Article

The Future of Energy and the Case of the Arctic Offshore: The Role of Strategic Management

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Abstract: As risk and uncertainty factors have become more prominent in the already volatile energy market because of the COVID-19 pandemic, the development of Arctic hydrocarbon resources has become a debatable issue. At any rate, oil and gas companies need to improve their strategic management systems (along with the development of technologies) for the successful implementation of such complex projects. The purpose of this study was to propose the conceptual basis for transforming strategic management and planning systems of oil and gas companies so that they can successfully face global challenges when implementing offshore oil and gas projects in the Arctic as well as provide more sustainable energy sources. The article discusses the current situation with Arctic initiatives and the results of an analysis of price instability in the energy sector, along with an analysis of several megatrends affecting oil and gas companies. All this allows for presenting a conceptual vision of how a strategic management system should be transformed in order to become able to meet the requirements for implementing Arctic projects, with the emphasis being placed on sustainability, management requirements, and the key principles. The research is based on the fundamentals of strategic management and strategic planning and relies on methods such as desk study, content analysis, event analysis, comparative analysis, and factor analysis.

Keywords: arctic; oil and gas; offshore; energy; strategic management; global disturbances; uncertainty; hydrocarbons; strategic planning; projects; global trends

1. Introduction

Since 2008, when the U.S. Geological Survey (USGS) completed an assessment of oil and gas resources in the Arctic, hydrocarbon deposits in this region have been attracting increasing attention. According to rough estimates, the Arctic potentially contains about 90 billion barrels of oil reserves, 50 trillion cubic meters of gas reserves, and 44 billion barrels of gas condensate, which constitutes approximately 16%, 30%, and 26% of the world’s undiscovered hydrocarbon resources, respectively [1]. About 84% of them lie offshore in the Arctic’s seas [2].

In general, reserve estimates that have been conducted in different countries and by various organizations vary significantly because only preliminary exploration operations have been carried out. However, one thing is clear: the Arctic contains a huge volume of hydrocarbons.

Russia is one of the key players in the Arctic and has ambitions to continue developing its hydrocarbon Arctic deposits [3–5]. Russia’s Arctic hydrocarbon resources are estimated to consist of 13 billion tons of oil and about 86 trillion cubic meters of gas. However, only a small portion of this huge volume is currently categorized as reserves (1/20 of the oil resources and 1/8 of the gas resources) [6]. Arctic offshore oil and gas reserves are concentrated in two seas (the Barents and Kara Seas) where a lot of geological exploration has been done in recent years [6,7]. Such a volume of proven reserves and a huge resource...
potential indisputably confirm that the Russian Arctic is and will be an area of significant interest and concern on a global scale.

While oil prices grew and maintained a positive trend (from 2010 to 2014), the experts’ assessments of the future of Arctic offshore oil and gas projects were optimistic, and countries (including Russia) had ambitious plans. For instance, in 2012, it was planned to launch full-scale gas production at the Shtokman field, with its reserves being estimated at about four trillion cubic meters [8]. However, the project was suspended. According to the Russian experts’ estimates that were conducted in 2016, oil production should be launched at the Arctic offshore Dolginskoye field with oil reserves of 236 million tons by 2021–2023 [7]. However, according to the latest data, the start of production operations has been postponed [6]. In addition to the favorable price situation, the heightened interest in Arctic hydrocarbons at that time (as well as now) stemmed from the gradual depletion of conventional oil and gas reserves in both Russia and the world as a whole.

However, from 2014 to 2016, oil prices demonstrated a downward trend that made oil and gas companies all over the world revise their plans to start operations in the Arctic. For instance, Royal Dutch Shell announced the termination of its expensive Arctic program (around $7 billion of investment over a period of nine years) in 2015 [9]. The Russian oil and gas industry, in addition to the unfavorable pricing trends, came under the influence of the U.S. and EU sanctions [10–12], which had a major negative impact on Russian oil and gas projects including Arctic ones, because many of them were planned in cooperation with foreign companies. In 2016, Russia introduced a moratorium on issuing new licenses to companies that planned to operate offshore in the Arctic. In 2020, access to the Arctic shelf was still available only to state-controlled producers, namely Gazprom and Rosneft. Granting access to private companies is still being discussed.

The only offshore oil project that has been launched full-scale in the Russian Arctic is the Prirazlomnaya platform with total recoverable reserves of over 70 million tons of oil. Over six years (2014 to 2020), 13 million tons of Arctic Oil (ARCO) were produced and 19 wells were drilled (out of the 32 planned) [6,13]. ARCO oil has a high density (about 910 kg/m$^3$), which increases the demand for such oil in the European market [14]. Several other Russian Arctic offshore projects are at various stages of implementation, and their prospects remain unclear today [15].

In the context of the unfavorable price trends (starting from 2014), experts have estimated that large-scale offshore oil and gas production in the Arctic would be possible only after 2035 [7]. The new Energy Strategy of the Russian Federation for the period until 2035 (Energy Strategy to 2035) [16] adopted in June 2020 also declares that the key growth in hydrocarbon production in the Arctic is expected to happen after 2035. The Russian government sees the exploitation of its Arctic oil and gas reserves as the crux of its Energy Strategy to 2035. However, the ongoing global economic crisis can significantly change the prospects of offshore oil and gas production in the Arctic.

The most promising Arctic offshore oil project is the Dolginskoye field, with an estimated annual capacity of about four million tons of oil. By 2019, four exploration wells had been drilled [6]. According to experts, the field is elongated, which increases capital expenditures (CAPEX) as the use of two, rather than one oil production platform, is required [6]. In 2019, it was planned that production would start in 2031. However, given the new conditions, there is a possibility that the timing will be reviewed. As for offshore gas production in the Arctic, Gazprom Neft hopes to start operating the Kamennomysskoye field in 2025 [17].

It is obvious that the development of Arctic hydrocarbon resources is highly dependent on energy prices [18]. When they go down, Arctic offshore projects are put on hold. In 2020, the situation was exacerbated by the COVID-19 pandemic, with average oil prices plummeting and West Texas Intermediate (WTI) crude oil prices dropping below zero as storage facilities became scarce [19].

In addition to price volatility, which has been exacerbated by the pandemic, oil and gas companies are developing in an unstable environment [20,21]. Global megatrends such
as a high degree of uncertainty in the business environment, energy transition, the rapid development of technologies and digital solutions, increased competition, the growing role of environmental and social aspects as well as the impact of macroeconomic and geopolitical aspects require that companies make changes in their operations including making adjustments to their management systems. It is extremely important to note that experts predict a decrease in the share of oil in the global energy mix [22,23] and rapid growth in alternative energy sources. At the same time, experts claim that it is impossible to replace the majority of hydrocarbons with other energy sources in the near future [24]. Scholars also discuss the prospects of hydrogen initiatives in the context of the global sustainable energy agenda [25].

According to the World Energy Council’s report titled Decoding New Signals of Change (2020 World Energy Issues Monitor) [20], which was prepared with the participation of more than 3000 energy leaders from 104 countries, there are five categories of challenges in the energy sector that are encountered in the transition period: macroeconomic risks, business environment, geopolitics, energy vision, and technology [20]. Among the main findings of this study are the statements that “macroeconomic and geopolitical issues drive critical uncertainty”, and “technology issues drive action priorities” [20].

According to experts, the energy sector will undergo significant changes after the COVID-19 pandemic. It may result in improved financial positions of businesses that are not directly related to the volatile oil and gas market, serious financial implications for private oil companies as well as market concentration and consolidation [19].

However, despite the current instability and the ongoing transformation of the energy sector, the Russian Arctic will remain an area of significant interest for both domestic and international oil and gas companies. The Russian government confirms its intention to support offshore oil and gas production in the Arctic and strengthen the country’s position in the promising hydrocarbon province [16].

Even if the share of oil in the global energy mix does decrease, we believe that Arctic offshore oil fields will still be in demand since oil is and will be a raw material for such a promising industry such as petrochemistry. As for offshore gas fields, gas is an environmentally friendly type of fossil fuel that serves as a raw material for the promising sector of natural gas processing.

Today, the commercial performance of Arctic oil and gas projects depends on global oil prices, the availability or lack of state benefits, and the volumes of CAPEX and OPEX. CAPEX and OPEX largely depend on the level of technology development. Global prices and technological development are two crucial aspects that can reduce costs, primarily operating ones. In addition, we believe that strategic management issues are of great importance to hydrocarbon production in the Arctic.

All of the above emphasizes the relevance and importance of a study devoted to the peculiarities and prospects of developing Arctic offshore hydrocarbon resources and strategic management issues associated with this process.

As for studies that are relevant to the issue of hydrocarbon production in the Arctic and strategic management approaches to this activity, they can be divided into three groups: (1) strategic management fundamentals; (2) global trends affecting the development of the oil and gas industry; and (3) trends in offshore oil and gas production in the Arctic.

The theoretical framework (studies in the first group) of the research includes the generally recognized principles and approaches to the strategic management of industrial companies [26,27], that focus on issues such as strategic planning and forecasting for strategic decision making [28,29], strategic business management in turbulent environments [30–32], creating competitive advantages for industrial companies [33], strategic analysis (industry analysis; analysis of resources and capabilities) [34], and modern approaches to strategic planning in the energy sector [35,36], etc.

Based on an analysis of the studies in the first group, we can conclude that (1) the strategic management framework that has been developed so far is mainly focused on industrial enterprises, while Arctic oil and gas projects are complex and industry-specific
systems; and (2) these approaches do not take into account new trends and realities of the energy sector. In this regard, the fundamentals of strategic management must serve as a foundation for developing the principles of strategic management and strategic planning applied to hydrocarbon production in the Arctic, but the specifics of Arctic projects and megatrends in the energy sector should be taken into account.

By reviewing the studies in the second and third groups, we analyzed how these specifics can influence strategic management decisions. We studied global megatrends in the energy sector and the influence of the COVID-19 pandemic on the oil and gas industry [19–22,37–41], and present the results of this analysis in Section 3.2. We also studied the current hydrocarbon agenda [11,12,17,18,42,43] and tried to take into account all modern trends.

The identified gap in academic research allowed us to formulate the purpose of the paper presented below.

2. Materials and Methods

The purpose of this paper was to study the features and prospects for the development of strategic management and planning systems for offshore oil and gas projects in the Arctic against the background of global disturbances, a high degree of uncertainty, and their intensification during the COVID-19 pandemic as well as the importance of sustainability in the energy sector.

The research hypothesis is based on the assumption that oil and gas companies operating in the energy sector, which is highly turbulent and undergoing significant change due to a number of global megatrends, should improve their systems of strategic management and planning in order to reduce their dependence on global disturbances and be able to timely implement strategically important projects. Offshore oil and gas projects in the Arctic are the focus of this research.

In this paper, we raise the following research questions:

1. What are the main factors causing instability in the energy sector? What are the main global megatrends affecting the strategic development of oil and gas companies?
2. What are the main directions for transforming strategic management and planning systems used in offshore oil and gas projects that are affected by global disturbances?

To achieve our goal and address the questions above-mentioned, our research was structured as follows:

1. We started with a study of oil price volatility and an event analysis of oil market trends, accompanying them with a discussion on break-even points of offshore oil and gas projects in the Arctic.
2. We continued by identifying the main global trends affecting the strategic activities of oil and gas companies and the challenges that oil and gas companies face.
3. As a result, we present a vision of how strategic management and planning systems can be transformed to reduce the company’s dependence on a highly turbulent environment and increase its preparedness for implementing complex offshore projects in the Arctic.

The study is mostly analytical, and the analysis presented is qualitative. During the research, we turned to qualitative approaches such as meta-synthesis and content analysis [44,45]. The first approach helped us to synthesize primary qualitative case studies for achieving the purpose of the study. The steps of this approach such as research question design, identification of relevant studies and creation of inclusion criteria, and synthesis on an across-study level, among others, provided a methodological framework for a qualitative case study analysis. In addition, relevant statistical data and media sources on the topic were used. The main quantitative data sources were statistics provided by British Petroleum (BP) and the Ministry of Energy (Russia). As for academic literature, we used the Science Direct and Scopus databases (full access).
When conducting the research, a comprehensive desk study was carried out to collate currently available information on aspects such as general trends in oil and gas market development, global megatrends and challenges affecting the oil and gas sector, oil price volatility, and prospects for hydrocarbon production in the Arctic in pandemic and post-pandemic scenarios. To analyze the latter, we focused on reports provided by energy (oil and gas) companies and organizations since the development of Arctic projects in such scenarios has not yet been presented in academic literature.

As for particular methods, we employed event, comparative, situational, and causal analyses along with the methods of aggregation, decomposition, and systematization. When developing the basic principles of strategic management and planning for oil and gas companies, we focused on the generally accepted strategic management and strategic planning fundamentals for industrial companies.

3. Results

3.1. Volatility in Oil Prices and the Break-Even Point of Offshore Oil and Gas Projects in the Arctic

As noted above, price volatility in the energy sector is one of the key aspects affecting the future of oil and gas projects in the Arctic.

In general, oil (and gas) prices are the most discussed of all prices for commodities on global markets. In recent decades, a bi-directional relationship has been observed: on one hand, oil prices react to what is happening in politics and the global economy; on the other hand, the most important events in the global economy and politics are connected with oil [46]. These include the following: the rapid increase in shale oil and gas production in the United States [47,48]; sanctions against Russia and its oil and gas sector [10]; the ongoing conflicts in Libya, Iraq, and other countries; accelerating technological progress, which makes it possible to develop unconventional oil and gas fields; heated discussions about global climate change, the need for energy transition and relying more on alternative energy sources, etc. [38,46].

Figure 1 shows the changes in Brent crude oil prices from 1984 to 2020.

Figure 1. Brent spot prices 1984–2020, USD per barrel. Source: Created by the authors, data from [49,50].

Over the past 35 years, four significant drops in oil prices can be noted, the analysis of which is presented in Table 1. These price drops are linked to events affecting the changes in oil prices on the global market.
Table 1. Event analysis comprising changes in oil prices.

<table>
<thead>
<tr>
<th>Period</th>
<th>Changes in Oil Prices</th>
<th>Average Annual Brent Prices, USD/Barrel</th>
<th>Events that Caused Prices to Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st price drop</td>
<td>1985–1986: The price for Brent crude plummeted from a record high of more than $110 per barrel that was reached in 1980, decreasing by almost ten times by 1986.</td>
<td>1985–28</td>
<td>Oversupply of oil production, OPEC’s rejection of fixed prices and the introduction of Netback pricing, growth in oil production in Saudi Arabia, political events in oil-producing countries</td>
</tr>
<tr>
<td>2nd price drop</td>
<td>Second half of 2008: Prices decreased by three times from the all-time record level of $140 per barrel in June 2008 to $42 per barrel in January 2009.</td>
<td>2008–97</td>
<td>Global economic crisis</td>
</tr>
<tr>
<td>3rd price drop</td>
<td>2014–2015: Prices decreased by three times from $105 per barrel in June 2014 to $48 per barrel in January 2015 and then to $34 per barrel in January 2016.</td>
<td>2014–99</td>
<td>Several events were responsible (political and other events in the Middle East, the crisis in the Chinese stock market, etc.), the main of which was the technological progress in the field of shale oil production in the United States (which resulted in signing the OPEC+ agreement in 2016)</td>
</tr>
<tr>
<td>4th price drop</td>
<td>2018–2020: A decline in oil prices from $80 per barrel in October 2018 to less than $60 per barrel in December 2018, with a short-term recovery and a decline to $20 per barrel in March 2020.</td>
<td>2018–71</td>
<td>4.1—Growth in shale oil production in the United States and the revision of the OPEC+ deal; 4.2—The spread of coronavirus with consequences for the global economy and the termination of the OPEC+ deal (as a result, a new OPEC+ agreement was signed in 2020)</td>
</tr>
</tbody>
</table>

Source: Created by the authors, data from [10,49–54].

The fall in oil prices in 1986 was followed by a 13-year period of decline, with oil prices reaching a peak of $24 in 1990 and a low of $13 in 1998. The latter was due to the Asian financial crisis [49]. Since 2000, oil prices have gradually recovered, reaching their maximum in 2008 before the second fall, after which they grew again before the third fall in 2014. The growth in oil prices from 2010 to 2011 was associated with the onset of the Arab Spring [49], and their recovery since 2016 was the result of signing the OPEC+ agreement that came into force in 2017. Oil prices continued to grow gradually, reaching a five-year record high of more than $80 per barrel in October 2018. However, a new increase in shale oil production destabilized the market in 2018, which caused another decline in prices, which only worsened due to the COVID-19 pandemic and reached record low levels [39].

Oil price volatility became especially acute during the COVID-19 pandemic, which inexorably influenced the energy sector and the entire global economy [19], threatening the efficiency of not only Arctic projects, but the overall operations of oil companies. The

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1 For nine months of 2020 based on [50].
world’s largest oil companies reacted by trying to improve their operational activities as much as possible. For example, Sinopec (China) launched a “100-day campaign to tide over difficulties and improve performances” aimed at solving basic problems, optimizing the system, preventing and controlling risks, and using all the opportunities to overcome the crisis [55]. Despite the fact that the operating profit of the company in 1H2020 decreased by 31% compared to the same period in 2019, this can be considered as a positive trend given the serious crisis that directly affected the energy sector [55].

Obviously, companies and projects with high oil production costs were in the most vulnerable position. Among them were companies producing shale oil in the United States; according to rough estimates, their production costs amounted to $50 per barrel [56]. According to the estimates that were made by the International Energy Agency (IEA) in mid-2014, the break-even point of shale oil projects in the United States is around $80 per barrel [43]. Experts claim that recent events may affect the global oil market after 2020 [19]. Undoubtedly, such changes pose a serious threat to the future of offshore oil and gas projects in the Arctic.

The situation with Arctic oil and gas projects is similar [18]: operating projects were especially vulnerable during the period of record-low oil prices, while planned ones became more controversial. Figure 2 shows the changes in Brent crude oil prices from 2010 to 2020 along with a forecast for 2021 as well as changes in the break-even point of Russian and Norwegian Arctic offshore oil and gas projects (Norway’s Johan Sverdrup project in the North Sea and Johan Castberg project in the Barents Sea). Oil price forecasts for 2021 are presented based on data from the Energy Information Administration (EIA) and the United States Department of Energy (the forecast is about $50 per barrel) as well as the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD) (the forecast is about $40 per barrel).

![Figure 2. Changes in oil prices and the break-even point of offshore oil and gas projects in the Arctic. Source: Created by the authors, data from [6,43,49,55–62].](image)

According to the latest estimates by the Ministry of Energy of Russia, the break-even point of oil and gas offshore projects in the Russian Arctic is around $50–70, while the Norwegian company Equinor (formerly known as Statoil) claims that the break-even point for the development of the Johan Sverdrup field is less than $20 per barrel. In addition, after reaching the first-phase plateau (summer 2020), operating costs are expected to be below $2 per barrel [57]. Norway has made great strides in the development of Arctic hydrocarbons, demonstrating record low costs of offshore oil production. This is a result of technological advances and managerial efficiency.

In general, for Arctic offshore hydrocarbon projects to be successful, there should be either high oil prices, which are difficult to predict and not possible to control, or breakthrough technologies and innovative solutions that could provide a significant reduction in operating costs. The latter is an area whose development can open up new opportunities.
for offshore oil production. At the same time, any technological improvements require special approaches to strategic development and management, especially in times of global disturbances and high uncertainty.

3.2. Global Trends and Challenges for the Strategic Development of Oil and Gas Companies

A world of resource abundance is leading to a revaluation and gradual decline in oil prices as well as a focus on cost, efficiency, and speed [40]. The energy sector is characterized by intense competition (for markets and end users), a high degree of uncertainty and the speed of development of new technologies, and an orientation toward green growth [63].

The system of factors that influences both global energy markets and the operations of oil and gas companies is becoming more and more complex. It consists of political, economic, technological, social, and environmental factors that are global in their nature, many of which are unpredictable.

The business models of large oil and gas companies are vertically integrated [37]. For quite a long time, this model ensured the stability of companies in the sector. However, today, when the nature and speed of changes in the external environment have changed significantly, traditional approaches to maintaining sustainability (vertical integration, ensuring access to raw materials, diversifying activities and sales, a developed infrastructure and logistics system, etc.) are undergoing a transformation. Today, the exploration capabilities of oil and gas companies are not their distinguishing feature, megaprojects are not the only way to ensure strategic growth, and market opportunities can only be cost-effective for the industry leaders [40].

A number of global trends influence the activities of oil and gas companies and the energy sector as a whole. Figure 3 shows how global megatrends can be divided into groups such as Society and Ecology, Technologies, and Business Environment; together they create a set of common challenges for oil and gas companies, the systems, and directions of their strategic development. Table A1 provides a more detailed description of the key global trends, challenges, and ways that oil and gas companies can adapt.

Figure 3. Global trends and challenges for the strategic development of oil and gas companies. Source: Created by the authors, data from [14,21,40,64–72].

Deep tech innovations are putting an end to old work practices and make it possible to gradually improve productivity and, as a result, efficiency [40]. The depletion of conventional oil and gas reserves forces companies to develop complicated oil and gas projects (unconventional oil and gas, offshore, and shale projects), which generally require higher CAPEX and OPEX. All this creates new challenges for oil and gas companies and makes
the sector more and more technologically sophisticated. Oil and gas businesses can no longer ensure their sustainability by relying on easy-to-recover resources, and technology is playing an ever-increasing role at all stages of the production process.

The high volatility of oil prices leads to adjustments in the companies’ business plans and changes in their portfolios. As the oil and gas industry is becoming less economically sustainable, projects that heavily depend on oil prices become frozen or dismissed.

An important response made by oil and gas companies to the price volatility and uncertainty of the external environment is diversification, which manifests itself in the development of the value chain in the gas segment through the implementation of LNG (liquefied natural gas) projects, building up renewable energy assets, developing petrochemical and gas processing businesses, investing in the environment, electric vehicles, etc. At the same time, conventional, deepwater, unconventional, renewable, and other assets require separate approaches to management as well as different strategic business units (SBUs) and business models [40] that cannot operate based on the same principles or one set of technology.

Industry 4.0 brings to the fore the digitalization of industrial, organizational, and management processes [69]. Many oil and gas companies have begun to take advantage of digitalization, the Internet of Things, and robotics. These new technologies have enabled oil and gas companies to significantly reduce production costs and increase sales [46], and they have also changed approaches to sustainable development in the oil and gas industry. They are becoming an indispensable component of sustainable development. This imposes requirements not only on the need to develop technologies and to build up digital competencies of oil and gas companies, but also on their labor market and personnel policies. Programmers have become the most in demand professionals; automation and digitalization make workers redundant, and the remaining positions imply close man–machine interaction. In the long-term, there will be new job types and opportunity profiles [40].

The environmental factor largely determines the vector of sustainability in oil and gas and is bound to continue to do so in the future. The fight against anthropogenic CO\textsubscript{2} emissions has made the global community and oil and gas businesses pay more attention to renewables and the development of green initiatives within the company.

Approaches to social sustainability in the oil and gas industry are also being transformed; an increasing emphasis that businesses place on society is being expressed through social and environmental activities.

In this context, oil and gas companies implement a variety of innovative strategies, for instance, the open innovation model, which could support dealing with the industry’s challenges (mostly social and environmental pressure) [73].

In general, the energy sector is undergoing a transformation due to factors such as low-carbon initiatives growing in importance, the desire to reduce the companies’ dependence on the oil and gas market, and the desire to use opportunities provided by digitalization. The first aspect threatens the leading position of oil as an energy resource. For instance, fusion energy as well as other energy sources could successfully address long-term energy requirements and the issue of climate change [25,74].

Oil still accounts for the biggest share in the global energy mix (about 33% in 2019) [49]. However, as experts predict, this share will steadily decline. According to the IFA estimates [75], global oil demand will hit a plateau around 2030; it will grow until 2025, slowing down to a minimum thereafter. According to BP, which predicts two energy mix scenarios due to the transition to a low-carbon energy system, renewable energy sources and natural gas will have become more important than oil and coal by 2040, with oil consumption shrinking [21]. According to one of the considered scenarios (the Rapid Transition Scenario), BP estimates that the share of oil in the energy mix will be 24% in 2030 and 17% in 2040 [21].

All the issues discussed above lead to the transformation of sustainable development parameters in the industry. Global trends and the challenges of the last decades highlight that economic aspects in the context of sustainable development are not always a priority
and often yield to environmental, social, and technological ones. Energy resources are becoming more and more an instrument of geopolitics. The concept of energy sector sustainability that is based purely on market aspects is being disrupted, and non-economic forces are emerging. The role of non-market actors is growing, and some of them impose innovations on companies, requiring costly changes [76].

The main problem is the need to develop and successfully run businesses in the context of high unpredictability and a surprising business environment. I. Ansoff introduced these categories as well as the concept of environmental turbulence in the middle of the last century [77,78]. I. Ansoff introduced and substantiated five levels of environmental turbulence (from 1 to 5). He presented the matching of environmental turbulence, strategic aggressiveness, and responsiveness of the organization’s capability [32,78,79]. As the turbulence of the external environment increases, the management of a company must master the science of fast and effective change [31]. The researcher argued that the strategic success of a company is ensured only if the development level of the strategic management system (strategy, top management) corresponds to the level of turbulence in the external environment.

The energy sector is currently in the process of transformation, and it ranks 5 on the turbulence scale, which indicates high complexity, high speed of change, and unpredictability.

All these aspects determine the requirements on strategic management systems and management personnel. Management approaches and frameworks need to be consistent with the new reality that dominates the energy sector. The next section discusses the key aspects of the transformation of the strategic management and planning systems of oil and gas companies that could significantly contribute to the success of the companies’ operations and Arctic offshore hydrocarbon projects in a new reality.

3.3. Transformation of Strategic Management and Planning Systems of Oil and Gas Companies: Key Aspects

The strategic management of oil and gas companies and their SBUs in the context discussed above should be based on a set of new principles including those that could increase the company’s flexibility and adaptability in achieving its strategic goals and help to develop management creativity.

A number of strategic management functions are generally accepted including basic functions such as strategic analysis, strategic planning, and forecasting. New requirements are being imposed on them.

As for strategic analysis techniques, together with widely used and debatable methods such as PEST analysis, SWOT framework [34], etc., a special role is assigned to instruments for analyzing the phenomena and processes that dominate the energy sector, measuring its uncertainty, predicting the future (for instance, event analysis), and analyzing business sustainability in a highly volatile environment. These instruments can include the following: an analysis of a company’s core competencies based on the concept introduced by C.K. Prahalad and G. Hamel that defines a core competence as the “most powerful way to prevail” [80]; a business model analysis focusing on the assessment of the shares of various SBUs in the company portfolio (oil exploration and production, petrochemistry and gas processing, renewable energy, other types of business); and an analysis of the value chain [33] of an oil and gas company as a “collection of activities that are performed by a company to create value for its customers”. The latter provides a comprehensive review of the value creation for all processes and products produced in different businesses.

Within the framework of forecasting, in addition to forecasting the development of markets and technologies, it is necessary to assess global trends such as climate change and the growth in the use of non-fossil fuels in the global energy mix. A special role is played by forecasting the development of the range of products produced by petrochemistry and gas processing as well as the beneficial use of industrial waste including an increase in the value of technogenic CO$_2$ [81]. Complex forecasting models (those combining social, ecological, technological, and other factors and indicators) are of crucial importance.
Strategic planning forms a combination of programs and projects that should be multiple and adaptive. The strategic planning systems of oil and gas companies should also be continuous, but there may be no clear time cycles. The strategic plan that is created should be able to be adjusted outside the planning cycles. In oil and gas companies, strategic planning is mostly a calendar-driven ritual, and the planning process is generally elitist, “harnessing only a small proportion of an organization’s creative potential” [82]. It is important to use benchmarking practices.

In general, the strategic management of SBUs for offshore hydrocarbon production in the Arctic is a complex process where interaction with the external environment plays a crucial role, and the rate at which complex industrial systems for offshore hydrocarbon production are being developed is growing.

A conceptual vision of the basic transformation of strategic management systems is presented in Figure 4.

![Figure 4](image-url)

**Figure 4.** A conceptual vision of the basic transformation of strategic management systems of oil and gas companies. Source: Created by the authors.

Strategic control as the final stage of the strategic management process is also very important. This stage usually involves the use of balanced scorecards and their derivatives (for instance, the approach proposed by Kaplan and Norton) [83]. A balanced scorecard for assessing strategy efficiency is developed, as a rule, depending on the strategic and tactical goals. In the strategic management systems of oil and gas companies and their offshore assets, balanced scorecards could be specific and they should certainly correlate with sustainable development goals (including those associated with environmental and social sustainability) and include investment and organizational performance, the parameters of improving employee competencies, etc. In addition, the strategic control system should include strategic auditing. With the use of information systems, it is necessary to measure the progress of offshore projects and to assess both managerial solutions and the quality of business and functional strategies that have been developed.

Thus, the reaction in the strategic management system should be faster than it used to be. The strategic management and planning system should contribute to the survival and economic development of complex SBUs in the Arctic, ensuring their ecological balance and social orientation in a highly unpredictable environment. In the near future, sustainability will be more present and obligatory [84, 85].
The transformation of the requirements on the strategic management system in the context of global challenges, high uncertainty, and global shocks caused by the pandemic are shown in Figure 5.

[Image: Figure 5. Changes in strategic management requirements under the transformation of the energy sector and global disturbances. Source: Created by the authors.]

As noted above, the role of low-carbon initiatives is growing, and the share of fossil fuels may significantly decrease in the long run. The growing role of CO₂ mitigation options including the case of Arctic hydrocarbon projects will force oil and gas companies to extract/capture CO₂ and perform carbon dioxide storage (CCS) or usage (CCUS) operations, which will require expensive technological and engineering solutions. These factors, along with geopolitical issues, price volatility, tough competition, and a decrease in the cost of renewable energy, contribute to the growth in uncertainty in energy markets (Figure 5, axis Y).

In this regard, the requirements on the strategic management systems of oil and gas companies are increasing, especially in SBUs involved in offshore hydrocarbon production in the Arctic. The uniqueness of technological and organizational solutions as well as their inconvertibility, requires special competencies from managers and specialists working for oil and gas companies. The role of the system integrator is of critical importance. Strategic management and planning should contribute to the creation and development of new competencies and business practices. Digitalization of both production operations and the decision-making process is one of the requirements imposed on today’s strategic management systems. A strategic vision of modern trends in ensuring technological leadership including that in the area of environmental technologies and the diversification of production and products is also in the focus of strategic management. In addition, the importance of social responsibility of an oil and gas company should not be overlooked, especially in terms of preserving the Arctic’s ecosystems and biodiversity and the traditional way of life of locals living in the coastal regions of the Arctic.

We can assume that in the pandemic and post-pandemic periods, uncertainty will grow even more, and there is a need to increase the number of strategic alternatives developed by managers at oil and gas companies. The uncertainty and dynamism of the business environment raise the question of whether the strategic management system will return to the least number of strategic alternatives and solutions (Figure 5, axis X). The post-
The pandemic period is likely to be characterized by long-term low prices for hydrocarbons, which are currently below the break-even point of Russian Arctic offshore projects, and a decrease in demand for fossil fuels (due to the economic crisis and low-carbon trends). The influence of the latter may increase due to J. Biden’s victory in the U.S. presidential election, who promised to reenter the U.S. into the Paris Agreement and invest trillions of dollars in green energy [86]. With such prospects, oil and gas companies need to diversify their portfolios by focusing on the downstream sector, petrochemistry products, and gas processing products.

Based on the above, we present the key principles of strategic management and planning (Table 2) that could contribute to the oil and gas companies’ successful operation and implementation of complex offshore hydrocarbon projects in the Arctic against global disturbances (i.e., a range of complex factors discussed above (“a new reality”) including pandemic and post-pandemic trends). We can say that being put together, these aspects form an environment characterized by global disturbances.

Table 2. Changes in the principles of the strategic management and planning of oil and gas companies in the context of global disturbances.

<table>
<thead>
<tr>
<th>Principles</th>
<th>“A new reality”: the era of competition, globalization, and high uncertainty</th>
<th>“A new reality” + pandemic and post-pandemic scenarios = global disturbances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authority and responsibility</td>
<td>Greater independence of project managers</td>
<td>Limiting the number of decision makers</td>
</tr>
<tr>
<td>Adaptability</td>
<td>High adaptability of the strategic planning system and integration of programs and projects into current plans</td>
<td>Cyclicality is not a basic characteristic. Changes in strategic decisions in one planning cycle. Planning “online”</td>
</tr>
<tr>
<td>Scenario-building</td>
<td>Baseline scenario and several development alternatives</td>
<td>Simulating a large number of scenarios with detailed risk descriptions</td>
</tr>
<tr>
<td>Risk mitigation</td>
<td>Risk assessment and management</td>
<td>Strengthening the risk management component: mandatory creation of insurance funds and capital</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Commercial (financial), social, environmental</td>
<td>Growth in the role of environmental and social efficiency. Competence and technological efficiency</td>
</tr>
<tr>
<td>Focus on the environment</td>
<td>Environmental risk management is required</td>
<td>More stringent requirements concerning environmental safety. The almost complete exclusion of possible environmental damage</td>
</tr>
<tr>
<td>Focus on creativity</td>
<td>Ability to make non-standard decisions and think out of the box in the context of high uncertainty</td>
<td>Requirements for a decision maker to be a “system integrator” with an ability to solve different tasks through interdisciplinary competencies</td>
</tr>
<tr>
<td>Focus on digitalization</td>
<td>Digital transformation of management and planning systems</td>
<td>Faster digital transformation with the creation of digital managerial competencies</td>
</tr>
</tbody>
</table>

Source: Created by the authors with the use of [36,82,87–89].

We highlight the principles of authority and responsibility, adaptability, scenario-building, risk mitigation, and efficiency as well as the principles of focusing on environment, creativity, and digitalization. A number of principles are widely known in strategic management and planning systems. However, some principles of strategic management and planning in the Arctic SBU’s of oil and gas companies are becoming crucial for the implementation of complex programs and projects in the Arctic, for example, the focus on environment and digitalization. Such principles are fundamentally new for industrial companies. Traditional principles are undergoing a transformation. For example, speaking of efficiency, we cannot focus only on economic efficiency because social, environmental, and technological aspects of efficiency are also becoming very important. In the context of pandemic and post-pandemic scenarios, the characteristics of the new principles that have been developed over the past few years are also being somewhat transformed. The plan-
ning cycle is becoming more dynamic, the interests of stakeholders should be taken into account more fully, and the role of risk insurance is growing. Moreover, the management of oil and gas companies has no room for errors in ensuring environmental safety in offshore hydrocarbon production. It is also necessary to make jobs in the Arctic attractive [90].

4. Discussion

Currently, the world as a whole is changing due to the COVID-19 pandemic [84] and other factors that have been discussed. We admit that the development of offshore hydrocarbon resources in the Arctic may be viewed as being against the principles of sustainable development. Such projects pose a high risk to the environment as they may cause biodiversity disruption. If an oil spill occurs in the Arctic, eliminating the consequences of such an accident is very difficult due to the polar night, low temperatures, underdeveloped infrastructure, and the lack of reliable technological solutions. Therefore, strategic solutions for the development of offshore hydrocarbon resources in the Arctic should be aimed at ensuring environmental safety.

The development of underwater drilling and hydrocarbon production technologies is of great importance, therefore, it is necessary to upgrade offshore drilling equipment and improve the reliability of oil spill response technologies. The quality and accuracy of exploration equipment and technologies including seismoacoustic and seismic R&D as well as 3D exploration with digital processing and integrated data interpretation should meet all modern requirements.

Industry 4.0 technologies are becoming more and more important since they can facilitate sustainable practices [84] and could play a special role in strategic management. New digital technologies, combined with datasets, can transform field operations, making strategic decisions faster, more efficient, and better. The ability to collect and interpret data and then take effective action while minimizing risks to employees and the environment will be at the core of strategic management in the near future.

At the same time, the strategic management and planning system should provide a clear rationale for Arctic projects. The strategic management system should recognize the existing constraints and envision difficulties in implementing strategic Arctic plans. In this light, strategic alternatives connected with the development of conventional or unconventional oil reserves on land could be preferable.

Implementing offshore hydrocarbon projects will allow for new technological solutions to be tested and new competencies to be acquired. However, the experience acquired and the unique competencies developed could be used on a large scale only if there is a demand, which may be low or completely absent. We assume that low oil prices and the growing interest in renewable energy will bar companies from implementing Arctic projects on a large scale (i.e., no more than one or two projects may be executed). In the end, it will not let oil and gas companies use the unique competencies that they have acquired. This is also an issue for the strategic management and planning system to solve as the company’s R&D efforts can be directed toward other promising projects (for instance, diversification of downstream operations).

The principles of strategic management aimed at enhancing the role of social and environmental responsibility can also become an obstacle to offshore oil and gas production from an economic point of view. Compliance with strict environmental standards and high social responsibility to workers and local communities entails serious additional CAPEX and OPEX; the industry needs to respond to these environmental and social concerns in an economic and sustainable way [73].

We can assume that financial efficiency should not be the main point and that the principles of sustainable development are very important. We can even assume that offshore oil and gas production is not only a business, but also the opportunity to develop unique competencies and create an image of a responsible and advanced company. However, in any event, oil and gas companies (like everyone else) operate following the principle of economic pragmatism. The development of projects where there may be a lower degree of
stakeholder influence, fewer restrictions, and greater financial efficiency is an alternative that oil and gas companies still have, taking into account the low oil recovery rate in Russia and the great opportunities to improve the economic indicators of such projects. In general, the economic vector of offshore oil and gas production in the Arctic should be directed at improving industrial management, developing unmanned systems, automating all operations, and reducing semi-fixed costs as much as possible. In such a way, economic results can bring the break-even point of offshore production down, which can be observed in Norway.

We highlight the creativity and the ability to think using interdisciplinary knowledge as qualities characterizing the manager as a “system integrator”. It is also necessary to develop cross-cultural competencies in modern management. Managers need to learn from the experience of national and transnational management systems, and the managerial experience should be used properly in Arctic SBUs. This is the area that we would like to study in our further research.

5. Conclusions

To summarize the research, we would like to underline the following points:

1. An event analysis was conducted to study changes in oil prices. Additionally, global challenges and megatrends in the energy sector were analyzed that create a new reality to which oil and gas companies need to adapt. The oil and gas sector including offshore production in the Arctic is characterized by increasing uncertainty accompanied by a variety of risks, among which are environmental, technological, and investment ones.

2. Management requirements in the framework of strategic management systems were identified. These systems should be aimed at developing new business models, competencies, and the ability to strategically predict technological and organizational changes. They should also be highly responsible in terms of social and environmental challenges.

3. The principles of strategic management for the development of offshore projects in the Arctic were improved. They take into account the need to face the global challenges of recent years including pandemic and post-pandemic trends. In developing strategic plans, it is necessary to focus on a large number of scenarios, develop adaptive mechanisms, and ensure that the company’s operations comply with stringent environmental regulations.

4. The focus on creativity is an important point in today’s strategic management systems. In the context of growing uncertainty and an ever-increasing number of extraordinary situations, it is vital for businesses to take a creatively different approach to management. In offshore oil and gas production, a focus should be made on optimizing labor utilization on-site, which strengthens the role of digital technologies and smart systems (both technological and managerial ones).

Author Contributions: Conceptualization, E.G.C., A.I., and A.C.; Methodology, E.G.C., A.I., and A.C.; Validation, A.I. and A.C.; Formal analysis, A.I.; Investigation, E.G.C., A.I., and A.C.; Writing—original draft preparation, E.G.C., A.I., and A.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.
## Appendix A

### Table A1. Global trends, challenges, and approaches that oil and gas companies can take to adapt to a new reality.

<table>
<thead>
<tr>
<th>Sphere–A Global Trend–Key Challenges</th>
<th>Description</th>
<th>Challenges for Oil and Gas Companies</th>
<th>Companies’ Adaptation Tools</th>
</tr>
</thead>
</table>
| 1 S&E–1.1–E, D                      | Growing importance of social factors in the company’s activities. A higher degree of the company’s responsibility to its employees and society as a whole | - Publicity  
- Taking into account the interests of a wide range of stakeholders  
- Ensuring smooth production and its safety  
- Ensuring favorable working conditions  
- Ensuring a high quality of life for the people in the regions where the company operates  
- Participation in the social development of the regions | - Implementing the principles of sustainable development (social, economic, and environmental aspects)  
- Implementing internal and external social policies  
- Improving the system of interaction between the company and stakeholders  
- Developing publicity strategies; image making  
- Digitalization aimed at ensuring safety at work and environmental safety  
- Implementing the principles of a circular economy (circular models) |
| 1 S&E–1.2–H, D                      | Growing public concern about the environment. A higher degree of the company’s responsibility to society and the environment | - Ensuring a minimum level of environmental impact  
- Compliance with stringent environmental regulations imposed on both production processes and end products | |
| 2 T–2.1–A, C                        | Growing technological sophistication of businesses against the background of the gradual depletion of conventional oil and gas reserves; the need to implement high-tech projects; more stringent environmental regulations that both production processes and end products have to comply with | - Technological leadership (by technology, equipment, and competencies)  
- The need to use more advanced technologies for the exploration, production, transportation, and processing of hydrocarbons | - Implementing various strategies aimed at technological development (co-financing R&D, creating partnerships for complex projects, using the model of 'open innovations', etc.)  
- Developing competencies in technological and digital leadership |
| 2 T–2.2–G, C                        | Rapid development of technologies for obtaining, storing, processing, and using data, which provides the opportunity to improve production efficiency and upgrade production and management processes | - Digital transformation  
- Improving the company’s production and managerial performance through digitalization | - Fostering intrapreneurship  
- Implementing various digitalization strategies (integration with IT companies, creation of the company’s own IT departments, improving personnel policies) |
| 2 T–2.3–D, E                        | Rapid development and improvement of Internet and cloud technologies and the growing popularity of social networks, which makes it necessary to change the conduct of business principles | - Meeting society’s environmental, ethical, and social needs  
- The growing role of society’s “requests for transparency”  
- Creating the company’s informational platform | - Studying the value chain and developing a list of critical digital technologies “Industry 4.0” |
Table A1. Cont.

<table>
<thead>
<tr>
<th>Sphere–A Global Trend–Key Challenges</th>
<th>Description</th>
<th>Challenges for Oil and Gas Companies</th>
<th>Companies’ Adaptation Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 BE–3.1–B, C, D, F</td>
<td>A volatile and, as a result, unpredictable external environment with ongoing significant changes in prices, markets, and also technological, social, environmental, and regulatory factors</td>
<td>- Business sustainability under any scenario (including low prices for oil)</td>
<td>- Diversification (reorientation to the production of products with high added value (oil and gas processing products) and development of new low-carbon businesses, products, and services that complement current activities)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- A flexible (adaptive) strategic management system</td>
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<tr>
<td></td>
<td></td>
<td>- A controllable degree of dependence on oil markets</td>
<td></td>
</tr>
<tr>
<td>3 BE–3.2–B, C, D, F</td>
<td>A high degree of uncertainty regarding key macroeconomic parameters, especially oil prices during the pandemic</td>
<td>- Business sustainability in a highly competitive environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Competent leadership</td>
<td></td>
</tr>
<tr>
<td>3 BE–3.3–D, F</td>
<td>Rivalry between companies for limited areas (markets, consumers, resources) and leadership (technological), which leads to increased competition between oil and gas companies at all stages, from licensing to selling products</td>
<td>- Business sustainability in the context of a possible decline in the share of oil in the global energy mix</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Compliance with the principles of the low-carbon agenda</td>
<td></td>
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<tr>
<td>3 BE–3.4–F, D</td>
<td>A growing role of renewable energy sources in the global energy mix due to low-carbon policies becoming mainstream</td>
<td>-</td>
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Source: Created by the authors with the use of [14,21,40,64–71].

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