to simulate various production scenarios and identify cost-effective strategies.

Diversification Strategies and Product Innovation. As the global energy transition accelerates, many oil refining companies are adopting diversification strategies to reduce reliance on traditional fuel production and explore new revenue streams. Investment in petrochemical production is becoming increasingly common, as demand for plastics, synthetic materials, and specialty chemicals continues to grow. Refineries are also expanding their product portfolios by investing in lubricants, asphalt, and specialty fuels, which offer higher profit margins compared to conventional gasoline and diesel.

Geopolitical and Market-Driven Investment Trends. Geopolitical factors play a crucial role in shaping investment decisions in the oil refinery sector. Trade policies, international sanctions, and regional conflicts significantly impact crude oil supply chains and investment security. In response, many countries are prioritizing domestic refining capacity expansion to reduce dependency on imported refined products. Additionally, the fluctuation of crude oil prices influences investment strategies, with periods of high oil prices encouraging capacity expansion, while low prices often lead to cost-cutting measures and project delays [1].

Energy Transition and Alternative Fuel Investments. With the growing emphasis on decarbonization, many oil refining companies are directing investments toward alternative fuels such as hydrogen, synthetic fuels, and biofuels. Hydrogen refineries, particularly those focused on blue hydrogen (produced from natural gas with carbon capture) and green hydrogen (generated from renewable energy sources), are gaining traction as part of the broader effort to achieve carbon neutrality. Additionally, investments in e-fuels and renewable diesel production are expected to increase as governments introduce incentives for low-carbon energy alternatives.

Financial and Investment Models in Refining. Due to the high capital requirements of refinery projects, investment strategies often involve public-private partnerships (PPPs), joint ventures, and project financing models. Many governments provide fiscal incentives, tax breaks, and subsidies to

encourage investment in refinery modernization and environmental upgrades. Additionally, global energy firms are exploring sustainable financing options, such as green bonds and ESG-linked investments, to attract environmentally conscious investors [2]. Several factors hinder investment flows into the oil refinery sector: 1) oil price volatility: fluctuating crude oil prices create uncertainty for long-term investments; 2) regulatory and environmental constraints: stricter emission norms increase compliance costs; 3) geopolitical risks: trade restrictions, conflicts, and sanctions affect supply chains and investment security; 4) access to financing: high capital requirements and declining investor interest in fossil fuels limit funding options.

In conclusion, investment trends in the oil refinery sector are being shaped by technological advancements, regulatory pressures, digital transformation, and the global energy transition. To remain competitive and financially viable, refineries must adopt innovative investment strategies, diversify their production portfolios, and embrace sustainability-driven initiatives that align with evolving market demands and environmental standards.

Government policies and fiscal instruments play a pivotal role in shaping investment flows in the oil refinery sector, influencing both the economic viability of refining operations and the attractiveness of the sector for domestic and foreign investors. Given the capital-intensive nature of the industry, governments worldwide implement targeted policy measures to support refinery modernization, environmental compliance, and overall competitiveness. These measures include tax incentives, subsidies, regulatory frameworks, trade policies, and public-private partnerships (PPPs), all of which impact investment decision-making. To encourage investment in refinery upgrades, many governments offer tax breaks and direct subsidies to reduce capital expenditure burdens. These incentives include: investment tax credits (itcs), accelerated depreciation schemes, excise tax exemptions, direct government grants and subsidies. These fiscal measures enhance refinery profitability, encourage compliance with environmental regulations, and support the transition to cleaner and more sustainable refining practices.

Environmental regulations significantly influence investment decisions in the refinery sector. Governments implement strict emission standards, carbon pricing mechanisms, and sustainability mandates to push the industry toward cleaner operations. Key policies include carbon taxation and emission trading schemes (ETS), low-carbon fuel standards (LCFS), mandates for sulfur reduction and stricter waste management regulations. While these regulations increase compliance costs, they also create opportunities for refiners to access green financing mechanisms and government incentives that promote sustainability-focused investments.

Governments frequently collaborate with private investors through public-private partnerships (PPPs) to finance and develop refinery infrastructure projects. These partnerships mitigate investment risks, enhance financial feasibility, and drive technological advancements. Key examples of state-supported investment initiatives include national refinery expansion programs, joint ventures with state-owned enterprises (SOEs), infrastructure development incentives.

These initiatives reduce capital constraints on private investors, foster industry growth, and facilitate the modernization of aging refinery assets.

Governments also influence investment in refining through import tariffs, export restrictions, and energy trade policies. These measures impact the competitiveness of domestic refineries by regulating market access and fuel pricing. Common trade-related policies include:

1. Import tariffs on refined petroleum products: protecting domestic refineries by imposing duties on imported fuels to encourage local refining investment.

2. Subsidized export programs: supporting refiners in competing in international markets by offering export credits or tax incentives.

3. Bilateral energy trade agreements: facilitating cross-border investments in refinery infrastructure through regional trade pacts and supply agreements.

While these policies aim to strengthen domestic refining industries, excessive trade protectionism can lead to market inefficiencies, reduced competition, and higher consumer fuel costs.

As part of the global transition to low-carbon energy, governments are implementing policies to promote alternative fuel production and reduce dependency on traditional fossil fuels. These policies encourage refinery investments in: hydrogen production facilities – particularly blue and green

hydrogen initiatives that align with national decarbonization strategies; renewable diesel and biofuel plants – incentivizing refineries to shift toward sustainable fuel production through tax credits and regulatory mandates; carbon capture and storage (ccs) projects – providing financial support for emission reduction technologies in refining operations. Many governments also facilitate green bond markets and sustainability-linked loans, allowing refiners to access capital for low-carbon projects at preferential interest rates.

One of the key concerns for refinery investors is regulatory uncertainty, particularly in regions with shifting energy policies and frequent legislative changes. Governments can enhance investor confidence by: a) providing long-term policy roadmaps for refinery investments; b) ensuring regulatory consistency to avoid sudden taxation or compliance burdens; c) offering investment guarantees and risk-sharing mechanisms to encourage private-sector participation. A stable and predictable policy environment is essential for attracting long-term capital and fostering sustained investment in refining capacity [4].

To remain competitive and financially sustainable, oil refineries must adopt strategic investment approaches that align with market trends, regulatory requirements, and technological advancements. In an industry characterized by high capital intensity, geopolitical uncertainties, and an accelerating energy transition, investment strategies should focus on diversification, financial restructuring, sustainability-driven initiatives, and digital transformation. These strategies will enable refineries to optimize operations, enhance profitability, and adapt to a changing global energy landscape.

Given the increasing global shift toward clean energy and the declining long-term demand for traditional fossil fuels, many oil refining companies are diversifying their investment portfolios to reduce reliance on crude oil refining and explore alternative revenue streams. Key diversification strategies include: a) expansion into petrochemicals: the demand for plastics, synthetic materials, and specialty chemicals continues to grow, making petrochemical production a viable long-term investment; b) production of alternative fuels: investments in renewable diesel, biofuels, and synthetic fuels are becoming increasingly attractive due to government mandates and consumer demand for cleaner energy sources; c) hydrogen and ammonia production: with global decarbonization targets, refineries are investing in blue and green hydrogen production facilities, as well as ammonia-based fuel technologies to cater to future energy markets; d) expansion into energy storage and distribution: some refining companies are venturing into battery storage systems, LNG terminals, and carbon capture projects to enhance their market position in the evolving energy sector. These diversification efforts allow refineries to future-proof their business models, tap into emerging markets, and reduce exposure to crude oil price volatility.

Due to the capital-intensive nature of oil refining, financial sustainability depends on strategic capital allocation, cost optimization, and debt management. Companies are employing the following financial strategies:

- Optimization of capital expenditure (CAPEX): refiners are focusing on high-return, costeffective projects, prioritizing brownfield expansions and efficiency improvements over new greenfield developments.

- Debt restructuring and risk management: given the risks associated with fluctuating oil prices and regulatory pressures, refineries are restructuring debt portfolios to reduce financial liabilities, secure lower interest rates, and improve cash flow stability.

– Public-Private Partnerships (PPPs) and joint ventures: many governments and private investors collaborate through PPPs to fund refinery modernization and infrastructure development, reducing financial burdens on individual companies.

- Sustainable financing mechanisms: refining companies are increasingly turning to green bonds, ESG-linked loans, and sustainability-focused investment funds to finance low-carbon projects.

Strategic financial management ensures long-term profitability, operational resilience, and the ability to finance critical investment projects.

As global climate policies push for lower emissions, oil refineries are making sustainability-driven investments to comply with regulations and improve environmental performance. Key areas of investment include:

1. Energy efficiency improvements: implementation of heat recovery systems, process integration, and AI-driven energy management tools to reduce energy consumption and emissions.

2. Carbon capture, utilization, and storage (CCUS): investing in CO₂ capture technologies to offset emissions and participate in emerging carbon credit markets.

3. Water and waste management solutions: adoption of advanced wastewater treatment plants, closed-loop cooling systems, and waste-to-energy technologies to enhance sustainability.

4. Integration of renewable energy sources: many refineries are investing in solar, wind, and bioenergy to power their operations and reduce reliance on fossil fuels [4].

These sustainability initiatives enhance long-term compliance, attract green financing, and improve corporate reputation in a market increasingly focused on ESG (Environmental, Social, and Governance) criteria.

The adoption of digital technologies is revolutionizing the oil refining sector, enabling higher efficiency, predictive maintenance, and real-time operational optimization. Strategic investment in digitalization includes:

Artificial Intelligence (AI) and Big Data analytics. AI-powered predictive models enhance equipment reliability, optimize production planning, and minimize operational risks. Internet of Things (IoT) sensors and automation. IoT-enabled devices provide real-time monitoring of refinery processes, allowing for early detection of performance anomalies and reducing downtime. Digital twin technology. Creating virtual refinery models enables companies to simulate various scenarios, test process optimizations, and make data-driven investment decisions. Blockchain for supply chain transparency. Many refineries are adopting blockchain-based solutions to enhance traceability of crude oil sourcing, trading, and logistics, improving security and efficiency. By embracing digitalization, refineries can boost productivity, reduce costs, and maintain a competitive edge in an increasingly complex energy market.

The oil refining industry faces multiple risks, including geopolitical instability, regulatory uncertainties, and market volatility. To mitigate these risks, companies are adopting comprehensive investment risk management strategies, such as:

- Scenario analysis and stress testing: evaluating multiple economic, geopolitical, and regulatory scenarios to assess potential investment risks and develop contingency plans.

– Diversification of crude oil supply sources: reducing dependency on single crude oil suppliers or regions to minimize supply chain disruptions.

- Hedging against oil price fluctuations: using commodity hedging instruments to manage financial exposure to volatile crude oil and refined product prices.

- Regulatory compliance and policy engagement: proactively engaging with governments and regulatory bodies to anticipate and influence policy changes that impact investment decisions.

Effective risk management ensures investment resilience and financial stability, allowing refineries to navigate market disruptions and external challenges.

Conclusions. The oil refinery sector is undergoing significant transformations, driven by technological advancements, regulatory changes, market volatility, and the global shift toward sustainability. Investment provision remains a key determinant of the industry's long-term viability, influencing the ability of refineries to modernize infrastructure, enhance operational efficiency, and comply with environmental mandates. Given the capital-intensive nature of refining operations, strategic investment planning, financial resilience, and innovation-driven approaches are crucial for maintaining competitiveness in an evolving energy landscape.

The oil refinery industry faces multiple investment challenges, including fluctuating oil prices, geopolitical uncertainties, shifting demand patterns, and stringent regulatory requirements. The volatility of crude oil markets impacts investment cycles, making long-term financial planning complex. Additionally, the growing emphasis on decarbonization and the transition to alternative fuels necessitate new capital investments in cleaner refining technologies, carbon capture, and biofuel production.

Governments worldwide are playing a central role in shaping investment trends by implementing tax incentives, regulatory frameworks, and sustainability mandates to encourage refinery modernization and emissions reductions. Public-private partnerships (PPPs), green financing

mechanisms, and policy stability are critical enablers of sustained investment flows in the refining sector.

To remain financially and operationally viable, refineries must adopt strategic investment approaches that align with emerging energy trends and regulatory expectations. These strategies include:

1. Infrastructure modernization – upgrading refining capacity, adopting energy-efficient technologies, and integrating advanced process control systems.

2. Diversification of revenue streams – investing in petrochemicals, biofuels, hydrogen production, and specialty chemicals to reduce dependence on traditional fuels.

3. Sustainability-driven initiatives – implementing carbon capture, utilization, and storage (CCUS), renewable energy integration, and waste management solutions to enhance environmental compliance.

4. Digital transformation and automation – leveraging AI, big data analytics, IoT-enabled sensors, and blockchain technologies to optimize operations, reduce costs, and improve supply chain transparency.

5. Financial restructuring and risk management – securing sustainable financing options, optimizing capital expenditure (CAPEX), and diversifying crude oil supply sources to mitigate economic uncertainties.

By integrating these strategic priorities, refineries can enhance profitability, improve resilience to market shocks, and align with the global push toward low-carbon energy solutions.

Government policies remain a crucial factor in directing investment trends within the oil refinery sector. Tax credits, subsidies, and regulatory incentives drive refinery upgrades, while carbon pricing mechanisms, emission caps, and sustainability-linked policies encourage investments in cleaner technologies. Governments also facilitate strategic infrastructure investments through state-backed projects, joint ventures, and incentives for alternative fuel production.

A stable and predictable policy environment is essential for fostering investor confidence and ensuring that refinery investments align with long-term energy transition objectives. The oil refining industry operates in an environment of high uncertainty, requiring proactive risk management strategies to safeguard long-term investments. Companies must develop scenario-based planning frameworks, hedge against oil price volatility, and strengthen geopolitical risk assessments. Additionally, engaging with policymakers, optimizing debt structures, and exploring sustainable investment avenues will be key to navigating future challenges.

Looking ahead, investment in refinery decarbonization, alternative fuels, and digital transformation will be the defining factors for industry sustainability. Refineries that embrace innovation, diversify revenue sources, and integrate sustainability-focused investments will be well-positioned to thrive in the evolving global energy market.

The future of the oil refinery sector depends on its ability to adapt to shifting energy demands, regulatory landscapes, and technological innovations. By adopting strategic investment approaches, optimizing capital allocation, and prioritizing sustainability, refineries can ensure long-term competitiveness, financial stability, and compliance with evolving environmental standards. As the energy transition accelerates, the sector must proactively shape its investment priorities to remain relevant and resilient in an increasingly decarbonized world.

References:

1. Bakhur, N. V. (2021) Investytsiine zabezpechennia rozvytku rehioniv Ukrainy: problemy ta shliakhy yikh vyrishennia [Investment support for the development of regions of Ukraine: problems and ways to solve them]. *Efektyvna ekonomika – Effective Economy*, no. 7. Available at: http://www.economy.nayka.com.ua/?op=1&z=9063

2. Hasanov, S. S., Shtanhret, A. M., Kotliarevskyÿ Ya.V. (2012) Antykryzove korporatyvne upravlinnia: teoretychni ta prykladni aspekty [Anti-crisis corporate management: theoretical and applied aspects]. Kyiv: DNNU "Akad. fin. Upravlinnia".

3. Zakon Ukrainy «Pro investytsiinu diialnist» vid 18.09.1991. № 1560-XII [Law of Ukraine "On Investment Activity" dated September 18, 1991. No. 1560-XII]. Available at: https://zakon.rada.gov.ua/laws/show/1560-12#Text

4. Kontseptsiia rozvytku hazo- ta naftopererobnoi promyslovosti Ukrainy do 2025 roku [Concept of the development of the gas and oil processing industry of Ukraine until 2025]. Available at: https://mepr.gov.ua/files/docs/Proekt/2020/19022020/3_Kontseptsiia.NP_zas.TsOVV_Kontseptsiia.pdf

5. Reznik, N. P., Slobodianyk, A. M., Kotliarov, V. O. (2018) Investytsiine zabezpechennia konkurentospromozhnosti ahropromyslovykh formuvan [Investment support of competitiveness of agro-industrial formations]. Kyiv: DP "Vyd. dim "Personal".

6. Gitman, L. J., Joehnk, M. D., Smart, S. B. (2011) Fundamentals of Investing [with MyFinanceLab]. Frenchs Forest NSW: Pearson Australia.

Список використаних джерел:

1. Бахур Н. В. Інвестиційне забезпечення розвитку регіонів України: проблеми та шляхи їх вирішення. Ефективна економіка. 2021. № 7. URL: http://www.economy.nayka.com.ua/?op=1&z=9063

2. Гасанов С. С., Штангрет А. М., Котляревський Я. В. Антикризове корпоративне управління: теоретичні та прикладні аспекти. Київ : ДННУ «Акад. фін. Управління», 2012. 301 с.

3. Про інвестиційну діяльність: Закон України від 18.09.1991. № 1560-XII. URL: https://zakon.rada.gov.ua/laws/show/1560-12#Text

4. Концепція розвитку газо- та нафтопереробної промисловості України до 2025 року. URL: https://mepr.gov.ua/files/docs/Proekt/2020/19022020/3_Концепція.НП_зас.ЦОВВ_Концепція.pdf

5. Резнік Н. П., Слободяник А. М., Котляров В. О. Інвестиційне забезпечення конкурентоспроможності агропромислових формувань. Київ : ДП «Вид. дім «Персонал», 2018. 344 с.

6. Gitman L.J., Joehnk M.D., Smart S.B. Fundamentals of Investing [with MyFinanceLab]. Frenchs Forest NSW : Pearson Australia, 2011. 784 p.

Габрилевич О. В., аспірант Національний університет водного господарства та природокористування o.v.habrylevych@nuwm.edu.ua ORCID: 0009-0002-5991-9903

ПІДВИЩЕННЯ КОНКУРЕНТОСПРОМОЖНОСТІ НАФТОПЕРЕРОБНОГО СЕКТОРУ ЧЕРЕЗ СТРАТЕГІЧНІ ІНВЕСТИЦІЇ

Анотація. Нафтопереробний сектор стикається з численними викликами, зокрема ринковою волатильністю, посиленням регуляторного тиску та глобальним енергетичним переходом. Ця стаття аналізує ключові інвестиційні тенденції та стратегії, необхідні для модернізації нафтопереробних підприємств, забезпечення їх фінансової стабільності та підвищення екологічної стійкості. Особлива увага приділяється таким напрямам інвестицій, як оновлення інфраструктури, диверсифікація виробництва у сферу нафтохімії та альтернативних видів палива, цифрова трансформація підприємств і впровадження екологічно орієнтованих технологій. У дослідженні також розглядається роль державної політики, включаючи податкові стимули, регуляторні механізми та фінансову підтримку галузі. Аналізуються ризики інвестування та ефективні стратегії управління ними, зокрема хеджування, диверсифікація сировинних поставок та застосування стійких фінансових механізмів. Окрему увагу приділено впливу глобальних економічних трендів, що визначають попит на нафтопродукти, а також ролі міжнародних екологічних угод у формуванні інвестиційної політики компаній. Розглянуто перспективи розвитку нафтопереробного сектору в контексті переходу до вуглецево-нейтральної економіки та виклики, пов'язані з необхідністю адаптації підприємств до нових стандартів. У висновках підкреслюється важливість довгострокового стратегічного планування, адаптації до нових екологічних стандартів та необхідність активного залучення інновацій для підвищення конкурентоспроможності нафтопереробних підприємств у мінливих ринкових умовах. Впровадження інноваційних технологій, розширення співпраці з міжнародними інвесторами та розробка ефективних механізмів державної підтримки є ключовими факторами, що визначатимуть майбутнє галузі. Особливо актуальним стає формування нових бізнес-моделей, що поєднують традиційні нафтопереробні процеси з відновлюваними енергетичними рішеннями. Підвищення ефективності управління інвестиціями та впровадження циркулярної економіки сприятимуть стабільності та сталому розвитку нафтопереробної промисловості.

Ключові слова: нафтопереробний сектор, інвестиційне забезпечення, модернізація НПЗ, фінансова стабільність, стійкість.