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Counterplan Research of Oil Firms on Continuing Expansion of Substitute Energy for Petroleum

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Abstract. *The global energy market is undergoing a rapid transformation. Oil and substitute energy are becoming increasingly important due to their great influence on the global economy. Meanwhile, the COVID-19 pandemic has become a significant factor affecting the energy market and global economy. Therefore, the establishment of management strategies for oil companies is becoming increasingly important as substitute energy supply and development expand. For this reason, we present and discuss the counterplan research of oil firms on continuing the expansion of substitute energy for petroleum.*

Keywords: management, strategy, counterplan, oil firm, substitute energy, petroleum

JEL Codes: O13, P18

1. Introduction

The sudden increase in the oil production of North America, as well as shale oil in the United States and oil sands in Canada, increased global supply, thus affecting oil prices and oil firm profits. The excessively long duration of COVID-19 has significantly influenced oil firms worldwide. The current trend in global inflation has resulted in a sudden increase in the price of resources, raw materials, and oil. Supply and development for substitute energy are being supported worldwide. As the phenomenon of global resource depletion intensifies, all countries are striving to develop and secure resources. Global trends are used to assess the competitiveness of a country concerning resource preservation, serving as an important factor for a country's economic development. However, issues surrounding environmental pollution also increased. It is determined that the solution to environmental pollution and resource depletion is the development of substitute energy. If developed, substitute energy can eliminate the problem of resource depletion with its availability. By minimizing global warming or carbon dioxide emissions that occur from resource development, security, and consumption, substitute energy can make a significant contribution to environmental purification. In this paper, we conducted research, as well as presented and discussed counterplan research strategies of petroleum firms concerning the continuous expansion of substitute energy. The introduction, literature review, management strategy for successful firm management, global oil market trend, current status of substitute energy for petroleum, research model and methodology, strategy model research results, counterplan research discussion, conclusions, and research limitation are all included in this paper.

2. Literature Review

Analyst forecast biases are positively related to EIA oil forecast biases but only for firms with greater analyst coverage (Wang and Macy, 2021). Oil and gas reserves are clearly the most important assets that oil and gas companies have. Large oil companies are most profitable during periods of moderate gasoline prices (Ford, 2011). Oil price risk is positively impacted by increases in oil production (Sadorsky, 2008).

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The so far implemented enterprise resource planning (ERP) systems have in many cases failed to meet the requirements regarding business process control, decrease of business costs and increase of company profit margin (Gajic et al., 2014). Anecdotal evidence suggests that high oil prices embolden oil-rich states to behave more aggressively (Hendrix, 2015). If we are to revitalize the energy management industry, we need a better sense of what energy management is and what we'd like it to be (Hansen, 2008). Environmental management plays a pivotal role in the financial performance of the energy industry (Xu and Chen, 2019). The integrated practice of strategic management, that is the use of the three components of the strategic management process (formulation, implementation, and evaluation) does matter (Elbanna et al., 2020). In general, optimal corporate strategy has focused on strategic environments and characteristics of business units rather than on managerial flexibility (Chen et al., 2013). Many organizations adopt merger and acquisition (M&A) as a part of their corporate strategy to achieve their business objectives (Chui, 2011). Innovation without clarity in the business model leads to modest or negligible performance outcomes (Gronum and Verreynne, 2015). To achieve positive economic, environmental, and social benefits, many incumbent manufacturing firms attempt to apply circular economy principles to their business practices (Frishammar and Parida, 2018). The emerging growth of the sharing economy demonstrates the need to understand the factors driving this growth and the business models and practices of sharing economy service companies (Apte and Davis, 2019). Although the term 'business model' is widely used in the business world, the academic research on this issue is sparse (Schweizer, 2005). Business model innovation is an emerging hot topic in management research (Filser et al., 2020). Surprisingly, neither empowering leadership nor team creativity was related to business model innovation (Amoroso et al., 2021). Businesses increasingly incorporate the sustainability aspects into their products, services, and processes that drive innovation (Klein et al., 2021). The key elements of a global business model include propositions for adding customer value and capturing a share of that value, methods to control, deploy, and utilize critical resources, and integrated processes that deliver value to target global customers (Tallman et al., 2018). Strategy can be formally interpreted as an idealized path optimizing heterogeneous resource deployment to produce maximum financial gain (Johnson and Foss, 2016). Matrix methods may usefully be deployed to characterise the architecture of resources, costs, and revenues that a business uses to create and deliver value to customers that defines its business model (Johnson, 2017). The earned value project management method integrates three critical elements of project management: scope management, cost management, and time management (Anbari, 2003). The values relate to efficiency, legitimacy, power and control, and stakeholder satisfaction (Eskerod and Riis, 2009).

3. Effective Firm Management Strategy

Management strategy is often defined as a series of actions taken to develop and carry out plans aimed at accomplishing specific goals after determining the company's future path. Two oil shocks made forecasting the economic cycle impossible in the 1970s, thus resulting in scepticism surrounding the strategic plans due to the increasingly recurring highs and lows of the global economy. Meanwhile, American firms, which largely contributed to the global economy, were eventually threatened by Japanese and German firms in the 1950s and 1960s. As a result, CEOs became more interested in developing strategic analysis and thinking skills. The goals of the firm must first be established before developing a management strategy. It is also important to assess the environment of the firm, identify its resources and capabilities, derive strategic alternatives, and use the most efficient strategy. The adopted strategy necessitates internal reorganization of the firm in which the organizational structure and control system are designed. The firm can provide suggestions for future decisions based on the results of strategic practice. The different types of management strategies are cost leadership strategy, differentiation strategy, diversification strategy, niche strategy,

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technological strategy, and cooperative strategy. Cost leadership strategy is centered on management, having an advantageous cost leadership over other firms in order to secure within the industry a preemptive position regarding cost. Differentiation strategy differentiates a firm from its competitors by offering clients design, brand image, quality, delivery, flexibility, service, reliability, and high value. Diversification strategy refers to a firm's decision to establish a new business instead of utilizing an existing one. Niche strategy refers to planning based on market analysis and exploring a new market by pioneering one or segmenting the current market. Technological strategy refers to a strategy that involves securing a competitive advantage using technology. Cooperative strategy refers to a strategy that promotes cost reduction, quality improvement, and productivity improvement.

4. Global Oil Market Trend

In December 2019, the whole world was left shaken by the effects of COVID-19, which resulted in a sudden decline in crude oil demand. As a result, the oil industry is trying to cope with the market changes brought about by the global expansion of transition movements under the new climate change system. According to the International Energy Agency (IEA), there is a decline in oil demand. Furthermore, the demand for oil in advanced countries is dwindling, and the rate of growth of oil demand in emerging economies is expected to slow further. The Korean New Deal policy is deemed necessary by South Korea to boost the competitiveness of renewable energy that is gaining traction in the era of global energy conversion resulting from its high dependence on oil and gas. The global oil market is being influenced significantly by the development of shale oil and clean energy, as well as the expansion of electric vehicle supply. As a result of price volatility, oil price forecasts from major energy institutions worldwide are far off, and uncertainties in oil firms are growing. In macroeconomics, oil prices and the unemployment rate are considered as key indicators. When analyzing the oil market, it is important to address this based on supply and demand as oil prices are representative goods that explain the law of supply and demand in pricing. The Middle East, the Commonwealth of Independent States (CIS), South America, and Africa are major oil suppliers of the world. Meanwhile, North America, Europe, and the Asia-Pacific are the world's largest oil consumers. Global oil reserves are increasing as oil exploration in each country improves; however, there is a significant instability with the distribution by region. There is constant volume movement to consumer destination because oil production and consumption by country or region are unbalanced. Oil reserves are readily available. The oil reserves ratio of OECD countries in advanced countries is 15.0%, whereas the reserves ratio of OPEC countries, a group of oil-producing countries, is 70.1%. Table 1 shows the production in thousands of barrels per day.

Table 1: The production in thousands of barrels per day

Classification	**2021**	**Groth rate per annum**		
		2021	**2011-21**	**Share 2021**
OECD	28,405	0.7%	3.8%	31.6%
Non-OECD	61,471	1.9%	-0.5%	68.4%
OPEC	31,745	2.9%	-0.8%	35.3%
Non-OPEC	58,131	0.8%	1.6%	64.7%
European Union	366	-7.0%	-4.8%	0.4%

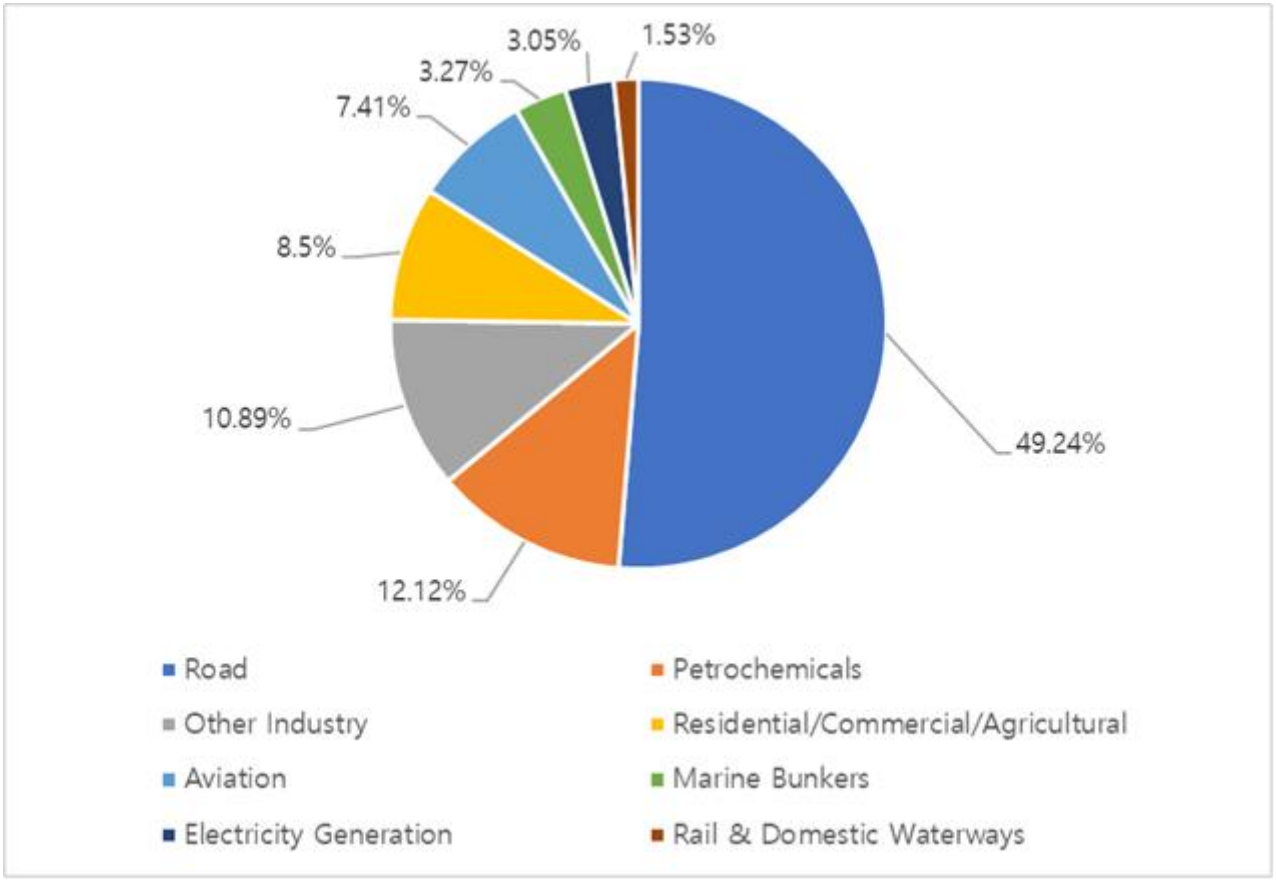
Data Source: BP Statistical Review (2022)

As oil demand declines, the global oil market is expected to accelerate energy conversion. The decline in oil demand is only temporary, and energy conversion is expected to fall behind the priority as demand

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quickly recovers. Subsequently, oil demand determines global oil market trends. Demand for clean energy may increase as a result of declining oil prices and oil demand, whereas demand for gasoline and diesel is expected to decline by 2025 as a result of competition to improve efficiency, CO2 emissions reduction, and recognition of electric vehicles. Fig. 1 shows the distribution of oil demand in the OECD.

Fig. 1: The distribution of oil demand in the OECD



Data Source: Chemical & Resource (2022), Statista

5. Current Status of Substitute Energy for Petroleum

As the world's resource depletion worsens, all countries are attempting to develop and secure resources. Environmental pollution is a serious issue in resource development and security. Mass production and overconsumption of resources are clearly the causes of environmental problems. This pattern will continue as the energy efficiency policy increases the use of fossil fuels, production, and consumption, thus making their disposal difficult to achieve. According to the World Climate Conference (WCC), only sustainable development can improve the quality of life. Reducing environmental pollution to reduce carbon dioxide emissions and stabilize greenhouse gas concentrations in the atmosphere has become an area of importance in the United Nations Framework Convention on Climate Change. Table 2 shows the objective of reducing carbon emissions in major countries. Fig. 2 shows the major countries that emit carbon dioxide.

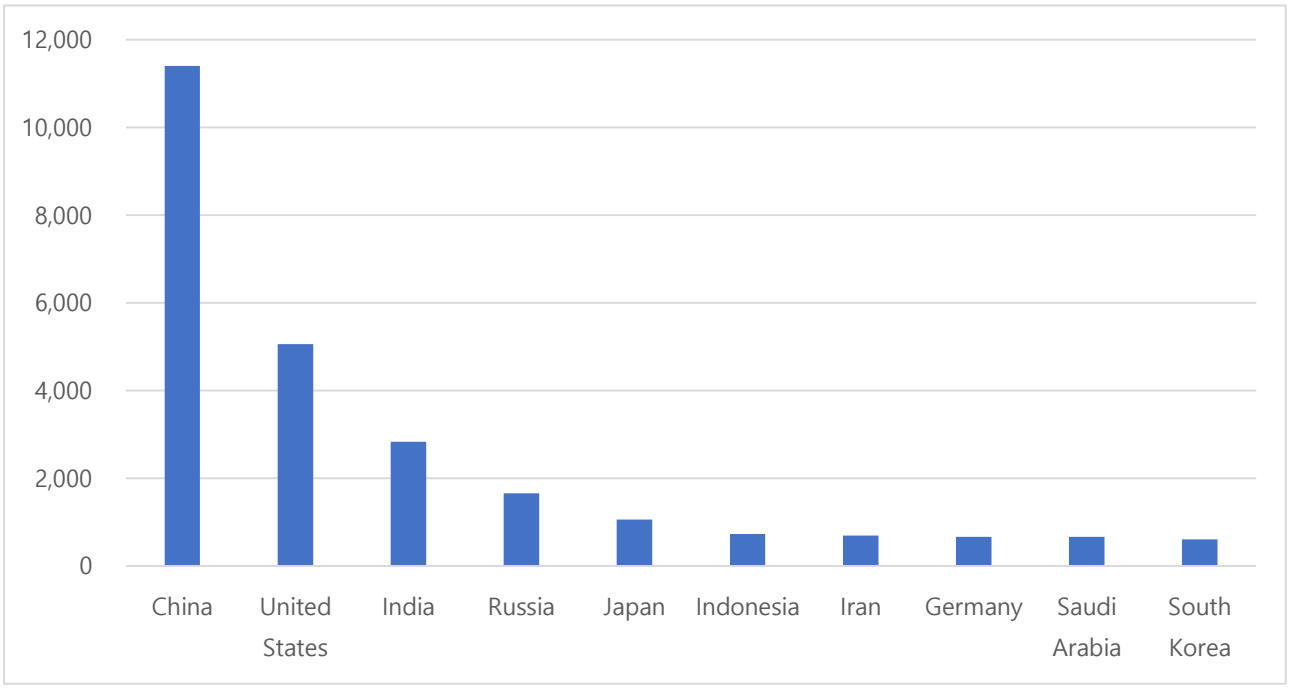
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Table 2. The objective of reducing carbon emissions in major countries

Country	Content
United States	50% ~ 52% reduction compared to 2005 by 2030
China	2020 goal reconfirmation
EU	55% reduction compared to 1990 by 2030
Japan	46% reduction compared to 2013 by 2030
South Korea	24.4% reduction compared to 2017 by 2030 → Raise the reduction goal and resubmit
Canada	40% ~45% reduction compared to 2005 by 2030

Data Source: NDC Registry (2021), United Nations Framework Convention on Climate Change

Fig. 2: The major countries that emit carbon dioxide



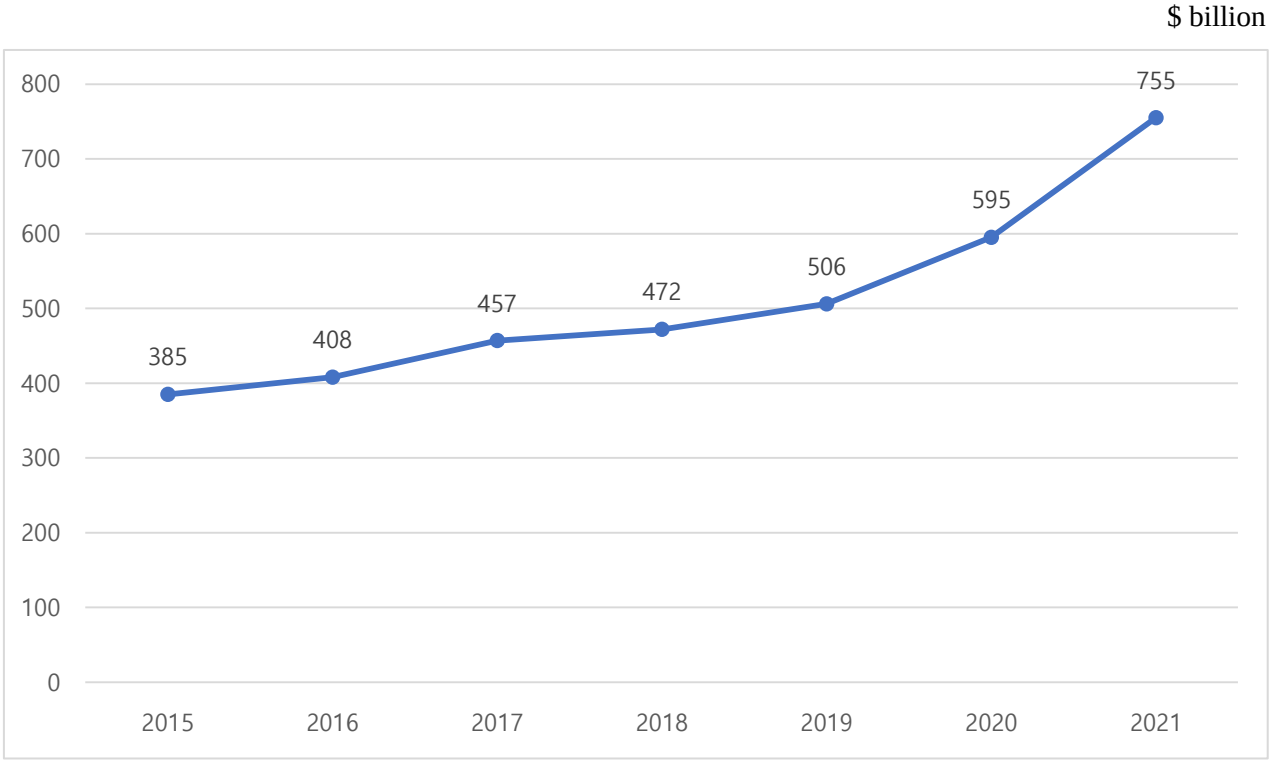
Data Source: Global Carbon Atlas (2022)

Substitute energy development is one of the measures being taken to address the crisis of environmental pollution and resource depletion. Clean energy technology is rapidly evolving, and prices are continuing to fall to ensure economic feasibility. One of the challenges to the existing oil firm's management strategies to generate profits is the rapid diffusion of electric vehicles. Furthermore, de-petroleum nation policies are also having a significant impact worldwide. If developed, substitute energy can be used indefinitely. It has the advantage of greatly contributing to environmental stabilization with carbon dioxide reduction. Substitute energy, also known as renewable energy, is the energy produced by converting fossil fuels or renewable energy (e.g., sunlight, water, geothermal heat, precipitation, and biological organisms). Due to the increasing competition for securing resources, excessive use of resources, and environmental pollution, substitute energy is considered a new solution. Solar energy, wind power energy, hydropower energy, nuclear energy,

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bio energy, and thermal energy are the main types of substitute energy. Solar energy refers to the radiant energy from the sun in the form of heat and light that provides support to the living things found on Earth and its climate. Wind power energy is the energy generated by harnessing the power of the wind. Hydropower energy is the energy generated by harnessing the force of water. Nuclear energy is defined as the large amount of energy that is continuously produced by either a fission or fusion reaction. Bio energy, also known as biomass energy, is the energy derived from biomass as fuel. Thermal energy is defined as the energy that causes a change in the temperature or state of an object as heat takes its form. Fig. 3 shows the investment in the global energy transition.

Fig. 3: The investment in global energy transition



Data Source: Bloomberg NEF (2022)

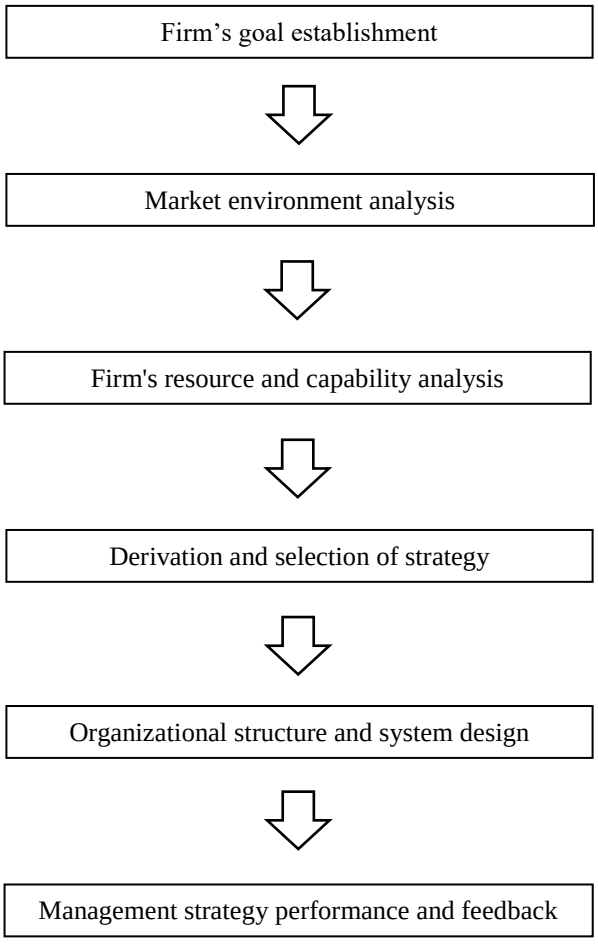
6. Research Model and Methodology

A management strategy model is discussed in this study for research purposes. Management strategy is analyzed in terms of firm strategy, market strategy, and business strategy. A firm strategy is based on a firm's entry into the business and market. Market strategy is based on the performance of a firm using its strategies to gain an advantage in the market. Business strategy relies on a firm's support of its management, marketing, personnel, finance, production, and R&D. This study focuses on oil firms and their establishment of strategies. Management strategy identifies the objectives of the firm, the allocation of its resources, and the businesses and markets that it enters. The scope of the firm's business and the market in which it competes are based on its strategy. Firm strategies include business areas in which a firm is involved, while focusing on strategies with various environmental characteristics at a competitive level. Market strategy is used to enhance a firm's competitive position in the market. It heavily relies on establishing its edge over its competitors. Furthermore, a competitive advantage strategy is necessary for firms to have a competitive edge

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in the market. It is important to have overwhelming competitiveness and a competitive advantage over other firms. To achieve the firm's strategic goals, business strategy is important when allocating internal resources and arranging activities within the firm. Business strategy includes financial management, personnel management, marketing, production operation management, and R&D. It is important for firms to have a systematic management strategy to be able to distribute the resources. For this reason, this study aims to establish management strategies for oil firms. Fig. 4 shows the establishment of management strategy.

Fig. 4: The establishment of management strategy



7. Research Results for Strategy Model

A diversification strategy of oil firms is shown in this study for the expansion of substitute energy for petroleum. In addition, there is a remarkable increase in the demand for shale oil and natural gas worldwide. Due to the availability of coal, it is unlikely to become depleted. Oil firms can introduce strategies for supplying different sources of energy, such as natural gas, coal, other fossil fuels, and biomass. Meanwhile, the diversification strategy considers the significance of natural gas and efforts to reduce energy costs. For an efficient handling of non-liquid fuels (e.g., natural gas and coal), advanced technology and other applicable technologies are necessary. In order to service firms, diversification of power energy transport systems

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requires reparation using existing gas station networks and addressing the decrease in oil demand resulting from the increase in the number of electric vehicles that are currently available, such as Tesla. The majority of the transportation energy systems use petroleum fuel. Moreover, electric energy is expected to be the better option concerning to energy efficiency and air pollution. Electrical storage is an important technology in transport energy conversion. The large amount of power consumption by electric charging stations necessitates a large power storage system. As a result, oil firms must improve their technical understanding of power storage. The value of technology will increase as it can efficiently explore, develop, and convert oil and hydrocarbon resources into advanced energy. Firms that provide technology services must enhance their expertise by acquiring key talents. In the near future, oil firms need to invest in substitute energy businesses. Projects involving substitute energy are more important from a policy standpoint than an economic standpoint. Furthermore, these can be promoted through government policies and support. As oil prices increase and international agreement to combat climate change grows, so does the focus on substitute energy. As the market continues to decline and the economic crisis worsens, advanced countries are also pursuing restructuring of the industry. Oil firms are willing to improve their capabilities in the harnessing of substitute energy. A substitute energy business model includes technologies and facilities supplied by technology providers via core technologies and substitute energy facilities handled by operators. From an operator's standpoint, oil firms should be investing in solar and wind power facilities. In addition, the role of corporate suppliers is considered important as they are the providers of core technologies related to biofuels. Venture funds can be used to invest in technologies having future growth capabilities. Oil firms can access the operating sector of oil refining facilities and sell products directly produced offshore by securing a supply chain of firms. Diversification of a refining facility operation project is a viable strategy upon the establishment of the capital and initiatives. Operating refining facilities can help solve the issue of financing for diversification strategies experienced by oil firms. Oil firms need to fortify their businesses by utilizing technology services such as discovery, mining, development, and sales of oil resources to state-owned firms. It is also preferable for oil firms to act as technology suppliers to facilitate a new and substitute energy business. However, there may be a difference based on the specifics of new and substitute energy. Even though the business diversification of oil firms has been evaluated, applying this to all oil firms in a collective manner is found to be difficult. The management strategy of a firm should be reviewed in light of the situation, capability, and specificity of each company.

8. Discussion for Counterplan Research

High technology and large-scale capital goods facilities are required in the oil business. There are fundamental uncertainties involved, such as the absence of oil, and it must be promoted for an extended period. The risk of running the business is higher than that of general manufacturing because it goes through different technical processes. Oil development projects also face various risks in terms of reserves, prices, and development costs, as these are considered factors of interest to stakeholders. Due to the increasing awareness regarding the limitations of oil reserves and the importance of the environment, there is a growing need for a substitute energy for oil. The importance of substitute energy development becomes clear, as well as the concept of sustainable development, keeping the environment in mind. Therefore, oil firms should establish management strategies that are in line with global trends. The concept of sustainable development focuses on harmonizing economic development and environmental protection without compromising the environment. Resource development should be assessed to ensure that it does not impede development. Overproduction and overconsumption are the root causes of the wide development and environmental

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disparities; therefore, economic patterns must be changed. It is also necessary to respond to global environmental issues. Regulations affecting development are followed, and cooperation with related organizations is necessary. The national economy should be included in the government's policy support plan for oil firms. Securing economic energy resources will aid in the support of energy projects as well as the discovery of new national economic growth engines. Instead of directly participating in projects, the government's support policy should focus on infrastructure, such as securing manpower and R&D. Oil firms should maintain their competitiveness by enhancing investment efficiency according to the current status of the oil market and the strategies established by the firm. In addition, they need to secure technology and increase investment and profits to improve management efficiency.

9. Conclusions and Research Limitations

In this study, the response strategies of oil firms were shown in terms of substitute energy supply and development expansion. Consumption of energy resources has increased significantly, along with income, mass production, and consumption, due to the advancement in science and technology. For this reason, more energy resources are deemed necessary. In addition, there is a constant need for securing and developing resources resulting from economic growth and resource depletion. Environmental pollution caused by energy resources is also becoming a major concern. Policies and activities regarding the supply and development of substitute energy are actively promoted worldwide to create an eco-friendly environment. The value creation of an oil firm focuses on increasing the net profit by exploring, developing, purchasing assets, and investing in oil. In light of the global trends and changes in the energy market, oil firms need to establish new management strategies and re-establish their roles. Due to the number of variables involved, the oil business is currently difficult to predict. As a result, oil firms need to establish a new management strategy, as well as redefine and diversify their business portfolio. When dealing with global trends and changes in the energy market, efficiency and competitiveness must be increased by the oil market situation and management strategies established by the oil firms. In this study, we looked into the establishment of effective management strategies that oil firms can use for substitute energy supply and development expansion. The research limitations in this study are as follows. There was difficulty in establishing a management strategy for oil firms and substitute energy, and future predictions for the energy market. Due to the prolonged COVID-19 pandemic, oil firms are having a difficult time establishing management strategies. It is also important to forecast prospects for substitute energy. In future studies, we will conduct further research on the matters discussed in the research limitations.

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