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Chykalova A.
student at the Department of Management of Enterprises
ORCID: 0009-0009-7221-5258;

Koleshnia Ya.
Candidate of Sciences in Economics (Ph.D), Assos. Prof.,
Associate Professor at the Department of Management of Enterprises
National Technical University of Ukraine
«Igor Sikorsky Kyiv Polytechnic Institute»,
Kyiv, Ukraine
ORCID: 0000-0002-4856-4898

MONITORING INNOVATIVE WASTE PROCESSING TECHNOLOGIES IN THE OIL AND GAS SECTOR AS A TASK OF STRATEGIC COMPETITIVE INTELLIGENCE

Identifying technological trends in the modern business environment is a key objective of competitive intelligence, enabling companies to formulate their own proactive development strategy. It involves systematically collecting information from a wide range of sources to support decision-making, depending on the expected outcome. In this context, monitoring technological innovations is particularly significant, as the emergence of new technologies can radically alter market conditions.

Strategic competitive intelligence, focused on long-term business goals, examines technological trends over a specific period, helping to anticipate market changes. The true value of this approach lies in providing company managers with a tool to understand which technological solutions competitors will adopt in the future. This is of fundamental importance for the oil and gas sector, where waste processing technologies are rapidly evolving, creating new market niches for those who are the first to master them.

The process of identifying technological trends as a subject of competitive intelligence is based on the analysis of open-source information, which is entirely legitimate, unlike industrial espionage. Analyzing competitors' investment activity and researching patent databases, scientific publications, and industry reports in the field of development enables the creation of an objective picture of the industry's technological development. As emphasized in the scientific literature, approximately 90% of the information needed to make key decisions is publicly available, and the task of competitive intelligence is to transform this scattered information into systematic knowledge suitable for strategic planning. Identifying technological trends is the fundamental basis for formulating a competitive strategy, enabling the company to actively shape the market's future through the implementation of innovative technological solutions, particularly in the field of the circular economy [1].

The current challenge of waste management in Ukraine, where traditional landfill methods still predominate, calls for the immediate implementation of innovative solutions. An analysis of international experience demonstrates the high effectiveness of "smart" technologies based on artificial intelligence. Such monitoring tools significantly improve the quality of waste sorting. The implementation of such innovations in Ukraine will help realize the National Waste Management Strategy, bringing the country closer to European environmental standards. This is particularly relevant in the context of the need to reduce the burden on landfills:

- smart waste containers equipped with material recognition systems enable automated sorting of recyclables, compacting of waste directly at the collection point, and optimization of collection routes based on actual fill levels, which significantly reduces logistics costs;
- robotic recycling systems that use computer vision are capable of quickly identifying different waste fractions and providing recommendations on the best methods for their further processing, thereby increasing the efficiency of waste processing facilities;
- pneumatic waste transport systems using underground pipelines represent innovative deep-processing technologies that enable the disposal of waste at extremely high temperatures to produce useful byproducts [2].

The importance of competitive intelligence is further underscored by the strategic significance of the oil and gas sector, particularly amidst global military and political crises, and the ensuing logistical disruptions. For Ukraine, ensuring the efficient and resilient functioning of this sector is critical. At the same time, adherence to the principles of sustainable development and the implementation of a circular economy are essential.

Assessing the potential of technologies for the oil and gas sector in the context of competitive intelligence is a critical stage of strategic analysis, enabling companies to identify the most effective areas for innovative development. Such an assessment involves a comprehensive study of technological solutions, taking into account their alignment with global sustainable development trends, particularly the principles of the circular economy, which are becoming particularly important for the oil and gas industry in the context of Ukraine's European integration.

The process of assessing the viability of technologies in the oil and gas sector should be based on a systematic analysis of their potential impact on companies' operational efficiency, reductions in environmental impact, and the creation of new revenue streams, particularly through the implementation of innovative methods for processing drilling waste. As evidenced by the experience of developed countries, the most promising technological solutions are those that enable the transformation of waste into secondary resources, creating closed-loop production cycles. Particular attention should be paid to analyzing global patent databases, scientific publications, and investment flows to identify technologies with the greatest potential for near-term commercialization.

Given the specific nature of the oil and gas sector, priority should be given to technologies that ensure high economic efficiency and have a proven track record of successful implementation in countries with similar climatic conditions. An important selection criterion is the technology's ability to integrate into existing production processes without requiring a radical overhaul of the entire infrastructure, thereby significantly accelerating the achievement of positive results from innovations. Ultimately, it is this multifaceted analysis that enables companies in the oil and gas sector to make informed strategic decisions on selecting waste-processing technologies, which form the foundation for future sustainable business development [3].

The modern paradigm of strategic management calls for a shift away from rigid planning models toward flexible, adaptive approaches that ensure a company's resilience in the face of market turbulence. In this context, the results of technology monitoring serve as the fundamental basis for developing a dynamic competitive strategy that proactively responds to changes in the external environment. Integrating monitoring data into the strategy-making process allows the enterprise to transform identified technological trends into a source of long-term competitive advantages:

- systematized results of monitoring technological innovations provide an analytical foundation for the stage of identifying strategic threats and opportunities, enabling the company to model likely directions of its technological evolution based on a PESTEL analysis;
- information on promising technologies obtained through monitoring is a key resource for developing strategic scenarios that outline alternative paths for the company's development, depending on the pace of these innovations' adoption in the competitive environment;
- based on an in-depth analysis of technological trends, adaptive strategic goals are formulated that can be adjusted in response to changes in market conditions, thereby ensuring that the strategic focus is maintained without sacrificing flexibility;
- monitoring results directly influence the identification of a company's competitive advantages, as understanding which technologies will become industry standards in the near future allows for timely investment in the development of unique capabilities;
- the continuous updating of process monitoring data is essential for the effective functioning of the feedback mechanism during the final stage of the strategic cycle, where a strategic audit is used to make timely adjustments to the strategic course in light of new technological challenges [4].

This study confirms that systematic monitoring of innovative technologies provides a fundamental basis for developing a company's competitive strategy in a changing environment. Integrating monitoring data into the strategic planning process enables a company to move beyond traditional reactive management, where technological changes become a source of long-term competitive advantages. Building a dynamic strategic management system based on continuous information updates, scenario modeling, and flexible goal adjustments is particularly relevant for the oil and gas sector, where implementing circular-economy technologies requires a continuous adaptive process. Utilizing monitoring results at every stage of the strategic cycle – from identifying opportunities to evaluating effectiveness – ensures the necessary balance between strategic stability and tactical flexibility, which ultimately forms the foundation for the company's sustainable development amid market turbulence.

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